

NOTICE TO BIDDERS

Please be advised that by viewing, downloading or printing bid documents from any plan room or website, you assume all risks, errors and omissions that may result in your not having the latest drawings, modifications or addenda that a prime bidder would receive directly if they were listed on the official bidders list.

All general contractors and subcontractors should obtain plan sets directly from Ladd Environmental.

**CONTRACT DOCUMENTS AND SPECIFICATIONS
FOR
CONTRACT NO. 5 – UPGRADES TO FORT PAYNE
WASTEWATER TREATMENT PLANT
FOR
THE CITY OF FORT PAYNE**

Financed by:

**ALABAMA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
CLEAN WATER STATE REVOLING FUND (CWSRF) PROGRAM
CWSRF PROJECT NO. CS010396-07**

Prepared for:

**THE CITY OF FORT PAYNE
100 Alabama Avenue, N.W.
Fort Payne, AL 35967-2052**

Prepared by:

**LADD ENVIRONMENTAL CONSULTANTS, INC.
P. O. Box 680869
Fort Payne, AL 35968-1609**



Providing Engineering Solutions

OCTOBER 2023



ADDENDUM NO. 1
FOR
CONTRACT NO. 5 – UPGRADES TO FORT PAYNE WASTEWATER TREATMENT PLANT
FOR
THE CITY OF FORT PAYNE
CWSRF PROJECT NO. CS010396-07

APRIL 19, 2024

TO: ALL PLAN HOLDERS AND INTERESTED PARTIES

SUBJECT: Plans, Specifications, and Contract Documents are hereby amended, modified, and changed as follows:

I. Reference Part VI – Technical Specifications. Add the following Technical Specifications:

- A. Section 01650 – Starting of Systems
- B. Section 02223 – Backfilling.
- C. Section 02225 – Trenching, Bedding and Backfilling
- D. Section 02733 – Wastewater Pressure Piping, Valves and Accessories
- E. Section 11320 – Progressive Cavity Wastewater and Sludge Pumps
- F. Section 11363 – Polymer Feed Unit
- G. Section 15010 – Basic Mechanical Requirements

II. Reference Plans

- A. Replace Sheet No. 6, 11, E-1, E-2, E-3 and E-4 with attached marked Addendum No. 1.

III. Reference Attachment “A”

- A. Add the “Existing Polybend Model 1200-P4AB Data to Attachment “A”.

THIS ADDENDUM ISSUED THIS 19TH DAY OF APRIL 2024.

LADD ENVIRONMENTAL CONSULTANTS, INC.

William Evans Morgan

 Evan Morgan, P.E.



TABLE OF CONTENTS

| NUMBER | TITLE | PAGE NUMBERS |
|----------|---|---|
| PART I | Advertisement for Bid Information for Bidders | I-1 – 2 I-3 - I-6 |
| PART II | Bid Explanation of Bid Form Bid Bond Certification Regarding Debarment, Suspension and Other Responsibility Matters Certification by Proposed Prime or Subcontractor Regarding Equal Employment Opportunity Debarred Firms Requirements Debarred Firms Certification | II-1 - II-2 II-3 II-4 II-5 II-6 II-7 II-8 |
| PART III | Agreement Bond and Insurance Payment Bond Performance Bond Contractor's Certification of Insurance Certificate of Compliance with the Beason-Hammon Alabama Taxpayer and Citizen Protection Act Contractor's E-Verify MOU Notice of Award Notice to Proceed Change Order Certificate of Owner's Attorney | III-1 - III-3 III-4 III-5 - III-6 III-7 - III-8 III-9 III-10 III-11 III-12 III-13 III-14 III-15 |
| PART IV | Supplemental General Conditions General Conditions | IV-1 - IV-43 IV-44 - IV-56 |
| PART V | Special Conditions | V-1 - V-16 |



**PART VI – TECHNICAL SPECIFICATIONS
(CONTINUED)**

| NUMBER | TITLE | PAGE NUMBERS |
|---|--|--------------------|
| <u>DIVISION NO. 1 - GENERAL REQUIREMENTS</u> | | |
| 01010 | Summary of Work | 01010-1 – 01010-2 |
| 01011 | Summary of Project | 01011-1 – 01011-2 |
| 01019 | Contract Considerations | 01019-1 – 01019-3 |
| 01039 | Coordination and Meetings | 01039-1 – 01039-5 |
| 01300 | Submittals | 01300-1 – 01300-4 |
| 01400 | Quality Control | 01400-1 – 01400-4 |
| 01500 | Construction Facilities and Temporary Controls | 01500-1 – 01500-6 |
| 01600 | Material and Equipment | 01600-1 – 01600-3 |
| 01650 | Starting of Systems | 01650-1 – 01650-2 |
| 01700 | Contract Closeout | 01700-1 – 01700-3 |
| <u>DIVISION NO. 2 – SITEWORK</u> | | |
| 02060 | Structure Demolition | 02060-1 – 02060-3 |
| 02222 | Excavation | 02222-1 – 02222-2 |
| 02223 | Backfilling | 02223-1 – 02223-4 |
| 02225 | Trenching, Bedding and Backfilling | 02225-1 – 02225-6 |
| 02281 | Termite Control | 02281-1 – 02281-4 |
| 02662 | Plant Water Piping, Valves and Related Items | 02662-1 – 02662-9 |
| 02675 | Disinfection of Water Distribution Systems | 02675-1 – 02675-5 |
| 02733 | Wastewater Pressure Piping, Valves and Accessories | 02733-1 – 02733-9 |
| 02923 | Landscape Grading | 02923-1 |
| <u>DIVISION NO. 3 - CONCRETE</u> | | |
| 03100 | Concrete Formwork | 03100-1 – 03100-5 |
| 03300 | Cast-In-Place Concrete | 03300-1 – 03300-10 |
| 03370 | Concrete Curing | 03370-1 – 03370-2 |
| <u>DIVISION NO. 4 – MASONRY</u> | | |
| 04100 | Mortar and Grout | 04100-1 – 04100-3 |
| 04300 | Unity Masonry System | 04300-1 – 04300-8 |
| <u>DIVISION NO. 6 – WOOD AND PLASTIC</u> | | |
| 06112 | Framing and Sheathing | 06112-1 – 06112-5 |
| 06125 | Wood Decking | 06125-1 – 06125-2 |
| 06193 | Plate Connected to Wood Trusses | 06193-1 – 06193-3 |



TABLE OF CONTENTS
PART VI – TECHNICAL SPECIFICATIONS
 (CONTINUED)

| NUMBER | TITLE | PAGE NUMBERS |
|--|---|--------------------|
| <u>DIVISION NO. 7 – THERMAL AND MOISTURE PROTECTION</u> | | |
| 07210 | Spray Polyurethane Foam Insulation | 07210-1 – 07210-4 |
| 07611 | Standing Seam Metal Roof | 07611-1 – 07611-7 |
| 07620 | Sheet Metal, Flashing and Trim | 07620-1 – 07620-4 |
| 07631 | Gutters and Downspouts | 07631-1 – 07631-4 |
| 07720 | Continuous Ridge Vents and Soffit-Louver Strips | 07720-1 – 07720-2 |
| 07920 | Joint Sealants | 07920-1 – 07920-4 |
| <u>DIVISION NO. 8 – DOORS AND WINDOWS</u> | | |
| 08111 | Standard Steel Doors | 08111-1 – 08111-4 |
| 08112 | Standard Steel Frames | 08112-1 – 08112-3 |
| 08113 | Weatherstripping | 08113-1 – 08113-3 |
| 08332 | Overhead Coiling Doors (Steel) | 08332-1 – 08332-5 |
| 08710 | Door Hardware | 08710-1 – 08710-6 |
| <u>DIVISION NO. 9 – FINISHES</u> | | |
| 09820 | Acrylic Emulsion Textured Coating and Cementitious-Base Waterproof Coating for Concrete | 09820-1 – 09820-4 |
| 09900 | Painting | 09900-1 – 09900-15 |
| <u>DIVISION NO. 11 – EQUIPMENT</u> | | |
| 11320 | Progressive Cavity Wastewater and Sludge Pumps | 11320-1 – 11320-7 |
| 11326 | Submersible Effluent Pump (Packaged System) | 11326-1 – 11326-9 |
| 11353 | Chemical Metering Pumps | 11353-1 – 11353-11 |
| 11363 | Polymer Feed Unit | 11363-1 – 11363-8 |
| 13206 | High Density Linear Polyethylene (HDLPE) Liquid Chemical Double Wall Storage Tanks and Related Items | 13206-1 – 13206-12 |
| <u>DIVISION NO. 15 – MECHANICAL</u> | | |
| 15010 | Basic Mechanical Requirements | 15010-1 – 15010-2 |
| 15410 | Plumbing Piping | 15410-1 – 15410-13 |



PART VI – TECHNICAL SPECIFICATIONS
(CONTINUED)

| NUMBER | TITLE | PAGE NUMBERS |
|--|-----------------------------------|-------------------|
| <u>DIVISION NO. 16 – ELECTRICAL</u> | | |
| 16010 | Electrical-General Provisions | 16010-1 - 16010-4 |
| 16011 | Electrical-Scope of Work | 16011-1 - 16011-4 |
| 16012 | Demolition – Electrical | 16012-1 - 16012-2 |
| 16100 | Basic Materials and Methods | 16100-1 |
| 16110 | Raceways - Metal | 16110-1 - 16110-4 |
| 16111 | Raceways – Non-Metallic | 16111-1 - 16111-2 |
| 16120 | Conductors | 16120-1 - 16120-4 |
| 16130 | Outlet, Junction and Pull Boxes | 16130-1 - 16130-3 |
| 16140 | Wiring Devices | 16140-1 - 16140-2 |
| 16170 | Safety Switches | 16170-1 - 16170-2 |
| 16181 | Fuses | 16181-1 |
| 16450 | Grounding | 16450-1 - 16450-3 |
| 16459 | Dry Type Transformers | 16459-1 - 16459-2 |
| 16461 | Panelboards – Lighting/Receptacle | 16461-1 - 16461-4 |



TABLE OF CONTENTS
ATTACHMENTS

| NUMBER | TITLE | PAGE NUMBERS |
|--------|---|--------------|
| A | Existing Polyblend Model 1200-P4AB Data | A-1 – A-49 |



PART I

**ADVERTISEMENT FOR BID
INFORMATION FOR BIDDERS**

ADVERTISEMENT FOR BIDS

CITY OF FORT PAYNE
100 Alabama Avenue, N.W.
Fort Payne, AL 35967-2052

Separate sealed BIDS for the construction of (briefly describe nature, scope, and major elements of the work): **Contract No. 5 - Upgrades to Fort Payne Wastewater Treatment Plant, CWSRF Project No. CS010396-07, including Liquid Bleach Feed System (Building, Chemical Tank, Feed Equipment), Polymer System Upgrade and Sludge Pump Replacement and related items**

will be received by: **City of Fort Payne**
at the office(s) of: **100 Alabama Avenue, N.W.**
Fort Payne, AL 35967-2052
until: **2:00 o'clock PM CDT**
Thursday, May 30, 2024, and then at said office publicly opened and read aloud.

The CONTRACT DOCUMENTS may be examined at the following locations:

City of Fort Payne, Fort Payne, AL
Ladd Environmental Consultants, Inc., Fort Payne, AL
Construct Connect Plan Room, 1-800-364-2059
Dodge Data & Analytics Plan Room
The Blue Book Plan Room

Copies of the CONTRACT DOCUMENTS may be obtained at the office of **Ladd Environmental Consultants, Inc.**, located at **1207 Chitwood Avenue, SE, Fort Payne, AL 35967-4822, (P. O. Box 680869, Zip Code: 35968-1609)**, upon payment of a plan deposit of **\$175.00** for each set.

Prime contractor bidders will be refunded 100% of the plan deposit for one set returned to the Engineer, in reusable condition, within 10 days after the bid opening. Additional sets obtained shall be refunded 50% of the plan deposit.

All non-bidders, subcontractors, vendors or dealers shall be refunded 50% of the plan deposit for each set returned to the Engineer, in reusable condition, within 10 days after the bid opening.

The plan deposit amount as indicated above is in accordance with Alabama Act No. 97-225, (Title 39, Code of Alabama, 1975, As Amended), relating to the competitive bid laws for public works.

All Bidders must comply with the requirements of the State Licensing Board for General Contractors (Latest Edition) and with the Alabama Act No. 97-225 (Title 39, Code of Alabama, 1975 as Amended) relating to competitive bid laws for public works.

All Bidders must be properly licensed in accordance with the requirements of the State Licensing Board for General Contractors (Chapter 8, Title 34, Code of Alabama, 1975 or latest).

Any contract or contracts awarded under this invitation for bids are expected to be funded by a loan from the State Revolving Fund from the Alabama Water Pollution Control Authority, administered by the Alabama Department of Environmental Management. Neither the State of Alabama, nor any of its departments, agencies, or employees is or will be a party to this invitation for bids or any resulting contract. This procurement will be subject to regulations contained in the laws of the State of Alabama and as applicable.

A Pre-Bid Conference will be held at the office of the City of Fort Payne, City Hall, 100 Alabama Avenue, NW, Fort Payne, AL 35967 at 2:00 o'clock P.M., CDT, Tuesday, May 21, 2024. All prospective bidders and other interested parties are requested to attend. The Pre-Bid Conference is **NOT** mandatory, but is strongly encouraged. Minutes of the meeting will be prepared and issued to all plan holders.

April 24, 2024
Date

CITY OF FORT PAYNE
Brian Baine, Mayor

The Times Journal

April 27, 2024

INFORMATION FOR BIDDERS

BIDS will be received by the **CITY OF FORT PAYNE** herein called the "OWNER", at **City of Fort Payne, City Hall, 100 Alabama Avenue, NW, Fort Payne, AL 35967 at 2:00 o'clock P.M., CDT, Thursday, May 30, 2024**, and then at said office publicly opened and read aloud.

Each BID must be submitted in a sealed envelope, addressed to the **City of Fort Payne, 100 Alabama Avenue, NW, Fort Payne, AL 35967**. Each sealed envelope containing a BID must be plainly marked on the outside as BID for "**Contract No. 5 – Upgrades to the Fort Payne Wastewater Treatment Plant – CWSRF Project No. CS010396-07**" and the envelope should bear on the outside the name of the BIDDER, his address, his license number and the name of the project for which the BID is submitted. If forwarded by mail, the sealed envelope containing the BID must be enclosed in another envelope addressed to the OWNER a **100 Alabama Avenue, NW, Fort Payne, AL 35967**

BIDDERS must meet the requirements of the Alabama State Law Regarding General Contractors (Chapter 8, Title 34, Code of Alabama, 1975, as amended by the most current amendment) including both Contractors who are resident and nonresident of the State of Alabama.

BIDDERS must be properly licensed with the Alabama State Licensing Board for General Contractors within the proper classification for the project being BID, as required by the Code of Alabama as indicated above.

BIDDERS must include their license number on the outside of the sealed envelope containing the BID, as well as on the BID PROPOSAL FORM. Any BID received which does not contain the license number on the outside of the sealed envelope will not be considered by the OWNER and will be returned unopened to the BIDDER.

Any BID submitted which contains the license number on the outside of the sealed envelope will be taken as prima facia evidence that the BIDDER is in fact a duly licensed general contractor, with a valid unexpired license, in the classification required for this project, and in good standing with the Alabama Licensing Board for General Contractors. If it is subsequently discovered, after the Bid Opening, that the BIDDER has misrepresented this fact to the OWNER, then the BID will be disqualified and the State Licensing Board so notified.

All BIDS must be made on the required BID form. All blank spaces for BID prices must be filled in, in ink or typewritten, and the BID form must be completed and executed when submitted. Only one copy of the BID form is required.

The BIDDER is advised not to remove the BID DOCUMENTS from this bound volume of Contract Documents and Specifications for submission as a BID. The entire bound Contract Documents and Specifications volume (including Part I, II, III, IV and V) shall be submitted at the BID Opening intact with no pages removed. The BIDDER is further advised to ensure that all required forms and certificates have been completed and executed as required by the BID Documents. Deviation by the BIDDER from this procedure as outlined herein may be considered by the OWNER as nonresponsive (See Special Conditions).

The OWNER may waive any informalities or minor defects. The OWNER reserves the right to reject for good cause, 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. No BIDDER may withdraw a BID within 60 days after the actual date of the opening thereof. Should there be reasons why the contract cannot be awarded within the specified period, the time may be extended by mutual agreement between the OWNER and the BIDDER.

BIDDERS must satisfy themselves of the accuracy of the estimated quantities in the BID Schedule by examination of the site and a review of the drawings and specifications including ADDENDA. After BIDS have been submitted, the BIDDER shall not assert that there was a misunderstanding concerning the quantities of WORK or of the nature of the WORK to be done.

If any person contemplating the submission of a BID for the proposed contract is in doubt as to the true meaning of any part of the plans, specifications or other proposed contract documents, he should submit a written request for an interpretation thereof to:

Ladd Environmental Consultants, Inc.
P. O. Box 680869
Fort Payne, AL 35968-1609

The request must be received at least ten days prior to the date fixed for the opening of BIDS. Any interpretation of the contract documents will be made by ADDENDA duly issued to each person receiving a set of such documents not later than six days prior to the time of opening of BIDS. The OWNER will not be responsible for explanations or interpretations of proposed documents, except as issued in accordance herewith.

The OWNER shall provide to BIDDERS prior to BIDDING, all information which is pertinent to, and delineates and describes, the land owned and rights-of-way acquired or to be acquired.

The CONTRACT DOCUMENTS contain the provisions required for the construction of the PROJECT. Information obtained from an officer, agent, or employee of the OWNER or any other person shall not affect the risks or obligations assumed by the CONTRACTOR or relieve him from fulfilling any of the conditions of the contract.

Each BID must be accompanied by a BID BOND payable to the OWNER for five percent of the total amount of the BID not to exceed \$10,000. As soon as the BID prices have been compared, the OWNER will return the BONDS of all except the three lowest responsible BIDDERS. When the Agreement is executed the BONDS of the two remaining unsuccessful BIDDERS will be returned. The BID BOND of the successful BIDDER will be retained until the payment BOND and performance BOND have been executed and approved, after which it will be returned. A certified check may be used in lieu of a BID BOND.

A PERFORMANCE BOND in the amount of 100 percent of the CONTRACT PRICE and a PAYMENT BOND in the amount of 100 percent of the CONTRACT AMOUNT authorized to transact business in the State of Alabama, and approved by the OWNER, will be required for the faithful performance of the contract.

Attorneys-in-fact who sign BID BONDS or Payment BONDS and Performance BONDS must file with each BOND a certified and effective dated copy of their Power of Attorney.

The party to whom the contract is awarded will be required to execute the Agreement and obtain the performance BOND within ten (10) calendar days from the date when NOTICE OF AWARD is delivered to the BIDDER. The NOTICE OF AWARD shall be accompanied by the necessary Agreement and BOND forms. In case of failure of the BIDDER to execute the Agreement, the OWNER may at his option consult the BIDDER in default, in which case the BID BOND accompanying the proposal shall become the property of the OWNER.

The OWNER, within ten (10) working days, or fifteen (15) calendar days of receipt of acceptable performance BOND, payment BOND and Agreement signed by the party to whom the Agreement was awarded shall sign the Agreement and return to such party an executed duplicate of the Agreement. Should the OWNER not execute the Agreement within such period, the BIDDER may by WRITTEN NOTICE withdraw his signed Agreement. Such notice of withdrawal shall be effective upon receipt of the notice by the OWNER.

The NOTICE TO PROCEED shall be issued within ten (10) working days or fifteen (15) calendar days of the execution of the Agreement by the OWNER. Should there be reasons why the NOTICE TO PROCEED cannot be issued within such period, the time may be extended by mutual agreement between the OWNER and CONTRACTOR. If the NOTICE TO PROCEED has not been issued within the fifteen (15) calendar or ten (10) working day period or within the period mutually agreed upon, the CONTRACTOR may terminate the Agreement without further liability on the part of either party.

The OWNER may make such investigations as he 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 Agreement and to complete the WORK contemplated therein.

A conditional or qualified BID will not be accepted.

Award will be made to the lowest responsible, responsive BIDDER, of the BID SCHEDULE selected by the OWNER (See PART V, SPECIAL CONDITIONS).

All applicable Laws, ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the PROJECT shall apply to the contract throughout.

Alabama Act No. 97-225 (Title 39, Code of Alabama, 1975, As Amended) relating to competitive bid laws for Public Works shall apply to the BID DOCUMENTS for this PROJECT.

Each BIDDER is responsible for inspecting the site and for reading and being thoroughly familiar with the CONTRACT DOCUMENTS. The failure or omission of any BIDDER to do any of the foregoing shall in no way relieve any BIDDER from any obligation in respect to his BID.

Further, the BIDDER agrees to abide by the requirements under Executive Order No. 11246, as amended, including specifically the provisions of the equal opportunity clause set forth in the SUPPLEMENTAL GENERAL CONDITIONS, if applicable.

The CONTRACTOR's State license number shall be provided as required by the State Law of Alabama.

Any BIDDER may modify his/her BID by e-mail, telephonic facsimile (FAX) or written on the exterior of the bid envelope at any time prior to the scheduled closing time for receipt of BIDS, provided such is received by the OWNER prior to the closing time, and provided further, that the OWNER has verified prior to the BID OPENING, by telephone or in person communication with the BIDDER, that the e-mail, FAX or printed bid envelope modification is valid and the indicated modification to the BID is correct, and is the intent of the BIDDER.

The e-mail, FAX or written bid envelope modification should not reveal the BID PRICE but should provide the addition, subtraction or other modification to the TOTAL BASE BID amount so that the final total BID PRICE or terms will not be known by the OWNER until the sealed BID is opened. If the BID contains multiple bid items, the modification should provide the addition or subtraction to a stated specific bid item and should state whether the addition or subtraction is for the UNIT PRICE or the TOTAL for that bid item. If the addition or subtraction amount is not applied to a specific bid item, it will be added or subtracted proportionally among all bid items based on the TOTAL BID PRICE.

BID FORMS or BID BONDS submitted by FAX or e-mail are not acceptable.

The OWNER reserves the right to request from the BIDDER written confirmation of the BID modification to be included in the executed CONTRACT DOCUMENTS.

The ENGINEER is: **Ladd Environmental Consultants, Inc.**

His address is: **P. O. Box 680869, Fort Payne, AL 35968-1609**

[2244.5]
[9/00]

PART II

BID

BID BOND

**CERTIFICATION REGARDING DEBARMENT, SUSPENSION AND OTHER
RESPONSIBILITY MATTERS**

**ATTACHMENT 4
CERTIFICATION BY PROPOSED PRIME OR SUBCONTRACTOR REGARDING
EQUAL EMPLOYMENT OPPORUNITY**

**ATTACHMENT 6
DEBARRED FIRMS**

DEBARRED FIRMS CERTIFICATION

BID

Proposal of _____ (hereinafter called "BIDDER"), organized and existing under the Laws of the State of _____ doing business as ¹ _____. To the **CITY OF FORT PAYNE** (hereinafter called "OWNER").

In compliance with your Advertisement for BIDS, BIDDER hereby proposes to perform all WORK for the construction of **Contract No. 5 – Upgrades to Fort Payne Wastewater Treatment Plant, CWSRF Project No. CS010396-07** in strict accordance with the CONTRACT DOCUMENTS, within the time set forth therein, and at the prices stated herein.

By permission of this BID, each BIDDER certifies, and in the case of a joint BID each party thereto certifies as to his own organization, that this BID has been arrived at independently, without consultation, communication, or agreement as to any matter relating to this BID with any other BIDDER or with any competitor.

BIDDER hereby agrees to commence WORK under this contract on or before a date to be specified in the NOTICE TO PROCEED and to fully complete the PROJECT within **180 consecutive calendar days** thereafter, BIDDER further agrees to pay as liquidated damages in the amount stated in the Special Conditions for each consecutive calendar day thereafter as provided in Section 15.9 of the General Conditions.

BIDDER acknowledges receipt of the following ADDENDUM:

¹ Insert "a corporation", "a partnership", or "an individual" as applicable.

BIDDER agrees to perform all the work described in the Drawings, Bid Documents and Specifications for the following unit prices or lump sum. **NOTE:** BIDS shall include sales tax and all other applicable taxes and fees. (PART II, for explanation of Bid Items.)

BID SCHEDULE

| ITEM | DESCRIPTION | TOTAL BID |
|------|-------------------------------------|-----------|
| 1. | Wastewater Treatment Plant Upgrades | \$ |

Respectfully submitted:

Company Name

Mailing Address

Signature

City State

Title

Street Address

License No. Date

City State

Phone No. FAX No.

E-Mail Address

(If BID by a Corporation)

[SEAL]

[2244]

EXPLANATION OF BID FORM

- A. Bidders shall provide all labor, equipment, and materials including sales tax and applicable taxes and fees as required for a total, complete, and workable facility meeting the intent of the Drawings and Specifications.
- B. **Rock Removal:** The Contractor is advised that **NO ADDITIONAL PAY** will be made for any rock removal for any excavation or trenching required for the work. The Contractor shall provide the total excavation/trenching cost, including any rock removal and disposal costs in the bid price.
- C. **Surface Replacement:** Unless indicated otherwise, the Contractor is advised that **NO ADDITIONAL PAY** will be made for any surface replacement (pavement, concrete, grass, etc.) required for the Work. The Contractor shall provide the cost of any required surface replacement in the unit price for pipe installation as applicable, except where surface replacement is included as a separate Bid Item.
- D. Unit prices as established in the various contracts and bid schedules shall cover and be divided as indicated.
- E. **It is the intent of the Owner to award this project upon receipt of bids to the lowest responsible bidder. The successful Contractor must begin work within 14 calendar days of issuance of the Notice to Proceed, unless a different date is agreed to by both the Owner and Contractor.**
- F. Bid Schedule
1. Bid Item No. 1 – Wastewater Treatment Plant Upgrades
 - a. Complete labor, material and equipment required for the Wastewater Treatment Plant Upgrades including, but not limited to, excavation, bedding, backfill, concrete, piping, valves, fittings, connections, electrical, piping, building, chemical tanks, chemical pumps, package lift station, sludge pumps, polymer system, sitework, mobilization, testing, erosion control, fencing, start-up, clean-up, O & M Manual and all related items for a complete lift station modifications meeting the intent of the Contract Documents.
 - b. Basis of payment shall be lump sum for a complete installation.
- G. Stated Allowance
1. All costs associated with the SCADA modification, including (but not limited to) coordination with the system integrator, system hardware upgrades necessary for the alterations and additions, PLC configuration and HMI configuration shall be included in the Contractor's bid.
 2. Contractor's price shall include an allowance of \$10,000 dollars, before overhead and markup, for alterations and additions to the existing plant SCADA system to be performed by Revere Control Systems of Birmingham, AL.
 3. System integrator shall modify the existing wonderware/in-touch HMI System to provide annunciation, control input, alarms and reporting for the new input/output points. Chemical pumps shall be paced based on plant effluent flow and the operator's inputs, in the HMI, for concentration setting of the chemicals. Reporting shall include standard status, runtime and alarm reporting as well as flow totalization for each chemical system.

BID BOND

KNOW ALL MEN BY THESE PRESENT: That we, the undersigned, _____
_____ as Principal, and _____ as Sure-
ty, are hereby held and firmly bound unto the **CITY OF FORT PAYNE** as OWNER in the penal sum of **5% of total amount of bid (maximum \$10,000)** for payment of which, well and truly to be made, we hereby jointly and severally bind ourselves, successors and assigns. Signed, this _____ day of _____, 20_____.

The Condition of the above obligation is such that whereas the Principal has submitted to the **CITY OF FORT PAYNE** a certain BID, attached hereto and hereby made a part hereof to enter into a contract in writing, for **Contract No. 5 – Upgrades to Fort Payne Wastewater Treatment Plant, CWSRF Project No. CS010396-07.**

NOW, THEREFORE,

- (a) If said BID shall be rejected, or
- (b) If said BID shall be accepted and the Principal shall execute and deliver a contract in the Form of Contract attached hereto (properly completed in accordance with said BID) and shall furnish a BOND for his faithful performance of said contract, and for the payment of all persons performing labor or furnishing materials in connection therewith, and shall in all other respects perform the agreement created by the acceptance of said BID,

then this obligation shall be void, otherwise the same shall remain in force and effect; it being expressly understood and agreed that the liability of the Surety for all and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated. The Surety, for value received, hereby stipulates and agrees that the obligations of said Surety and its Bond shall be in no way impaired or affected by any extension of the time within which the OWNER may accept such BID; and said Surety does hereby waive notice of any such extension.

IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set forth above.

_____(L.S.)
Principal

Surety

By: _____

IMPORTANT - Surety companies executing BONDS must be authorized to transact business in the State of Alabama.

ATTACHMENT 4

CERTIFICATION BY PROPOSED PRIME OR SUBCONTRACTOR

REGARDING EQUAL EMPLOYMENT OPPORTUNITY

CS010396-07

Name of Prime Contractor _____

SRF Project No. _____

INSTRUCTIONS

This certification is required pursuant to Executive Order 11246, Part II, Section 203 (b), (30 F.R. 12319-25). Any bidder or prospective contractor, or any of their proposed subcontractors, shall state as an initial part of the bid or negotiations of the contract whether it has participated in any previous contract or subcontract subject to the equal opportunity clause; and, if so, whether it has filed all compliance reports due under applicable instructions.

Where the certification indicated that the prime or subcontractor has not filed a compliance report due under applicable instruction, such contractor shall be required to submit a compliance report.

CONTRACTOR'S CERTIFICATION

Contractor's Name: _____

Address: _____

1. Bidder has participated in a previous contract or subcontract subject to the Equal Opportunity Clause.

YES NO

2. Compliance Reports were required to be filed in connection with such contract or subcontract.

YES NO

If YES, state what reports were filed and with what agency:

3. Bidder has filed all compliance reports due under applicable instructions, including SF-100 (also known as EEO-1).

4. If answer to item 3 is NO, please explain in detail on reverse side of this certification.

Certification: The information above is true and complete to the best of my knowledge and belief. (A willfully false statement is punishable by law - U.S. Code, Title 18, Section 1001.)

NAME AND TITLE OF SIGNER (PLEASE TYPE)

Signature

Date

EPA-R4-0017(5-73)

ATTACHMENT 6

DEBARRED FIRMS

All prime construction contractors shall certify that Subcontracts have not and will not be awarded to any firm that is currently on the General Service Administration's Master List of Debarred, Suspended and Voluntarily Excluded Persons in accordance with the provisions of ADEM Administrative Code 335-6-14-.35. Debarment action is taken against a firm for noncompliance with Federal Law.

All bidders shall complete the attached certification in duplicate and submit both copies to the Owner with the Bid Proposal. The Owner shall transmit one copy to ADEM within 14 days after the bid opening.

DEBARRED FIRMS CERTIFICATION

Contract No. 1

SRF Project No. CS010396-07

The undersigned hereby certifies that the firm of _____
_____ has not and will not award a subcontract, in connection with any contract awarded to it as the result of this bid, to any firm that is currently on the General Service Administration's Master List of Debarred, Suspended, and Voluntarily Excluded Persons.

Name of Firm Submitting Bid

Signature of Authorized Official

Title

Date

[2244]
[11/97]

PART III

AGREEMENT

BONDS AND INSURANCE

PAYMENT BOND

PERFORMANCE BOND

CONTRACTOR'S CERTIFICATION OF INSURANCE

**CERTIFICATE OF COMPLIANCE WITH THE BEASON-HAMMON ALABAMA
TAXPAYER AND CITIZEN PROTECTION ACT**

CONTRACTOR'S E-VERIFY (MOU)

NOTICE OF AWARD

NOTICE TO PROCEED

CONTRACT CHANGE ORDER

CERTIFICATION OF OWNER'S ATTORNEY

AGREEMENT

THIS AGREEMENT, made this _____ day of _____, 20____, by and between the **City of Fort Payne** hereinafter called "OWNER" and _____ doing business as a _____ (Corporation, Partnership, Individual) hereinafter called "CONTRACTOR".

WITNESSETH: That for and in consideration of the payments and agreements hereinafter mentioned:

1. The CONTRACTOR will commence and complete the construction of **Contract No. 5 – Upgrades to Fort Payne Wastewater Treatment Plant, CWSRF Project No. CS010396-07.**

2. The CONTRACTOR will furnish all of the material, supplies, tools, equipment, labor and other services necessary for the construction and completion of the PROJECT described herein.

3. The CONTRACTOR will commence the work required by the CONTRACT DOCUMENTS within **10** calendar days after the date of the NOTICE TO PROCEED and will complete the same within **180 consecutive calendar days** unless the period for completion is extended otherwise by the CONTRACT DOCUMENTS.

4. The CONTRACTOR agrees to perform all of the WORK described in the CONTRACT DOCUMENTS and comply with the terms therein for the sum of \$ _____, or as shown in the BIDS schedule.

5. The term "CONTRACT DOCUMENTS" means and includes the following:

- (A) Advertisement for BIDS
- (B) Information for BIDDERS
- (C) BID
- (D) BID BOND
- (E) Debarment Certification
- (F) Agreement
- (G) General Conditions
- (H) SUPPLEMENTAL GENERAL CONDITIONS (SRF GENERAL CONDITIONS)
- (I) SPECIAL CONDITIONS
- (J) Technical Specifications
- (K) Payment BOND
- (L) Performance BOND
- (M) NOTICE OF AWARD
- (N) NOTICE TO PROCEED
- (O) CHANGE ORDER

- (P) DRAWINGS prepared by **Ladd Environmental Consultants, Inc.** dated **June 2023**.
- (Q) SPECIFICATIONS prepared or issued by **Ladd Environmental Consultants, Inc.**, dated **June 2023**.
- (R) ADDENDA

No. _____, dated _____, 20__

No. _____, dated _____, 20__

No. _____, dated _____, 20__

6. The OWNER will pay to the CONTRACTOR in the manner and at such times as set forth in the General Conditions such amounts as required by the CONTRACT DOCUMENTS.

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

8. The Owner does hereby certify that this Contract was let in accordance with the provisions of Alabama Act No. 97-225 (Title 39, Code of Alabama, 1975, As Amended), and all other applicable provisions of law.

9. Beason-Hammon Certification. By signing this contract, grant, or other agreement, the contracting parties affirm, for the duration of the agreement, that they will not violate federal immigration law or knowingly employ, hire for employment, or continue to employ an unauthorized alien within the State of Alabama. Furthermore, a contracting party found to be in violation of this provision shall be deemed in breach of the agreement and shall be responsible for all damages resulting therefrom.

10. Boycott Certificate. CONTRACTOR certifies that it is not currently engaged in, and will not engage in, the boycott of a person or an entity based in or doing business with a jurisdiction with which this state can enjoy open trade.

IN WITNESS WHEREOF, the parties hereto have executed, or caused to be executed by their duly authorized officials, this Agreement in **six (6)** copies, each of which shall be deemed an original on the date first above written.

OWNER: CITY OF FORT PAYNE

BY: _____
 Brian Baine, Mayor

(SEAL)

ATTEST:

Name: _____
 (Please Type)

Title: _____

CONTRACTOR NAME

Name: _____

Address: _____

(SEAL)

ATTEST:

Name: _____

(Please Type)

Title: _____

ATTACHMENT 9

BONDS AND INSURANCE

Bond requirements for contracts in excess of \$100,000 are:

1. Bid guarantee equivalent to five percent of the bid price (maximum \$10,000). The bid guarantee shall consist of a firm commitment such as a certified check or bid bond submitted with the bid.
2. Performance bond equal to 100 percent of the contract price and;
3. Payment bond equal to a minimum of 100 percent of the contract price.

Insurance requirements are contained in the General Conditions, Article 5, Page GC-10. In addition to the insurance required by Article 5, the Owner or the Contractor as appropriate, must acquire any flood insurance made available by the Federal Emergency Management Agency as required by 40 CFR 30.600 (b), if construction will take place in a flood hazard area identified by the Federal Emergency Management Agency. The Owners requirements on Flood insurance are contained in the Special Conditions Section of the Contract Documents.

See PART V, SPECIAL CONDITIONS for Owner's requirements on Public Liability and Property Damage Insurance, Commercial General Liability Insurance, Comprehensive Automobile and Vehicle Liability Insurance, Umbrella Excess Liability Insurance, Workman's Comprehensive and Employer's Liability Insurance and Builder's Risk Insurance.

PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS: that

(Name of Contractor)

(Address of Contractor)

a _____ (Corporation, Partnership, Individual), hereinafter called Principal, and

(Name of Surety)

(Address of Surety)

hereinafter called Surety, are held and firmly bound unto

**CITY OF FORT PAYNE
100 Alabama Avenue, NW, Fort Payne, AL 35967**

hereinafter called OWNER, in the penal sum of _____, (\$ _____) 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 _____, 20_____, a copy of which is hereto attached and made a part hereof for the construction of:

Contract No. 5 – Upgrades to Fort Payne Wastewater Treatment Plant CWSRF Project No. CS010396-07

NOW THEREFORE, if the Principal shall promptly make payment to all persons, firms, SUBCONTRACTORS, and corporations furnishing materials for or performing labor in the prosecution of the WORK provided for in such contract, and any authorized extension or modification thereof, including all amounts due for materials, lubricants, oil, gasoline, coal and coke, repairs on machinery, equipment and tools, consumed or used in connection with the construction of such WORK, and all insurance premiums on said WORK, and for all labor, performed in such WORK whether by SUBCONTRACTOR or otherwise, 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 to the terms of the contract or to the WORK to be performed thereunder or the SPECIFICATIONS accompanying the same shall in any wise 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 **six (6)** counterparts, each one of which shall be deemed an original, this the _____ day of _____, 20_____.

ATTEST:

CONTRACTOR

(Principal) Secretary

By: _____

(Address)

(SEAL)

Witness as to Principal

(Address)

Surety

ATTEST:

By: _____

Attorney-in-Fact

Witness as to Surety

(Address)

(Address)

NOTE: Date of **BOND** must not be prior to date of **Contract**. If **CONTRACTOR** is Partnership, all partners should execute **BOND**.

IMPORTANT: Surety companies executing **BONDS** must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the State of Alabama.

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS: that

(Name of Contractor)

(Address of Contractor)

a _____ (Corporation, Partnership, Individual), hereinafter called Principal, and

(Name of Surety)

(Address of Surety)

hereinafter called Surety, are held and firmly bound unto

**CITY OF FORT PAYNE
100 Alabama Avenue, NW, Fort Payne, AL 35967**

hereinafter called OWNER, in the penal sum of _____, (\$ _____) 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 _____, 20____, a copy of which is hereto attached and made a part hereof for the construction of:

Contract No. 5 – Upgrades to Fort Payne Wastewater Treatment Plant CWSRF Project No. CS010396-07

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 one year guaranty period, 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 to the terms of the contract or to WORK to be performed thereunder or the SPECIFICATIONS accompanying the same shall in any wise 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 **six (6)** counterparts, each one of which shall be deemed an original, this the _____ day of _____, 20_____.

ATTEST:

(Principal) Secretary

(Witness as to Principal)

(Address)

CONTRACTOR

By: _____

(Address)

(SEAL)

ATTEST:

(Surety) Secretary

(SEAL)

Witness as to Surety

(Address)

Surety

By: _____
Attorney-In-Fact

(Address)

NOTE: Date of **BOND** must not be prior to date of **Contract**. If **CONTRACTOR** is Partnership, all partners should execute **BOND**.

IMPORTANT: Surety companies executing **BONDS** must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the State of Alabama.

CONTRACTOR'S CERTIFICATION OF INSURANCE
(INSERT HERE)

State of Alabama)
County of _____)

CERTIFICATE OF COMPLIANCE WITH THE BEASON-HAMMON ALABAMA TAXPAYER AND CITIZEN PROTECTION ACT (ACT 2011-535, as amended by ACT 2012-491)

DATE: _____

RE Contract/Grant/Incentive (describe by number or subject):

Contract No. 5 – Upgrades to Fort Payne Wastewater Treatment Plant CWSRF Project No. CS010396-07 by and between _____ (Contractor/Grantee) and
City of Fort Payne (State Agency, Department or Public Entity)

The undersigned hereby certifies to the State of Alabama as follows:

1. The undersigned holds the position of _____ with the Contractor/Grantee named above, and is authorized to provide representations set out in this Certificate as the official and binding act of that entity, and has knowledge of the provisions of THE BEASON-HAMMON ALABAMA TAXPAYER AND CITIZEN PROTECTION ACT (ACT 2011-535 of the Alabama Legislature, as amended by ACT 2012-491) which is described herein as “the Act.”

2. Using the following definitions from Section 3 of the Act, select and initial either (a) or (b), below, to describe the Contractor/Grantee's business structure.

BUSINESS ENTITY. Any person or group of persons employing one or more persons performing or engaging in any activity, enterprise, profession, or occupation for gain, benefit, advantage, or livelihood, whether for profit or not for profit.

a. Self-employed individuals, business entities filing articles of incorporation, partnerships, limited partnerships, limited liability companies, foreign corporations, foreign limited partnerships, and foreign limited liability companies authorized to transact business in this state, business trusts, and any business entity that registers with the Secretary of State.

b. Any business entity that possesses a business license, permit, certificate, approval, registration, charter, or similar form of authorization issued by the state, any business entity that is exempt by law from obtaining such a business license, and any business entity that is operating unlawfully without a business license.

EMPLOYER. Any person, firm, corporation, partnership, joint stock association, agent, manager, representative, foreman, or other person having control or custody of any employment, place of employment, or of any employee, including any person or entity employing any person for hire within the State of Alabama, including a public employer. This term shall not include the occupant of a household contracting with another person to perform casual domestic labor within the household.

___ (a) The Contractor/Grantee is a business entity or employer as those terms are defined in Section 3 of the Act.

___ (b) The Contractor/Grantee is not a business entity or employer as those terms are defined in Section 3 of the Act.

3. As of the date of this Certificate, the Contractor/Grantee does not knowingly employ an unauthorized alien within the State of Alabama and hereafter it will not knowingly employ, hire for employment, or continue to employ an unauthorized alien within the State of Alabama;

4. The Contractor/Grantee is enrolled in E-Verify unless it is not eligible to enroll because of the rules of that program or other factors beyond its control.

Certified this _____ day of _____ 20____.

Name of Contractor/Grantee/Recipient

By: _____

Its _____

The above Certification was signed in my presence by the person whose name appears above, on this _____ day of _____ 20____.

WITNESS: _____

Printed Name of Witness

CONTRACTOR'S E-VERIFY (MOU)
(INSERT HERE)

NOTICE OF AWARD

To: _____

PROJECT Description: **Contract No. 5 – Upgrades to Fort Payne Wastewater Treatment Plant**
CWSRF Project No. CS010396-07

The OWNER has considered the BID submitted by you for the above described WORK in response to its Advertisement for Bids dated _____, 2024, and Information for Bidders.

You are hereby notified that your BID has been accepted for items in the amount of \$_____.

You are required by the Information for Bidders to execute the Agreement and furnish the required CONTRACTOR'S Performance BOND, Payment BOND and Certificates of Insurance within ten (10) calendar days from the date of this Notice to you.

If you fail to execute said Agreement and to furnish said BONDS within ten (10) days from the date of this Notice, said OWNER will be entitled to consider all your rights arising out of the OWNER'S acceptance of your BID as abandoned and as a forfeiture of your BID BOND. The OWNER will be entitled to such other rights as may be granted by law.

You are required to return an acknowledged copy of this NOTICE OF AWARD to the OWNER.

Dated this _____ day of _____, 20____.

OWNER: CITY OF FORT PAYNE

By: _____
Brian Baine, Mayor

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE OF AWARD is hereby acknowledged

by: _____,

this the _____ day of _____, 20____

By: _____

Title: _____

NOTICE TO PROCEED

To: _____

Date: _____
Project: Contract No. 5 – Upgrades to Fort
Payne Wastewater Treatment Plant
CWSRF Project No. CS010396-07

You are hereby notified to commence WORK in accordance with the Agreement dated _____, 20____, on or before _____, 20____, and you are to complete the WORK within **180 consecutive calendar days** thereafter.

The date of completion of all WORK is therefore _____, 20____.

CITY OF FORT PAYNE

By: _____
Brian Baine, Mayor

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE TO PROCEED is hereby acknowledged

by: _____,

this the _____ day of _____, 20____

By: _____

Title: _____

CHANGE ORDER

Order No. _____

Date: _____

Agreement Date: _____

NAME OF PROJECT: **Contract No. 5 – Upgrades to Fort Payne Wastewater Treatment Plant
CWSRF Project No. CS010396-07**

OWNER: _____ CITY OF FORT PAYNE _____

CONTRACTOR: _____

The following changes are hereby made to the CONTRACT DOCUMENTS:

Justification:

Change to CONTRACT PRICE:

Original CONTRACT PRICE: \$ _____.

Current CONTRACT PRICE adjusted by previous CHANGE ORDER \$ _____.

The CONTRACT PRICE due to this CHANGE ORDER will be (increased) (decreased) by:
\$ _____.

The new CONTRACT PRICE including this CHANGE ORDER will be \$ _____.

Change to CONTRACT TIME:

The CONTRACT TIME will be (increased)(decreased) by _____ calendar days.

The date for completion of all work will be _____ (Date).

Approvals Required:

To be effective this Order must be approved by the Federal Agency if it changes the scope or objective of the PROJECT, or as may otherwise be required by the SUPPLEMENTAL GENERAL CONDITIONS.

Requested by:

Recommended by:

Ladd Environmental Consultants, Inc.

Ordered by:

Accepted by:

Federal Agency Approval (where applicable) _____

CERTIFICATE OF OWNER'S ATTORNEY

I, the undersigned, **W. N. "Rocky" Watson**, the duly authorized and acting legal representative of the **CITY OF FORT PAYNE** do hereby certify as follows:

I have examined the foregoing contract and surety bonds and the manner of execution thereof, and I am of the opinion that each of the aforesaid agreements has been duly executed by the proper parties thereto acting through their duly authorized representatives; that said representatives have full power and authority to execute said agreements on behalf of the respective parties named thereon; and that the foregoing agreements constitute valid and legally binding obligations upon the parties executing the same in accordance with terms, conditions, and provisions thereof; and that the contract is the result of procurement in accordance with Title 39 of the Alabama Code and applicable federal laws, rules, and regulations.

W. N. "Rocky" Watson

Date: _____

[2244.5]
[11/97]

PART IV

SUPPLEMENTAL GENERAL CONDITIONS

WAGE RATES

GENERAL CONDITIONS

**State of Alabama
Alabama Department of Environmental Management
State Revolving Fund (SRF) Loan Program**



SRF Section
Permits and Services Division
Alabama Department of Environmental Management
Post Office Box 301463
Montgomery, Alabama 36130-1463

(334) 271-7793
(334) 271-7950 FAX

**Supplemental General Conditions
for SRF Assisted**

Public Drinking Water and Wastewater
Facilities Construction Contracts



SRF Project Number: CS010396-07

Table of Contents:

| | | |
|-------|---|--------|
| I | ADEM Special Conditions..... | SGC-3 |
| II | Bonds and Insurance..... | SGC-3 |
| III | Utilization of Disadvantaged Business Enterprises (DBEs) | SGC-3 |
| IV | Six Affirmative Steps for Good Faith DBE Solicitation | SGC-4 |
| V | Documentation Required from Loan Recipient and Contractor | SGC-5 |
| VI | Resources for Identifying DBE Contractors/Subcontractors..... | SGC-7 |
| VII | DBE Compliance Form..... | SGC-8 |
| VIII | EPA Form 6100-2 DBE Subcontractor Participation Form..... | SGC-10 |
| IX | EPA Form 6100-3 DBE Subcontractor Performance Form..... | SGC-12 |
| X | EPA Form 6100-4 DBE Subcontractor Utilization Form..... | SGC-14 |
| XI | EPA Form 5700-52 A MBE/WBE Utilization Reports..... | SGC-16 |
| XII | Changes to Approved DBE Compliance Form..... | SGC-23 |
| XIII | Certification Regarding Equal Employment Opportunity..... | SGC-24 |
| XIV | Debarred Firms Certification..... | SGC-25 |
| XV | Davis-Bacon and Related Acts..... | SGC-26 |
| XVI | American Iron and Steel..... | SGC-35 |
| XVII | Project Sign Detail - CWSRF..... | SGC-36 |
| XVIII | Project Sign Detail - DWSRF..... | SGC-37 |
| XIX | Construction Contract Requirements..... | SGC-38 |
| XX | Project Review and Cost Summary..... | SGC-39 |

I – ADEM Special Conditions

1. Construction within State rights-of-way shall be in accordance with the Alabama Department of Transportation policies and procedures.
2. Construction is to be carried out in compliance with applicable NPDES permits and in a manner that prevents bypassing of raw wastewater flows during construction. If bypassing is anticipated, the ADEM NPDES Enforcement Branch (334-271-7975) shall be advised in advance and the contractor shall take all necessary steps to minimize the impacts of bypassing.
3. Siltation and soil erosion shall be minimized during construction. The contractor shall obtain an NPDES storm water permit for construction if required.
4. The owner shall provide and maintain competent and adequate supervision and inspection.
5. ADEM and EPA shall have access to the site and the project work at all times.
6. These Special Conditions shall supersede any conflicting provisions of this contract.
7. **A project sign is required.** See **Parts XVII and XVIII, pages SGC-36 – SGC-37**, for more information.

II – Bonds and Insurance

Bonding requirements shall comply with Alabama Act No. 97-225. Provisions of the Act are summarized below:

1. Bid Bond – Not less than 5% of either the owner’s estimated cost or of the proposed prime contractor’s bid up to a maximum of \$10,000. The bid guarantee shall consist of a cashier’s check drawn on an Alabama bank or a bid bond executed by a surety company duly authorized and qualified to make bonds in the State of Alabama.
2. Performance Bond – In an amount not less than 100% of the contract price.
3. Payment Bond – Payable to the awarding authority, shall be executed in an amount not less than 50% of the contract price.

In addition to the insurance requirements elsewhere in the specifications, the owner or the contractor, as appropriate, must acquire any flood insurance made available by the Federal Emergency Management Agency as required by 40 CFR 30.600 (b), if construction will take place in a flood hazard area identified by the Federal Emergency Management Agency.

III – Utilization of Disadvantaged Businesses Enterprises (DBEs)

It is the policy of the State Revolving Loan Fund (SRF) to promote a “fair share” of sub-agreement awards to **small, minority, and/or women-owned businesses** for equipment, supplies, construction, and services. Compliance with these contract provisions is required in order for project costs to be eligible for SRF funding. *The “fair share” objective is a goal, not a quota.* DBE (Disadvantaged Business Enterprise) is an all-inclusive business classification, which includes MBE (minority business enterprises and/or WBE (women business enterprises) and is used synonymously when these entities are referenced individually or collectively.

Failure on the part of the apparent successful bidder to submit required information to the Loan Recipient (Owner) may be considered (by the Loan Recipient (Owner)) in evaluating whether the bidder is responsive to the bid requirements. The project objectives for utilization of Minority Business Enterprises (MBEs) and Women's Business Enterprises (WBEs) are as follows:

| | | |
|------------------------|----------|---------|
| Commodities (Supplies) | MBE 4% | WBE 11% |
| Contractual (Services) | MBE 8% | WBE 30% |
| Equipment | MBE 5% | WBE 20% |
| Construction | MBE 2.5% | WBE 3% |

For purposes of clarification:

- This objective applies to any Federally assisted procurement agreement in excess of \$10,000.
- This objective necessitates three responsibilities; separate solicitations must be made of small and minority and women's business enterprises.
- A minority business is a business, at least 51 percent of which is owned and controlled by minority group members (Black; Hispanic; Asian American; American Indian; and, any other designations approved by the Office of Management and Budget).
- A women's business is a business, at least 51 percent of which is owned and controlled by one or more women.
- The control determination will revolve around the minority or woman owner's involvement in the day-to-day management of the business enterprise.
- Solicitation should allow adequate time for price analysis. ADEM recommends that contact be made no later than 15 days before bid opening.
- Efforts taken to comply with this objective must be documented in detail; maintain records of firms contacted, including any negotiation efforts to reach competitive price levels, and awards to the designated firms.
- ADEM recommends that the Loan Recipient (Owner) or proposed Prime Contractor utilizes the services of the Minority Business Development Service Centers. These Centers are funded by the U.S. Department of Commerce to provide technical, financial and contracting assistance to minority and women's business enterprises. These Centers are located in a number of Regional cities.
- Use of the services provided by these Centers does not absolve the Loan Recipient (Owner) or proposed Prime Contractor from pursuing additional efforts to meet this objective.

IV – Six Affirmative Steps for Good Faith DBE (MBE-WBE) Solicitation

The Loan Recipient (Owner) shall follow the six affirmative steps found in the SRF application when using loan funds to procure sources of supplies, construction and services.

If the successful bidder plans to subcontract a portion of the project, the bidder must submit to the owner within 10 days after bid opening, evidence of the affirmative steps taken to utilize small, minority and women's businesses. These six affirmative steps or 'good faith efforts' are required methods to ensure that DBEs have the opportunity to compete for procurements funded by EPA financial assistance dollars. Such affirmative steps are described as follows:

1. Ensure DBEs are made aware of contracting opportunities to the fullest extent practicable through outreach and recruitment activities. This will include placing DBEs on solicitation lists and soliciting them whenever there are potential sources.

2. Make information on forthcoming opportunities available to DBEs and arrange time frames for contracts and establish delivery schedules, where the requirements permit, in a way that encourages and facilitates participation by DBEs in the competitive process. This includes, whenever possible, posting solicitation for bids or proposals for a minimum of 30 calendar days before the bid or proposal closing date.
3. Consider in the contracting process whether firms competing for large contracts could subcontract with DBEs. This will include dividing total requirements when economically feasible into smaller tasks or quantities to permit maximum participation by DBEs in the competitive process.
4. Encourage contracting with a consortium of DBEs when a contract is too large for one of these firms to handle individually.
5. Use the resources, services, and assistance of the AL Department of Transportation (ALDOT), Small Business Administration (SBA), and the Minority Business Development Agency of the Department of Commerce (MBDA).
6. If the Contractor awards subcontracts, it must take the steps described in items (1) through (5) listed above.

V – Documentation Required from Loan Recipient (Owner) and Contractor

The low, responsive, responsible bidder must forward the following items, in duplicate, to the loan recipient (owner) no later than 10 days after bid opening. The Loan Recipient (Owner) shall transmit one (1) copy of its DBE documentation of the prime contractor solicitation and one (1) copy of the prime contractor's/bidder's DBE documentation of all subcontractor solicitation to the SRF Section within 14 days after bid opening.

1. SRF project number and project name/loan name*. (*not contract name)
2. List of **all** subcontractors (**DBE and non-DBE**) with name, address, telephone number, estimated contract dollar amount and duration. If there are to be no subcontractors, please indicate such in a letter on company letterhead.
3. List of any subcontract work yet to be committed with estimate of dollar amount and duration of contract.
4. MBE-WBE (DBE) Documents - See **Part V, page SGC-6**.
5. Debarred Firms Certification – See **Part XIV, page SGC-25**.
6. Certification Regarding Equal Employment Opportunity – See **Part XIII, page SGC-24**.

The Loan Recipient (Owner) shall submit annual MBE/WBE Utilization Reports (EPA Form 5700-52A, **pages SGC-16 - SGC-17**) within 30 days of the end of the annual reporting period (**October 30th, i.e. by November 30th**). Submit reports directly to:

Laketa Ross, Accountant
 Administrative Section
 Fiscal Branch
 Alabama Department of Environmental Management
 Post Office Box 301463
 Montgomery, Alabama 36130-1463

The proposed Prime Contractor must submit the following items to the Loan Recipient (Owner):

1) DBE Compliance Form. The Loan Recipient (Owner) must submit this information to the SRF Section to demonstrate compliance with the DBE requirements. ADEM's approval is required prior to award of the construction contract and commencement of any SRF-funded construction. **(Page SGC-8)**

2) Certification Regarding Equal Employment Opportunity. This form is required of the proposed prime contractor (re: all subcontracts executed) and should be submitted with the prime proposed contractor's MBE-WBE solicitation submittal to the Loan Recipient (Owner). **(Page SGC-24)**

3) Debarred Firms Certification. This form is required of the proposed prime contractor (re: all subcontracts executed) and should be submitted with the prime proposed contractor's MBE-WBE solicitation submittal to the Loan Recipient (Owner). **(Page SGC-25)**

4) EPA Form 6100-2 DBE Subcontractor Participation Form. This form gives a DBE subcontractor the opportunity to describe the work the DBE subcontractor received from the proposed prime contractor, how much the DBE subcontractor was paid, and any other concerns the DBE subcontractor might have. The proposed prime contractor must provide this form to each DBE subcontractor for the DBE subcontractor's submittal to the SRF Section's MBE-WBE Compliance Staff (to be forwarded to EPA's DBE Coordinator). **(Page SGC-10)**

5) EPA Form 6100-3 DBE Subcontractor Performance Form. This form captures an intended DBE subcontractor's description of work to be performed for the proposed prime contractor and the price of the work. The proposed prime contractor must provide this form to each DBE subcontractor for the DBE subcontractor's submittal to the SRF Section's MBE-WBE Compliance Staff (to be forwarded to EPA's DBE Coordinator). **(Page SGC-12)**

6) EPA Form 6100-4 DBE Subcontractor Utilization Form. This form captures the proposed prime contractor's intended use of all identified DBE subcontractors and the estimated dollar amount of the work. The proposed prime contractor must provide this form to each DBE subcontractor for the DBE subcontractor's submittal to the SRF Section's MBE-WBE Compliance Staff (to be forwarded to EPA's DBE Coordinator). **(Page SGC-14)**

7) EPA Form 5700-52 A MBE/WBE Utilization Reports (DBE Annual Report), if applicable. The Loan Recipient (Owner) must submit this information to the SRF Section within 30 days of the end of the annual reporting period (October 30th), i.e., **by November 30th**. **(Pages SGC-16 - SGC-17)**

8) Changes to Approved DBE Compliance Form, if applicable. If any changes, substitutions, or additions are proposed to the subcontractors included in previous Department approvals, the Owner must submit this information to the Department for prior approval in order for the affected subcontract work to be eligible for SRF funding. **(Page SGC-23)**

9) Certified Payrolls. These should be submitted to the Loan Recipient (Owner), at least, monthly for the prime contractor and all subcontractors. The Loan Recipient (Owner) must maintain payroll records and make these available for inspection

Please note that DBEs, MBEs, and WBEs must be certified in writing by EPA, SBA, or DOT (or by state, local, Tribal, or private entities whose certification criteria match EPA's). Depending upon the certifying agency, a DBE may be classified as a Disadvantaged Business Enterprise (DBE), a Minority Business Enterprise (MBE), or a Women's Business Enterprise (WBE). Written certification as a DBE (MBE or WBE) is required in order to be counted toward the Loan Recipient/Owner's MBE-WBE accomplishments.

The documentation of these good faith solicitation efforts must be detailed in order to allow for satisfactory review. Such documentation might include fax confirmation sheets, copies of solicitation letters/emails, printouts of the online solicitations, printouts of online search results, affidavits of publication in newspapers, etc. The proposed prime contractor is strongly encouraged to follow up each written, fax, or email solicitation with, at least, 1 logged phone call.

The proposed prime contractor must employ the six affirmative steps to subcontract with DBEs, even if the proposed prime contractor has achieved its fair share objectives.

The prime contractor must employ the six affirmative steps to subcontract with DBEs, even if the proposed prime contractor has achieved its fair share objectives. If a DBE subcontractor fails to complete work under the subcontract for any reason, the proposed prime contractor must notify the Loan Recipient (Owner) in writing prior to any termination and must employ the six 'good faith efforts' described above if using a replacement subcontractor. Any proposed changes from an approved DBE subcontractor must be reported to the Loan Recipient (Owner) and to the SRF Section on the Changes to Approved Subcontractors Form prior to initiation of the action. EPA Forms Nos. 6100-3 and 6100-4 must also be submitted to the SRF Section for new DBE subcontracts.

-

VI – Resources for Identifying MBE-WBE (DBE) Contractors/Subcontractors

The following organizations may provide assistance in soliciting DBE participation:

City of Birmingham
Office of Economic
Development
ATTN: **Monique Shorts**,
Economic Specialist
710 20th Street North
Birmingham, Alabama
35203
Ph: (205) 254-2799
Fax: (205) 254-7741
Monique.shorts@birminghamal.gov

U.S. Small Business
Administration
<http://www.pro-net.sba.gov>

National Association
of Minority
Contractors (NAMC)
<https://namcatlanta.org/>

Alabama Department
of Transportation
ATTN: **John Huffman**
1409 Coliseum Boulevard
Montgomery, Alabama
36130
Ph: (334) 244-6261
<http://www.dot.state.al.us>

U.S. Department of
Commerce
Minority Business
Development Agency
ATTN: **Donna Ennis**
75 5th Street NW,
Suite 300
Atlanta, Georgia 30308
Ph: (404) 894-2096
<http://www.mbda.gov/>

Governor's Office of
Minority and Women's
Business Enterprises
Hilda Lockhart,
STEP Project Director
401 Adams Avenue
Suite 360
Montgomery, Alabama
36130
Ph: (334) 242-2220

Birmingham Construction
Industrial Authority ATTN:
Ashley Orl or **Kimberly
Bivins**
601 37th Street South
Birmingham, Alabama
35222
Ph: (205) 324-6202
aorl@bcia1.org
kbaylorbivins@bcia1.org

NOTE:

- (1) The Loan Recipient (Owner) and the proposed Prime Contractor shall use the necessary resources to identify and directly solicit no less than three (3) certified DBE/MBE/WBE companies to bid in each expected contract/subcontract area. If a diligent and documented search of ALDOT, SBA, and MBDA directories does not identify three (3) potential certified DBE/MBE/WBE firms, then the proposed Prime Contractor shall post an advertisement in, at least, one (1) of the other online or print resources. Whenever possible, post solicitation for bids or proposals should be posted/advertised for a minimum of 30 calendar days before the bid or proposal closing date.**
- (2) Expenditures to a DBE that acts merely as a broker or passive conduit of funds, without performing, managing, or supervising the work of its subcontract in a manner consistent with normal business practices may not be counted.**
- (3) The proposed Prime Contractor should attempt to identify and first solicit DBEs in the geographic proximity of the project before soliciting those located farther away.**
- (4) In addition, our SRF DBE Compliance Staff is readily available for assistance, as follows: Laketa Ross at (334) 271-7727 or laketa.ross@adem.alabama.gov OR Diane Lockwood (DBE Coordinator) at (334) 271-7815 or dpl@adem.alabama.gov.**

VII – DBE Compliance Form

NOTE: FOR DBE COMPLIANCE, ONE (1) COPY OF THIS FORM (WITH ALL INFORMATION OUTLINED) IS REQUIRED (WITH THE LOAN RECIPIENT (OWNER)'S DBE SUBMITTAL) FOR EACH PR&CS REVIEW. THE LOAN RECIPIENT (OWNER) AND PROPOSED PRIME CONTRACTOR SHOULD ENSURE THAT THIS INFORMATION IS COMPLETE PRIOR TO THE PR&CS SUBMITTAL TO THE SRF SECTION.

Loan Recipient: City of Fort Payne SRF Loan (Project) Number: CS010396-07

CERTIFICATIONS:

I certify that the information submitted on and with this form is true and accurate and that this company has met and will continue to meet the conditions of this construction contract regarding DBE solicitation and utilization. I further certify that criteria used in selecting subcontractors and suppliers were applied equally to all potential participants and that EPA Forms 6100-2 and 6100-3 were distributed to all DBE subcontractors.

(Proposed Prime Contractor Signature) Date _____

(Printed Name and Title)

I certify that I have reviewed the information submitted on and with this form and that it meets the requirements of the Loan Recipient's/Owner's State Revolving Fund loan contract.

(Only ONE (1) signature required below.)**

(Signature of Loan Recipient (Owner)) Date _____

OR**

(Loan Recipient's (Owner's) Representative's Signature, (P.E.)) Date _____

(Printed Name and Title)

GENERAL INFORMATION:

Loan Recipient (Owner) Contact: _____

Loan Recipient (Owner) Phone Number/Email: _____

Consulting Engineer Contact: _____

Consulting Engineer Phone Number/Email: _____

Proposed Prime Contractor: _____

Proposed Prime Contractor Contact: _____

Proposed Prime Contractor Phone Number/Email: _____

Proposed Prime Contract Amount: \$ _____

Proposed Total DBE/MBE Participation: \$ _____ Percentage: _____ % Goal: 2.5%

Proposed Total WBE Participation: \$ _____ Percentage: _____ % Goal: 3.0%

Please ensure the following is submitted in the full DBE submittal (with the DBE COMPLIANCE FORM (page SGC-8)):

- (1) **List of all committed and uncommitted subcontractors** by trade, including company name, address, telephone number, contact person, dollar amount of subcontract, and DBE/MBE/WBE status. Indicate in writing if no solicitations were made because the contractor intends to use only its own forces to accomplish the work.
- (2) **Proof of certification (certificate or letter)** by EPA, SBA, DOT (or by state, local, Tribal, or private entities whose certification criteria match EPA's) for each subcontractor listed as a DBE, MBE, or WBE.
- (3) **Documentation of solicitation effort for prospective DBE firms**, such as fax confirmation sheets, copies of solicitation letters/emails, printout of the online solicitations, printouts of online search results, affidavits of publication in newspapers, etc. The prime contractor is strongly encouraged to follow up each written, fax, or email solicitation with at least 1 logged phone call. Whenever possible, post solicitation for bids or proposals should be for a minimum of 30 calendar days before the bid or proposal closing date.
- (4) **Justification for not selecting a certified DBE subcontractor** that submitted a low bid for any subcontract area.
- (5) **Certification By Proposed Prime Contractor or Subcontractor Regarding Equal Opportunity Employment. (Page SGC-24)**
- (6) **Debarred Firms Certification. (Page SGC-25)**
- (7) **EPA Form 6100-2 DBE Subcontractor Participation Form** for **each** proposed **certified** DBE subcontractor.* **(Page SGC-10)** (*This form is completed by the proposed prime contractor. It is signed by **each** proposed subcontractor **only**.)
- (8) **EPA Form 6100-3 DBE Subcontractor Performance Form** for each DBE subcontractor.** **(Page SGC-12)** (**This form is completed by the proposed prime contractor and signed by each proposed certified subcontractor and the proposed prime contractor per subcontract.)
- (9) **EPA Form 6100-4 DBE Subcontractor Utilization Form** to summarize all DBE subcontracts/subcontractors.*** **(Page SGC-14)** (***)This form is completed and signed by the proposed prime contractor **only**.)

NOTE:

ALL DBE contractors selected must have a current DBE certificate or letter of certification by an approved certifying agency.

Loan Recipient (Owner) DBE Submittal

At minimum, the Loan Recipient (Owner)'s DBE submittal should **always** consist of **a cover letter (preferred, but optional) and a VII - DBE Compliance Form (page SGC-8) and DBE solicitation documentation** (i.e., DBE solicitation list(s) with source(s) of list(s) clearly identified, contractor contact information and results/outcomes of each solicitation (or of the overall solicitation effort, if all results/outcomes were the same), documentation of solicitation method (i.e., copies of emails, phone logs, faxes, etc.).

Prime Contractor DBE Submittal

At minimum, the Prime Contractor's DBE submittal should **always** consist of **a cover letter (preferred, but optional) and DBE solicitation documentation** (i.e., DBE solicitation list(s) with source(s) of list(s) clearly identified, subcontractor contact information and results/outcomes of each solicitation (or of the overall solicitation effort, if all results/outcomes were the same), documentation of solicitation method (i.e., copies of emails, phone logs, faxes, etc.) **OR** a "No Subcontractors" Letter (if none will be utilized) **and** a List of **ALL (DBE/non-DBE) subcontractors contracted/yet to be contracted and ALL EPA 6100 Forms described above (DBE subcontractors selected or not) and** Certification Regarding Equal Employment Opportunity **and** Debarred Firms Certification.

VIII - EPA Form 6100-2 DBE Subcontractor Participation Form



OMB Control No: 2090-0030

Disadvantaged Business Enterprise (DBE) Program DBE Subcontractor Participation Form

An EPA Financial Assistance Agreement Recipient must require its prime contractors to provide this form to its DBE subcontractors. This form gives a DBE¹ subcontractor² the opportunity to describe work received and/or report any concerns regarding the EPA-funded project (e.g., in areas such as termination by prime contractor, late payments, etc.). The DBE subcontractor can, as an option, complete and submit this form to the EPA DBE Coordinator at any time during the project period of performance.

| | | | |
|-----------------------|--|-------------------------------|--|
| Subcontractor Name | | Project Name | Contract No. 5 - Upgrades to Fort Payne Wastewater Treatment Plant |
| Bid/ Proposal No. | Assistance Agreement ID No. (if known) | Point of Contact | |
| | CS010396-07 | | |
| Address | | | |
| Telephone No. | | Email Address | |
| Prime Contractor Name | | Issuing/Funding Entity: CWSRF | |

| Contract Item Number | Description of Work Received from the Prime Contractor Involving Construction, Services, Equipment or Supplies | Amount Received by Prime Contractor |
|----------------------|--|-------------------------------------|
| | | |

¹ A DBE is a Disadvantaged, Minority, or Woman Business Enterprise that has been certified by an entity from which EPA accepts certifications as described in 40 CFR 33.204-33.205 or certified by EPA. EPA accepts certifications from entities that meet or exceed EPA certification standards as described in 40 CFR 33.202.

² Subcontractor is defined as a company, firm, joint venture, or individual who enters into an agreement with a contractor to provide services pursuant to an EPA award of financial assistance.

VIII - EPA Form 6100-2 DBE Subcontractor Participation Form



OMB Control No: 2090-0030

**Disadvantaged Business Enterprise (DBE) Program
DBE Subcontractor Participation Form**

Please use the space below to report any concerns regarding the above EPA-funded project:

| | |
|--------------------------------|-------------------|
| Subcontractor Signature | Print Name |
| | |
| Title | Date |
| | |

The public reporting and recordkeeping burden for this collection of information is estimated to average three (3) hours per response. Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques to the Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460. Include the OMB control number in any correspondence. Do not send the completed form to this address.

IX - EPA Form 6100-3 DBE Subcontractor Performance Form



OMB Control No: 2090-0030

**Disadvantaged Business Enterprise (DBE) Program
DBE Subcontractor Performance Form**

This form is intended to capture the DBE¹ subcontractor's² description of work to be performed and the price of the work submitted to the prime contractor. An EPA Financial Assistance Agreement Recipient must require its prime contractor to have its DBE subcontractors complete this form and include all completed forms in the prime contractors bid or proposal package.

| | | | |
|-----------------------|---|-------------------------------|--|
| Subcontractor Name | | Project Name | Contract No. 5 - Upgrades to Fort Payne Wastewater Treatment Plant |
| Bid/ Proposal No. | Assistance Agreement ID No. (if known) CS010396-07 | Point of Contact | |
| Address | | | |
| Telephone No. | | Email Address | |
| Prime Contractor Name | | Issuing/Funding Entity: CWSRF | |

| Contract Item Number | Description of Work Submitted to the Prime Contractor Involving Construction, Services, Equipment or Supplies | Price of Work Submitted to the Prime Contractor |
|--|---|---|
| | | |
| DBE Certified By: <input type="radio"/> DOT <input checked="" type="radio"/> SBA <input type="radio"/> Other: _____ | | Meets/ exceeds EPA certification standards? <input type="radio"/> YES <input type="radio"/> NO <input type="radio"/> Unknown |

¹ A DBE is a Disadvantaged, Minority, or Woman Business Enterprise that has been certified by an entity from which EPA accepts certifications as described in 40 CFR 33.204-33.205 or certified by EPA. EPA accepts certifications from entities that meet or exceed EPA certification standards as described in 40 CFR 33.202.

² Subcontractor is defined as a company, firm, joint venture, or individual who enters into an agreement with a contractor to provide services pursuant to an EPA award of financial assistance.

IX - EPA Form 6100-3 DBE Subcontractor Performance Form



OMB Control No: 2090-0030

**Disadvantaged Business Enterprise (DBE) Program
DBE Subcontractor Performance Form**

I certify under penalty of perjury that the forgoing statements are true and correct. Signing this form does not signify a commitment to utilize the subcontractors above. I am aware of that in the event of a replacement of a subcontractor, I will adhere to the replacement requirements set forth in 40 CFR Part 33 Section 33.302 (c).

| | |
|-----------------------------------|-------------------|
| Prime Contractor Signature | Print Name |
| | |
| Title | Date |
| | |

| | |
|--------------------------------|-------------------|
| Subcontractor Signature | Print Name |
| | |
| Title | Date |
| | |

The public reporting and recordkeeping burden for this collection of information is estimated to average three (3) hours per response. Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques to the Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460. Include the OMB control number in any correspondence. Do not send the completed form to this address.

X - EPA Form 6100-4 DBE Subcontractor Utilization Form



OMB Control No: 2090-0030

Disadvantaged Business Enterprise (DBE) Program DBE Subcontractor Utilization Form

This form is intended to capture the prime contractor's actual and/or anticipated use of identified certified DBE¹ subcontractors² and the estimated dollar amount of each subcontract. An EPA Financial Assistance Agreement Recipient must require its prime contractors to complete this form and include it in the bid or proposal package. Prime contractors should also maintain a copy of this form on file.

| | | | |
|----------------------------------|---|---|--|
| Prime Contractor Name | | Project Name Contract No. 5 - Upgrades to Fort Payne Wastewater Treatment Plant | |
| Bid/ Proposal No. | Assistance Agreement ID No. (if known) CS010396-07 | Point of Contact | |
| Address | | | |
| Telephone No. | | Email Address | |
| Issuing/Funding Entity: CWSRF | | | |

| I have identified potential DBE certified subcontractors | <input type="radio"/> YES | <input checked="" type="radio"/> NO | |
|---|-------------------------------|-------------------------------------|--------------------------|
| If yes, please complete the table below. If no, please explain: | | | |
| | | | |
| Subcontractor Name/ Company Name | Company Address/ Phone/ Email | Est. Dollar Amt | Currently DBE Certified? |
| | | | |
| | | | |
| | | | |

Continue on back if needed

¹ A DBE is a Disadvantaged, Minority, or Woman Business Enterprise that has been certified by an entity from which EPA accepts certifications as described in 40 CFR 33.204-33.205 or certified by EPA. EPA accepts certifications from entities that meet or exceed EPA certification standards as described in 40 CFR 33.202.

² Subcontractor is defined as a company, firm, joint venture, or individual who enters into an agreement with a contractor to provide services pursuant to an EPA award of financial assistance.

X - EPA Form 6100-4 DBE Subcontractor Utilization Form



OMB Control No: 2090-0030

**Disadvantaged Business Enterprise (DBE) Program
DBE Subcontractor Utilization Form**

I certify under penalty of perjury that the forgoing statements are true and correct. Signing this form does not signify a commitment to utilize the subcontractors above. I am aware of that in the event of a replacement of a subcontractor, I will adhere to the replacement requirements set forth in 40 CFR Part 33 Section 33.302 (c).

| | |
|-----------------------------------|-------------------|
| Prime Contractor Signature | Print Name |
| | |
| Title | Date |
| | |

The public reporting and recordkeeping burden for this collection of information is estimated to average three (3) hours per response. Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques to the Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460. Include the OMB control number in any correspondence. Do not send the completed form to this address.



**U.S. ENVIRONMENTAL PROTECTION AGENCY
MBE/WBE UTILIZATION UNDER FEDERAL GRANTS
AND COOPERATIVE AGREEMENTS**

| |
|---|
| PART I OF II (PAGES SGC-16 & SGC-17) |
|---|

| FOR COOPERATIVE AGREEMENTS OR OTHER FEDERAL FINANCIAL ASSISTANCE WHERE THE COMBINED TOTAL OF FUNDS BUDGETED FOR PROCURING SUPPLIES, EQUIPMENT, CONSTRUCTION OR SERVICES EXCEED \$150,000. | | | | | | | | | | | | | | | | | | | |
|--|--|-----------|--------------|-----------|----------|----------|-------|--------|-------|-------|-------|-------|------|--------|-------|-------|-------|-------|------|
| PART 1: PLEASE REVIEW INSTRUCTIONS BEFORE COMPLETING | | | | | | | | | | | | | | | | | | | |
| 1A. FEDERAL FISCAL YEAR (Oct 1- Sep 30) 20_____ | 1B. REPORT TYPE <input type="checkbox"/> Annual <input type="checkbox"/> Last Report (Project completed) | | | | | | | | | | | | | | | | | | |
| 1C. REVISION OF A PRIOR YEAR REPORT? <input type="radio"/> No <input type="radio"/> Yes, Year _____ IF YES, BRIEFLY DESCRIBE THE REVISIONS YOU ARE MAKING: | | | | | | | | | | | | | | | | | | | |
| 2A. EPA FINANCIAL ASSISTANCE OFFICE ADDRESS (ATTN: DBE COORDINATOR) | 3A. RECIPIENT NAME AND ADDRESS | | | | | | | | | | | | | | | | | | |
| 2B. EPA DBE COORDINATOR Name: Email: Phone: Fax: | 3B. RECIPIENT REPORTING CONTACT Name: Address: Phone: Email: | | | | | | | | | | | | | | | | | | |
| 4A. FINANCIAL ASSISTANCE AGREEMENT ID NUMBER (SRF State Recipients, refer to Instructions for Completion of blocks 4A, 5A and 5C) | 4B. FEDERAL FINANCIAL ASSISTANCE PROGRAM TITLE OR CFDA NUMBER: | | | | | | | | | | | | | | | | | | |
| 5A. TOTAL ASSISTANCE AGREEMENT AMOUNT EPA Share: \$ _____ Recipient Share: \$ _____ <input type="checkbox"/> N/A (SRF Recipient)/Loan Amount: \$ _____ | 5B. If NO procurements and NO accomplishments were made this reporting period (by the recipients, sub-recipients, loan recipients, and prime contractors), CHECK and SKIP to Block No. 7. (Procurements are all expenditures through contract, order, purchase, lease or barter of supplies, equipment, construction, or services needed to complete Federal assistance programs. Accomplishments, in this context, are procurements made with MBEs and/or WBEs.) <input type="checkbox"/> | | | | | | | | | | | | | | | | | | |
| 5C. Total Procurements This Reporting Period (Only include amount not reported in any prior reporting period) Total Procurement Amount \$ _____ (Include total dollar values awarded by recipient, sub-recipients and SRF loan recipients, including MBE/WBE expenditures.) | | | | | | | | | | | | | | | | | | | |
| 5D. Were sub-awards issued under this assistance agreement? Yes <input type="radio"/> No <input type="radio"/> Were contracts issued under this assistance agreement? Yes <input type="radio"/> No <input type="radio"/> | | | | | | | | | | | | | | | | | | | |
| 5E. MBE/WBE Accomplishments This Reporting Period Actual MBE/WBE Procurement Accomplished (Include total dollar values awarded by recipient, sub-recipients, SRF loan recipients and Prime Contractors.) | | | | | | | | | | | | | | | | | | | |
| | <table border="0" style="width: 100%;"> <tr> <td></td> <td align="center">Construction</td> <td align="center">Equipment</td> <td align="center">Services</td> <td align="center">Supplies</td> <td align="center">Total</td> </tr> <tr> <td align="right">\$MBE:</td> <td align="center">_____</td> <td align="center">_____</td> <td align="center">_____</td> <td align="center">_____</td> <td align="center">0.00</td> </tr> <tr> <td align="right">\$WBE:</td> <td align="center">_____</td> <td align="center">_____</td> <td align="center">_____</td> <td align="center">_____</td> <td align="center">0.00</td> </tr> </table> | | Construction | Equipment | Services | Supplies | Total | \$MBE: | _____ | _____ | _____ | _____ | 0.00 | \$WBE: | _____ | _____ | _____ | _____ | 0.00 |
| | Construction | Equipment | Services | Supplies | Total | | | | | | | | | | | | | | |
| \$MBE: | _____ | _____ | _____ | _____ | 0.00 | | | | | | | | | | | | | | |
| \$WBE: | _____ | _____ | _____ | _____ | 0.00 | | | | | | | | | | | | | | |
| 6. COMMENTS: (If no MBE/WBE procurements, please summarize how certified MBEs/WBEs were notified of the opportunities to compete for the procurement dollars entered in Block 5C and why certified MBEs /WBEs were not awarded any procurements during this reporting period.) | | | | | | | | | | | | | | | | | | | |
| 7. NAME OF RECIPIENT'S AUTHORIZED REPRESENTATIVE | TITLE | | | | | | | | | | | | | | | | | | |
| 8. SIGNATURE OF RECIPIENT'S AUTHORIZED REPRESENTATIVE | DATE | | | | | | | | | | | | | | | | | | |

If reporting DBE procurement, please enter the Loan Project Number and the information in the grid below, as applicable. If no additional DBE procurement to report, please enter the Loan Project Number and enter 'N/A' in the black box below.

PART II.

PART II OF II
(PAGES SGC-16 & SGC-17)

MBE/WBE PROCUREMENTS MADE DURING REPORTING PERIOD

SRF Financial Assistance Agreement Number:

| 1. Procurement Made By Recipient Sub-Recipient and/or SRF Loan Recipient | 2. Business Enterprise Minority Women | 3. \$ Value of Procurement | 4. Date of Procurement MM/DD/YY | 5. Type of Product or Service (Enter Code) | 6. Name/Address/Phone Number of MBE/WBE Contractor or Vendor |
|--|--|-------------------------------|---------------------------------------|--|--|
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Type of Product or Service Codes: 1 = Construction 2 = Supplies 3 = Services 4 = Equipment
Note: Recipients are required to submit MBE/WBE reports to EPA beginning with the Federal fiscal year the recipients receive the award, continuing until the project is completed.

Instructions:

A. General Instructions:

MBE/WBE utilization is based on 40 CFR Part 33. The reporting requirement reflects the class deviation issued on November 8, 2013, clarified on January 9, 2014 and modified on December 2, 2014. EPA Form 5700-52A must be completed annually by recipients of financial assistance agreements where the combined total of funds budgeted for procuring supplies, equipment, construction or services exceeds \$150,000. This reporting requirement applies to all new and existing awards and voids all previous reporting requirements.

In determining whether the \$150,000 threshold is exceeded for a particular assistance agreement, the analysis must focus on funds budgeted for procurement under the supplies, equipment, construction, services or "other" categories, and include funds budgeted for procurement under sub-awards or loans

Reporting will also be required in cases where the details of the budgets of sub-awards/loans are not clear at the time of the grant awards and the combined total of the procurement and sub-awards and/or loans exceeds the \$150,000 threshold.

When reporting is required, all procurement actions are reportable, not just the portion which exceeds \$150,000.

If at the time of award the budgeted funds exceed \$150,000 but actual expenditures fall below, a report is still required.

If at the time of award, the combined total of funds budgeted for procurements in any category is less than or equal to \$150,000 and is maintained below the threshold, no DBE report is required to be submitted.

Recipients are required to report 30 days after the end of each federal year, per the terms and conditions of the financial assistance agreement.

Last reports are due October 30th or 90 days after the end of the project period, whichever comes first.

MBE/WBE program requirements, including reporting, are material terms and conditions of the financial assistance agreement.

B. Definitions:

Procurement is the acquisition through contract, order, purchase, lease or barter of supplies, equipment, construction or services needed to accomplish Federal assistance programs.

A **contract** is a written agreement between an EPA recipient and another party (also considered "prime contracts") and any lower tier agreement (also considered "subcontracts") for equipment, services, supplies, or construction necessary to complete the project. This definition excludes written agreements with another public agency. This definition includes personal and professional services, agreements with consultants, and purchase orders.

A **minority business enterprise (MBE)** is a business concern that is (1) at least 51 percent owned by one or more minority individuals, or, in the case of a publicly owned business, at least 51 percent of the stock is owned by one or more minority

individuals; and (2) whose daily business operations are managed and directed by one or more of the minority owners. In order to qualify and participate as an MBE prime or subcontractor for EPA recipients under EPA's DBE Program, an entity must be properly certified as required by 40 CFR Part 33, Subpart B.

U.S. citizenship is required. Recipients shall presume that minority individuals include Black Americans, Hispanic Americans, Native Americans, Asian Pacific Americans, or other groups whose members are found to be disadvantaged by the Small Business Act or by the Secretary of Commerce under section 5 of Executive order 11625. The reporting contact at EPA can provide additional information.

A **woman business enterprise (WBE)** is a business concern that is, (1) at least 51 percent owned by one or more women, or, in the case of a publicly owned business, at least 51 percent of the stock is owned by one or more women and (2) whose daily business operations are managed and directed by one or more of the women owners. In order to qualify and participate as a WBE prime or subcontractor for EPA recipients under EPA's DBE Program, an entity must be properly certified as required by 40 CFR Part 33, Subpart B.

Business firms which are 51 percent owned by minorities or women, but are in fact not managed and operated by minorities or females do not qualify for meeting MBE/WBE procurement goals. U.S. Citizenship is required.

Good Faith Efforts

A recipient is required to make the following good faith efforts whenever procuring construction, equipment, services, and supplies under an EPA financial assistance agreement. These good faith

efforts for utilizing MBEs and WBEs must be documented. Such documentation is subject to EPA review upon request:

1. Ensure DBEs are made aware of contracting opportunities to the fullest extent practicable through outreach and recruitment activities. For Indian Tribal, State and Local and Government recipients, this will include placing DBEs on solicitation lists and soliciting them whenever they are potential sources.
2. Make information on forthcoming opportunities available to DBEs and arrange time frames for contracts and establish delivery schedules, where the requirements permit, in a way that encourages and facilitates participation by DBEs in the competitive process. This includes, whenever possible, posting solicitations for bids or proposals for a minimum of 30 calendar days before the bid or proposal closing date.
3. Consider in the contracting process whether firms competing for large contracts could subcontract with DBEs. For Indian Tribal, State and local Government recipients, this will include dividing total requirements when economically feasible into smaller tasks or quantities to permit maximum participation by DBEs in the competitive process.
4. Encourage contracting with a consortium of DBEs when a contract is too large for one of these firms to handle individually.
5. Use the services and assistance of the SBA and the Minority Business Development Agency of the Department of Commerce.
6. If the prime contractor awards subcontracts, require the prime contractor to take the steps in paragraphs (a) through (e) of this section.

C. Instructions for Part I:

1A. Specify Federal fiscal year this report covers. The Federal fiscal year runs from October 1st through September 30th (**e.g. November 29, 2014 falls within Federal fiscal year 2015**)

1B. Specify report type. Check the annual reporting box. Also indicate if the project is completed.

1C. Indicate if this is a revision to a previous year and provide a brief description of the revision you are making.

2A-B. Please refer to your financial assistance agreement for the mailing address of the EPA financial assistance office for your agreement.

The "EPA DBE Reporting Contact" is the DBE Coordinator for the EPA Region from which your financial assistance agreement was originated. For a list of DBE Coordinators please refer to the EPA OSBP website at http://epa.gov/osbp/dbe_cord.

3A-B. Identify the agency, state authority, university or other organization which is the recipient of the Federal financial assistance and the person to contact concerning this report.

4A. Provide the Assistance Agreement number assigned by EPA. A separate report must be submitted for each Assistance Agreement.

***For SRF recipients:** In box 4a list numbers for ALL OPEN Assistance Agreements being reported on this form.

4B. Refer back to Assistance Agreement document for this information.

5A. Provide the total amount of the Assistance Agreement which includes Federal funds plus recipient matching funds and funds from other sources.

***For SRF recipients only:** SRF recipients will not enter an amount in 5a. SRF recipients should check the "N/A" box.

5B. Self-explanatory.

5C. Provide the total dollar amount of **ALL** procurements awarded this reporting period by the recipient, sub-recipients, and SRF loan recipients, **including** MBE/WBE expenditures, not just the portion which exceeds \$150,000. For example: Actual dollars for procurement from the procuring office; actual contracts let from the contracts office; actual goods, services, supplies, etc., from other sources including the central purchasing/procurement centers).

***NOTE:** To prevent double counting on line 5C, if any amount on 5E is for a subcontract and the prime contract has already been included on Line 5C in a prior reporting period, then report the amount going to MBE or WBE subcontractor on line 5E, but exclude the amount from Line 5C. To include the amount on 5C again would result in double counting because the prime contract, which includes the subcontract, would have already been reported.

***For SRF recipients only:** In 5c please enter the total annual procurement amount under all of your SRF Assistance Agreements. The figure reported in this section is **not** directly tied to an individual Assistance Agreement identification number. (**SRF state recipients report state procurements in this section**)

5D. State whether or not sub-awards and/or subcontracts have been issued under the financial assistance agreements by indicating “yes” or “no”.

5E. Where requested, also provide the total dollar amount of all MBE/WBE procurement awarded during this reporting period by the recipient, sub-recipients, SRF loan recipients, and prime contractors in the categories of construction, equipment, services and supplies. These amounts include Federal funds plus recipient matching funds and funds from other sources.

6. If there were no MBE/WBE accomplishments this reporting period, please briefly how certified MBEs/WBEs were notified of the opportunities to compete for the procurement dollars entered in Block 5C and why certified MBEs /WBEs were not awarded any procurements during this reporting period.

7. Name and title of official administrator or designated reporting official.

8. Signature, month, day, and year report submitted.

D. Instructions for Part II:

For each MBE/WBE procurement made under this financial assistance agreements during the reporting period, provide the following information:

1. Check whether this procurement was made by the recipient, sub-recipient/SRF loan recipient, or the prime contractor.

2. Check either the MBE or WBE column. If a firm is both an MBE and WBE, the recipient may choose to count the entire procurement towards EITHER its MBE or WBE accomplishments. The recipient may also divide the total amount of the procurement (using any ratio it so chooses) and count those divided amounts toward its MBE and WBE accomplishments. If the recipient chooses to divide the procurement amount and count portions toward its MBE and WBE accomplishments, please state the appropriate amounts under the MBE and WBE columns on the form. **The combined MBE and WBE amounts for that MBE/WBE contractor must not exceed the “Value of the Procurement” reported in column #3**

3. Dollar value of procurement.

4. Date of procurement, shown as month, day, year. Date of procurement is defined as the date the contract or procurement was awarded, **not** the date the contractor received payment under the awarded contract or procurement, unless payment occurred on the date of award. **(Where direct purchasing is the procurement method, the date of procurement is the date the purchase was made)**

5. Using codes at the bottom of the form, identify type of product or service acquired through this procurement (e.g., enter 1 if construction, 2 if supplies, etc.).

6. Name, address, and telephone number of MBE/WBE firm.

**This data is requested to comply with provisions mandated by: statute or regulations (40 CFR Parts 30, 31, and 33 and/or 2 CFR Parts 200 and 1500); OMB Circulars; or added by EPA to ensure sound and effective assistance management. Accurate, complete data are required to obtain funding, while no pledge of confidentiality is provided.

The public reporting and recording burden for this collection of information is estimated to average 1 hour per response annually. Burden means the total time, effort, or financial resources expended by persons to generate, maintain, retain, or disclosure or provide information to or for a Federal agency. This includes the time needed to review instructions; develop, acquire, install, and utilize technology and systems for the purposes of collecting, validating, and verifying information, processing and maintaining information, and disclosing and providing information; adjust the existing ways to comply with any previously applicable instructions and requirements; train personnel to be able to respond to a collection of information; search data sources; complete and review the collection of information; and transmit or otherwise disclose the information. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number.

Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques to the Director, OPPE Regulatory Information Division, U.S. Environmental Protection Agency (2136), 1200 Pennsylvania Avenue, NW, Washington, D.C. 20460. Include the OMB Control number in any correspondence. Do not send the completed form to this address.

XII – Changes to Approved DBE Compliance Form

NOTE: THIS FORM IS REQUIRED OF THE LOAN RECIPIENT (OWNER) (WITH THE PRIME CONTRACTOR'S INPUT) FOR DBE COMPLIANCE ONLY IF A SUBCONTRACTOR/SUPPLIER/VENDOR IS SOUGHT AND/OR PROCURED AFTER THE CONTRACT ATA (APPROVAL-TO-AWARD) HAS BEEN ISSUED. IT IS SIMILAR TO THE DBE COMPLIANCE FORM (PAGE SGC-8) IN THAT IT IS THE COVER/SUMMARY FORM USED TO DOCUMENT THE ADDITIONAL DBE SOLICITATION AND/OR REVISE THE ORIGINAL DBE APPROVAL STATUS.

Loan Recipient: _____ Loan (Project) Number: _____

CERTIFICATIONS:

I certify that the information submitted on and with this form is true and accurate and that this company has met and will continue to meet the conditions of this construction contract regarding DBE solicitation and utilization. I further certify that criteria used in selecting subcontractors and suppliers were applied equally to all potential participants and that EPA Forms 6100-2 and 6100-3 were distributed to all DBE subcontractors.

(Prime Contractor Signature) Date _____

(Printed Name and Title)

*I certify that I have reviewed the information submitted on and with this form and that it meets the requirements of the Loan Recipient's/Owner's State Revolving Fund loan contract. (*Only ONE (1) signature required below.)*

(Signature of Loan Recipient (Owner)) Date _____

OR*

(Loan Recipient's (Owner's) Representative's Signature, (P.E.)) Date _____

(Printed Name and Title)

GENERAL INFORMATION: (Please attach additional pages to address 1 through 5, as needed.)

- (1) If an approved subcontractor is terminated or replaced, please identify this company and briefly state the reason.
- (2) For new or additional subcontractors, list name, trade, address, telephone number, contact person, dollar amount of subcontract and DBE status.
- (3) Attach proof of certification by EPA, SBA, DOT (or by state, local, Tribal or private entities whose certification criteria match EPA's) for each subcontractor listed as a DBE, MBE or WBE.
- (4) Attach documentation of solicitation effort for prospective DBE firms, such as fax confirmation sheets, copies of solicitation letters/emails, printouts of the online solicitations, printouts of online search results, affidavits of publication in newspapers, etc. The prime contractor is strongly encouraged to follow up each solicitation with, at least, one (1) logged phone call. Whenever possible, post solicitation for bids or proposals should be for a minimum of 30 calendar days before the bid or proposal closing date.
- (5) Provide justification for not selecting a certified DBE subcontractor that submitted a low bid for any subcontract area.

XIII – Certification Regarding Equal Employment Opportunity

The prime contractor is required to comply with Executive Order 112-46 of September 24, 1965 entitled "Equal Employment Opportunity" as amended by Executive Order 11375 of October 13, 1967.

The contract for the work under this proposal will obligate the prime contractor and its subcontractors not to discriminate in employment practices.

The prime contractor shall not maintain or provide for his/her employees the facilities, which are segregated on a basis of race, creed, color or national origin, whether such facilities are segregated by directive or on a de facto basis.

The prime contractor must, if requested, submit a compliance report concerning their employment practices and policies in order to maintain his/her eligibility to receive the award of the contract.

The prime contractor must be prepared to comply in all respects with any contract provisions regarding non-discrimination stipulated in conjunction with labor standards.

PRIME CONTRACTOR'S CERTIFICATION:

Prime Contractor's Name: _____

Address: _____

1. Bidder has participated in a previous contract or subcontract subject to the Equal Opportunity Clause. Yes ___ No ___
2. Compliance Reports were required to be filed in connection with such contract or subcontract. Yes ___ No ___
3. Bidder has filed all compliance reports due under applicable contract requirements. Yes ___ No ___

If answer to item 3 is "No", please explain in detail on reverse side of this certification.

Certification - The information above is true and complete to the best of my knowledge and belief.

Signature of Prime Contractor: _____

Title: _____

Date: _____

XIV – Debarred Firms Certification

All prime construction contractors shall certify that Subcontracts have not and will not be awarded to any firm that is currently on the General Service Administration's Master List of Debarred, Suspended and Voluntarily Excluded Persons, in accordance with the provisions of ADEM Administrative Code 335-6-14-.35. Debarment action is taken against a firm for noncompliance with Federal Law.

All bidders shall complete this certification in duplicate and submit both copies to the Loan Recipient (Owner) with the bid proposal. The Loan Recipient (Owner) shall transmit one copy to the SRF Section within 14 days after the bid opening.

Project Name/Loan Name*: Contract No. 5 - Upgrades to Fort Payne Wastewater Treatment Plant
(*not **Contract** Name)

SRF Project No.: CS010396-07

The undersigned hereby certifies that the firm of _____
_____ has not and will not award a subcontract, in connection with any contract awarded to it as the result of this bid, to any firm that is currently on the General Service Administration's Master List of Debarred, Suspended, and Voluntarily Excluded Persons.

Signature of Prime Contractor: _____

Title: _____

Date: _____

XV – Davis-Bacon and Related Acts

Labor Standards Provisions for Federally Assisted Contracts

Wage Rate Requirements Under FY 2013 Continuing Appropriation

I. Requirements under the Consolidated and Further Continuing Appropriations Act, 2013 (P.L. 113-6) For Subrecipients That Are Governmental Entities:

The following terms and conditions specify how recipients will assist EPA in meeting its Davis-Bacon (DB) responsibilities when DB applies to EPA awards of financial assistance under the FY 2013 Continuing Resolution with respect to State recipients and subrecipients that are governmental entities. If a subrecipient has questions regarding when DB applies, obtaining the correct DB wage determinations, DB provisions, or compliance monitoring, it may contact the State recipient. If a State recipient needs guidance, the recipient may contact Cynthia Y. Edwards at Edwards.Cynthiay@epa.gov or at 404-562-9340 of EPA, Region 4 Grants and SRF Management Section, for guidance. The recipient or subrecipient may also obtain additional guidance from DOL's web site at <http://www.dol.gov/whd/>

1. Applicability of the Davis- Bacon (DB) prevailing wage requirements.

Under the FY 2013 Continuing Resolution, DB prevailing wage requirements apply to the construction, alteration, and repair of treatment works carried out in whole or in part with assistance made available by a State water pollution control revolving fund and to any construction project carried out in whole or in part by assistance made available by a drinking water treatment revolving loan fund. If a subrecipient encounters a unique situation at a site that presents uncertainties regarding DB applicability, the subrecipient must discuss the situation with the recipient State before authorizing work on that site.

2. Obtaining Wage Determinations.

(a) Subrecipients shall obtain the wage determination for the locality in which a covered activity subject to DB will take place prior to issuing requests for bids, proposals, quotes or other methods for soliciting contracts (solicitation) for activities subject to DB. These wage determinations shall be incorporated into solicitations and any subsequent contracts. Prime contracts must contain a provision requiring that subcontractors follow the wage determination incorporated into the prime contract.

(i) While the solicitation remains open, the subrecipient shall monitor www.wdol.gov weekly to ensure that the wage determination contained in the solicitation remains current. The subrecipients shall amend the solicitation if DOL issues a modification more than 10 days prior to the closing date (i.e. bid opening) for the solicitation. If DOL modifies or supersedes the applicable wage determination less than 10 days prior to the closing date, the subrecipients may request a finding from the State recipient that there is not a reasonable time to notify interested contractors of the modification of the wage determination. The State recipient will provide a report of its findings to the subrecipient.

(ii) If the subrecipient does not award the contract within 90 days of the closure of the solicitation, any modifications or supersedes DOL makes to the wage determination contained in the solicitation shall be effective unless the State recipient, at the request of the subrecipient, obtains an extension of the 90 day period from DOL pursuant to 29 CFR 1.6(c)(3)(iv). The subrecipient shall monitor www.wdol.gov on a weekly basis if it does not award the contract within 90 days of closure of the solicitation to ensure that wage determinations contained in the solicitation remain current.

(b) If the subrecipient carries out activity subject to DB by issuing a task order, work assignment or similar instrument to an existing contractor (ordering instrument) rather than by publishing a solicitation, the subrecipient shall insert the appropriate DOL wage determination from www.wdol.gov into the ordering instrument.

(c) Subrecipients shall review all subcontracts subject to DB entered into by prime contractors to verify that the prime contractor has required its subcontractors to include the applicable wage determinations.

(d) As provided in 29 CFR 1.6(f), DOL may issue a revised wage determination applicable to a subrecipient's contract after the award of a contract or the issuance of an ordering instrument if DOL determines that the subrecipient has failed to incorporate a wage determination or has used a wage determination that clearly does not apply to the contract or ordering instrument. If this occurs, the subrecipient shall either terminate the contract or ordering instrument and issue a revised solicitation or ordering instrument or incorporate DOL's wage determination retroactive to the beginning of the contract or ordering instrument by change order. The subrecipient's contractor must be compensated for any increases in wages resulting from the use of DOL's revised wage determination.

3. Contract Subcontract Provisions.

(a) The Recipient shall insure that the subrecipient(s) shall insert in full in any contract in excess of \$2,000 which is entered into for the actual construction, alteration and/or repair, including painting and decorating, of a treatment work under the CWSRF or a construction project under the DWSRF financed in whole or in part from Federal funds or in accordance with guarantees of a Federal agency or financed from funds obtained by pledge of any contract of a Federal agency to make a loan, grant or annual contribution (except where a different meaning is expressly indicated), and which is subject to the labor standards provisions of any of the acts listed in § 5.1 or the FY 2010 appropriation , the following clauses:

(1) Minimum wages.

(i) All laborers and mechanics employed or working upon the site of the work will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (a)(1)(iv) of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in § 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph (a)(1)(ii) of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

Subrecipients may obtain wage determinations from the U.S. Department of Labor's web site, www.dol.gov.

(ii)(A) The subrecipient(s), on behalf of EPA, shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The State award official shall approve a request for an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(1) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(2) The classification is utilized in the area by the construction industry; and

(3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(B) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the subrecipient(s) agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), documentation of the action taken and the request, including the local wage determination shall be sent by the subrecipient (s) to the State award official. The State award official will transmit the request, to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210 and to the EPA DB Regional Coordinator concurrently. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification request within 30 days of receipt and so advise the State award official or will notify the State award official within the 30-day period that additional time is necessary.

(C) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the subrecipient(s) do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the award official shall refer the request and the local wage determination, including the views of all interested parties and the recommendation of the State award official, to the Administrator for determination. The request shall be sent to the EPA DB Regional Coordinator concurrently. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt of the request and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(D) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs (a)(1)(ii)(B) or (C) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(iv) If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

(2) Withholding.

The subrecipient(s), shall upon written request of the EPA Award Official or an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor under this contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the (Agency) may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

(3) Payrolls and basic records.

(i) Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

(ii)(A) The contractor shall submit weekly, for each week in which any contract work is performed, a copy of all payrolls to the subrecipient, that is, the entity that receives the sub-grant or loan from the State capitalization grant recipient. Such documentation shall be available on request of the State recipient or EPA. As to each payroll copy received, the subrecipient shall provide written confirmation in a form satisfactory to the State indicating whether or not the project is in compliance with the requirements of 29 CFR 5.5(a)(1) based on the most recent payroll copies for the specified week. The payrolls shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on the weekly payrolls. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at <https://www.dol.gov/agencies/whd/forms/wh347> or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the subrecipient(s) for transmission to the State or EPA if requested by EPA, the State, the contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the subrecipient(s).

(B) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(1) That the payroll for the payroll period contains the information required to be provided under § 5.5(a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under § 5.5(a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;

(2) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;

(3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(C) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph (a)(3)(ii)(B) of this section.

(D) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.

(iii) The contractor or subcontractor shall make the records required under paragraph (a)(3)(i) of this section available for inspection, copying, or transcription by authorized representatives of the State, EPA or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the Federal agency or State may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

(4) Apprentices and trainees.

(i) Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(ii) Trainees. Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program.

If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(iii) Equal employment opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

(5) Compliance with Copeland Act requirements.

The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.

(6) Subcontracts.

The contractor or subcontractor shall insert in any subcontracts the clauses contained in 29 CFR 5.5(a)(1) through (10) and such other clauses as the EPA determines may be appropriate, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.

(7) Contract termination: debarment.

A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

(8) Compliance with Davis-Bacon and Related Act requirements.

All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.

(9) Disputes concerning labor standards.

Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and Subrecipient(s), State, EPA, the U.S. Department of Labor, or the employees or their representatives.

(10) Certification of eligibility.

(i) By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

4. Contract Provision for Contracts in Excess of \$100,000.

(a) Contract Work Hours and Safety Standards Act. The subrecipient shall insert the following clauses set forth in paragraphs (a)(1), (2), (3), and (4) of this section in full in any contract in an amount in excess of \$100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by Item 3, above or 29 CFR 4.6. As used in this paragraph, the terms laborers and mechanics include watchmen and guards.

(1) Overtime requirements.

No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

(2) Violation; liability for unpaid wages; liquidated damages.

In the event of any violation of the clause set forth in paragraph (a)(1) of this section the contractor and any subcontractor responsible therefore shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (a)(1) of this section, in the sum of \$10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (a)(1) of this section.

(3) Withholding for unpaid wages and liquidated damages.

The subrecipient, upon written request of the EPA Award Official or an authorized representative of the Department of Labor, shall withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (b)(2) of this section.

(4) Subcontracts.

The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (a)(1) through (4) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (a)(1) through (4) of this section.

(b) In addition to the clauses contained in Item 3, above, in any contract subject only to the Contract Work Hours and Safety Standards Act and not to any of the other statutes cited in 29 CFR 5.1, the Subrecipient shall insert a clause requiring that the contractor or subcontractor shall maintain payrolls and basic payroll records during the course of the work and shall preserve them for a period of three years from the completion of the contract for all laborers and mechanics, including guards and watchmen, working on the contract. Such records shall contain the name and address of each such employee, social security number, correct classifications, hourly rates of wages paid, daily and weekly number of hours worked, deductions made, and actual wages paid. Further, the Subrecipient shall insert in any such contract a clause providing that the records to be maintained under this paragraph shall be made available by the contractor or subcontractor for inspection, copying, or transcription by authorized representatives of the (write the name of agency) and the Department of Labor, and the contractor or subcontractor will permit such representatives to interview employees during working hours on the job.

5. Compliance Verification

(a) The subrecipient shall periodically interview a sufficient number of employees entitled to DB prevailing wages (covered employees) to verify that contractors or subcontractors are paying the appropriate wage rates. As provided in 29 CFR 5.6(a)(6), all interviews must be conducted in confidence. The subrecipient must use Standard Form 1445 (SF 1445) or equivalent documentation to memorialize the interviews. Copies of the SF 1445 are available from EPA on request.

(b) The subrecipient shall establish and follow an interview schedule based on its assessment of the risks of noncompliance with DB posed by contractors or subcontractors and the duration of the contract or subcontract. At a minimum, the subrecipient should conduct interviews with a representative group of covered employees within two weeks of each contractor or subcontractor's submission of its initial weekly payroll data and two weeks prior to the estimated completion date for the contract or subcontract. Subrecipients must conduct more frequent interviews if the initial interviews or other information

indicates that there is a risk that the contractor or subcontractor is not complying with DB. Subrecipients shall immediately conduct necessary interviews in response to an alleged violation of the prevailing wage requirements. All interviews shall be conducted in confidence.

(c) The subrecipient shall periodically conduct spot checks of a representative sample of weekly payroll data to verify that contractors or subcontractors are paying the appropriate wage rates. The subrecipient shall establish and follow a spot check schedule based on its assessment of the risks of noncompliance with DB posed by contractors or subcontractors and the duration of the contract or subcontract. At a minimum, if practicable, the subrecipient should spot check payroll data within two weeks of each contractor or subcontractor's submission of its initial payroll data and two weeks prior to the completion date the contract or subcontract . Subrecipients must conduct more frequent spot checks if the initial spot check or other information indicates that there is a risk that the contractor or subcontractor is not complying with DB. In addition, during the examinations the subrecipient shall verify evidence of fringe benefit plans and payments there under by contractors and subcontractors who claim credit for fringe benefit contributions.

(d) The subrecipient shall periodically review contractors and subcontractors use of apprentices and trainees to verify registration and certification with respect to apprenticeship and training programs approved by either the U.S Department of Labor or a state, as appropriate, and that contractors and subcontractors are not using disproportionate numbers of, laborers, trainees and apprentices. These reviews shall be conducted in accordance with the schedules for spot checks and interviews described in Item 5(b) and (c) above.

(e) Subrecipients must immediately report potential violations of the DB prevailing wage requirements to the EPA DB contact listed above and to the appropriate DOL Wage and Hour District Office listed at <https://www.dol.gov/agencies/whd/contact/local-offices>.

"General Decision Number: AL20240066 01/05/2024

Superseded General Decision Number: AL20230066

State: Alabama

Construction Type: Heavy
Including Water and Sewer Line Construction

County: De Kalb County in Alabama.

Note: Contracts subject to the Davis-Bacon Act are generally required to pay at least the applicable minimum wage rate required under Executive Order 14026 or Executive Order 13658. Please note that these Executive Orders apply to covered contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but do not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(1).

If the contract is entered into on or after January 30, 2022, or the contract is renewed or extended (e.g., an option is exercised) on or after January 30, 2022: Executive Order 14026 generally applies to the contract. The contractor must pay all covered workers at least \$17.20 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in 2024.

If the contract was awarded on or between January 1, 2015 and January 29, 2022, and the contract is not renewed or extended on or after January 30, 2022: Executive Order 13658 generally applies to the contract. The contractor must pay all covered workers at least \$12.90 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on that contract in 2024.

The applicable Executive Order minimum wage rate will be adjusted annually. If this contract is covered by one of the Executive Orders and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must still submit a conformance request.

Additional information on contractor requirements and worker protections under the Executive Orders is available at <http://www.dol.gov/whd/govcontracts>.

Modification Number Publication Date
 0 01/05/2024

ENGI0320-005 01/01/2010

Rates Fringes

Power equipment operators:
 Cherry Picker (Hydraulic
 Crane Under 100 Ton).....\$ 21.08 8.31
 Crane (Hydraulic &
 Conventional Cranes 100
 Ton and Over).....\$ 22.08 8.31
 Oiler.....\$ 18.42 8.31

 SUAL2007-151 11/28/2007

Rates Fringes

ELECTRICIAN.....\$ 15.96 ** 3.57
 LABORER: Common or General.....\$ 8.00 ** 0.00
 LABORER: Pipelayer.....\$ 10.13 ** 0.00
 OPERATOR: Backhoe.....\$ 13.46 ** 0.00
 OPERATOR: Bulldozer.....\$ 16.60 ** 2.64
 OPERATOR: Drill.....\$ 9.50 ** 2.36
 OPERATOR: Grader/Blade.....\$ 12.59 ** 1.33
 OPERATOR: Loader (Front End)....\$ 11.67 ** 0.00
 OPERATOR: Roller.....\$ 9.45 ** 0.00
 OPERATOR: Scraper.....\$ 9.78 ** 0.18
 OPERATOR: Trackhoe.....\$ 12.00 ** 0.00
 TRUCK DRIVER.....\$ 15.70 ** 5.86

 WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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** Workers in this classification may be entitled to a higher minimum wage under Executive Order 14026 (\$17.20) or 13658 (\$12.90). Please see the Note at the top of the wage determination for more information. Please also note that the minimum wage requirements of Executive Order 14026 are not currently being enforced as to any contract or subcontract to which the states of Texas, Louisiana, or Mississippi, including their agencies, are a party.

Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at <https://www.dol.gov/agencies/whd/government-contracts>.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (iii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of ""identifiers"" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than ""SU"" or ""UAVG"" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of

the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the ""SU"" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
- * a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour National Office because National Office has responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

=====
END OF GENERAL DECISION"

XVI – American Iron and Steel Requirement





Section 4.13 Compliance with 2014 Appropriations Act. (a) The Loan Recipient agrees to comply with all federal requirements applicable to the Authority Loan (including those imposed by P.L. 113-76, Consolidated Appropriations Act (the "2014 Appropriations Act") and related SRF Policy Guidelines) which the Loan Recipient understands includes, among other things, requirements that all of the iron and steel products used in the Project are to be produced in the United States ("American Iron and Steel") unless (i) the Loan Recipient has requested and obtained a waiver from the U.S. Environmental Protection Agency pertaining to the Project or (ii) the Authority has otherwise advised the Loan Recipient in writing that the Buy American Requirement is not applicable to the Project. .

(b) The Loan Recipient also agrees to comply with all recordkeeping and reporting requirements under the Clean Water Act (codified generally under 33 U.S.C. §1251 et seq.) (the "Clean Water Act"), including any reports required by a federal agency or the Authority such as performance indicators of program deliverables, information on costs and Project progress. The Loan Recipient understands that (i) each contract and subcontract related to the Project is subject to audit by appropriate federal and state entities, and (ii) failure to comply with the Clean Water Act and this Agreement may be an Event of Default hereunder that results in a repayment of the Authority Loan in advance of the maturity of the Evidence of Indebtedness and/or other remedial actions.

The Loan Recipient agrees to cause all contractors and subcontractors to comply with (through the inclusion of appropriate terms and conditions in all contracts, subcontracts and lower tiered transactions, such terms and conditions to be in substantially the form set forth in connection with the development and construction of the project



The Contractor acknowledges to and for the benefit of the City of Fort Payne Alabama ("Purchaser"), and the Alabama Water Pollution Control Authority or the Drinking Water Finance Authority (the "State Authority") that it understands the goods and services under this Agreement are being funded with monies made available by the Clean Water State Revolving Fund that have statutory requirements commonly known as "American Iron and Steel;" that requires all of the iron and steel products used in the project to be produced in the United States ("American Iron and Steel") including iron and steel products provided by the Contractor pursuant to this Agreement. The Contractor hereby represents and warrants to and for the benefit of the Purchaser and the State Authority that (a) the Contractor has reviewed and understands the American Iron and Steel Requirement, (b) all of the iron and steel products used in the project will be and/or have been produced in the United States in a manner that complies with the American Iron and Steel Requirement, unless a waiver of the requirement is approved, and (c) the Contractor will provide any further verified information, certification or assurance of compliance with this paragraph, or information necessary to support a waiver of the American Iron and Steel Requirement, as may be requested by the Purchaser or the State Authority. Notwithstanding any other provision of this Agreement, any failure to comply with this paragraph by the Contractor shall permit the Purchaser or State Authority to recover as damages against the Contractor any loss, expense, or cost (including without limitation attorney's fees) incurred by the Purchaser or State Authority resulting from any such failure (including without limitation any impairment or loss of funding, whether in whole or in part, from the State Authority or any damages owed to the State Authority by the Purchaser). While the Contractor has no direct contractual privity with the State Authority, as a lender to the Purchaser for the funding of its project, the Purchaser and the Contractor agree that the State Authority is a third-party beneficiary and neither this paragraph (nor any other provision of this Agreement necessary to give this paragraph force or effect) shall be amended or waived without the prior written consent of the State Authority.

XVII – Project Sign Detail - CWSRF

| | | |
|---|---|--|
|  <p>ADEM Alabama Department of Environmental Management</p> | <p>STATE OF ALABAMA Honorable (name), Governor</p> |  |
| <p>ALABAMA WATER POLLUTION CONTROL AUTHORITY POLLUTION CONTROL PROJECT</p> <p>(NAME OF OWNER) (NAME OF PROJECT)</p> <p>\$(amount) STATE REVOLVING FUND LOAN</p> <p>(NAME OF CONTRACTOR) • CONTRACTOR (NAME OF ENGINEER) • CONSULTING ENGINEER</p> <p>ALABAMA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT U.S. ENVIRONMENTAL PROTECTION AGENCY</p> | | |
|  | |  |

1. Sign is to be constructed of ½” MDO plywood, 4’ x 8’. Alternate materials may be used if approved by ADEM prior to use.
2. Paint with two (2) coats oil-base enamel before lettering.
3. Background color white; lettering black.
4. Lettering may be painted or vinyl. All lettering sizes to be proportionate to sign layout.
5. Sign shall be attached to 4” x 4” x 8’ treated posts. Alternatives may be used if approved by ADEM prior to use.
6. Sign shall be placed in prominent location, easily readable from existing street or roadway.
7. Sign shall be maintained in good condition until completion of project.

XVIII – Project Sign Detail - DWSRF

| | | |
|---|---|---|
|  <p>ADEM Alabama Department of Environmental Management</p> | <p>STATE OF ALABAMA Honorable (Name), Governor</p> |  |
| <p>ALABAMA DRINKING WATER FINANCE AUTHORITY INFRASTRUCTURE PROJECT</p> | | |
| <p>(NAME OF OWNER) (NAME OF PROJECT)</p> | | |
| <p>\$(amount) STATE REVOLVING FUND LOAN</p> | | |
| <p>(NAME OF CONTRACTOR) • CONTRACTOR (NAME OF ENGINEER) • CONSULTING ENGINEER</p> | | |
| <p>ALABAMA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT U.S. ENVIRONMENTAL PROTECTION AGENCY</p> | | |

Two vertical rectangular posts are shown below the sign frame, one on the left and one on the right, representing the support structure for the sign.

1. Sign is to be constructed of ½” MDO plywood, 4’ x 8’. Alternate materials may be used if approved by ADEM prior to use.
2. Paint with two (2) coats oil-base enamel before lettering.
3. Background color white; lettering black.
4. Lettering may be painted or vinyl. All lettering sizes to be proportionate to sign layout.
5. Sign shall be attached to 4” x 4” x 8’ treated posts. Alternatives may be used if approved by ADEM prior to use.
6. Sign shall be placed in prominent location, easily readable from existing street or roadway.
7. Sign shall be maintained in good condition until completion of project.

XIX – Construction Contract Requirements

This checklist is to be completed by the Loan Recipient (Owner)/Engineer when submitting plans and specifications to the SRF Section for review. It affirms to the SRF reviewer that the Loan Recipient (Owner)/Engineer has addressed these items (in boilerplate form) within the specifications manual.

| Contract Page No. | Satisfied Yes/No | |
|---------------------------------|------------------|--|
| <u>I-1 & I-2</u> | <u>Yes</u> | Bid Advertisement (including date, time, and location of bid opening). |
| <u>I-3 & II-8</u> | <u>Yes</u> | Bid Bond. |
| <u>I-3 & III-7</u> | <u>Yes</u> | Performance Bond (100%). |
| <u>I-3 & III-5</u> | <u>Yes</u> | Payment Bond (Not less than 50%). |
| <u>II-2, III-1 & III-13</u> | <u>Yes</u> | Contract Length. |
| <u>V-15</u> | <u>Yes</u> | Liquidated Damages. |
| <u>V-6 - V-10</u> | <u>Yes</u> | Liability Insurance (including workman's comp, public liability, and builder's risk, if applicable). |
| <u>V-14 & V-15</u> | <u>Yes</u> | Method of Award (i.e. lowest, responsive, responsible bidder). |
| <u>N/A</u> | <u>N/A</u> | Air testing of gravity sewers (if applicable). |

Within 14 days after the bid opening, the Loan Recipient (Owner)/Engineer is to prepare the Project Review and Cost Summary (per the **PR&CS Checklist, page SGC-39**) and submit it to the SRF Section of ADEM. Upon completion of review, a written ATA (Approval-to-Award) will be issued.

NOTE:

The Loan Recipient (Owner) assumes all financial risk, if the construction contract is awarded prior to the issuance of an ATA letter by the SRF Section.

XX – Project Review and Cost Summary

| | | |
|---|-------------------------------------|-------------------------|
| ADEM Alabama Department of Environmental Management | SRF Project Review and Cost Summary | Form Revised 07-2021 |
| <p>This form is to be completed and submitted (with supporting documentation) to the SRF Section <u>within 14 days after bid opening</u>. Following satisfactory review, an ATA (Approval-to-Award) letter will be issued. After the ATA is issued/award of the contract, a pre-construction conference should be scheduled (with the SRF Project Manager in attendance). <u>A complete, bound set of the executed contract documents manual should be forwarded to the SRF Section for review and written approval following the pre-construction conference.</u></p> | | |
| Loan Recipient: <u>City of Fort Payne</u> Project Number: <u>CS010396-07</u> | | |
| Project Name: <u>Contract No. 5 - Upgrades to Fort Payne Wastewater Treatment Plant</u> | | |
| Contract Number: _____ Contract Name: _____ | | |
| 1. Date of plans and specifications concurrence letter from ADEM-SRF Section: _____ | | |
| Date of construction permit issuance from ADEM-DW Branch: _____ | | |
| 2. Attach copies of the following documents: | | |
| ___ a. Bid advertisement with certification by publisher and date(s) of publication. | | |
| ___ b. Certified bid tabulation. | | |
| ___ c. Proposal of the selected bidder. | | |
| ___ d. Bid bond. | | |
| ___ e. Engineer's letter to the loan recipient recommending award of the contract. If the award is made to other than the low bidder, provide justification. | | |
| ___ f. Site certificates for the project, if not previously submitted with the SRF loan application. | | |
| ___ g. <u>DBE Documentation from the loan recipient (owner) and the prime contractor.</u> Utilization, solicitation and documentation requirements (with a list of required documents) are discussed in detail in Parts III - V (pages SGC-3 - SGC-23) of the ADEM <i>SRF Supplemental General Conditions</i> for SRF Assisted Public Drinking Water and Wastewater Facilities Construction Contracts. | | |
| ___ h. Copy of the wage determination used in bidding. | | |
| ___ i. Any addenda that have been issued after ADEM review of the plans and specifications. | | |
| Comments: | | |
| _____ | | |
| _____ | | |

PART IV
GENERAL CONDITIONS

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| 1. | Definitions | 15. | Time for Completion and Liquidated Damages |
| 2. | Additional Instructions and Detail Drawings | 16. | Correction of Work |
| 3. | Schedules, Reports & Records | 17. | Subsurface Conditions |
| 4. | Drawings & Specifications | 18. | Suspension of Work, Termination and Delay |
| 5. | Shop Drawings | 19. | Payments to Contractors |
| 6. | Materials, Services, and Facilities | 20. | Acceptance of Final Payment |
| 7. | Inspection & Testing | 21. | Insurance |
| 8. | Substitutions | 22. | Contract Security |
| 9. | Patents | 23. | Assignments |
| 10. | Surveys, Permits and Regulations | 24. | Indemnification |
| 11. | Protection of Work, Property and Persons | 25. | Separate Contracts |
| 12. | Supervision by Contractor | 26. | Subcontracting |
| 13. | Changes in the Work | 27. | Engineer's Authority |
| 14. | Changes in Contract Time | 28. | Land & Rights-of-Way |
| | | 29. | Guaranty |
| | | 30. | Arbitration |
| | | 31. | Taxes |
| | | 32. | Document Ownership |

1. Definitions

- 1.1 Wherever used in the CONTRACT DOCUMENTS, the following terms shall have the meanings indicated which shall be applicable to both the singular and plural thereof:
- 1.2 ADDENDA - Written or graphic instruments issued prior to the execution of the Agreement which modify or interpret the CONTRACT DOCUMENTS, DRAWINGS and SPECIFICATIONS, by additions, deletions, clarifications, or corrections.
- 1.3 BID - The offer or proposal of the BIDDER submitted on the prescribed form setting forth the prices for the WORK to be performed.
- 1.4 BIDDER - Any person, firm, or corporation submitting a BID for the WORK.
- 1.5 BONDS - Bid, Performance, and Payment Bonds and other instruments of security, furnished by the CONTRACTOR and his surety in accordance with the CONTRACT DOCUMENTS.
- 1.6 CHANGE ORDER - A written order to the CONTRACTOR authorizing an addition, deletion, or revision in the WORK within the general scope of the CONTRACT DOCUMENTS, or authorizing an adjustment in the CONTRACT PRICE or CONTRACT TIME.
- 1.7 CONTRACT DOCUMENTS - The contract, including Advertisement for Bids, Information for Bidders, BID, Bid Bond, Agreement, Payment Bond, Performance Bond, NOTICE OF AWARD, NOTICE TO PROCEED, CHANGE ORDER, DRAWINGS, SPECIFICATIONS, and ADDENDA.
- 1.8 CONTRACT PRICE - The total monies payable to the CONTRACTOR under the terms and conditions of the CONTRACT DOCUMENTS.
- 1.9 CONTRACT TIME - The number of calendar days stated in the CONTRACT DOCUMENTS for the completion of the WORK.
- 1.10 CONTRACTOR - The person, firm, or corporation with whom the OWNER has executed the Agreement.

- 1.11 DRAWINGS - The part of the CONTRACT DOCUMENTS which show the characteristics and scope of the WORK to be performed and which have been prepared or approved by the ENGINEER.
- 1.12 ENGINEER - The person, firm, or corporation named as such in the CONTRACT DOCUMENTS.
- 1.13 FIELD ORDER - A written order effecting a change in the WORK not involving an adjustment in the CONTRACT PRICE or an extension of the CONTRACT TIME, issued by the ENGINEER to the CONTRACTOR during construction.
- 1.14 NOTICE OF AWARD - The written notice of the acceptance of the BID from the OWNER to the successful BIDDER.
- 1.15 NOTICE TO PROCEED - Written communication issued by the OWNER to the CONTRACTOR authorizing him to proceed with the WORK and establishing the date of commencement of the WORK.
- 1.16 OWNER - A public or quasi-public body or authority, corporation, association, partnership, or individual for whom the WORK is to be performed.
- 1.17 PROJECT - The undertaking to be performed as provided in the CONTRACT DOCUMENTS.
- 1.18 RESIDENT PROJECT REPRESENTATIVE - The authorized representative of the OWNER who is assigned to the PROJECT site or any part thereof.
- 1.19 SHOP DRAWINGS - All drawings, diagrams, illustrations, brochures, schedules, and other data which are prepared by the CONTRACTOR, a SUBCONTRACTOR, manufacturer, SUPPLIER, or distributor, which illustrate how specific portions of the WORK shall be fabricated or installed.
- 1.20 SPECIFICATIONS - A part of the CONTRACT DOCUMENTS consisting of written descriptions of a technical nature of materials, equipment, construction systems, standards, and workmanship.
- 1.21 SUBCONTRACTOR - An individual, firm, or corporation having a direct contract with the CONTRACTOR or with any other SUBCONTRACTOR for the performance of a part of the WORK at the site.
- 1.22 SUBSTANTIAL COMPLETION - That date as certified by the ENGINEER when the construction of the PROJECT or a specified part thereof is sufficiently completed, in accordance with the CONTRACT DOCUMENTS, so that the PROJECT or specified part can be utilized for the purposes for which it is intended.
- 1.23 SUPPLEMENTAL GENERAL CONDITIONS - Modifications to General Conditions required by a Federal Agency for participation in the PROJECT and approved by the Agency in writing prior to inclusion in the CONTRACT DOCUMENTS, or such requirements that may be imposed by applicable state laws.
- 1.24 SUPPLIER - Any person or organization who supplies materials or equipment for the WORK, including that fabricated to a special design, but who does not perform labor at the site.
- 1.25 WORK - All labor necessary to produce the construction required by the CONTRACT DOCUMENTS, and all materials and equipment incorporated or to be incorporated in the PROJECT.
- 1.26 WRITTEN NOTICE - Any notice to any party of the Agreement relative to any part of this Agreement in writing and considered delivered and the service thereof completed, when posted by certified or registered mail to the said party at his last given address, or delivered in person to said party or his authorized representative on the WORK.

2. Additional Instructions and Detail Drawings

- 2.1 The CONTRACTOR may be furnished additional instructions and detail drawings, by the ENGINEER, as necessary to carry out the WORK required by the CONTRACT DOCUMENTS.
- 2.2 The additional drawings and instruction thus supplied will become a part of the CONTRACT DOCUMENTS. The CONTRACTOR shall carry out the WORK in accordance with the additional detail drawings and instructions.

3. Schedules, Reports, and Records

- 3.1 The CONTRACTOR shall submit to the OWNER such schedule of quantities and costs, progress schedules, payrolls, reports, estimates, records, and other data where applicable as required by the CONTRACT DOCUMENTS for the WORK to be performed.
- 3.2 Prior to the first partial payment estimate, the CONTRACTOR shall submit construction progress schedules showing the order in which he proposes to carry on the WORK, including dates at which he will start the various parts of the WORK, estimated date of completion of each part, and as applicable:
 - 3.2.1 The dates at which special detail drawings will be required; and
 - 3.2.2 Respective dates for submission of SHOP DRAWINGS, the beginning of manufacture, the testing and installation of materials, supplies, and equipment.
- 3.3 The CONTRACTOR shall also submit a schedule of payments that he anticipates he will earn during the course of the WORK.

4. Drawings and Specifications

- 4.1 The intent of the DRAWINGS and SPECIFICATIONS is that the CONTRACTOR shall furnish all labor, materials, tools, equipment, and transportation necessary for the proper execution of the WORK in accordance with the CONTRACT DOCUMENTS and all incidental work necessary to complete the PROJECT in an acceptable manner, ready for use, occupancy, or operation by the OWNER.
- 4.2 In case of conflict between the DRAWINGS and SPECIFICATIONS, the SPECIFICATIONS shall govern. Figure dimensions on DRAWINGS shall govern over scale dimensions, and detailed DRAWINGS shall govern over general DRAWINGS.
- 4.3 Any discrepancies found between the DRAWINGS and SPECIFICATIONS and site conditions or any inconsistencies or ambiguities in the DRAWINGS or SPECIFICATIONS shall be immediately reported to the ENGINEER, in writing, who shall promptly correct such inconsistencies or ambiguities in writing. WORK done by the CONTRACTOR after his discovery of such discrepancies, inconsistencies, or ambiguities shall be done at the CONTRACTOR's risk.

5. Shop Drawings

- 5.1 The CONTRACTOR shall provide SHOP DRAWINGS as may be necessary for the prosecution of the WORK as required by the CONTRACT DOCUMENTS. The ENGINEER shall review and take appropriate action on SHOP DRAWINGS, product data, samples, and other submittals required by the CONTRACT DOCUMENTS. Such review shall be only for general conformance with the design concept and general compliance with the information given in the CONTRACT DOCUMENTS. It shall not include review of quantities, dimensions, weights or gauges, fabrication processes, construction methods, coordination with the work of other trades, or construction safety precautions, all of which are the sole responsibility of the CONTRACTOR. The ENGINEER's review shall be conducted with reasonable promptness consistent with sound professional practice. Review of a specific item shall not indicate acceptance of an assembly of which the item is a component. The ENGINEER shall not be required to review and shall not be responsible for any deviations from the CONTRACT DOCUMENTS not clearly noted by the CONTRACTOR, nor shall the ENGINEER be required to review partial submissions or those for which submissions for correlated items have not been received.
- 5.2 When submitted for the ENGINEER's review, SHOP DRAWINGS shall bear the CONTRACTOR's certification that he has reviewed, checked, and approved the SHOP DRAWINGS and that they are in conformance with the requirements of the CONTRACT DOCUMENTS.
- 5.3 Portions of the WORK requiring a SHOP DRAWING or sample submission shall not begin until the SHOP DRAWING or submission has been processed by the ENGINEER. A copy of each SHOP DRAWING and each sample as reviewed by the ENGINEER shall be kept in good order by the CONTRACTOR at the site and shall be available to the ENGINEER.

6. Materials, Services, and Facilities

- 6.1 It is understood that, except as otherwise specifically stated in the CONTRACT DOCUMENTS, the CONTRACTOR shall provide and pay for all materials, labor, tools, equipment, water, light, power, transportation, supervision, temporary construction of any nature, and all other services and facilities of any nature whatsoever necessary to execute, complete, and deliver the WORK within the specified time.
- 6.2 Materials and equipment shall be so stored as to insure the preservation of their quality and fitness for the WORK. Stored materials and equipment to be incorporated in the WORK shall be located so as to facilitate prompt inspection.
- 6.3 Manufactured articles, materials, and equipment shall be applied, installed, connected, erected, used, cleaned, and conditioned as directed by the manufacturer.
- 6.4 Materials, supplies, and equipment shall be in accordance with samples submitted by the CONTRACTOR and approved by the ENGINEER.
- 6.5 Materials, supplies, or equipment to be incorporated into the WORK shall not be purchased by the CONTRACTOR or the SUBCONTRACTOR subject to a chattel mortgage or under a conditional sale contract or other agreement by which an interest is retained by the seller.

7. Inspection and Testing

- 7.1 All materials and equipment used in the construction of the PROJECT shall be subject to adequate inspection and testing in accordance with generally accepted standards, as required and defined in the CONTRACT DOCUMENTS.
- 7.2 The OWNER shall provide all inspection and testing services not required by the CONTRACT DOCUMENTS.
- 7.3 The CONTRACTOR shall provide at his expense the testing and inspection services required by the CONTRACT DOCUMENTS.
- 7.4 If the CONTRACT DOCUMENTS, laws, ordinances, rules, regulations, or orders of any public authority having jurisdiction require any WORK to specifically be inspected, tested, or approved by someone other than the CONTRACTOR, the CONTRACTOR will give the ENGINEER timely notice of readiness. The CONTRACTOR will then furnish the ENGINEER the required certificates of inspection, testing, or approval.
- 7.5 Inspections, tests, or approvals by the ENGINEER or others shall not relieve the CONTRACTOR from his obligations to perform the WORK in accordance with the requirements of the CONTRACT DOCUMENTS.
- 7.6 The ENGINEER and his representatives will at all times have access to the WORK. In addition, authorized representatives and agents of any participating Federal or State agency shall be permitted to inspect all work, materials, payrolls, records of personnel, invoices of materials, and other relevant data and records. The CONTRACTOR will provide proper facilities for such access and observation of the WORK and also for any inspection or testing thereof.
- 7.7 If any WORK is covered contrary to the written instructions of the ENGINEER, it must, if requested by the ENGINEER, be uncovered for his observation and replaced at the CONTRACTOR's expense.
- 7.8 If the ENGINEER considers it necessary or advisable that covered WORK be inspected or tested by others, the CONTRACTOR, at the ENGINEER's request, will uncover, expose, or otherwise make available for observation, inspection, or testing as the ENGINEER may require, that portion of the WORK in question, furnishing all necessary labor, materials, tools, and equipment. If it is found that such WORK is defective, the CONTRACTOR will bear all the expenses of such uncovering, exposure, observation, inspection and testing and of satisfactory reconstruction. If, however, such WORK is not found to be defective, the CONTRACTOR will be allowed an increase in the CONTRACT PRICE or an extension of CONTRACT TIME, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, and reconstruction, and an appropriate CHANGE ORDER shall be issued.

8. Substitutions

- 8.1 Whenever a material, article, or piece of equipment is identified on the DRAWINGS or SPECIFICATIONS by reference to brand name or catalog numbers, it shall be understood that this is referenced for the purpose of defining the performance or other salient requirements and that other products of equal capacities, quality, and function shall be considered. The CONTRACTOR may recommend the substitution of a material, article, or piece of equipment of equal substance and function for those referred to in the CONTRACT DOCUMENTS by reference to brand name or catalog number, and if, in the opinion of the ENGINEER, such material, article, or piece of equipment is of equal substance and function to that specified, the ENGINEER may approve its substitution and use by the CONTRACTOR. Any cost differential shall be deductible from the CONTRACT PRICE and the CONTRACT DOCUMENTS shall be appropriately modified by CHANGE ORDER. The CONTRACTOR warrants that if substitutes are approved, no major changes in the function or general design of the PROJECT will result. Incidental changes or extra component parts required to accommodate the substitute will be made by the CONTRACTOR without a change in the CONTRACT PRICE or CONTRACT TIME.

9. Patents

- 9.1 The CONTRACTOR shall pay all applicable royalties and license fees. He shall defend all suits or claims for infringement of any patent rights and save the OWNER harmless from loss on account thereof, except that the OWNER shall be responsible for any such loss when a particular process, design, or the product of a particular manufacturer or manufacturers is specified; however, if the CONTRACTOR has reason to believe that the design, process, or product specified is an infringement of a patent, he shall be responsible for such loss unless he promptly gives such information to the ENGINEER.

10. Surveys, Permits, Regulations

- 10.1 The OWNER shall furnish all boundary surveys and establish all base lines for locating the principal component parts of the WORK together with a suitable number of bench marks adjacent to the WORK as shown in the CONTRACT DOCUMENTS. From the information provided by the OWNER, unless otherwise specified in the CONTRACT DOCUMENTS, the CONTRACTOR shall develop and make all detail surveys needed for construction such as slope stakes, batter boards, stakes for pile locations, and other working points, liens, elevations, and cut sheets.
- 10.2 The CONTRACTOR shall carefully preserve bench marks, reference points and stakes and, in case of willful or careless destruction, he shall be charged with the resulting expense and shall be responsible for any mistake that may be caused by their unnecessary loss or disturbance.
- 10.3 Permits and licenses of a temporary nature necessary for the prosecution of the WORK shall be secured and paid for by the CONTRACTOR unless otherwise stated in the SUPPLEMENTAL GENERAL CONDITIONS. Permits, licenses, and easements for permanent structures or permanent changes in existing facilities shall be secured and paid for by the OWNER unless otherwise specified. The CONTRACTOR shall give all notices and comply with all laws, ordinances, rules, and regulations bearing on the conduct of the WORK as drawn and specified. If the CONTRACTOR observes that the CONTRACT DOCUMENTS are at a variance therewith, he shall promptly notify the ENGINEER in writing, and any necessary changes shall be adjusted as provided in Section 13, "Changes in the Work".

11. Protection of Work, Property, and Persons

- 11.1 The CONTRACTOR will be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the WORK. He will take all necessary precautions for the safety of, and will provide the necessary protection to prevent damage, injury or loss to all employees on the WORK and other persons who may be affected thereby, all the WORK and all materials or equipment to be incorporated therein, whether in storage on or off the site, and other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction.
- 11.2 The CONTRACTOR will comply with all applicable laws, ordinances, rules, regulations, and orders of any public body having jurisdiction. He will erect and maintain, as required by the conditions and progress of the WORK, all necessary safeguards for safety and protection. He will notify owners of adjacent utilities when prosecution of the WORK may affect them. The CONTRACTOR will remedy all damage, injury, or

loss to any property caused, directly or indirectly, in whole or part, by the CONTRACTOR, any SUBCONTRACTOR, or anyone directly or indirectly employed by any of them or anyone for whose acts any of them be liable, except damage or loss attributable to the fault of the CONTRACT DOCUMENTS or to the acts or omissions of the OWNER or the ENGINEER or anyone employed by either of them or anyone for whose acts either of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of the CONTRACTOR.

- 11.3 In emergencies affecting the safety of persons or the WORK or property at the site or adjacent thereto, the CONTRACTOR, without special instruction or authorization from the ENGINEER or OWNER, shall act to prevent threatened damage, injury, or loss. He will give the ENGINEER prompt WRITTEN NOTICE of any significant changes in the WORK or deviations from the CONTRACT DOCUMENTS caused thereby, and a CHANGE ORDER shall thereupon be issued covering the changes and deviations involved.
12. Supervision by Contractor
- 12.1 The CONTRACTOR will supervise and direct the WORK. He will be solely responsible for the means, methods, techniques, sequences, and procedures of construction. The CONTRACTOR will employ and maintain on the WORK a qualified supervisor or superintendent who shall have been designated in writing by the CONTRACTOR as the CONTRACTOR's representative at the site. The supervisor shall have full authority to act on behalf of the CONTRACTOR and all communications given to the supervisor shall be as binding as if given to the CONTRACTOR. The supervisor shall be present on site at all times as required to perform adequate supervision and coordination of the work.
13. Changes in the Work
- 13.1 The OWNER may at any time, as the need arises, order changes within the scope of the WORK without invalidating the Agreement. If such changes increase or decrease the amount due under the CONTRACT DOCUMENTS, or in the time required for performance of the WORK, an equitable adjustment shall be authorized by CHANGE ORDER.
- 13.2 The ENGINEER also may at any time, by issuing a FIELD ORDER, make changes in the details of the WORK. The CONTRACTOR shall proceed with the performance of any changes in the WORK so ordered by the ENGINEER unless the CONTRACTOR believes that such FIELD ORDER entitles him to a change in CONTRACT PRICE or TIME, or both, in which event he shall give the ENGINEER WRITTEN NOTICE thereof within 7 days after the receipt of the ordered change. Thereafter, the CONTRACTOR shall document the basis for the change in contract PRICE or TIME within 30 days. The CONTRACTOR shall not execute such changes pending the receipt of an executed CHANGE ORDER or further instruction from the OWNER.
14. Change in Contract Price
- 14.1 The CONTRACT PRICE may be changed only by a CHANGE ORDER. The value of any WORK covered by a CHANGE ORDER or of any claim for increase or decrease in the CONTRACT PRICE shall be determined by one or more of the following methods in order of precedence listed below:
- 14.1.1 Unit prices previously approved.
- 14.1.2 An agreed lump sum.
- 14.1.3 The actual cost for labor, direct overhead, materials, supplies, equipment, and other services necessary to complete the WORK. In addition, there shall be added an amount to be agreed upon, but not to exceed 15% of the actual cost of the WORK to cover the cost of general overhead and profit.
15. Time for Completion and Liquidated Damages
- 15.1 The date of beginning and the time for completion of the WORK are essential conditions of the CONTRACT DOCUMENTS and the WORK embraced shall be commenced on a date specified in the NOTICE TO PROCEED.

- 15.2 The CONTRACTOR will proceed with the WORK at such rate of progress to insure full completion within the CONTRACT TIME. It is expressly understood and agreed, by and between the CONTRACTOR and the OWNER, that the CONTRACT TIME for the completion of the WORK described herein is a reasonable time, taking into consideration the average climatic and economic conditions and other factors prevailing in the locality of the WORK.
- 15.3 If the CONTRACTOR shall fail to complete the WORK within the CONTRACT TIME, or extension of time granted by the OWNER, then the CONTRACTOR will pay to the OWNER the amount for liquidated damages as specified in the BID for each calendar day that the CONTRACTOR shall be in default after the time stipulated in the CONTRACT DOCUMENTS.
- 15.4 The CONTRACTOR shall not be charged with liquidated damages or any excess cost when the delay in completion of the WORK is due to the following, and the CONTRACTOR has promptly given WRITTEN NOTICE of such delay to the OWNER or ENGINEER.
 - 15.4.1 To any preference, priority, or allocation order duly issued by the OWNER.
 - 15.4.2 To unforeseeable causes beyond the control and without the fault or negligence of the CONTRACTOR, including, but not restricted to, acts of God, or of the public enemy, acts of the OWNER, acts of another CONTRACTOR in the performance of a contract with the OWNER, fires, flood, epidemics, quarantine restrictions, strikes, freight embargoes, and abnormal and unforeseeable weather.
 - 15.4.3 To any delays of SUBCONTRACTORS occasioned by any of the causes specified in Paragraph 15.4.1 and 15.4.2 of this article.
- 16. Correction of Work
 - 16.1 The CONTRACTOR shall promptly remove from the premises all WORK rejected by the ENGINEER for failure to comply with the CONTRACT DOCUMENTS, whether incorporated in the construction or not, and the CONTRACTOR shall promptly replace and re-execute the WORK in accordance with the CONTRACT DOCUMENTS and without expense to the OWNER and shall bear the expense of making good all WORK of other CONTRACTORS destroyed or damaged by such removal or replacement.
 - 16.2 All removal and replacement WORK shall be done at the CONTRACTOR's expense. If the CONTRACTOR does not take action to remove such rejected WORK within 10 days after receipt of WRITTEN NOTICE, the OWNER may remove such WORK and store the materials at the expense of the CONTRACTOR.
- 17. Subsurface Conditions
 - 17.1 The CONTRACTOR shall promptly, and before such conditions are disturbed, except in the event of an emergency, notify the OWNER by WRITTEN NOTICE of:
 - 17.1.1 Subsurface or latent physical conditions at the site differing materially from those indicated in the CONTRACT DOCUMENTS; or
 - 17.1.2 Unknown physical conditions at the site, or an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in WORK of the character provided for in the CONTRACT DOCUMENTS.
 - 17.2 The OWNER shall promptly investigate the conditions, and if he finds that such conditions do so materially differ and cause an increase or decrease in the cost of, or in the time required for, performance of the WORK, an equitable adjustment shall be made and the CONTRACT DOCUMENTS shall be modified by a CHANGE ORDER. Any claim of the CONTRACTOR for adjustment hereunder shall not be allowed unless he has given the required WRITTEN NOTICE; provided that the OWNER may, if he determines the facts so justify, consider and adjust any such claims asserted before the date of final payment.

18. Suspension of Work, Termination, and Delay

- 18.1 The OWNER may suspend the WORK or any portion thereof for a period of not more than 90 days or such further time as agreed upon by the CONTRACTOR, by WRITTEN NOTICE to the CONTRACTOR and the ENGINEER which notice shall fix the date on which WORK shall be resumed. The CONTRACTOR will resume that WORK on the date so fixed. The CONTRACTOR will be allowed an increase in the CONTRACT PRICE or an extension of the CONTRACT TIME, or both, directly attributable to any suspension.
- 18.2 If the CONTRACTOR is adjudged as bankrupt or insolvent, or if he makes a general assignment for the benefit of his creditors, or if a trustee or receiver is appointed for the CONTRACTOR or for any of his property, or if he files a petition to take advantage of any debtor's act, or to reorganize under the bankruptcy or applicable laws, or if he fails repeatedly to supply sufficient skilled workmen or suitable materials or equipment, or if he fails repeatedly to make prompt payments to SUBCONTRACTORS or for labor, materials, or equipment, or if he disregards laws, ordinances, rules, regulations, or orders of any public body having jurisdiction of the WORK, or if he disregards the authority of the ENGINEER, or if he otherwise violates any provision of the CONTRACT DOCUMENTS, then the OWNER may, without prejudice to any other right or remedy and after giving the CONTRACTOR and his surety a minimum of 10 days from delivery of a WRITTEN NOTICE, terminate the services of the CONTRACTOR and take possession of the PROJECT and of all materials, equipment, tools, construction equipment, and machinery thereon owned by the CONTRACTOR, and finish the WORK by whatever method he may deem expedient. In such case, the CONTRACTOR shall not be entitled to receive any further payment until the WORK is finished. If the unpaid balance of the CONTRACT PRICE exceeds the direct and indirect costs of completing the PROJECT, including compensation for additional professional services, such excess SHALL BE PAID TO THE CONTRACTOR. If such costs exceed such unpaid balance, the CONTRACTOR will pay the difference to the OWNER. Such costs incurred by the OWNER will be determined by the ENGINEER and incorporated in a CHANGE ORDER.
- 18.3 Where the CONTRACTOR's services have been so terminated by the OWNER, said termination shall not affect any right of the OWNER against the CONTRACTOR then existing or which may thereafter accrue. Any retention or payment of monies by the OWNER due the CONTRACTOR will not release the CONTRACTOR from compliance with the CONTRACT DOCUMENTS.
- 18.4 After 10 days from delivery of a WRITTEN NOTICE to the CONTRACTOR and the ENGINEER, the OWNER may, without cause and without prejudice to any other right or remedy, elect to abandon the PROJECT and terminate the CONTRACT. In such case, the CONTRACTOR shall be paid for all WORK executed and any expense sustained plus reasonable profit.
- 18.5 If, through no act or fault of the CONTRACTOR, the WORK is suspended for a period of more than 90 days by the OWNER or under an order of court or other public authority, or the ENGINEER fails to act on any request for payment within 30 days after it is submitted, or the OWNER fails to pay the CONTRACTOR substantially the sum approved by the ENGINEER or awarded by arbitrators within 30 days of its approval and presentation, then the CONTRACTOR may, after 10 days from delivery of a WRITTEN NOTICE to the OWNER and the ENGINEER, terminate the CONTRACT and recover from the OWNER payment for all WORK executed and all expenses sustained. In addition and in lieu of terminating the CONTRACT, if the ENGINEER has failed to act on a request for payment or if the OWNER has failed to make any payment as aforesaid, the CONTRACTOR may upon 10 days WRITTEN NOTICE to the OWNER and the ENGINEER stop the WORK until he has been paid all amounts then due, in which event and upon resumption of the WORK, CHANGE ORDERS shall be issued for adjusting the CONTRACT PRICE or extending the CONTRACT TIME or both to compensate for the costs and delays attributable to the stoppage of the WORK.
- 18.6 If the performance of all or any portion of the WORK is suspended, delayed, or interrupted as a result of a failure of the OWNER or ENGINEER to act within the time specified in the CONTRACT DOCUMENTS, or if no time is specified, within a reasonable time, an adjustment in the CONTRACT PRICE or an extension of the CONTRACT TIME, or both, shall be made by CHANGE ORDER to compensate the CONTRACTOR for the costs and delays necessarily caused by the failure of the OWNER or ENGINEER.

19. Payment to Contractor

- 19.1 At least 10 days before each progress payment falls due (but not more often than once a month), the CONTRACTOR will submit to the ENGINEER a partial payment estimate filled out and signed by the CONTRACTOR covering the WORK performed during the period covered by the partial payment estimate and supported by such data as the ENGINEER may reasonably require. If payment is requested on the

basis of materials and equipment not incorporated in the WORK, but delivered and suitably stored at or near the site, the partial payment estimate shall also be accompanied by such supporting data, satisfactory to the OWNER, as will establish the OWNER's title to the material and equipment and protect his interest therein, including applicable insurance. The ENGINEER will, within 10 days after receipt of each partial payment estimate, either indicate in writing his approval of payment and present the partial payment estimate to the OWNER, or return the partial payment estimate to the CONTRACTOR indicating in writing his reasons for refusing to approve payment. In the latter case, the CONTRACTOR may make the necessary corrections and resubmit the partial payment estimate. The OWNER will, within 10 days of presentation to him of an approved partial payment estimate, pay the CONTRACTOR a progress payment on the basis of the approved partial payment estimate. The OWNER shall retain 5% of the amount of each payment until final completion and acceptance of all work covered by the CONTRACT DOCUMENTS. The OWNER at any time, however, after 50% of the WORK has been completed, if he finds that satisfactory progress is being made, shall reduce retainage to 0% on the current and remaining estimates. On completion and acceptance of a part of the WORK on which the price is stated separately in the CONTRACT DOCUMENTS, payment may be made in full, including retained percentages, less authorized deductions.

- 19.2 The request for payment may also include an allowance for the cost of such major materials and equipment which are suitably stored either at or near the site.
- 19.3 Prior to SUBSTANTIAL COMPLETION, the OWNER, with the approval of the ENGINEER and with concurrence of the CONTRACTOR, may use any completed or substantially completed portions of the WORK. Such use shall not constitute an acceptance of such portions of the WORK.
- 19.4 The OWNER shall have the right to enter the premises for the purpose of doing work not covered by the CONTRACT DOCUMENTS. This provision shall not be construed as relieving the CONTRACTOR of the sole responsibility for the care and protection of the WORK, or the restoration of any damaged WORK except such as may be caused by agents or employees of the OWNER.
- 19.5 Upon completion and acceptance of the WORK, the ENGINEER shall issue a certificate attached to the final payment request that the WORK has been accepted by him under the conditions of the CONTRACT DOCUMENTS. The entire balance found to be due the CONTRACTOR, including the retained percentages, but except such sums as may be lawfully retained by the OWNER, shall be paid to the CONTRACTOR within 30 days of completion and acceptance of the WORK.
- 19.6 The CONTRACTOR will indemnify and save the OWNER or the OWNER's agents harmless from all claims growing out of the lawful demands of SUBCONTRACTORS, laborers, workmen, mechanics, materialmen, and furnishers of machinery and parts thereof, equipment, tools, and all supplies, incurred in the furtherance of the performance of the WORK. The CONTRACTOR shall, at the OWNER's request, furnish satisfactory evidence that all obligations of the nature designated above have been paid, discharged, or waived. If the CONTRACTOR fails to do so, the OWNER may, after having notified the CONTRACTOR, either pay unpaid bills or withhold from the CONTRACTOR's unpaid compensation a sum of money deemed reasonably sufficient to pay any and all such lawful claims until satisfactory evidence is furnished that all liabilities have been fully discharged whereupon payment to the CONTRACTOR shall be resumed in accordance with the terms of the CONTRACT DOCUMENTS, but in no event shall the provisions of this sentence be construed to impose any obligations upon the OWNER to either the CONTRACTOR, his Surety, or any third party. In paying any unpaid bills of the CONTRACTOR, any payment so made by the OWNER shall be considered as a payment made under the CONTRACT DOCUMENTS by the OWNER to the CONTRACTOR and the OWNER shall not be liable to the CONTRACTOR for any such payments made in good faith.
20. Acceptance of Final Payment as Release
- 20.1 The acceptance by the CONTRACTOR of final payment shall be and shall operate as a release to the OWNER of all claims and all liability to the CONTRACTOR other than claims in stated amounts as may be specifically excepted by the CONTRACTOR for all things done or furnished in connection with this WORK and for every act and neglect of the OWNER and others relating to or arising out of this WORK. Any payment, however, final or otherwise, shall not release the CONTRACTOR or his sureties from any obligations under the CONTRACT DOCUMENTS or the Performance BOND and Payment BONDS.

21. Insurance

- 21.1 The CONTRACTOR shall purchase and maintain such insurance as will protect him from claims set forth below which may arise out of or result from the CONTRACTOR's execution of the WORK, whether such execution be by himself or by any SUBCONTRACTOR or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:
- 21.1.1 Claims under workmen's compensation, disability benefit, and other similar employee benefit acts.
- 21.1.2 Claims for damages because of bodily injury, occupational sickness or disease, or death of his employees.
- 21.1.3 Claims for damages because of bodily injury, sickness or disease, or death of any person other than his employees.
- 21.1.4 Claims for damages insured by usual personal injury liability coverage which are sustained (1) by any person as a result of an offense directly or indirectly related to the employment of such person by the CONTRACTOR, or (2) by any other person.
- 21.1.5 Claims for damages because of injury to or destruction of tangible property, including loss of use resulting therefrom.
- 21.2 Certificates of Insurance acceptable to the OWNER shall be filed with the OWNER prior to commencement of the WORK. These Certificates shall contain a provision that coverages afforded under the policies will not be canceled unless at least 15 days prior WRITTEN NOTICE has been given to the OWNER.
- 21.3 The CONTRACTOR shall procure and maintain, at his own expense, during the CONTRACT TIME, Liability Insurance as hereinafter specified:
- 21.3.1 CONTRACTOR's General Public Liability and Property Damage Insurance including vehicle coverage issued to the CONTRACTOR and protecting him from all claims for personal injury, including death, and all claims for destruction of or damage to property, arising out of or in connection with any operations under the CONTRACT DOCUMENTS, whether such operations be by himself or by any SUBCONTRACTOR under him, or anyone directly or indirectly employed by the CONTRACTOR or by a SUBCONTRACTOR under him. Insurance shall be written with a limit of liability of not less than \$500,000 for all damages arising out of bodily injury, including death, at any time resulting therefrom, sustained by any one person in any one accident; and a limit of liability of not less than \$500,000 aggregate for any such damages sustained by two or more persons in any one accident. Insurance shall be written with a limit of liability of not less than \$200,000 for all property damage sustained by any one person in any one accident; and a limit of liability of not less than \$200,000 aggregate for any such damage sustained by two or more persons in any one accident.
- 21.3.2 The CONTRACTOR shall acquire and maintain, if applicable, Fire and Extended Coverage Insurance upon the PROJECT to the full insurable value thereof for the benefit of the OWNER, the CONTRACTOR, and SUBCONTRACTORS as their interests may appear. This provision shall in no way release the CONTRACTOR or CONTRACTOR's surety from obligations under the CONTRACT DOCUMENTS to fully complete the PROJECT.
- 21.4 The CONTRACTOR shall procure and maintain, at his own expense, during the CONTRACT TIME, in accordance with the provisions of the laws of the state in which the working is performed, Workmen's Compensation Insurance, including occupational disease provisions, for all of his employees at the site of the PROJECT and in case any work is sublet, the CONTRACTOR shall require such SUBCONTRACTOR's similarly to provide Workmen's Compensation Insurance, including occupational disease provisions for all of the latter's employees unless such employees are covered by the protection afforded by the CONTRACTOR. In case any class of employees engaged in hazardous work under this contract at the site of the PROJECT is not protected under Workmen's Compensation statute, the CONTRACTOR shall provide, and shall cause each SUBCONTRACTOR to provide, adequate and suitable insurance for the protection of his employees not otherwise protected.

- 21.5 The CONTRACTOR shall secure, if applicable, "All Risk" type Builder's Risk Insurance for WORK to be performed. Unless specifically authorized by the OWNER, the amount of such insurance shall not be less than the CONTRACT PRICE totaled in the BID. The policy shall cover not less than the losses due to fire, explosion, hail, lightning, vandalism, malicious mischief, wind, collapse, riot, aircraft, and smoke during the CONTRACT TIME, and until the WORK is accepted by the OWNER. The policy shall name as the insured the CONTRACTOR, the ENGINEER and the OWNER.
22. Contract Security
- 22.1 The CONTRACTOR shall within 10 days after the receipt of the NOTICE OF AWARD furnish the OWNER with a Performance BOND and a Payment BOND in penal sums equal to the amount of the CONTRACT PRICE, conditioned upon the performance by the CONTRACTOR of all undertakings, covenants, terms, conditions, and agreements of the CONTRACT DOCUMENTS, and upon prompt payment by the CONTRACTOR to all persons supplying labor and materials in the prosecution of the WORK provided by the CONTRACT DOCUMENTS. Such BONDS shall be executed by the CONTRACTOR and a corporate bonding company licensed to transact such business in the state in which the WORK is to be performed and named on the current list of "Surety Companies Acceptable on Federal Bonds" as published in the Treasury Department Circular Number 570. The expense of these BONDS shall be borne by the CONTRACTOR. If at any time, a surety on any such BOND is declared a bankrupt or loses its right to do business in the state in which the WORK is to be performed or is removed from the list of Surety Companies accepted on Federal BONDS, CONTRACTOR shall within 10 days after notice from the OWNER to do so, substitute an acceptable BOND (or BONDS) in such form and sum and signed by such other surety or sureties as may be satisfactory to the OWNER. The premiums on such BOND shall be paid by the CONTRACTOR. No further payment shall be deemed due nor shall be made until the new surety or sureties shall have furnished an acceptable BOND to the OWNER.
23. Assignments
- 23.1 Neither the CONTRACTOR nor the OWNER shall sell, transfer, assign, or otherwise dispose of the CONTRACT or any portion thereof, or of his right, title, or interest therein, or his obligations thereunder, without written consent of the other party.
24. Indemnification
- 24.1 The CONTRACTOR will indemnify and hold harmless the OWNER and the ENGINEER and their agents and employees from and against all claims, damages, losses, and expenses, including attorney's fees arising out of or resulting from the performance of the WORK, provided that any such claims, damage, loss, or expense is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property including the loss of use resulting therefrom; and is caused in whole or in part by any negligent or willful act or omission of the CONTRACTOR, and SUBCONTRACTOR, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable.
- 24.2 In any and all claims against the OWNER or the ENGINEER, or any of their agents or employees, by any employee of the CONTRACTOR, any SUBCONTRACTOR, anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable, the indemnification obligation shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for the CONTRACTOR or any SUBCONTRACTOR under workmen's compensation acts, disability benefit acts, or other employee benefit acts.
- 24.3 The obligation of the CONTRACTOR under this Paragraph shall not extend to the liability of the ENGINEER, his agents or employees arising out of the preparation or approval of maps, DRAWINGS, opinions, reports, surveys, CHANGE ORDERS, designs, or SPECIFICATIONS.
25. Separate Contracts
- 25.1 The OWNER reserves the right to let other contracts in connection with this PROJECT. The CONTRACTOR shall afford other CONTRACTORS reasonable opportunity for the introduction and storage of their materials and the execution of their WORK, and shall properly connect and coordinate his WORK with theirs. If the proper execution or results of any part of the CONTRACTOR's WORK depends

upon the WORK of any other CONTRACTOR, the CONTRACTOR shall inspect and promptly report to the ENGINEER any defects in such WORK that render it unsuitable for such proper execution and results.

25.2 The OWNER may perform additional WORK related to the PROJECT by himself, or he may let other contracts containing provisions similar to these. The CONTRACTOR will afford the other CONTRACTORS who are parties to such Contracts (or the OWNER, if he is performing the additional WORK himself) reasonable opportunity for the introduction and storage of materials and equipment and the execution of WORK, and shall properly connect and coordinate his work with theirs.

25.3 If the performance of additional WORK by other CONTRACTORS or the OWNER is not noted in the CONTRACT DOCUMENTS prior to the execution of the CONTRACT, WRITTEN NOTICE thereof shall be given to the CONTRACTOR prior to starting any such additional WORK. If the CONTRACTOR believes that the performance of such additional WORK by the OWNER or others involves him in additional expense or entitles him to an extension of the CONTRACT TIME, he may make a claim therefor as provided in Sections 14 and 15.

26. Subcontracting

26.1 The CONTRACTOR may utilize the services of specialty SUBCONTRACTORS on those parts of the WORK which, under normal contracting practices, are performed by specialty SUBCONTRACTORS.

26.2 The CONTRACTOR shall not award WORK to SUBCONTRACTOR(s), in excess of 50% of the CONTRACT PRICE, without prior written approval of the OWNER.

26.3 The CONTRACTOR shall be fully responsible to the OWNER for the acts and omissions of his SUBCONTRACTORS, and of persons either directly or indirectly employed by them, as he is for the acts of omissions of persons directly employed by him.

26.4 The CONTRACTOR shall cause appropriate provisions to be inserted in all subcontracts relative to the WORK to bind SUBCONTRACTORS to the CONTRACTOR by the terms of the CONTRACT DOCUMENTS insofar as applicable to the WORK of SUBCONTRACTORS and give the CONTRACTOR the same power as regards terminating any subcontract that the OWNER may exercise over the CONTRACTOR under any provision of the CONTRACT DOCUMENTS.

26.5 Nothing contained in this CONTRACT shall create any contractual relation between any SUBCONTRACTOR and the OWNER.

27. ENGINEER's Authority

27.1 The ENGINEER shall act as the OWNER's representative during the construction period. He shall decide questions which may arise as to quality and acceptability of materials furnished and WORK performed. He shall interpret the intent of the CONTRACT DOCUMENTS in a fair and unbiased manner. The ENGINEER will make visits to the site and determine if the WORK is proceeding in accordance with the CONTRACT DOCUMENTS.

27.2 The CONTRACTOR will be held strictly in the intent of the CONTRACT DOCUMENTS in regards to the quality of materials, workmanship, and execution of the WORK. Inspections may be made at the factory or fabrication plant of the source of material supply.

27.3 The ENGINEER will not be responsible for the construction means, controls, techniques, sequences, procedures, or construction safety.

27.4 The ENGINEER shall promptly make decisions relative to interpretation of the CONTRACT DOCUMENTS.

28. Land and Rights-of-Way

28.1 Prior to issuance of NOTICE TO PROCEED, the OWNER shall obtain all land and rights-of-way necessary for carrying out and for the completion of the WORK to be performed pursuant to the CONTRACT DOCUMENTS, unless otherwise mutually agreed.

28.2 The OWNER shall provide to the CONTRACTOR information which delineates and describes the lands owned and rights-of-way acquired.

28.3 The CONTRACTOR shall provide at his own expense and without liability to the OWNER any additional land and access thereto that the CONTRACTOR may desire for temporary construction facilities, or for storage of materials.

29. Guaranty

29.1 The CONTRACTOR shall guarantee all materials and equipment furnished and WORK performed for a period of 1 year from the date of SUBSTANTIAL COMPLETION. The CONTRACTOR warrants and guarantees for a period of 1 year from the date of SUBSTANTIAL COMPLETION of the system that the completed system is free from all defects due to faulty materials or workmanship and the CONTRACTOR shall promptly make such corrections as may be necessary by reason of such defects including the repairs of any damage to other parts of the system resulting from such defects. The OWNER will give notice of observed defects with reasonable promptness. In the event that the CONTRACTOR should fail to make such repairs, adjustments, or other WORK that may be made necessary by such defects, the OWNER may do so and charge the CONTRACTOR the cost thereby incurred. The Performance BOND shall remain in full force and effect through the guarantee period.

30. Arbitration - Not Applicable

31. Taxes

31.1 The CONTRACTOR will pay all sales, consumer, use, and other similar taxes required by the laws of the place where the WORK is performed except as described in the following sub-paragraph.

31.2 Owner is exempt from payment of sales and compensating use taxes of Alabama and of cities and counties hereof on all materials to be incorporated into the work as follows.

31.2.1 Contractor will be required to enter into a purchasing agent agreement with Owner to purchase supplies and materials for invoices totaling \$1,000.00 or more to be incorporated into the Work using Alabama Department of Revenue Form STPPA-1. Owner will pay suppliers directly for tax exempt supplies and materials. Amounts paid to suppliers will be deducted from amount payable to Contractor as if payment had been made to Contractor and removed from the contract by summary change order. Documentation of delivery and payment for materials must be submitted in the same manner as stored materials.

31.2.2 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 into the Work.

31.2.3 Any invoices that total less than \$1,000.00 will not be covered by this agreement.

31.2.4 Contractor shall be responsible for delivery, storage, handling and protection of all materials whether paid directly by the Contractor or by the Owner.

32. Document Ownership

32.1 All plans, details, and documents are intended for use solely in the execution of this project and any re-use without the express written consent of the ENGINEER is prohibited. Any such re-use without the written consent of the ENGINEER shall relieve the ENGINEER of all responsibility and liability incurred in the re-use thereof.

PART V

SPECIAL CONDITIONS

TABLE OF CONTENTS

PART V

SPECIAL CONDITIONS

| PART NO. | TITLE |
|----------|--|
| 1. | Bid Form Requirements |
| 2. | Subcontractors |
| 3. | Project Engineering and Observation |
| 4. | Reservation of Owner's Rights |
| 5. | Work Schedule |
| 6. | Responsibilities of the Contractor |
| 7. | Observation, Final Payment and Acceptance |
| 8. | Water for Construction and Time Coordination |
| 9. | Sanitary Facilities and Drinking Water |
| 10. | Examination of Site |
| 11. | Conflicts |
| 12. | Insurance and Liability |
| 13. | Public Liability and Property Damage Insurance |
| 14. | Commercial General Liability Insurance |
| 15. | Comprehensive Automobile and Vehicle Liability Insurance |
| 16. | Umbrella Excess Liability Over Primary Insurance |
| 17. | Worker's Compensation and Employer's Liability Insurance |
| 18. | Builders Risk All Risk Insurance |
| 19. | Completed Operating Coverage |
| 20. | Miscellaneous Insurance |
| 21. | Proof of Carriage of Insurance |
| 22. | Communications |
| 23. | Partial Use of Site Improvements |
| 24. | Coordination with Other Contractors |
| 25. | Equal Employment Practice |
| 26. | Kickback Statute and Regulations |
| 27. | Safety Compliance |
| 28. | Emergencies |
| 29. | Local and State Laws |
| 30. | Existing Utilities and Piping |
| 31. | Protection of Public and Private Property and Persons |
| 32. | Traffic Control |
| 33. | Road Crossings |
| 34. | Erosion and Siltation Control |
| 35. | Contractor's Responsibilities During Warranty Period |
| 36. | Utilization of United States Produced Products |
| 37. | Indemnification |
| 38. | Method of Award |
| 39. | Project Sign |
| 40. | Liquidated Damages |
| 41. | Basis of Bids |
| 42. | Alternate Major Equipment Items and Products |
| 43. | Warranty Period |
| 44. | Explanation of Bid Form |

SPECIAL CONDITIONS

1. Bid Form Requirements

A. The Bidder is advised of the following requirements which must be strictly adhered to in order for the Bid to be accepted by the Owner:

1. All requirements as stipulated in the "Advertisement for Bids" and the "Information for Bidders".
2. All bidders must be properly licensed in accordance with the requirements of the Alabama State Licensing Board for General Contractors (Chapter 8, Title 34, Code of Alabama, 1975, or latest).
3. Bidders must include their license number on the outside of the sealed envelope containing the Bid, as well as on the Bid Proposal Form. Any Bid received which does not contain the license number on the outside of the sealed envelope will not be considered by the Owner and will be returned unopened to the Bidder.
4. Any Bid submitted which contains the license number on the outside of the sealed envelope will be taken as prima facie evidence that the Bidder is in fact a duly licensed general contractor, with a valid unexpired license in the classification required for this project, and in good standing with the Alabama State Licensing Board. If it is subsequently discovered, after the Bid opening, that the Bidder has misrepresented this fact to the Owner, then the Bid will be disqualified and the State Licensing Board so notified.
5. In the event the total project cost including materials, labor, and equipment (even if the materials are furnished by the Owner and not included in the construction contract price) is less than \$50,000, unlicensed contractors may bid on the construction contract in accordance with the Alabama State Bid Laws. The BIDDER must indicate on the outside of the sealed envelope that he is not a licensed contractor, and his BID including material cost is less than \$50,000.

B. Telephonic Facsimile (FAX) Modification of Bid

1. Any bidder may modify his/her bid by telephonic facsimile (FAX) communication at any time prior to the scheduled closing time for receipt of bids, provided such telephonic facsimile (FAX) communication is received by the Owner prior to the closing time, and provided further, that the Owner has verified prior to the bid opening, by telephone communication with the bidder, that the FAX is valid and the indicated modification to the bid is correct, and is the intent of the Bidder.
2. The telephonic facsimile (FAX) communication should not reveal the bid price but should provide the addition, subtraction or other modification to the total base bid amount so that the final total bid price or terms will not be known by the Owner until the sealed bid is opened.
3. Bid Forms, Bid Bonds, or Certifications, submitted by telephonic facsimile (FAX) are not acceptable.
4. The Owner reserves the right to request from the bidder written confirmation of the bid modification to be included in the executed Contract Documents.

2. Subcontractors

- A. Reference: Alabama State House of Representatives Bill H565 which amends Sections 34-8-1, 34-8-7, and 34-8-9, Code of Alabama 1975, Relating to Licensing Board for General Contractors.
- B. Any subcontractor on the Project covered by these Contract Documents who performs Work under Contract to another General Contractor, where the cost of the subcontract Work performed is \$50,000 or more, shall be considered as engaging in the business of General Contracting, and shall comply with the requirements of H565.
- C. Subcontractors shall be duly licensed by the Alabama State Licensing Board for General Contractors as required by H565.
- D. See General Conditions.

3. Project Engineering and Observation

- A. All observation, interpretation of Drawings, approval of items and materials, and approval of change orders shall be handled by the Owner's Engineer:

Ladd Environmental Consultants, Inc.
P.O. Box 680869
Fort Payne, Alabama 35968-1609

Phone: 256-845-5315
FAX: 256-845-5383
E-MAIL: ladd@laddenv.com

- B. In general, all contact between the Contractor and the Owner concerning prosecution of the work shall be through the Engineer. If, in the opinion of the Engineer, the matter should be referred to the Owner, the necessary steps will be taken to do so.
- C. The Contractor shall furnish to the Engineer such labors as deemed necessary for measurement of work in place, checking of work, observation, and shall make every effort to cooperate with the Engineer in rectifying unsatisfactory work.

4. Reservation of Owner's Rights

- A. The Owner reserves the right to accept or reject any proposals or accept any combination of proposals.
- B. The Owner reserves the right to accept any schedule, alternatives, to deduct any alternatives, to delete any unit items, or any combination thereof as required and considered by the Owner to be in the best interest of the Owner.
- C. The Owner reserves the right to vary individual quantities, or change sizes, or add or delete individual unit items so long as the total contract amount is not changed by more than the dollar amount or percentage allowed by the Alabama State Bid Laws and the Rules and Regulations of the Funding Agency.

5. Work Schedule

- A. A normal work week shall consist of 40 hours; five eight-hour days - Monday through Friday.
- B. The Contractor shall not schedule work on Saturdays, Sundays or Holidays unless absolutely necessary for the welfare of the project, unless three (3) days prior written notice is given to the Engineer and written consent is obtained. This notice and consent must be obtained on a weekly basis. **"NO BLANKET CONSENT WILL BE ISSUED"**.

6. Responsibilities of the Contractor

- A. Except as otherwise specifically stated in the Contract Documents, the Contractor shall provide and pay for all materials, labor, tools, equipment, light, heat, power, transportation, superintendence, temporary construction of every nature, charges, levies, fees, taxes, or other expenses, and all other services and facilities of every nature whatsoever necessary for the performance of the Contract, and to provide all improvements required in this Contract complete in every respect within the specified time.
- B. The Contractor shall be totally, solely and fully responsible for all aspects of safety associated with the work. (See Paragraph 27).
- C. The Contractor shall be totally liable and responsible to the Owner and any regulatory agency for all fines, penalties and judgements associated with the performance of the Contract including delays in completion of the Project.
- D. The Contractor shall insure that all subcontractors utilized for the construction of the Project adhere to the requirements of Alabama State House of Representatives Bill H565, relating to the subcontractor license requirement of the Alabama State Licensing Board for General Contractors (see Paragraph 2).

7. Observation, Final Payment, and Acceptance

- A. Periodic Inspections: After the completion of each phase of the work and before continuing to a subsequent phase, the Contractor shall notify the Engineer and arrange for inspection of the work in place if such subsequent phase would preclude the inspection of said completed phase.
- B. Final Inspection Request: When the project construction work is substantially completed and fully operable, the Contractor shall notify the Engineer in writing that the work will be ready for final inspection on a definite date which shall be stated in such notice. This notice shall be given to the Engineer at least two (2) weeks prior to the date specified for the requested date of final inspection. If the Engineer concurs with the request, then the Engineer shall notify the Owner by submission of the final inspection request with a signed concurrence by the Engineer.
- C. Final Inspection
 - 1. Following receipt of the final inspection request with Engineer concurrence, the Owner shall determine if the project construction work is complete and ready for final inspection as represented by the Contractor. If the Owner concurs, then he shall instruct the Engineer to make all necessary arrangements for final inspection on the date requested, or as soon as practical thereafter.
 - 2. Final inspection shall be conducted by the Engineer, accompanied by the Owner, the Contractor, representatives of the State and Federal Agencies responsible for project financing or construction approval, and any other interested parties.
 - 3. A punch list of all items of work which must be completed or rectified by the Contractor in order to complete the project in accordance with the Drawings, Specifications, and Contract Documents will be prepared by the Engineer and presented to the Contractor.

D. Notice of Completion

1. The Contractor, upon completion of the project, shall post a legal advertisement in a local or area-wide newspaper of general circulation within the project area, meeting the approval of the Engineer.
2. The legal advertisement shall indicate the name of the project and the name of the Contractor, shall stipulate that the construction work has been completed, and that all claims arising out of the construction contract shall be filed with the Engineer at the address of the Engineer's business office (contained in the Advertisement), not later than a date stipulated in the advertisement.
3. The advertisement shall be run once per week for four weeks, and the date stipulated shall be one week from the date of the last advertisement. A copy of the advertisement and publisher's certificate shall be provided to the Engineer by the Contractor.

E. Final Estimate

1. Following the Engineer's acceptance of project completion, and receipt of the Publishers Certificate of the Notice of Completion, the Contractor may submit to the Engineer the final estimate for payment. The Contractor shall furnish, along with the final estimate, satisfactory evidence that all payrolls, payments to subcontractors and material/equipment suppliers, and any and all outstanding indebtedness in connection with the construction contract have been paid in full, and that the Contractor has complied with all applicable State laws.
2. Final payment may then be made by the Owner in accordance with the General Conditions. The entire balance found to be due to the Contractor, including retainage, but accepting such sums as may legally be retained by the Owner in accordance with the Contract Documents and applicable State laws shall be paid to the Contractor.

F. Measurement of Quantities

1. All Work completed under the Contract will be measured by the Engineer according to the United States Standard Measures.
2. All linear surface measurements will be made horizontally or vertically as required by the item measured.
3. The measurement of quantities applies to both periodic and final requests for payment.
4. See Technical Specifications, Section 01019.
5. See "Basis of Payment" as stipulated for each Bid Item in the explanation of the Bid Form included in these Special Conditions.

8. Water for Construction and Time Coordination

- A. **Water for use in the construction of this project shall be paid for by the Contractor.** The Contractor shall coordinate with the Owner for all water usage to prevent any interference with the daily operation of the facility.
- B. The use of water shall in no way result in the Owner's or the water supplier's being liable for such use and the Contractor shall accept full responsibility of damage to the equipment and for contamination of the system.

- C. The Contractor's use of water shall be at such times and of such quantities as not to interrupt or adversely affect the Owner's or water supplier's customer service. The Owner reserves the right to limit the use of such water in case of shortage or waste.

9. Sanitary Facilities and Drinking Water

- A. Sanitary facilities and drinking water shall be made available by the Contractor at the site and the Contractor shall see that the facilities shall be kept clean and orderly. Due care shall be exercised in protecting them from abuse. The facilities shall result in no cost to the Owner.

10. Examination of Site

- A. Each bidder shall visit the site of the proposed work, perform his own on-site investigations and fully acquaint himself with conditions relating to construction and labor requirements so that he may fully understand the facilities, difficulties, and restrictions attending the execution of the work under this Contract. The Bidder shall perform a thorough investigation of all existing conditions. The dimensions, elevations, etc. shown on the Contract Drawings are intended to be exact; however, the Contractor shall verify such elements on the site before commencing work.
- B. The failure or omission of any bidder to receive or examine any form instrument, addendum, or other documents, or to visit the site, perform site investigations and acquaint himself with conditions there existing shall in no wise relieve any bidder from any obligation with respect to his Bid or to the Contract.
- C. The submission of a Bid shall be taken as prima facia evidence of compliance with this site examination in full.
- D. The interested Bidders, subcontractors, equipment suppliers and related persons and organizations shall be fully responsible for any and all damage or accidents associated with their prebid activities. They shall hold harmless and indemnify the Owner and Engineer, their employees, agents and consultants against all damages, claims and expenses associated with their prebid activities.
- E. The interested Bidders, subcontractors, equipment suppliers, etc., shall familiarize themselves and their personnel of all potential hazards associated with their prebid activities and the Project. All prebid activities and Work shall be performed in a safe manner.

11. Conflicts

- A. Upon discovering any conflict or difference in actual conditions and those presented in the Contract Documents, the Contractor shall notify the Engineer immediately and shall cease operation in that area of the work or concerning that item, until such deficiency is interpreted or rectified. His proceeding shall not constitute a claim for any work or materials which are later determined to have to be removed or modified.
- B. Existing utilities are shown based on information provided by others. The Contractor shall make test probes or excavation, as required, ahead of scheduled pipelaying, etc., to allow for planning any relocations or adjustments that may be necessary because of conflicts.

12. Insurance and Liability

- A. The Contractor shall not commence work under this Contract until he has obtained all insurance required by the Contract Documents and such insurance has been accepted by the Owner, nor is the Contractor to allow any subcontractor to commence work on his subcontract until all similar insurance required of the subcontractor has been so obtained and accepted by the Owner. This insurance shall include a Waiver of Subrogation as to the Owner and its respective officers, agents, employees and subcontractors. The Contractor shall maintain required insurance during the term of the Contract and during any and all periods when any Work is being performed pursuant to the Project, and shall require subcontractors to do same.

- B. The obtaining and maintaining by Contractor and subcontractors of the insurance required herein does not relieve the contractor of any responsibilities, obligations or duties to the Owner pursuant to this Contract.
- C. The Contractor shall have an insurance professional review the Contractor's activities in regard to the performance of this Contract and the Contractor shall obtain any further or additional insurance or greater limits recommended by the insurance professional. Insurance shall be with companies which are licensed to do business in Alabama, are approved by the Owner, and which have a Best Rating of A-VIII or better.
- D. Neither the setting of insurance limits or requirements nor the acceptance of the same by Owner imply or represent that the limits or the insurance carrier is sufficient or that such insurance actually has been obtained, that being the responsibility of the Contractor.
- E. Review or acceptance of insurance by Owner or representatives of Owner shall not relieve or decrease the liability of Contractor hereunder.
- F. In the event any work under this Contract is performed by a subcontractor, the Contractor shall be responsible for any liability directly or indirectly arising out of the work performed under this Contract, regardless of whether or not such work is covered by the subcontractor's insurance. The Contractor's insurance shall cover all project activities including those that may be performed by subcontractors, suppliers, or manufacturers, etc.
- G. The Owner shall have the right to inspect and approve Contractor's insurance coverages. Should the Owner deem it advisable to modify these coverages in any way, it shall so instruct the Contractor in writing and may pay cost of any increased coverage or take credit for any decreases as may be appropriate. In case of the breach of any provision of this Article or in the case of Contractor default, the Owner, at his option, may take out and maintain, at the expense of the Contractor, such insurance as the Owner may deem proper and may deduct the cost of such insurance from any monies which may be due or become due the Contractor or its Surety under this Contract.

13. Public Liability and Property Damage Insurance

- A. The Contractor's and his subcontractor's Public Liability and Property Damage Insurance as a minimum shall provide adequate protection against the following special hazards:
 - 1. **Blasting and damage resulting therefrom.**
 - 2. **Work along and adjacent to existing utilities (underground and above ground).**
 - 3. **Damage caused by excavation failures.**
 - 4. **Flood and water damage.**
 - 5. **Workman's compensation.**
 - 6. **Builder's risk.**
 - 7. **Public liability.**
 - 8. **Property damage.**

14. Commercial General Liability Insurance

- A. The Contractor shall maintain during the life of this Contract or any extensions thereof, commercial general liability insurance, including the Owner's and the Contractor's protective liability and blanket contractual liability coverage.
- B. This insurance shall be written in comprehensive form and shall protect the Owner, the Engineers, and the Contractor against all claims (regardless of the claimant) arising from injuries to persons or damage to property in connection with the work under this Contract, arising out of any act or omission to act of the Contractor or any of its agents, employees or subcontractors.
- C. The coverage and limits of liability shall apply to underground explosion and collapse hazards. The provision for this coverage shall be shown on the certificate.
- D. Such insurance shall contain no exclusions for underground explosion, and collapse hazards.
- E. The Contractor shall require subcontractors to take out and maintain the type of insurance required herein to the extent of their involvement in the project so as to be adequate to protect against liability.
- F. **The limit of liability shall not be less than \$1,000,000 combined single limit or equivalent.**

15. Comprehensive Automobile and Vehicle Liability Insurance

- A. The Contractor shall maintain during the term or any extensions of this Contract, comprehensive automobile and vehicle liability insurance. This insurance shall be written in comprehensive form and shall protect the Contractor, the Engineers and the Owner against all claims for injuries to persons or damages to property arising out of any act or omission to act of the Contractor or any of its agents, employees or subcontractors and shall cover operations with respect to on-site and off-site operations under this Contract and insurance coverage shall extend to any and all motor vehicles or other related equipment, irrespective of whether the same is owner, non-owned or hired, etc..
- B. The Contractor shall require subcontractors to take out and maintain the type of insurance required herein to the extent of their involvement in the project so as to be adequate to protect against liability.
- C. **The limits of liability shall not be less than \$1,000,000 combined single limit or equivalent.**

16. Umbrella Excess Liability Over Primary Insurance

- A. The Contractor shall take out and maintain during the life of this Contract and any extensions thereof Umbrella Excess Liability Insurance in a form suitable to the Owner.
- B. The minimum limits of coverage shall be as follows:

| | | |
|----|------------------------|--------------------|
| 1. | Each Occurrence | \$1,000,000 |
| 2. | Aggregate | \$1,000,000 |
- C. The coverage shall be over the required General Liability Insurance and Automobile Liability Insurance as a minimum. There shall be no gaps or sublimit deductibles.

17. Worker's Compensation and Employer's Liability Insurance

- A. The Contractor shall take out and maintain during the life of this Contract Workmen's Compensation Insurance as required by Alabama Law for all of his employees employed at the site of the project or off-sites related to the project and, in case any work is sublet, the Contractor shall require the subcontractor similarly to provide Workmen's Compensation Insurance for all of the lat-

ter's employees unless such employees are covered by the protection afforded by the Contractor. In case any class of employee engaged in any work under this Contract at the site of project is not protected under the Workmen's Compensation statute, the Contractor shall provide, and shall cause each subcontractor to provide, adequate accident insurance for the protection of his employees not otherwise protected.

- B. Where work under this Contract includes any water or navigational exposure, coverage shall be included to cover Federal Longshoreman's and Harborworker's Act and Federal Jones Act or other applicable law or regulations.

18. Builders Risk All Risk Insurance

- A. Builders Risk All Risk Insurance shall be provided during the life of this Contract and during the period of any work associated with the Contract for all elements of the project.
- B. The Contractor shall secure and maintain during the life of this Contract, Builders Risk All Risk Replacement Cost Insurance in the minimum amount of 100 percent of the total contract price with the difference in conditions supplement. The difference in conditions supplement shall provide coverage in the same amount for earthquake, landslide, flood, or collapse. The flood coverage shall also meet the requirements of coverage required by applicable Federal and State Agencies (such as EPA, ADEM and others). Such coverage shall provide for losses to be paid to the Contractor and the Owner as their interest may appear, but only if the Contractor is not in default as to any conditions of the Contract.
- C. The Owner, its officers, agents, consultants, Program Coordinator and employees shall be named as additional insureds on the Contractor's and any subcontractor's Builders Risk All Risk Insurance policies for any claims arising out of work performed under this Contract.
- D. This insurance shall include a waiver of subrogation as to the Owner, its officers, agents, employees, consultants, Engineers and consultants to the Engineers, the Contractor and their respective officers, agents, employees and subcontractors.
- E. The Contractor and all subcontractors shall waive all rights against the Owner, Engineers and consultants to the Engineers for damages covered by the Builder's Risk Insurance provided for under the terms of this Contract.

19. Completed Operations Coverage

- A. The Contractor shall maintain completed operations coverage with its certificate on file with the Owner for at least one year after the project has achieved final completion and final acceptance.

20. Miscellaneous Insurance - NOT REQUIRED.

- A. The Contractor shall take out and maintain during the life of this Contract and any extensions thereof, any and all other insurance required by the railroads, highways or other utilities. The Contractor shall provide for the Owner any insurance the permits, agreements or utilities require the Owner to carry. The Contractor shall provide whatever insurance may be required of the Owner or the Contractor by permits or agreements, etc., with the railroad, highways or other utilities. The Contractor shall familiarize himself with all insurance requirements contained in easements, permits and agreements associated with this project. The Contractor shall provide any Railroad Protective Liability and other General Liability insurance in the amounts contained in the agreements or in greater amounts if higher limits are appropriate or required elsewhere. The Contractor shall bear the cost of all required insurance and shall include in his BID a sufficient amount to cover the cost of all required insurance.

21. Proof of Carriage of Insurance

- A. The Contractor shall furnish the Owner with satisfactory proof of carriage of the insurance required herein, in the form of an insurance certificate and affidavit or if the Owner elects in the form of a policy. In any case, insurance shall be in a form satisfactory to the Owner.
- B. The following shall be certificate/affidavit holders and additional insureds for this project:**
1. **City of Fort Payne**
100 Alabama Avenue, NW
Fort Payne, AL 35967
 2. **Ladd Environmental Consultants, Inc.**
P. O. Box 680869
Fort Payne, AL 35968-1609
- C. All the insurance policies provided shall meet all the following requirements:
1. The Contractor's and any subcontractor's general liability, automobile liability insurance and umbrella insurance shall endorse the Owner, its officers, agents, employees, consultants, engineers and their consultants as additional insureds for any claims arising out of work performed under this Contract or in lieu thereof an Owner's protective policy.
 2. Cancellation: The certificate and policy, as the case may be, shall state that the Owner shall be given thirty (30) days written notice of cancellation or any change in the insurance coverage. Certificates shall not exclude liability for failure to notify nor shall it state "endeavor to notify" in lieu of what is required.
 3. The Contractor or any subcontractors waive subrogation as to the Owner, its officers, agents, employees, Engineers and their consultants. This shall be stated as such in all policies and on all certificates.
 4. The full aggregate limits apply per job or Contract. This shall be stated as such in all policies and on all certificates. The certificate shall not contain language indicating that the stated coverages may have been reduced by claims paid.
 5. Authorized representatives of the insurance company shall certify that he/she is authorized to execute certificate and that coverages stated are correct and in compliance with the Contract Documents.
- D. The insurance company shall furnish the Owner an "Affidavit of Insurance Provided" prior to execution of the Contract by the Owner. The Contractor shall also furnish the Owner commercial certificate(s) of insurance, modified to meet the requirements herein demonstrating compliance with these requirements prior to the execution of the Contract by the Owner. However, the furnishing of such certificates of insurance shall not obligate the Owner or the Engineer to review the certificates. Further, any review and acceptance of the insurance by the Owner or Engineer shall not relieve the Contractor of the requirement to provide the specified insurance. Further, the showing of insurance conditions on the certificate deviating from that required herein shall not relieve the Contractor of the requirement to provide the specified insurance.
- E. Other evidence of insurance satisfactory to the Owner shall be furnished to the Owner, if requested.

22. Communications

- A. All notices, demands, requests, instructions, approvals, proposals, and claims must be in writing, addressed to the Engineer's Project Manager.

- B. Any notice to or demand upon the Contractor shall be sufficiently given if delivered at the office of the Contractor stated on the signature page of the Agreement (or at such other office as the Contractor may from time to time designate in writing to the Owner), or if deposited in the United States Mail in a sealed, postage-prepaid envelope, or delivered with charges prepaid to any telegraph company for transmission, in each case addressed to such office.
- C. All papers required to be delivered to the Owner shall, unless otherwise specified in writing to the Contractor, be delivered to:
- City of Fort Payne
100 Alabama Avenue, NW
Fort Payne, AL 35967**
- D. A copy of all such papers and correspondence which are delivered to the Owner shall also be delivered to the Engineer:
- Ladd Environmental Consultants, Inc.
P. O. Box 680869
Fort Payne, AL 35968-1609**
- E. Any notice to or demand upon the Owner shall be sufficiently given if so delivered, or if deposited in the United States Mail in a sealed, postage-prepaid envelope, or transmitted by telephonic facsimile (FAX) (followed immediately by mailed written confirmation of the FAX) to said Owner at such address, or to such other representatives of the Owner or to such other address as the Owner may subsequently specify in writing to the Contractor for such purpose. Copies of any correspondence to the Owner shall be furnished also to the Engineer.
- F. Any such notice shall be deemed to have been given as of the time of actual delivery, or in the case of mailing, when the same should have been received in due course of post, or in the case of telephonic facsimile (FAX), at the time of actual receipt, as the case may be.

23. Partial Use of Site Improvements

- A. The Owner, at its election, may give notice to the Contractor and place in use those sections of the improvements which have been completed, inspected, and can be accepted as complying with the Drawings and Technical Specifications and if, in its opinion, each such section is reasonably safe, fit, and convenient, for the use and accommodation for which it was intended, provided:
1. The use of such sections of the improvements shall in no way impede the completion of the remainder of the work by the Contractor.
 2. The Contractor shall not be responsible for any damages or maintenance costs due directly to the use of such sections.
 3. The use of such sections shall in no way relieve the Contractor of his liability due to having used defective materials or to poor workmanship.
 4. The period of guarantee stipulated in the General Conditions hereof shall not begin to run until the date of final acceptance of and beneficial use of the work by the Owner.

24. Coordination With Other Contractors

- A. The Contractor is hereby made aware that his work must be coordinated with any other Contractors performing simultaneous work under separate contracts as a part of the overall project. The Contractor will be expected to coordinate his work with other Contractors, and to prosecute his work in such a manner that no disruption or delay of any other Contractor's work will occur, in or

der for the total to proceed in an efficient and orderly manner for completion of all contracts on schedule as stipulated in these Contract Documents.

25. Equal Employment Practice

- A. The Contractor and any subcontractors in the performance of this Contract shall not discriminate against any employee or applicant for employment because of race, creed, color, national origin, or sex and shall so certify in accordance with enclosed certificate in Part II of the Contract Documents. The Contractor shall include in all sub-contracts a provision imposing a like obligation upon the subcontractor.
- B. See Supplemental General Conditions as applicable.

26. Kickback Statute and Regulations

- A. The regulations issued by the Secretary of Labor and published in the Federal Register of March 1, 1941 6 F.F. 1210, pursuant to Public Law No. 324, 73rd Congress, approved June 13, 1934 (48 statute 948), to prevent rebates or deductions from wages as set out in payrolls, are expressly made a part of this Contract. The Contractor and all subcontractors shall submit the affidavits required by said regulations as therein provided and shall be subject in all other respects to the provisions of said statute and of the said regulations thereunder.

27. Safety Compliance

- A. All Contractors are solely responsible for compliance with the rules and regulations, and amendments thereof, set forth in the Occupational Safety and Health Act of 1970 (PL 91-596) and under Section 102 of Contract Work Hours and Safety Standards Act (PL 91-54) or other similar and related laws, rules, or regulations in the execution of his work. The Owner and the Engineer assume no responsibility implied or otherwise, for the Contractors, subcontractors, or their workmen in compliance with aforementioned. The Contractor is cautioned to consider OSHA Requirements in securing the necessary insurance where applicable as noted in the Construction Contract.
- B. In addition to safety hazards associated with normal construction activities, the Contractors shall familiarize themselves with and understand all of the potential safety hazards associated specifically with the construction project as covered by the Contract Documents.
- C. The Contractor shall include all of the potential hazards associated with the construction project in his Job Safety Program. The Owner and Engineer assume no responsibility nor liability whatsoever for the Contractor's Safety Program nor its implementation. This is solely and totally the responsibility of the Contractor.

28. Emergencies

- A. In emergencies affecting the safety or protection persons or the work or property at the site or adjacent thereto, Contractor, without special instruction or authorization from Engineer or Owner, 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. If Engineer determines that a change in the Contract Documents is required because of the action taken in response to an emergency, a Work Directive Change or Change Order will be issued to document the consequences of the changes or variations.

29. Local and State Laws

- A. The Contractor and any Subcontractor shall abide by all local and State laws or ordinances to the extent that such requirements do not conflict with Federal laws or regulations.

30. Existing Utilities and Piping

- A. The Contractor is hereby made aware that there are existing utilities and piping located within the construction area (i.e., existing electrical, telephone, gas mains, sewers, force mains, gravity lines, etc.). The Contractor is to maintain in proper working condition all existing utilities and piping unless directed otherwise. Any lines disrupted shall be the responsibility of the Contractor to repair or cause to be repaired to the satisfaction of the Owner and Engineer. It will be the responsibility of the Contractor to notify each utility owner (private or public) and to determine location of existing lines.
- B. Underground Damage Prevention Legislation Act No. 94-487 (State of Alabama) - NOT REQUIRED.
1. The Contractor is advised that the requirements stipulated in the referenced Legislation concerning the "ONE-CALL NOTIFICATION CENTER", notification of all utility owners, location and staking of all utilities within the construction area, and all other related items covered by the Legislation in order to protect existing utilities during construction activities must be adhered to, as indicated and as applicable.

31. Protection of Public and Private Property and Persons

- A. The Contractor will be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the work. The Contractor will provide all necessary precautions and protection as required to prevent damage, injury, or harm to all employees of the work, and any other persons who may be affected by the work.
- B. The Contractor will be responsible for providing all necessary precautions and protection as required to prevent damage to all public and private property within the construction site or adjacent thereto including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities and all related items not designated for removal, relocation, or replacement in the course of construction of the project.
- C. The Contractor will be responsible for all necessary repairs and/or replacement of any damaged public or private property as indicated herein, as required to reinstate the damaged property to the same or better condition as it existed prior to the project. All such repairs and/or replacements shall meet with the approval of the Engineer.
- D. See General Conditions.

32. Traffic Control

- A. The Contractor shall be responsible for complying with Section 6 of "Federal Manual on Uniform Traffic Control Devices".

33. Road Crossings

- A. The Contractor is hereby made aware that pipeline installation on highway right-of-way must be installed in accordance with the appropriate County or State Permit (Agreement for the Accommodation of Utility Facilities on Public Right-Of-Way) included as a part of the Drawings and Contract Documents. The cased installation at all road crossings shall be constructed in a manner to facilitate using the least amount possible of casing, and meet the appropriate Highway Department permit requirements, and as approved by the Engineer.

34. Erosion and Siltation Control

- A. The Contractor is advised that during the construction of the project, all measures shall be taken as necessary to control erosion and downstream siltation due to stormwater run-off from the disturbed area or discharged water utilized in the construction project.

- B. Temporary erosion and siltation control procedures utilized by the Contractor for the project may include temporary berms, dikes, sediment basins, drains, silt fences, rock filter check dams, erosion control netting, hay bales, sand bags or other control procedures as deemed necessary by the Engineer.
- C. The Contractor is advised that the following erosion control procedures must be adhered to during construction of any stream crossings or adjacent to any natural streams in order to minimize erosion and siltation which may cause pollution of the stream or interfere with the existing natural flow:
 - 1. The natural ground adjacent to the proposed pipeline and structures shall not be disturbed. Only that excavation as absolutely required for the installation of the pipeline and structures shall be permitted.
 - 2. The natural stream bed adjacent to the installation shall not be disturbed, except to the minimum extent as required for the construction of the project.
 - 3. No excavated material or debris shall be deposited on the downstream side of the trench during the pipeline construction. The excavated material to be used for final backfill shall be placed on the upstream side. Any excavated rock or other debris not approved by the Engineer for final backfill shall be removed from the stream bed. The existing natural stream bed and channel shall be maintained in its natural state and no rock, material, or debris shall be deposited so as to interfere with the natural stream bed.

D. NPDES General Stormwater Permit

- 1. **The Contractor shall be totally responsible for securing, when required, the EPA NPDES General Stormwater Permit for the construction project.**
 - 2. **The Contractor shall be responsible for all costs associated with the application and issuance of this permit.**
 - 3. **Contact Alabama Department of Environmental Management, Mining and Nonpoint Source Section, Water Division, Telephone: 334-271-7786 or 334-271-7839.**
- E. See Part VI, Technical Specifications for permanent grassing of disturbed areas.

35. Contractor's Responsibilities During Warranty Period

- A. See General Conditions.
- B. See Part VI, Technical Specifications.
- C. For all defects or equipment problems or other difficulties during the warranty period, the Contractor shall submit a report to the Engineer outlining each problem, the actions to date, the schedule for proposed actions, and a detailed description of the progress on resolving each problem since the last report. Where appropriate or when requested by the Engineer, the Contractor shall include a similar report from the applicable manufacturer and/or vendor regarding the progress of resolution. The reports shall be submitted weekly, unless a less frequent interval is determined by the Engineer. If the Engineer relaxes the interval, he may reinstate it at any time if he deems that the rate of progress is not acceptable.

36. Utilization of United States Produced Products

- A. The Contractor shall comply with the provisions of Alabama Act No. 97-225 (Title 39, Code of Alabama, 1975, As Amended) Relating to Competitive Bid Laws for Public Works.

- B. The Contractor shall use in the execution of the Contract materials, supplies and Products manufactured, mined, processed or otherwise produced in the United States or its territories, if the same are available at reasonable and competitive prices and are not contrary to any Sole Source Specification implemented by the Alabama Act No. 97-225.
- C. The Contractor shall use steel produced within the United States when specifications in the Construction Contract require the use of steel and do not limit its supply to a sole source as covered by the Alabama Act No. 97-225.
- D. If the Owner decides that the procurement of the domestic steel products becomes impractical as a result of a national emergency, national strike or other cause, the Owner may waive the above restriction on steel procurement.

37. Indemnification

- A. The indemnification provisions of Part IV, General Conditions and Supplemental General Conditions, shall extend totally and completely to the parties listed as certificate holders in Part V, Special Conditions, Paragraph 19, the same as if those parties were listed in Part IV.

38. Method of Award

- A. As stipulated in the Information for Bidders, and the General Conditions, Contract Award will be made to the Lowest Responsible, Responsive Bidder submitting the lowest Total Base Bid as determined by the Owner, unless all Bids are rejected, which is a right reserved by the Owner.
- B. In the event multiple Bid Schedules are included in the Bid Documents, the Owner reserves the right to select the Schedule(s) to be awarded. Contract Award will be based on the lowest Bid submitted for the Schedule(s) selected for Award by the Owner.
- C. In the event Additive or Deductive Alternates are included in the Bid Documents, the Owner reserves the right to add or deduct from the applicable Total Base Bid amount, by Change Order, after determination of the Lowest Responsible, Responsive Bidder for the Schedule(s) selected by the Owner for Award.
- D. After the determination of the Schedule(s) to be Awarded, and the Lowest Responsible Responsible Bidder(s), the Bidder is advised that the Owner reserves the right to delete any Unit Bid Items from any Schedule, in any combination, as determined by the Owner to be in the best interest of the Owner.
- E. The total amount of any deleted items and the total maximum percentage deletion allowed will be in accordance with the Alabama State Bid Laws and the Rules and Regulations as established by any Funding Agencies participating in the Project.
- F. The Bidder is therefore advised not to off-set any Unit Bid Item Costs and to make all effort to accurately Bid each item (including all labor, equipment, installation, materials, administrative, miscellaneous, overhead, profit and all similar applicable costs for each Bid Item) so that no financial harm will accrue to the Bidder in the event Bid Items are in fact deleted by the Owner.
- G. A "Responsive, Responsible Bidder" will be expected to:
 - 1. Be competent and experienced in the type construction required by the Project.
 - 2. Have sufficient and adequate manpower and equipment to perform the required project construction work properly and within the established construction period.
 - 3. Have adequate financial status to meet the obligations contingent to the project work.
 - 4. Maintain a permanent place of business.

- 5. Submit a complete bid form without deletions, excisions, qualifications, special conditions, or requirements, unless otherwise requested specifically in the bid documents.
- 6. Be properly licensed by and in good standing with the Alabama State Licensing Board for General Contractors. See Paragraph 1 of these Special Conditions.

39. Project Sign

- A. The General Contractor(s) shall erect project sign(s) on the project identifying the project and indicating that the government is participating in the development of the project. The sign(s) shall be substantially in accordance with the drawing as shown in Part V of these Contract Documents and shall be made from 3/4" plywood, and maintained in a good condition until completion of the project.
- B. See Supplemental General Conditions.
- C. See Technical Specifications Section 01500.

40. Liquidated Damages

- A. **Liquidated damages, as per the General Conditions, are established as \$_____ per calendar day.**

41. Basis of Bids Format - NOT USED.

- A. When applicable, see Technical Specification, Section 01100, "Basis of Bid" and "Alternate" Major Equipment Items and Products.

42. Alternate Major Equipment Items and Products - NOT USED.

- A. When applicable, see Technical Specification, Section 01100, "Basis of Bid" and "Alternate" Major Equipment Items and Products.
- B. Post-Bid Submittals on Alternate Major Equipment Items and Products shall be as indicated in Technical Specifications, Section 01100.
- C. No Pre-Bid Submittals on Alternate Major Equipment Items and Products will be reviewed by the Engineer. See Technical Specifications, Section 01100.

43. Warranty Period

- A. **As stipulated in the General Conditions, the Contractor shall guarantee all materials and equipment furnished and work performed for a period of one (1) year from "date of substantial completion and written acceptance by the Owner".**
- B. **This "date of substantial completion and written acceptance by the Owner" is defined herein as the date of written acceptance by the Owner.**

44. Explanation of Bid Form: See Part II.

END OF SPECIAL CONDITIONS

[2244]
[REV9/00]

PART VI

TECHNICAL SPECIFICATIONS

SECTION 01010
SUMMARY OF WORK

PART 1 GENERAL

- 1.01 Section Includes
 - A. Work by Owner.
 - B. Owner furnished products.
 - C. Contractor use of site.
 - D. Work Sequence.
 - E. Owner occupancy.
- 1.02 Related Sections
 - A. Applicable to Work of this Section are the Drawings and General Provisions of the Contract, including: Part IV, General and Supplementary Conditions, Part V, Special Conditions, and all other Division No. 1 Sections.
- 1.03 Work by Owner: NOT USED.
- 1.04 Owner Furnished Products: NOT USED.
- 1.05 Contractor Use of Site
 - A. Limit Use of Site to Allow: Owner occupancy.
 - B. Utility Outages and Shutdown: Must be coordinated with Owner. Existing facilities must remain in operation.
- 1.06 Work Sequence
 - A. Construct Work to accommodate Owner's occupancy requirements and facilities operation during the construction period, coordinate construction schedule and operations with Owner and Engineer.
 - B. All work shall be performed in the manner and sequence necessary to maintain existing facilities in proper operation.
 - C. **The Contractor shall be responsible for the cost of any penalties, fines or litigation costs to the Owner caused by the Contractor's construction activities.**
- 1.07 Owner Occupancy
 - A. **The Owner will occupy the existing water and wastewater pumping, transmission, and treatment facilities during the entire period of construction for the conduct of normal operations as required to meet the NPDES Permit requirements, and serve the Owner's customers.**
 - B. Cooperate with Owner to minimize conflict, and to facilitate Owner's operations.
 - C. Schedule the Work to accommodate this requirement.

DIVISION NO. 1
GENERAL REQUIREMENTS

SUMMARY OF WORK
SECTION 01010

PART 2 PRODUCTS - NOT USED.

PART 3 EXECUTION - NOT USED.

END OF SECTION

[2244]
[9/98]

SECTION 01011
SUMMARY OF PROJECT

PART 1 GENERAL

- 1.01 Section Includes
 - A. Project; Work covered by Contract Documents.
 - B. Contracts.
 - C. Administrative and procedural Sections applicable to all Contracts.
 - D. Temporary facilities and services Sections applicable to all Contracts.
- 1.02 Related Sections
 - A. Applicable to Work of this Section are the Drawings and General Provisions of the Contract, including: Part IV, General and Supplementary Conditions, Part V, Special Conditions, and all other Division No. 1 Sections.
- 1.03 Project - Work Covered By Contract Documents
 - A. Construction of all facilities as covered by the Specifications, detailed on the Drawings, indicated on the Bid Schedules and meeting the intent of the Contract Documents.
- 1.04 Contract
 - A. Perform Work of each Construction Contract under a unit price Contract with the Owner.
 - B. Work of Construction Contract is identified in the following Articles and on the Drawings.
- 1.05 Administrative and Procedural Sections Applicable To All Contracts
 - A. Part VI, Section 01019 - Contract Considerations: Schedule of Values.
 - B. Part VI, Section 01019 - Contract Considerations: Applications for Payment.
 - C. Part VI, Section 01019 - Contract Considerations: Procedures for Changes to the Work.
 - D. Part VI, Section 01019 - Contract Considerations: Measurement and Payment.
 - E. Part VI, Section 01019 - Contract Considerations: Alternates.
 - F. Part VI, Section 01300 - Submittals: Submittal Procedure, Shop Drawings.
 - G. Part VI, Section 01300 - Progress Schedules: Progress Schedules.
 - H. Part VI, Section 01039 - Coordination and Meetings: Coordination, Preconstruction Conference.
 - I. Part VI, Section 01400 - Quality Control: Quality Control, Testing Laboratory Services.
 - J. Part VI, Section 01600 - Material and Equipment: Material and Equipment Transportation, Handling, Storage, and Protection.
 - K. Part VI, Section 01650 - Starting of Systems: Starting Systems, Testing, Adjusting, and Balancing.

- L. Part VI, Section 01700 - Contract Closeout: Closeout, Final Cleaning, Warranties, Spare Parts.
- 1.06 Temporary Facilities and Services Sections Applicable To All Contracts
 - A. Section 01500 - Construction Facilities and Temporary Controls: Temporary electricity.
 - B. Section 01500 - Construction Facilities and Temporary Controls: Separate Telephone Service Required for the Work.
 - C. Section 01500 - Construction Facilities and Temporary Controls: Field Offices and Sheds Required for the Work.
- 1.07 Work by Owner - Section 01010
- 1.08 Owner Furnished Products - Section 01010
- 1.09 Contractor Use of Site - Section 01010
- 1.10 Work Sequence - Section 01010
- 1.11 Owner Occupancy - Section 01010

PART 2 PRODUCTS - NOT USED.

PART 3 EXECUTION - NOT USED.

END OF SECTION

[2244]
[REV. 4/2022]

SECTION 01019
CONTRACT CONSIDERATIONS

PART 1 GENERAL

1.01 Section Includes

- A. Schedule of Values.
- B. Application for Payment.
- C. Change procedures.
- D. Measurement and Payment - Unit Prices.
- E. Alternates.

1.02 Related Sections

- A. Applicable to Work of this Section are the Drawings and General Provisions of the Contract, including: Part IV, General and Supplementary Conditions; Part V, Special Conditions; and all other Division No. 1 Sections.
- B. The Contract Documents (Drawings and Specifications) may contain conflicts or errors regarding the section or paragraph identification numbers, particularly when forms furnished by Federal Agencies are utilized, or standard specifications or codes are referenced (i.e. ASTM, ACI, IBC). Where the general intent can be reasonably established the Contractor shall comply with the documents the same as if the conflict or error did not exist.

1.03 Schedule Of Values

- A. Submit typed schedule on approved Application for Payment Form. See 1.04, Applications for Payment.
- B. Contractor submit Schedule of Values in duplicate within 10 days after date Notice to Proceed for approval by Engineer.
- C. Format
 - 1. Utilize Bid Schedule (Part II of Contract Documents) to identify each line item as numbered and described in Bid Schedule.
 - 2. Include within each line item, a direct proportional amount of Contractor's overhead and profit.
 - 3. Revise schedule to list approved Change Orders, with each Application for Payment.

1.04 Applications for Payment

- A. Submit six copies of each application on an approved Application for Payment Form. Forms which may be considered for use include HUD Form 4208, ED Form 112, FmHA Form 1924-18, Standard Ladd Payment Form or other similar form as approved for use by the Funding Agency and Engineer.
- B. Content and Format: Utilize Schedule of Values for listing items in Application for Payment.

C. Payment Period

1. Monthly.
2. Include paid invoices for purchased materials stored on job site.
3. Include construction progress schedule (See Section 01300).

1.05 Change Procedures

- A. The Engineer will advise of minor changes in the Work not involving an adjustment to Contract Sum/Price or Contract Time as authorized by the General Conditions by issuing supplemental instructions in a Field Order, signed by the Contractor.
- B. The Engineer may issue a Notice of Change which includes a detailed description of a proposed change with supplementary or revised Drawings and specifications, and a change in Contract Time for executing the change if deemed necessary by the Engineer. Contractor will prepare and submit an estimate within ten days.
- C. The Contractor may propose changes by submitting a request for change to the Engineer, describing the proposed change and its full effect on the Work. Include a statement describing the reason for the change, and the effect on the Contract Sum/Price and Contract Time with full documentation and a statement describing the effect on Work by separate or other contractors. Document any requested substitutions in accordance with Section 01600.
- D. Stipulated Sum/Price Change Order: Based on Notice of Change and Contractor's fixed price quotation.
- E. Unit Price Change Order: For pre-determined unit prices and quantities, the Change Order will be executed on a fixed unit price basis.
- F. Change Order Forms: To be provided by Engineer. See Change Order Form in Part III, Contract Documents.
- G. Execution of Change Orders
 1. Engineer will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.
 2. The acceptance and execution of the Change Order Form by the Contractor will affirm that the change, if any, indicated in the Contract Amount and the Time of Completion as indicated on the Form, is the total Change in Amount and Time due the Contractor for the Work covered by the Change Order, and the Contractor will not file for any additional claims associated with the Change Order.

1.06 Measurement and Payment - Unit Prices

- A. Authority
 1. Measurement methods are delineated in Part V, Special Conditions.
 2. Take all measurements and compute quantities. The Engineer may at his option verify or check measurements and quantities.
- B. Unit Quantities: Quantities and measurements indicated in the Bid Form are for contract purposes only. Quantities and measurements supplied or placed in the Work shall determine payment. Actual quantities provided will determine payment.

- C. Payment Includes: Full compensation for all required labor, materials, products, tools, equipment, plant, transportation, services and incidentals, erection, application or installation of an item of the Work, overhead and profit and all other costs incurred by the Contractor.
- D. Defect Assessment: The Work, or portions of the Work, not conforming to specified requirements, shall be replaced. If, in the opinion of the Engineer, it is not practical to remove and replace the Work, the Engineer will direct an appropriate remedy or adjust payment.

1.07 Alternates

- A. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at the Owner's option. Accepted Alternates will be identified in Owner-Contractor Agreement.
- B. Coordinate related work and modify surrounding work as required.

PART 2 PRODUCTS - NOT USED.

PART 3 EXECUTION - NOT USED.

END OF SECTION

[2244]
[Rev. 10/10]

SECTION 01039
COORDINATION AND MEETINGS

PART 1 GENERAL

- 1.01 Section Includes
 - A. Coordination.
 - B. Field engineering.
 - C. Alteration project procedures.
 - D. Cutting and patching.
 - E. Preconstruction conference.
 - F. Site mobilization conference.
 - G. Progress meetings.
 - H. Preinstallation conferences.
- 1.02 Related Sections
 - A. Applicable to Work of this Section are the Drawings and General Provisions of the Contract, including: Part IV, General and Supplementary Conditions; Part V, Special Conditions; and all other Division No. 1 Sections.
- 1.03 Coordination by Contractor
 - A. Coordinate scheduling, submittals, and Work of the various Sections of specifications to assure efficient and orderly sequence of installation of interdependent construction elements.
 - B. Verify that utility requirement characteristics of operating equipment are compatible with building utilities. Coordinate work of various Sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
 - C. Coordinate space requirements and installation of mechanical and electrical work which are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with line of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance and for repairs.
 - D. In finished areas, except as otherwise indicated, conceal pipes, ducts and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
 - E. Coordinate completion and clean up of Work of separate Sections in preparation for Substantial Completion.
 - F. After Owner occupancy of premises, coordinate access to site for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of Owner's activities.
 - G. Coordinate with any and all other Contractors performing simultaneous Work under separate Contracts as a part of the overall Project. The Contractor will be expected to coordinate his Work with

other Contractors, and to prosecute his Work in such a manner that no disruption or delay of any other Contractor's Work will occur, in order for the total Project to proceed in an efficient and orderly manner for completion of all Contracts on schedule. Keep Engineer fully informed of such coordination.

- H. Coordinate Construction Schedule to maintain any existing facilities in operation as required and to minimize disruption of existing operation. Keep Engineer fully informed of such coordination.
- I. Coordinate construction sequence to prevent violation of any State or Federal Permit or Order issued to the Owner or to the Contractor specifically for this Project, or any Permit held by the Owner for the operation of the existing facilities: These include, but are not limited to, NPDES Permits, Stormwater Permits, Construction Permits, Use Permits, Administrative Orders and all similar permits and orders which may be issued by EPA, ADEM, Corps of Engineers or any other applicable State or Federal Regulatory Agency.
- J. Should artifacts or archaeological features be encountered during project activities, work shall cease and the State Historical Association shall be consulted immediately. Artifacts are objects made, used or modified by humans. They include but are not excluded to arrowheads, broken pieces of pottery or glass, stone implements, metal fasteners or tools, etc. Archaeological features are stains in the soil that indicate disturbance by human activity. Some examples are post holes, building foundations, trash pits and even human burials.

1.04 Field Engineering by Contractor

- A. Contractor to locate and protect survey control and reference points.
- B. Control datum for survey is that shown on Drawings.
- C. Contractor to provide field engineering services. Establish elevations, lines, and levels, utilizing recognized engineering survey practices.

1.05 Alteration Project Procedures

- A. Materials: As specified in product Sections; match existing products and work for patching and extending work.
- B. Close openings in exterior surfaces to protect existing work from weather and extremes of temperature and humidity.
- C. Remove, cut, and patch work in a manner to minimize damage and to provide a means of restoring products and finishes to specified condition.
- D. Refinish visible existing surfaces to remain in renovated rooms and spaces, to specified condition for each material, with a neat transition to adjacent finishes.
- E. Where new work abuts or aligns with existing, perform a smooth and even transition. Patched work to match existing adjacent work in texture and appearance.
- F. When finished surfaces are cut so that a smooth transition with new work is not possible, terminate existing surface along a straight line at a natural line of division and make recommendation to Engineer.
- G. Patch or replace portions of existing surfaces which are damaged, lifted, discolored, or showing other imperfections.
- H. Finish surfaces as specified in individual product Sections.

1.06 Cutting and Patching

- A. Employ skilled and experienced installer to perform cutting and patching.
- B. Submit written request in advance of cutting or altering elements which affects
 - 1. Structural integrity of element.
 - 2. Integrity of weather-exposed or moisture-resistant elements.
 - 3. Efficiency, maintenance, or safety of element.
 - 4. Visual qualities of sight-exposed elements.
 - 5. Work of Owner or separate contractor.
- C. Execute cutting, fitting, and patching including excavation and fill, to complete Work, and to
 - 1. Fit the several parts together, to integrate with other Work.
 - 2. Uncover Work to install or correct ill-timed Work.
 - 3. Remove and replace defective and non-conforming Work.
 - 4. Remove samples of installed Work for testing.
 - 5. Provide openings in elements of Work for penetrations of mechanical and electrical Work.
- D. Execute work by methods which will avoid damage to other Work, and provide proper surfaces to receive patching and finishing.
- E. Cut rigid materials using masonry saw or core drill.
- F. Restore Work with new products in accordance with requirements of Contract Documents.
- G. Fit Work tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- H. Maintain integrity of wall, ceiling, or floor construction; completely seal voids.
- I. Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection; for an assembly, refinish entire unit.
- J. Identify any hazardous substance or condition exposed during the Work to the Engineer for decision or remedy.

1.07 Preconstruction Conference

- A. Engineer will schedule a conference after Notice of Award.
- B. Attendance Required: Owner, Engineer, all interested Funding Agencies, all interested State/Federal Approval Agencies, Contractor and all other interested parties.
- C. Contractor shall have all key project personnel in attendance including as a minimum the Project Manager, Project Engineer and Project Superintendent.

D. Agenda

1. Execution by Owner of Owner-Contractor Agreement. (Contractor will have submitted executed Agreement to Engineer prior to the Conference.)
2. Discussion of executed bonds and insurance certificates. (Bonds and certificates will have been submitted by the Contractor to the Engineer prior to the Conference.)
3. Distribution of Contract Documents.
4. Discussion of list of Subcontractors, list of products, Schedule of Values, and progress schedule.
5. Designation of personnel representing the parties in Contract, and the Engineer. The Contractor shall confirm in writing his authorized personnel.
6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders and Contract closeout procedures.
7. Scheduling.
8. Administrative rules, regulations, and requirements of OSHA. (The determination of OSHA Requirements shall be the responsibility of the Contractor.)
9. Use of premises by Owner and Contractor.
10. Owner's requirements and partial occupancy.
11. Security and housekeeping procedures.
12. Procedures for testing.
13. Procedures for maintaining record documents.
14. Requirements for start-up of equipment.
15. Inspection and acceptance of equipment put into service during construction period.
16. Coordination with other Contractors performing simultaneous Work.

1.08 Progress Meetings

- A. Contractor to schedule and administer meetings throughout progress of the Work as required and as deemed necessary by the Architect/ Engineer.
- B. Attendance Required: Contractor's project manager, project engineer and project superintendent, major subcontractors and suppliers, Owner, Engineer, as appropriate to agenda topics for each meeting.
- C. Agenda
 1. Review of Work progress.
 2. Field observations, problems, and decisions.
 3. Identification of problems which impede planned progress.
 4. Review of submittals schedule and status of submittals.

5. Review of off-site fabrication and delivery schedules.
6. Maintenance of progress schedule.
7. Corrective measures to regain projected schedules.
8. Planned progress during succeeding work period.
9. Coordination of projected progress.
10. Maintenance of quality and work standards.
11. Effect of proposed changes on progress schedule and coordination.
12. Other business relating to Work.

1.09 Preinstallation Conferences

- A. When required in individual specification Section, Contractor to convene a preinstallation conference at work site prior to commencing work of the Section.
- B. Require attendance of parties directly affecting, or affected by, work of the specific Section.
- C. Coordinate with Engineer in the selection of the meeting date. Make written request minimum seven days prior to desired date.
- D. Review conditions of installation, preparation and installation procedures, and coordination with related work.

PART 2 PRODUCTS - NOT USED.

PART 3 EXECUTION - NOT USED.

[2244]
[9/93]

END OF SECTION

SECTION 01300

SUBMITTALS

PART 1 GENERAL

1.01 Section Includes

- A. Submittal procedures.
- B. Construction progress schedules.
- C. Proposed products list.
- D. Shop drawings.
- E. Product data.
- F. Samples.
- G. Manufacturers' instructions.
- H. Manufacturers' certificates.
- I. Construction photographs.

1.02 Related Sections

- A. Applicable to Work of this Section are the Drawings and General Provisions of the Contract, including: Part IV, General and Supplementary Conditions; Part V, Special Conditions; all other Division No. 1 Sections; and all other Specification Divisions as applicable.

1.03 Submittal Procedures

- A. Transmit each submittal with Engineer accepted form.
- B. The Transmittal Form shall contain the following Certificate:

"I certify that (Name of Contractor) has reviewed the attached submittal in detail and it has been determined that the product/information/data covered herein fully complies with the Drawings and Specifications, (Contract Documents) in all respects except as specifically noted and called out on this Form and noted clearly on the enclosed Submittal."

_____ **Project Manager**

_____ **Date**

- C. Sequentially number the submittal forms. Resubmittals to have original number with an alphabetic suffix.
- D. Identify Project, Contractor, Subcontractor or supplier; pertinent Drawing sheet and detail number(s), and specification Section number, as appropriate.

- E. Submittal shall contain all information necessary for the Engineer to easily and clearly determine full compliance with the Contract Documents.
 - F. Apply Contractor's stamp, signed or initialed, certifying that review, verification of Products required, field dimensions, adjacent construction Work, and coordination of information, is in accordance with the requirements of the Work and Contract Documents.
 - G. Schedule submittals to expedite the Project, and deliver to Engineer at business address. Coordinate submission of related items.
 - H. Identify and list all variations from Contract Documents and Product or system limitations at the beginning of each submittal.
 - I. Provide space for Contractor and Engineer review stamps.
 - J. Revise and resubmit submittals as required, identify all changes made since previous submittal. Resubmittals shall not form the basis for any claims of an increase in cost or time.
 - K. Distribute copies of reviewed submittals to concerned parties. Instruct parties to promptly report any inability to comply with provisions.
 - L. Contractor to schedule submittals to enable sufficient review time by the Engineer. The Contractor should generally allow approximately two to four weeks for each submittal review after receipt by the Engineer. Contractor to coordinate submittals with Engineer to facilitate review.
 - M. The cost for any review by the Engineer of an unacceptable submittal after the review and return of a second submittal, unapproved, to the Contractor, shall be billed directly to the Contractor by the Engineer on an hourly cost-plus basis.**
- 1.04 Construction Progress Schedules
- A. Submit initial progress schedule in duplicate within 10 days after date of Notice to Proceed for Engineer review.
 - B. Revise and resubmit as required.
 - C. Submit revised schedules with each Application for Payment, identifying changes since previous version.
 - D. Submit a horizontal bar chart with separate line for each major section of Work or operation, identifying first work day of each week. Chart may be computer generated. See example on Page 01300-5.
 - E. Indicate estimated percentage of completion for each item of Work at each submission.
- 1.05 Proposed Products List
- A. Within 10 days after date of Notice to Proceed, submit complete list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
 - B. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.

1.06 Shop Drawings

- A. Submit the number of copies which Contractor requires, plus three copies which will be retained by Engineer. When Electrical and Controls are submitted, four copies will be retained by the Engineer.**
- B. After review, distribute in accordance with Article on Procedures above and for Record Documents described in Section 01700 - Contract Closeout.

1.07 Product Data

- A. Submit the number of copies which the Contractor requires, plus three copies which will be retained by the Engineer. When electrical and controls are submitted, four copies will be retained by the Engineer.**
- B. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information unique to this Project.
- C. After review, distribute in accordance with Paragraph 1.03 above and provide copies for Record Documents described in Section 01700 - Contract Closeout.

1.08 Samples (If Requested by Engineer)

- A. Submit samples to illustrate functional and aesthetic characteristics of the Product, with integral parts and attachment devices as required by the Product specification section. Coordinate sample submittals for interfacing work.
- B. Submit samples of finishes in custom colors selected, textures, and patterns for Engineer's selection.
- C. Include identification on each sample, with full Project information.
- D. Submit the number or samples specified in individual specification Sections; one of which will be retained by Engineer.
- E. Reviewed samples which may be used in the Work are indicated in individual specification Sections.

1.09 Manufacturer's Instructions

- A. Submit manufacturers' printed instructions for delivery, storage, assembly, installation, safety, start-up, adjusting, and finishing, in quantities specified for Product Data.
- B. Identify conflicts between manufacturers' instructions and Contract Documents.

1.10 Manufacturer's Certificates

- A. When specified in individual specification Sections, submit manufacturers' certificate to Engineer for review, in quantities specified for Product Data.
- B. Indicate material or product which conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- C. Certificates may be recent or previous test results on material or Product, but must be acceptable to Engineer.

1.11 Construction Videos

- A. Construction videos and photographs are not required. However, the Contractor is advised to document conditions in all areas of the project, both pre-construction and post-construction.**
- B. It is the sole responsibility of the Contractor to provide photographs, videos or other evidence required to establish site conditions should a claim be made about damages or restoration of pre-construction conditions.**

PART 2 PRODUCTS - NOT USED.

PART 3 EXECUTION - NOT USED.

END OF SECTION

[2244]
[Rev. 3/2020]

SECTION 01400
QUALITY CONTROL

PART 1 GENERAL

1.01 Section Includes

- A. Quality assurance and control of installation.
- B. References.
- C. Field samples.
- D. Mock-up.
- E. Inspection and testing laboratory services.
- F. Manufacturers' field services and reports.

1.02 Related Sections

- A. Applicable to Work of this Section are the Drawings and General Provisions of the Contract, including: Part IV, General and Supplementary Conditions; Part V, Special Conditions; and all other Division No. 1 Sections.

1.03 Contractor's Responsibility for Quality Assurance and Proper Installation

- A. Monitor quality control over suppliers, manufacturers, subcontractors, Products, services, site conditions, and workmanship, to produce Work of first class quality.
- B. Contractor to continuously inspect and monitor all aspects of the Work to ensure compliance with the Contract Documents. The presence of Owner, Engineer or Resident Construction Observers shall in no way alleviate the Contractor of this total responsibility for complete installation and quality assurance of the Work performed.
- C. Comply fully with manufacturers' instructions, including each step in sequence.
- D. Should manufacturers' instructions conflict with Contract Documents, request clarification from Engineer before proceeding.
- E. Comply with specified standards as a minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- F. Monitor the location, elevation, grade and size of all structures, piping, excavations, fill, compaction and other similar elements of the Work.
- G. Perform work by persons qualified to produce first class workmanship of specified quality.
- H. Secure Products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion or disfigurement.
- I. The total responsibility for quality assurance and proper installation of the Work shall rest solely with the Contractor. The presence of the Owner, Engineer or Construction Observer shall in no way reduce or alleviate this responsibility of the Contractor. The right of the Owner or Engineer to observe or test the Work shall not create any responsibility or duty on them regarding the installation or quality control of the Work nor obligate them to do the same in any particular schedule of frequency.

- J. Contractor shall fully cooperate and coordinate with the Engineer including providing ample opportunity for the Engineer to observe all aspects and phases of Work, including work in partial states of completion. Any Work performed and completed without the Engineer being given the opportunity to observe the quality of the Work, shall be uncovered as necessary (at the Contractor's expense) to enable the Engineer to observe the Work. At the Owner's option and with the recommendation of the Engineer, such Work may be accepted in lieu of uncovering the Work, provided that an appropriate reduction in the Contract Amount is agreed upon, is acceptable to the Owner, and it is determined by the Engineer that the overall quality or safety of the Project will not have been jeopardized by the acceptance of the Work.

1.04 References

- A. Conform to reference standard by date of issue current on date of Invitation to Bid.
- B. Should specified reference standards conflict with Contract Documents, request clarification from Engineer before proceeding.
- C. The contractual relationship of the parties to the Contract shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.05 Independent Testing Laboratory Services

- A. The Contractor will select from the following approved firms, an Independent Testing Laboratory (as applicable and required) to perform all testing and inspection services as required by the project and as specified in the Contract Documents. The Contractor shall pay for all services and all costs associated with the testing, observation, sampling and inspection services as required by the Contract Documents and as provided by the Independent Testing Laboratory.

1. Approved Geotechnical and Structural Testing Laboratories

- a. ATEC Associates, Inc.
Birmingham, AL; Lawrenceville, GA
- b. BHATE Engineering Corporation
Birmingham, AL
- c. Terracon
Birmingham, AL; Cullman, AL; Huntsville, AL
Marietta, GA and Chattanooga, TN
- d. S & ME
Huntsville, AL; Chattanooga, TN
- e. Christian Testing Laboratories, Inc.
Montgomery, AL; Summerdale, GA
- F. Chattahoochee Consulting Group
Atlanta, GA
- g. MACTEC
Kennesaw, GA; Birmingham, AL
- h. GTEC
Huntsville, AL

2. Approved Water, Wastewater and General Analytical Testing Laboratories
 - a. Enviro Management Company, Inc.
Birmingham, AL
 - b. Pace Analytical
(Formerly TTL, Inc., Montgomery, AL)
Tuscaloosa, AL
 - c. Technical Micronic Control
Huntsville, AL
 - d. Southern Environmental Testing
Florence, AL
 - e. ENERSOLV Corporation
(Formerly Mid-South Testing Laboratories, Inc.)
Decatur, AL
- B. The Contractor may submit other Independent Testing Laboratories for approval by the Engineer. As a minimum the following information will be required:
 1. Name, mailing address, telephone number, fax number and e-mail address.
 2. Number of years experience, laboratory capability, personnel and equipment.
 3. Approvals by State Agencies to perform laboratory services.
- C. The Independent Testing Laboratory will perform all required inspections, observations, tests and other services as specified in the Specifications and as required by the Engineer in accordance with the Contract Documents to ensure compliance with the Drawings, Specifications and Contract Documents and to verify quality of installation.
- D. Reports and all test results will be submitted promptly on a regular and timely basis by the Independent Testing Laboratory directly to the Engineer, in duplicate, with a copy to the Contractor, indicating observations, test results and conclusions regarding compliance or non-compliance with the Drawings, Specifications and Contract Documents. All test results not meeting the Specifications and requirements of the Contract Documents shall be specifically addressed and brought to the immediate attention of the Engineer.
- E. The Contractor Shall
 1. Include the total cost of the testing services as required by the Contract Documents in the Construction Bid Price.
 2. Cooperate fully with the Independent Testing Laboratory.
 3. Furnish samples of materials, design mix, equipment, tools, storage, access and assistance as requested and required.
 4. Notify Engineer and Independent Testing Laboratory minimum twenty-four hours prior to expected time for operations requiring services.
 5. Make arrangements as required with Independent Testing Laboratory for any additional samples and tests over and above those specified but deemed necessary by the Engineer for quality control in accordance with the Contract Documents.

- F. The Independent Testing Laboratory shall invoice the Contractor directly for all services performed.
 - G. Retesting required because of non-compliance with the Drawings, Specifications and Contract Documents shall be performed by the same Independent Testing Laboratory on instructions by the Engineer. All costs of retesting as required to meet the requirements of the Contract Documents shall be the total responsibility of the Contractor.
 - H. The Owner and Engineer may at their option utilize other independent consultants or independent parties as deemed necessary to assist the Owner in reviewing the Work of the Contractor. Such cost shall be borne by the Owner.
- 1.06 Manufacturers' Field Services and Reports
- A. When specified in individual specification Sections, Contractor will require material or Product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust, and balance of equipment and similar requirements as applicable, and to provide recommendations and instruction to Contractor as necessary.
 - B. Contractor to report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.
 - C. Contractor to submit report in duplicate within 30 days of observation to Engineer for review.

PART 2 PRODUCTS - NOT USED.

PART 3 EXECUTION - NOT USED.

[2244]
[REV. 11/2021]

END OF SECTION

SECTION 01500
CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 GENERAL

- 1.01 Section Includes
 - A. Temporary Utilities: Electricity, telephone service, water, and sanitary facilities.
 - B. Temporary Controls: Barriers, enclosures and fencing, protection of the Work, and water control.
 - C. Construction Facilities: Access roads, parking, progress cleaning, project signage, and temporary buildings.
 - D. Project sign.
 - E. Field offices.
 - F. Safety.
 - G. Permits
- 1.02 Related Sections
 - A. Applicable to Work of this Section are the Drawings and General Provisions of the Contract, including: Part IV, General and Supplementary Conditions; Part V, Special Conditions; and all other Division No. 1 Sections.
- 1.03 Temporary Electricity
 - A. Provide and pay for power service required from Utility source.
 - B. Provide power outlets for construction operations, with branch wiring and distribution boxes located as deemed necessary by Contractor. Provide flexible power cords as required.
 - C. Provide main service disconnect and overcurrent protection at meter.
 - D. Permanent convenience receptacles may not be utilized during construction unless authorized by Owner.
 - E. All temporary electrical facilities shall be installed, maintained and utilized in a safe manner, meeting all applicable electrical codes and OSHA requirements.
- 1.04 Temporary Lighting
 - A. Provide and maintain lighting for construction operations as deemed necessary.
 - B. Maintain lighting and provide routine repairs.
 - C. Permanent building lighting may not be utilized during construction unless authorized by Owner.
 - D. All temporary lighting facilities shall be installed, maintained and utilized in a safe manner meeting all applicable electrical codes and OSHA requirements.

1.05 Temporary Heat

- A. Existing facilities shall not be used.
- B. Provide and pay for heat devices and heat as required to maintain specified conditions for construction operations.
- C. All temporary heating facilities shall be installed, maintained, operated and utilized in a safe manner meeting all applicable codes and OSHA requirements.

1.06 Temporary Ventilation

- A. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
- B. Contractor may at his option utilize existing ventilation equipment. Extend and supplement equipment with temporary fan units as required to maintain a safe atmosphere and clean air for construction operations.

1.07 Telephone Service

- A. Provide and pay telephone service installation charges to Contractor's field office and Engineer's field office at time of project mobilization.
- B. Contractor to maintain and pay monthly service charges for Contractor's telephone service during the Project construction period.
- C. Engineer to pay monthly service charge for Engineer's telephone service.

1.08 Temporary Water Service

- A. Connect to existing water source for construction operations. Coordinate with Owner and utility company.
- B. Cost of water required for use in Project to be paid for as stipulated in Part V, Special Conditions.
- C. Exercise measures to conserve water.
- D. Extend branch piping with outlets located so water is available by hoses with threaded connections. Provide temporary pipe insulation to prevent freezing as required.
- E. Exercise safe practice to prevent cross connections and potential backflow of unsafe water into potable water system.

1.09 Temporary Sanitary Facilities

- A. Provide and maintain required facilities and enclosures. Existing facilities shall not be used.

1.10 Fencing, Barriers and Warning Devices

- A. Provide fencing or barriers to prevent unauthorized entry to construction areas, to allow for Owner's use of site, and to protect existing facilities and adjacent properties from damage from construction operations and demolition.
- B. Provide barricades, warning devices and other safety measures required by governing authorities for public rights-of-way. Provide similar protective devices and safety measures when required for safety

of construction personnel as well as the general public. As a minimum, comply with Alabama Department of Transportation Utility Manual (see Special Conditions).

- C. Provide protection for plant life designated to remain. Replace damaged plant life.
- D. Protect non-owned vehicular traffic, stored materials, site and structures from damage.

1.11 Stormwater Control

- A. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.
- B. Protect site from puddling or running water. Provide erosion control barriers as required to protect site from soil erosion (See Special Conditions).
- C. Provide barriers, controls and facilities as required to comply with EPA requirements (See Special Conditions).
- D. **Contractor to obtain all necessary permits including EPA NPDES General Stormwater Permits as required. See Paragraph 1.21, Permits and Fees (See Special Conditions).**

1.12 Protection Of Installed Work

- A. Protect installed Work and where specified in individual Specification Sections provide special protection.
- B. Provide temporary and removable protection for installed Products. Control activity in immediate work area to minimize damage.
- C. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- D. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials or other means as approved by Engineer.
- E. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
- F. Prohibit traffic from landscaped areas.
- G. Protect existing facilities, structures, buildings, mechanical equipment, electrical equipment and similar existing facilities from damage including, but not limited to, dust accumulation, water, mud, dirt, construction equipment blows and hits and similar items.
- H. Provide dust control to avoid disturbing adjacent property owners.
- I. Clean dust, mud and other construction debris from public streets and roads as necessary to avoid accumulations. Contractor shall anticipate frequent cleaning will be necessary (see Paragraph 1.16, Progress Cleaning).
- J. See Paragraph 1.10, Barriers and Warning Devices.
- K. Protect all partially and fully completed structures from flotation until accepted for use by Owner.

1.13 Security

- A. Provide security and facilities to protect Work, from unauthorized entry, vandalism, or theft.

- B. Coordinate with Owner.

1.14 Access Roads

- A. Construct and maintain temporary roads accessing public thoroughfares to serve construction area. Provide warning signs indicating truck traffic as necessary for safety of general public.
- B. Extend and relocate as Work progress requires. Provide detours as necessary for safety and unimpeded traffic flow.
- C. Provide and maintain access to fire hydrants, free of obstructions, as applicable.
- D. Existing on-site roads may be used for construction traffic as designated by Owner.
- E. Coordinate construction activities requiring open trenches, detours, street closings and similar items with Police Department, Fire Department, Ambulance Services, Owner and all affected utility departments. Perform Work in a manner to allow emergency access at all times.

1.15 Parking

- A. Arrange for or provide temporary parking areas to accommodate construction personnel. Coordinate with Owner.
- B. When site space is not adequate, provide additional off-site parking.

1.16 Progress Cleaning

- A. Maintain areas free of waste materials, litter, debris, and rubbish. Maintain site in a clean and orderly condition.
- B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
- C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.
- D. Contractor must remove waste materials, debris, and rubbish from site periodically and dispose off-site, in accordance with Federal, State, County and local laws, rules and regulations.

1.17 Project Identification

- A. Provide project sign(s) as required for each Construction Contract and as required by each Funding Agency.**
- B. Provide project sign(s) of exterior grade plywood and wood frame construction, painted, with exhibit lettering by professional sign painter meeting the requirements of the Special Conditions and Supplemental General Conditions.
- C. List title of project, names of Owner, Engineer, professional sub-consultants, Contractor, project number, funding agency, construction cost and other related items as required by the funding agency and as approved by the Engineer.
- D. Erect on site at location indicated by Engineer.
- E. No other project signs are allowed without Owner permission except those required by law.

1.18 Field Offices

- A. Contractor's Field Office: Weathertight, with lighting, telephone, electrical outlets, heating, cooling and ventilating equipment, rest-room with hot water and equipped with sturdy furniture (desk, chairs, 4-drawer file cabinet), drawing racks, layout tables, drawing display tables, computer, color monitor, ink jet printer, modem, word processing, spreadsheet and CAD software compatible with Engineer's software. Provide adequate space for project meetings, with table and chairs to accommodate ten persons.**
- B. Engineer's Field Office – NOT REQUIRED.**
1. Contractor to provide separate private Engineer's Field Office with a size similar to the Contractor's Field Office. The Engineer's Field Office shall be furnished and equipped in a similar manner with all utilities as noted for the Contractor's Field Office.
 2. Field office size, type, furnishings, location and layout to be approved by Engineer. Minimum size to be 60 x 12 feet.
 3. Provide adequate space and furnishings for two offices including conference space for ten persons.
 4. The Engineer's Field Office shall be totally installed and fully functional before the Contractor begins any other site activity.
 5. Mobile offices shall be tied down and water lines insulated. A porch or landing (minimum size 5 x 5 feet) shall be constructed at the top of the steps into the office.
 6. The Engineer's Field Office shall not be removed until the Engineer determines that the Project is ready for final acceptance by the Owner.
- C. Construction Observer's Field Office**
1. Contractor to provide separate private office, similarly furnished and equipped with all utilities as noted for Contractor's Field Office.
 2. Field Office size, type, furnishings, location and layout to be approved by Engineer.
 3. Minimum size to be 24 x 8 feet.
 4. The Construction Observer's Field Office shall be totally installed and fully functional before the Contractor begins any other site activity.
 5. Mobile offices shall be tied down and water lines insulated. A porch or landing (minimum size 5 x 5 feet) shall be constructed at the top of the steps into the office.
 6. The Construction Observer's Field Office shall not be removed until the Engineer determines that the Project is ready for final acceptance by the Owner.
- D.** Locate offices a minimum distance of thirty feet from existing facilities and new structures, well above any potential flood waters, as approved by Engineer.
- E.** Locate and layout field offices such that noise from other field offices, existing facilities, equipment, air conditioners and associated similar equipment does not cause distractions, disturbances or undue noise within the field offices.

- F. Water, sewer and electrical utility costs, installation charges, monthly service charges and all related costs for both the Contractor's and Engineer's or Construction Observer's Field Offices to be paid for by the Contractor (see Paragraph 1.07 for telephone).
- 1.19 Removal of Utilities, Facilities, and Controls
- A. Remove temporary above grade or buried utilities, equipment, facilities, materials, prior to final inspection.
 - B. Clean and repair damage caused by installation or use of temporary work.
 - C. Restore existing facilities used during construction to original condition. Restore permanent facilities used during construction to specified condition.
- 1.20 Safety
- A. The Contractor alone is totally responsible for safety at all times. This responsibility shall not rest with the Owner or Engineer.
 - B. The Contractor shall familiarize himself with and understand the potential safety hazards associated specifically with the construction project as indicated and detailed in the Contract Documents. The Contractor shall include all potential hazards associated with the Construction Project in his safety program.
 - C. The Contractor shall provide the Engineer a prompt, complete and thorough written report of any safety related incident associated with the Work including accidents, injuries, claims and related information as required by the Engineer.
 - D. The Contractor shall be familiar with and comply with all applicable OSHA Rules, Regulations and Requirements applicable to the Construction Project.
 - E. See General Conditions and Special Conditions.
- 1.21 Permits and Fees
- A. The Contractor is responsible for obtaining all necessary permits and paying all fees as required for the project including all local, state and federal permits and fees.
 - B. See General Conditions and Special Conditions.
- 1.22 Dust Control
- A. The Contractor shall use all means necessary to control dust on and near the work and on and near off-site borrow areas when dust is caused by the operations during performance of the work or if resulting from the condition in which the subcontractor left the site.
 - B. The Contractor shall thoroughly moisten all surfaces as required to prevent dust being a nuisance to the public, neighbors and concurrent performance of work on the site.

PART 2 PRODUCTS - NOT USED.

PART 3 EXECUTION - NOT USED.

DIVISION NO. 1
GENERAL REQUIREMENTS

CONSTRUCTION FACILITIES
AND TEMPORARY CONTROLS
SECTION 01500

END OF SECTION

SECTION 01600
MATERIAL AND EQUIPMENT

PART 1 GENERAL

1.01 Section Includes

- A. Products.
- B. Transportation and handling.
- C. Storage and protection.
- D. Product options.
- E. Substitutions.
- F. Operation and maintenance data.

1.02 Related Sections

- A. Applicable to Work of this Section are the Drawings and General Provisions of the Contract, including: Part IV, General and Supplementary Conditions; Part V, Special Conditions; and all other Division No. 1 Sections.

1.03 Products

- A. New material, machinery, components, equipment, fixtures, and systems forming the Work. Does not include machinery and equipment used for preparation, fabrication, conveying and erection of the Work. Products may also include existing materials or components required for reuse.
- B. Do not use materials and equipment removed from existing premises, except as specifically permitted by the Contract Documents.
- C. Provide interchangeable components of the same manufacturer, for similar components.

1.04 Transportation and Handling

- A. Transport and handle Products in accordance with manufacturer's instructions.
- B. Promptly inspect shipments to assure that Products comply with requirements, quantities are correct, and Products are undamaged.
- C. Provide equipment and personnel to handle Products by methods to prevent soiling, disfigurement, or damage.

1.05 Storage and Protection

- A. Prior to site delivery, Contractor to furnish Engineer with manufacturer's written storage recommendations and requirements.
- B. Store and protect Products in strict accordance with manufacturer's instructions with seals and labels intact and legible. Store sensitive Products in weather-tight, climate controlled enclosures.
- C. For exterior storage of fabricated Products (where permitted), place on sloped supports, above ground.

- D. Provide off-site storage and protection when site does not permit on-site storage or protection. Contractor must insure that Project insurance includes coverage for storage, trucking and all related items associated with any off-site storage.
- E. Cover Products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation.
- F. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
- G. Provide equipment and personnel to store Products by methods to prevent soiling, disfigurement, or damage.
- H. Arrange storage of Products to permit access for inspection. Contractor to periodically inspect (accompanied by Engineer) to assure Products are undamaged and are maintained under specified conditions.
- I. No equipment or Products may be stored in floodplain area or any area subject to flooding.

1.06 Product Options

- A. Products Specified by Reference Standards or by Description Only: Any product meeting those standards or description.
- B. Products Specified by Naming One or More Manufacturers: Products of manufacturers named and meeting specifications, no options or substitutions allowed.
- C. Products Specified by Naming One or More Manufacturers with a Provision for "Or Equal" Substitutions: Submit a request for substitution for any manufacturer not named.
- D. See Special Conditions.

1.07 Substitutions and Alternate Equipment

- A. **Part V, Special Conditions cover Alternate Equipment which may be proposed for use by the Contractor and the approval procedure, as applicable.**
- B. Substitutions may be considered when a product becomes unavailable through no fault of the Contractor.
- C. Contractor document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.
- D. A Request Constitutes a Representation that the Contractor
 - 1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
 - 2. Will provide the same or better warranty for the Substitution as for the specified product.
 - 3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner.
 - 4. Waives claims for additional costs or time extension which may subsequently become apparent.
 - 5. Will reimburse Engineer for review or redesign services associated with approval of Substitution.

- E. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.
 - F. Substitution Submittal Procedure
 - 1. Submit the number of copies which the Contract requires, plus three copies for the Engineer, of the request for Substitution for consideration. Limit each request to one proposed Substitution.
 - 2. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence.
 - 3. The Engineer will notify Contractor, in writing, of decision to accept or reject request.
- 1.08 Operation and Maintenance Data
- A. As soon as practical after approval of equipment submittal by Engineer, the Contractor will provide two preliminary sets of operation and maintenance information, data and manuals as provided by the manufacturer. The O & M data and manuals shall be as complete as possible.
 - B. See Section 01700, Contract Closeout.

PART 2 PRODUCTS - NOT USED.

PART 3 EXECUTION - NOT USED.

END OF SECTION

[2244]
[9/93]

SECTION 01650
STARTING OF SYSTEMS

PART 1 GENERAL

1.01 Section Includes

- A. Starting systems.
- B. Demonstration and instructions.
- C. Testing, adjusting, and balancing.

1.02 Related Sections

- A. Applicable to Work of this Section are the Drawings and General Provisions of the Contract, including: Part IV, General and Supplementary Conditions; Part V, Special Conditions; and all other Division No. 1 Sections.

1.03 Starting Systems

- A. Coordinate schedule for start-up of various equipment and systems.
- B. Notify Engineer three working days minimum prior to start-up of each item.
- C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, or other conditions which may cause damage.
- D. Verify that all items listed in manufacturer's instructions have been checked prior to start-up.
- E. Verify that all safety equipment, devices and mechanisms are properly installed, connected and fully operable.
- F. Verify that all equipment protective devices including, but not limited to, overload switches/alarms, shutdown switches/alarms, temperature sensors, leak detection and similar equipment and devices are properly installed, connected and fully operable.
- G. Verify that tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
- H. Verify wiring and support components for equipment are complete and tested.
- I. Manufacturer's Representative
 - 1. Execute start-up under supervision of responsible manufacturer's representative in accordance with manufacturers' instructions.
 - 2. Manufacturer to provide authorized representative to be present at site to inspect, check and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.
 - 3. Authorized Representative shall have a minimum of five years experience starting similar systems and shall have a thorough understanding of all aspects of the equipment.

- J. Verify by actual testing (in the presence of the Engineer) that the correct and corresponding identification numbers are the same on both of the following:
 - 1. Number stenciled on the equipment, and
 - 2. Number shown on motor control center, electrical devices/cabinets, circuit breaker, disconnect and all other control or indicator devices.
- 1.04 Demonstration and Instructions
 - A. Demonstrate fully and completely the operation and maintenance of the equipment and systems to Owner's personnel. Owner shall not be responsible for operation and maintenance of any equipment until after final inspection, start-up and acceptance by Owner.
 - B. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owners' Personnel in detail to explain all aspects of operation and maintenance including safety, recommended safety procedures, equipment and similar items regarding operating personnel safety.
 - C. Demonstrate start-up, operation, control, adjustment, troubleshooting, servicing, maintenance, alarms, safety features, shutdown and all other miscellaneous features of each item of equipment.
 - D. A complete set of operation and maintenance data and manuals shall be furnished to the Engineer at least seven days prior to start-up. (See Section 01700, Contract Closeout)
- 1.05 Testing, Adjusting, and Balancing
 - A. Contractor to coordinate testing, adjusting, and balancing of equipment with manufacturer's authorized representative.
 - B. All testing, adjusting, and balancing of equipment by the manufacturer's authorized representative will be provided in the presence of the Contractor, Engineer, and Owner.
 - C. All equipment and controls will be properly set and adjusted for proper operation as approved by the Engineer and as recommended by the manufacturer's representative for its intended operation.

PART 2 PRODUCTS - NOT USED.

PART 3 EXECUTION

- 3.01 The Contractor shall be solely responsible for all aspects of start-up.
- 3.02 The Owner and Engineer shall not assist in equipment start-up except to observe start-up procedures.
- 3.03 Contractor shall demonstrate fully to the satisfaction of the Owner and Engineer that the equipment meets the required performance and is properly set and adjusted for its intended purpose.
- 3.04 Actual start-up of equipment shall be performed by an authorized representative of the manufacturer so as to not violate any warranties.

[2244.5]
[9/97]

END OF SECTION

SECTION 01700
CONTRACT CLOSEOUT

PART 1 GENERAL

1.01 Section Includes

- A. Closeout procedures.
- B. Final cleaning.
- C. Adjusting.
- D. Project record documents.
- E. Operation and maintenance data.
- F. Warranties.
- G. Spare parts and maintenance materials.

1.02 Related Sections

- A. Applicable to Work of this Section are the Drawings and General Provisions of the Contract, including: Part IV, General and Supplementary Conditions; Part V, Special Conditions; and all other Division No. 1 Sections.

1.03 Closeout Procedures

- A. Submit written certification that Contract Documents have been reviewed, Work has been completely and thoroughly inspected by the Contractor, and that Work is complete in accordance with Contract Documents and ready for Engineer's inspection.
- B. Provide submittals to Engineer that are required by governing or other authorities.
- C. Submit Final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due. See Part V, Special Conditions.
- D. Submit Notice of Completion Certificate to Engineer. See Part V, Special Conditions.

1.04 Final Cleaning

- A. Execute final cleaning prior to requesting final inspection.
- B. Clean interior and exterior glass and surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
- C. Clean equipment and fixtures to a sanitary condition.
- D. Clean or replace filters of operating equipment.
- E. Clean debris from roofs, gutters, downspouts, and drainage systems.
- F. Clean site; sweep paved areas; rake clean landscaped surfaces; mow grassed areas.
- G. Remove waste and surplus materials, rubbish, and construction facilities from the site.

1.05 Adjusting

- A. Adjust operating Products and equipment to ensure smooth and unhindered operation.

1.06 Project Record Documents

- A. Maintain on Site, One Set of the Following Record Documents; Promptly Record All Actual Revisions to the Work

- 1. Contract Documents.
- 2. Drawings and Specifications.
- 3. Addenda.
- 4. Change Orders and other Modifications to the Contract.
- 5. Reviewed shop drawings, product data, and samples.
- 6. Videotapes and Reports as required by project.

- B. Store Record Documents separate from documents used for construction.

- C. Record information concurrent with construction progress.

- D. Specifications

- 1. Legibly Mark and Record at Each Product Section Description of Actual Products Installed, Including the Following
 - a. Manufacturer's name and product model and number.
 - b. Product substitutions or alternates utilized.
 - c. Changes made by Addenda and Modifications.

- E. Record Documents and Shop Drawings

- 1. Legibly Mark Each Item to Record Actual Construction Including
 - a. Measured depths of foundations in relation to finish floor datum.
 - b. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - c. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
 - d. Field changes of dimension and detail.
 - e. Details not on original Contract Drawings.
- 2. Provide pre-construction and post-construction videotapes as required by Section 01300, and all other videotapes and reports as required by project.

F. Field Coordinates and Elevations for Treatment Plants (Water and Wastewater)

1. In addition to the requirements of Paragraph "E" above and unless specifically indicated otherwise, Contractor shall provide record drawings with field coordinates and elevations for all installed facilities.
2. Coordinates shall be provided to locate all buried utility lines, conduits, duct banks and similar buried facilities. All pipe fittings (tees, crosses, pipe stubs, bends, etc.) shall be located with coordinates and top elevation. Bottom invert elevation shall be provided at end of all pipes.
3. Provide sufficient coordinates and top elevations to locate a buried utility when fittings are not used to change direction (bending or deflecting small diameter pipes).
4. Each structure shall be located with coordinates located at a minimum of two (2) corners. Top elevation shall be provided.

G. Submit all above noted documents to Engineer with claim for final Application for Payment.

1.07 Operation And Maintenance Data

- A. Submit to Engineer, prior to final inspection, four complete sets of all operation and maintenance data and manuals as provided by equipment manufacturers for all project electrical and mechanical equipment furnished or installed by the Contractor. The manuals shall include all pertinent safety information.
- B. The O & M Manuals shall be complete in all respects. The manuals shall be customized for the specific equipment furnished, bound, of high quality printing and accepted by the Engineer.
- C. See Section 01650, Starting of Systems.

1.08 Warranties

- A. Assemble documents from Subcontractors, suppliers, and manufacturers.
- B. Submit prior to final Application for Payment.
- C. Warranty Period: Unless otherwise indicated, warranty period is for one year. The beginning of the warranty period is the date of Owner written acceptance of the item or facility covered by the warranty.

1.09 Spare Parts and Maintenance Materials

- A. Provide products, spare parts, maintenance and extra materials in quantities specified in individual specification Sections.
- B. Deliver to Project site and place in location as directed by Owner; obtain receipt from Owner and furnish copy to Engineer prior to final payment.

PART 2 PRODUCTS - NOT USED.

PART 3 EXECUTION - NOT USED.

END OF SECTION

[2244]
[Rev. 7/02]

SECTION 02060
STRUCTURE DEMOLITION

PART 1 GENERAL

1.01 Section Includes

- A. Demolition of designated structures and removal of materials from site.
- B. Demolition and removal of foundations and slabs-on-grade.
- C. Disconnecting and capping of identified utilities.

1.02 Related Sections

- A. Applicable to Work of this Section are the Drawings and General Provisions of the Contract, including: Part IV, General and Supplementary Conditions; Part V, Special Conditions; Part VI, Technical Specifications; Division No. 1, General Requirements.

1.03 Project Record Documents

- A. Submit under provisions of Section 01700.
- B. Accurately record actual locations of capped utilities and subsurface obstructions.

1.04 Regulatory Requirements

- A. Conform to applicable code for demolition of structures, safety of adjacent structures, dust control, runoff control and disposal.
- B. Obtain required permits from authorities.
- C. Notify affected utility companies before starting Work and comply with their requirements.
- D. Do not close or obstruct roadways without permits.
- E. Conform to applicable regulatory procedures when discovering hazardous or contaminated materials.

1.05 Scheduling

- A. Schedule Work under the provisions of Section 01300.
- B. Schedule Work as appropriate to coincide with site excavation work and new construction.
- C. Schedule Work to allow existing facilities to remain in operation as necessary and required by the Owner.

PART 2 PRODUCTS - NOT USED.

PART 3 EXECUTION

3.01 Preparation

- A. Provide, erect, and maintain temporary barriers and security devices at locations shown on Drawings.

- B. Protect existing structures which are not to be demolished.
 - C. Prevent movement or settlement of adjacent structures. Provide bracing and shoring.
 - D. Mark location of utilities.
 - E. Evaluate contents of all wetwells, piping, structures and other elements to be demolished and take appropriate actions to protect health and safety of the Contractor's, Owner's, Engineer's personnel and any other on-site personnel, as well as the general public. The Contractor is advised that the contents of certain elements may be hazardous, toxic, explosive, flammable or harmful to plants, humans, animals or aquatic life.
 - F. Determine all equipment and materials which the Owner wishes to retain.
- 3.02 Demolition Requirements
- A. Conduct demolition to minimize interference with adjacent structures.
 - B. Cease operations immediately if adjacent structures appear to be in danger. Notify Engineer. Do not resume operations until safe.
 - C. Conduct operations with minimum interference to public or private accesses.
- 3.03 Demolition
- A. Disconnect, remove and cap and identify designated utilities within demolition areas.**
 - B. Remove existing treatment plant, pump station, piping, manholes, valve box, valves, motors, controls, conduit, fencing and related items as indicated on Plans.**
 - C. Remove concrete slabs on grade and the top two feet of the existing wetwell.**
 - D. Empty existing treatment plant and wetwell. Dispose of contents in accordance with applicable laws and regulations. Coordinate with Engineer.**
 - E. Backfill existing treatment plant excavation with onsite materials meeting approval of Engineer and with Type A crushed aggregate.**
 - F. Backfill existing wetwell with Type A crushed aggregate. See Section 02223.**
 - G. Rough grade and compact areas affected by demolition to maintain site grades and contours.**
 - H. Remove demolished materials from site.**
 - I. Do not burn or bury materials on site. Leave site in clean condition.**
 - J. Remove temporary Work.**
- 3.04 Existing Equipment and Materials to be Retained by Owner
- A. Coordinate with Owner prior to all demolition operations to determine all existing equipment and materials to be salvaged by the Contractor and retained by Owner.
 - B. Remove all equipment and materials to be retained by Owner and deliver to location designated by Owner.

- C. Take care to protect all such equipment and materials to be retained by the Owner from any damage during demolition, removal and delivery operations.

END OF SECTION

[2244]
[REV12/00]

SECTION 02222

EXCAVATION

PART 1 GENERAL

1.01 Section Includes

- A. Excavation for building foundations.
- B. Excavation for slabs-on-grade, paving and landscaping.
- C. Excavation for site structures.

1.02 Related Sections

- A. Applicable to Work of this Section are the Drawings and General Provisions of the Contract, including: Part IV, General and Supplementary Conditions; Part V, Special Conditions; Part VI, Technical Specifications; Division No. 1, General Requirements.

1.03 Field Measurements

- A. Verify that survey benchmark and intended elevations for the Work are as shown on Drawings.

PART 2 PRODUCTS - NOT USED.

PART 3 EXECUTION

3.01 Preparation

- A. Identify required lines, levels, contours, and datum.

3.02 Excavation

- A. Underpin adjacent structures which may be damaged by excavation work, including utilities and pipe chases.
- B. Excavate subsoil required to accommodate building foundations, slabs-on-grade, paving, site structures and construction operations.
- C. Excavate to working elevations for piling work. Coordinate special requirements for piling.
- D. Machine slope banks to angle of repose or less, until shored. Contractor shall determine and provide the minimum slope required for safety.
- E. Excavation cut not to interfere with normal 45 degree bearing splay of foundation.
- F. Grade top perimeter of excavation to prevent surface water from draining into excavation.
- G. Hand trim excavation. Remove loose matter.
- H. Remove lumped subsoil, boulders, and rock up to 1/3 cu yd measured by volume. See Section 02229 for definition of site rock and its removal.

- I. Notify Engineer of unexpected subsurface conditions and discontinue affected Work in area until notified to resume Work.
 - J. Correct unauthorized excavation at no extra cost to Owner.
 - K. Correct Areas Over-Excavated by Error
 - 1. In area where structures are to bear on bed rock, over-excavation shall be corrected by installing Lean Concrete (see Section 02223).
 - 2. In areas where structures are to bear on residual soil, Type A crushed aggregate (see Section 02223) shall be installed in minimum 6 inch loose fill layers and compacted to a minimum of 95 percent of the Standard Proctor maximum dry density and the same bearing capacity of the residual soil shall be obtained.
 - L. Stockpile excavated material in area designated on site and remove excess material not being reused from site.
- 3.03 Field Quality Control
- A. Field inspection will be performed under provisions of Section 01400.
 - B. An Independent Testing Firm (as indicated in Section 01400, Quality Control) shall be utilized to monitor the excavation for each structure and to assure by test and reports that the bearing capacity indicated on the Drawings, the Report of Geotechnical Exploration or elsewhere within the Contract Documents, has been obtained.
 - C. Provide for visual inspection of bearing surfaces.
 - D. Required bearing capacities for the Project shall be as indicated on the Drawings.
 - E. Frequency of Bearing Capacity Test: Same as for Compaction Testing (See Section 02211).
- 3.04 Protection
- A. Protect excavations by methods required to prevent cave-in or loose soil from falling into excavation.
 - B. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.
 - C. OSHA Construction Standards for Excavations (29CFR Part 1926.650.652 Subpart P) and all other OSHA Regulations shall be adhered to by the Contractor.
 - D. Contractor shall take all necessary and appropriate measures to continuously protect all personnel at or near site at all times including Contractor's, Owner's and Engineer's personnel, other on-site personnel, visitors and the general public, both during active and inactive construction periods.

[2244]
[9/93]

END OF SECTION

SECTION 02223

BACKFILLING

PART 1 GENERAL

1.01 Section Includes

- A. Building perimeter and site structure backfilling to subgrade elevations.
- B. Site filling and backfilling.
- C. Fill under slabs-on-grade and paving.
- D. Consolidation and compaction.
- E. Fill for over-excavation.

1.02 Related Sections

- A. Applicable to Work of this Section are the Drawings and General Provisions of the Contract, including: Part IV, General and Supplementary Conditions; Part V, Special Conditions; Part VI, Technical Specifications; Division No. 1, General Requirements.

1.03 References

- A. ANSI/ASTM C136 - Method for Sieve Analysis of Fine and Coarse Aggregates.
- B. ANSI/ASTM D698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 lb Rammer and 12 inch Drop.
- C. ANSI/ASTM D1556 - Test Method for Density of Soil in Place by the Sand-Cone Method.
- D. ANSI/ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb Rammer and 18 inch Drop.
- E. Alabama Department of Transportation Standard Specification of Highway Construction (ALDOT Standard Specifications).
- F. ANSI/ASTM D2922 - Test Method for Density of Soil and Soil-Aggregate In Place by Nuclear Methods (Shallow Depth).

1.04 Submittals

- A. Submit under provisions of Section 01300.
- B. Samples: Where required by Engineer, submit 10 pound sample of each type of fill to testing laboratory in air-tight containers.
- C. Notify Engineer prior to taking sample so that Engineer may observe procedure as deemed necessary.

PART 2 PRODUCTS

2.01 Fill Materials

- A. Type A - Crushed Aggregate: Pit run, natural stone (crusher run); free of shale, clay, friable material, sand, debris; graded in accordance with ANSI/ASTM C136 within the following limits and meeting the requirements of ALDOT Standard Specifications, Section 801, Size No. 410:

| SIEVE SIZE | PERCENT PASSING |
|------------|-----------------|
| 2 Inches | 100 |
| 1½ Inches | 85 to 100 |
| 1 Inch | 60 to 85 |
| 1/2 Inch | 30 to 60 |
| No. 4 | 18 to 30 |
| No. 8 | 11 to 20 |
| No. 16 | 8 to 15 |
| No. 50 | 5 to 9 |
| No. 200 | 2 to 6 |

- B. Type B - Coarse Aggregate: Natural stone; washed, free of clay, shale, organic matter; graded in accordance with ANSI/ASTM C136, to the following limits and meeting the requirements of ALDOT Standard Specifications, Section 801, Size No. 6.

| SIEVE SIZE | PERCENT PASSING |
|------------|-----------------|
| 1 Inch | 100 |
| ¾ Inch | 90 to 100 |
| ½ Inch | 20 to 55 |
| ⅜ Inch | 0 to 15 |
| No. 4 | 0 to 5 |

- C. Type C - Coarse Aggregate: Natural stone; washed, free of clay, shale, organic matter; graded in accordance with ANSI/ASTM C136, to the following limits and meeting the requirements of ALDOT Standard Specifications, Section 801, Size No. 5.

| SIEVE SIZE | PERCENT PASSING |
|------------|-----------------|
| 1-½ Inch | 100 |
| 1 Inch | 90 to 100 |
| ¾ Inch | 20 to 55 |
| ½ Inch | 0 to 10 |
| ⅜ Inch | 0 to 5 |

- D. Type D - Sand: Natural river or bank sand; washed, free of silt, clay, loam, friable or soluble materials or organic matter; graded in accordance with ANSI/ASTM C136, within the following limits:

| SIEVE SIZE | PERCENT PASSING |
|------------|-----------------|
| No. 4 | 100 |
| No. 14 | 10 to 100 |
| No. 50 | 5 to 90 |
| No. 100 | 4 to 30 |
| No. 200 | 0 |

- E. Subsoil: Reused or imported, graded, free of lumps larger than 6 inches, free of rocks, boulders and gravel larger than 2 inch size, debris, rubble and similar extraneous materials determined by the Engineer to be detrimental to the facility installed.

- F. Concrete: Lean concrete, structural concrete conforming to Section 03300 with a minimum compressive strength of 2000 psi.

PART 3 EXECUTION

3.01 Examination

- A. Verify fill materials to be reused are acceptable.
- B. Verify that foundation perimeter drainage, storm drainage and utility piping installations have been inspected.
- C. Verify underground tanks are anchored to their own foundation to avoid floatation after backfilling.

3.02 Preparation

- A. Generally, compact subgrade to density requirements for subsequent backfill materials.
- B. Cut out soft areas of subgrade not capable of in situ compaction. Backfill with Type A aggregate fill (6 inch minimum) and compact to density equal to or greater than requirements for subsequent backfill material.
- C. Prior to placement of aggregate base course material at gravel paved areas, compact subsoil to 95 percent standard proctor maximum dry density in accordance with ANSI/ASTM D698.
- D. Unless otherwise indicated or specified, in areas where a majority of the foundation is bearing in rock, a uniform foundation bearing capacity shall be obtained as specified on the Drawings by installing Lean Concrete down to rock elevation (see Drawings).
- E. Unless otherwise indicated or specified, in areas where a majority of the foundation is on residual soil, a uniform foundation bearing capacity shall be obtained as specified or as indicated on the Drawings by undercutting the rock and installing layers of compacted Type A crushed aggregate (compacted to 95 percent Standard Proctor Maximum Dry Density) as directed by an independent testing firm to obtain the specified bearing capacity as shown on the Drawings.

3.03 Backfilling

- A. Backfill areas to contours and elevations with unfrozen materials.
- B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen or spongy subgrade surfaces.
- C. Granular Fill (Type A, B and C Aggregate, and Type D Sand): Place and compact materials in continuous layers not exceeding 6 inches compacted depth.
- D. Soil Fill: Place and compact material in continuous layers not exceeding 6 inches compacted depth.
- E. Employ a placement method that does not disturb or damage foundation perimeter drainage, foundation dampproofing, foundation waterproofing and utilities in trenches.
- F. Maintain optimum moisture content of backfill materials to attain required compaction density (see Section 02211).
- G. Backfill against supported foundation walls. Do not backfill against unsupported foundation walls.

- H. Backfill simultaneously on each side of unsupported foundation walls until supports are in place.
 - I. Slope grade away from building minimum 2 inches in 10 feet, unless noted otherwise.
 - J. Make grade changes gradual. Blend slope into level areas.
 - K. Remove surplus backfill materials from site.
 - L. Leave fill material stockpile areas completely free of excess fill materials.
- 3.04 Tolerances
- A. Top Surface of Backfilling Under Paved Areas: Plus or minus one inch from required elevations.
- 3.05 Field Quality Control
- A. Field inspection and testing will be performed under provisions of Section 01400.
 - B. An Independent Testing Firm (as indicated in Section 01400, Quality Control) shall be utilized to monitor the excavation for each structure to assure by test and reports that the bearing capacity indicated on the Drawings, in a Report of Geotechnical Exploration (as applicable) or elsewhere within the Contract Documents, has been obtained.
 - C. Tests and analysis of fill material will be performed in accordance with ANSI/ASTM D698 and with Section 01400.
 - D. Compaction testing will be performed in accordance with ANSI/ASTM D1556 and with Section 01400.
 - E. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.
 - F. Frequency of Tests: See Section 02211.
 - G. Proof roll compacted fill surfaces under slabs-on-grade and paving.
- 3.06 Protection of Finished Work
- A. Protect finished Work under provisions of Section 01500.
 - B. Recompact fills subjected to vehicular traffic.

END OF SECTION

[2244.5]
[Rev. 07/2022]

SECTION 02225
TRENCHING, BEDDING AND BACKFILLING

PART 1 GENERAL

- 1.01 Section Includes
 - A. Trench excavation for utilities.
 - B. Compacted bedding under fill over utilities.
 - C. Backfilling and compaction.
- 1.02 Related Sections
 - A. Applicable to Work of this Section are the Drawings and General Provisions of the Contract, including: Part IV, General and Supplementary Conditions; Part V, Special Conditions; Part VI, Technical Specifications; Division No. 1, General Requirements.
- 1.03 References
 - A. ANSI/ASTM C136 - Method for Sieve Analysis of Fine and Coarse Aggregates.
 - B. ANSI/ASTM D698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 lb Rammer and 12 inch Drop.
 - C. ANSI/ASTM D1556 - Test Method for Density of Soil in Place by the Sand-Cone Method.
 - D. ANSI/ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb Rammer and 18 inch Drop.
 - E. ANSI/ASTM D2922 - Test Method for Density of Soil and Soil-Aggregate In Place by Nuclear Methods (Shallow Depth).
 - F. ANSI/AWWA C600 - Installation of Ductile Iron Water Mains and Their Appurtenances.
 - G. AWWA Manual No. M23 - PVC Pipe Design and Installation.
 - H. Handbook of PVC Pipe Design and Construction by Uni-Bell Plastic Pipe Association.
 - I. OSHA Construction Standard for Excavations - 29CFR Part 1926.650.652 Subpart P.
- 1.04 Field Measurements
 - A. Verify that survey benchmark and intended elevations for the Work are as shown on Drawings.

PART 2 PRODUCTS

- 2.01 Fill Materials
 - A. As specified in Section 02223.
- 2.02 Bedding Materials
 - A. As specified in Section 02223.

- B. Subsoil Material: As specified in Section 02223.
- C. Concrete: Lean concrete as specified in Section 02223.

PART 3 EXECUTION

3.01 Examination

- A. Verify that fill materials to be used or reused are acceptable by Engineer.

3.02 Preparation

- A. Identify required lines, levels, contours and datum.
- B. Maintain and protect existing utilities remaining, which pass through work area.
- C. Protect plant life, lawns and other features remaining as a portion of final landscaping.
- D. Protect bench marks, existing structures, fences, sidewalks, paving and curbs from excavation equipment and vehicular traffic.
- E. Protect above and below grade utilities which are to remain.

3.03 Excavation

- A. Excavate subsoil required for utility piping or conduits.
- B. Earth Excavation: Width of trench below top of pipe or conduit shall not be any greater than that necessary to provide room for pipelaying, jointing, fitting installation, bedding, haunching and compacting. Cut trenches only sufficiently wide to enable installation of utilities and allow inspection; maintain as narrow as practical (see Paragraph 3.03 J).
- C. Rock Excavation: Width of trench below top of pipe or conduit must be at least 24 inches wider than the nominal pipe diameter regardless of the method used for rock excavation.
- D. Excavation shall not interfere with normal 45 degree bearing splay of foundations.
- E. Hand trim excavation as necessary. Hand trim for bell and spigot pipe joints. Remove loose matter.
- F. Remove lumped subsoil, boulders and rock up to 1/3 cubic yard, measured by volume. See Section 02229 for definition of size rock and its removal.
- G. Correct unauthorized excavation at no cost to Owner.
- H. Correct areas over-excavated by error with Type A crushed or Type B coarse aggregate as instructed by the Engineer.
- I. Where unstable or flowing soil condition is encountered in the trench wall, stabilization will be required before laying pipe.
- J. All trenches and particularly deep trenches (4 feet or more in depth) will be constructed with the safety of the construction workmen uppermost in mind. Trench walls shall be sloped or sheeted, shored, braced or similarly protected against unstable or flowing soil conditions as required by OSHA Construction Standard for Excavations.

- K. Construction trenching shall be in accordance with AWWA Manual No. M23, ANSI/AWWA C600 or Handbook of PVC Pipe Design and Construction, except as modified in the Specifications.
 - L. When an unstable trench subgrade condition is encountered, which in the opinion of the Engineer will provide inadequate pipe support, the unsuitable material shall be removed and replaced with suitable foundation material (Type A or B aggregate material, Section 02223, as approved by the Engineer) prior to placing any bedding material.
 - M. Trenches shall be dewatered by pumping or other suitable means prior to any bedding or pipelaying.
- 3.04 Bury (Depth of Cover Over Pipe) Within Highway Right-Of-Way
- A. The critical controls for bury on a pipeline crossing are the low points in the highway cross-section. Usually, these are the bottoms of the longitudinal ditches.
 - B. In establishing the depth of bury below an unpaved ditch, consideration should be given to potential increases in ditch depth, resulting from scour, ditch measurement operations or the need to increase the capacity of the ditch.
 - C. On longitudinal installation, the critical controls for bury are the depths of lateral drainage facilities, landscaping, buried utility lines, bridge structures and likely highway maintenance operation.
 - D. See highway permits for each specific installation.
 - E. Unless indicated otherwise, the normal controls for the bury of the pipeline within the highway right-of-way are as follows:
 - 1. The minimum bury under ditches shall be 36 inches on freeways and high-grade highways and 30 inches on all other highways, unless otherwise indicated.
 - 2. Where ditches are not involved, such as curb and gutter sections, the minimum bury under pavement for new or relocated installations shall be 4 feet, unless otherwise indicated.
 - 3. The minimum bury for utility installation within the highway rights-of-way shall be 36 inches on freeway rights-of-way and other high-grade highways and 30 inches within the rights-of-way limits on all other types of highways, unless otherwise indicated.
 - 4. Where less than minimum bury is necessary because of other utilities, water tables, ordinances or similar reason, the pipe shall be re-routed or else protected with a casing or concrete slab not in contact with the pipeline or use shall be made of other suitable measures acceptable to the Highway Department. Where less than minimum bury is necessary, the utility or Contractor shall supply the State Highway Department the necessary documentation to show that minimum bury cannot be attained.
 - 5. Cover for pipelines carrying transmittances which are flammable, corrosive, expansive, energized or unstable, particularly if carried at high pressure or potential, should not be reduced below the minimum bury outlined in these standards.
- 3.05 Bedding
- A. Bedding shall be placed as required for the type of pipe (pressure or gravity, plastic or ductile iron) and excavation (earth or rock) as specified herein. Bedding as specified for fill materials in Section 02223. Piping to be supported during placement and compaction of bedding fill. All bedding to be firm, stable and level.

- B. Compaction: Bedding to be compacted to minimum 90% Standard Proctor Maximum Dry Density; minimum 95% Standard Proctor Maximum Dry Density under structures, concrete, pavement and streets (traffic area).
 - C. See Drawings. See Section 02211 for frequency of compaction testing.
 - D. Plastic Piping
 - 1. Pressure Piping - Earth Excavation: Stable, firm, level, trench bottom providing uniform support for full length of pipe. Trench subsoil free of rocks, boulders, rubble, cinders, ashes or debris and approved for use by the Engineer may be used unless otherwise indicated. (see Section 02223)
 - 2. Pressure Piping - Rock Excavation: Minimum 6 inches compacted subsoil either excavated from trench or imported, meeting the approval of the Engineer may be used. The Contractor, at his option, may use Type A crushed aggregate (crusher run) or Type D sand (see Section 02223).
 - 3. Gravity (Non-Pressure) Piping - Earth or Rock Excavation: Minimum 6 inches compacted Type A crushed or Type B coarse aggregate (see Section 02223) used for cushioning and leveling purposes, as approved by the Engineer.
 - 4. Pressure or Gravity Piping - Open Cut Under Concrete, Pavement or Streets (Traffic Area): Minimum 6 inches, compacted, Type A crushed aggregate (crusher run).
 - E. Ductile Iron or Steel Piping
 - 1. Pressure Piping - Earth Excavation: Stable, firm, level trench bottom providing uniform support for full length of pipe. Trench subsoil free of rocks, boulders, rubble, cinders, ashes and similar debris and approved for use by the Engineer may be used unless otherwise indicated (see Section 02223).
 - 2. Pressure Piping - Rock Excavation: Minimum 6 inch compacted Type D sand or Type A crushed aggregate (crusher run) (see Section 02223).
 - 3. Gravity Piping - Earth or Rock Excavation: Minimum 6 inches compacted Type A crushed or Type B coarse aggregate as approved by the Engineer (see Section 02223) used for cushioning and leveling.
 - 4. Pressure or Gravity Piping - Open Cut Under Concrete, Pavement or Streets (Traffic Area): Minimum 6 inches, compacted, Type A crushed aggregate (crusher run).
 - F. Reinforced Concrete Storm Sewerage Piping
 - 1. See Section 02722 for bedding, backfilling and installation.
 - 2. Any installation requirements not covered in Section 02722 shall be the same as for gravity ductile iron piping as specified herein.
- 3.06 Backfilling
- A. Backfill Material: See Section 02223.
 - B. Backfill only after locations of pipe, valves and appurtenances have been recorded and the pipelaying, jointing and bedding have been approved by the Engineer.
 - C. Frozen backfill materials will not be used.

- D. Backfill trenches to contours and elevations as shown, or to top of initial existing grade if no elevation is shown on Drawings. Windrow fill over trench to be provided to allow for natural settlement of the compacted fill unless otherwise indicated.
- E. Compaction of Backfill
1. Backfill (initial, haunching and final) to be compacted to minimum 90 percent Standard Proctor Maximum Dry Density unless indicated otherwise. Under concrete, structures, pavement, streets and traffic areas compaction to be minimum 95 percent Standard Proctor Maximum Dry Density.
 2. See Section 02211 for frequency of compaction testing. See Drawings.
- F. Initial Haunching Backfill: Same as bedding material, mechanically compacted in maximum 6 inch layers to springline of pipe. Work in and around pipe to provide uniform support, fill all voids and prevent future movement or settling. Compacted haunching backfill not required in narrow trenches for pressure plastic pipe installation unless otherwise indicated.
- G. Initial Backfill
1. Subsoil excavated from trench or imported meeting specifications in Section 02223.
 2. Initial backfill to be placed and mechanically compacted in maximum 6 inch layers around pipe and minimum 1 foot above top of pipe.
 3. In rock excavation, imported topsoil or subsoil meeting the requirements of Section 02223 for subsoil may be required. **Excavated rock during trenching operations, whether demolition required or not, will not be utilized for initial backfill.**
 4. No rocks, boulders, rubble, cinders, ashes, any debris or any subsoil or topsoil, which in the opinion of the Engineer may be detrimental to the pipe, will be placed as initial backfill. The Engineers decision will be final.
 5. See Paragraph 3.07 for road crossings.
- H. Final Backfill
1. The final backfill shall be the on-site excavated topsoil and subsoil; however, this must be free of boulders, large rocks, frozen clumps of dirt, debris and rubble, which in the opinion of the Engineer would be detrimental to the pipe.
 2. If sufficient on-site excavated topsoil and subsoil meeting the requirements of Section 02223 and meeting the approval of the Engineer is not available, then suitable fill material meeting the approval of the Engineer must be imported by the Contractor and utilized as final backfill. The final backfill shall be compacted by vibratory compactors and/or on-site construction equipment meeting the approval of the Engineer.
 3. The final backfill over the trench shall be windrow fill minimum 8 inches above the adjacent existing grade to allow for settling due to natural compaction over time, unless otherwise indicated.
 4. Excavated rocks, boulders, rubble and similar debris not acceptable as fill material shall be removed from the construction site and disposed as a part of the final clean-up operation as specified in Section 01700.
 5. See Paragraph 3.07 for road crossings.
- I. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen or spongy subgrade surfaces.

- J. Granular Fill: Place and compact material in continuous layers not exceeding 6 inches compacted depth.
 - K. Soil Fill: Place and compact material in continuous layers not exceeding 6 inches compacted depth.
 - L. Employ a placement method that does not disturb or damage adjacent structures or utilities.
 - M. Maintain optimum moisture content of backfill materials to attain required compaction density.
 - N. See each pipelaying Section for any special requirements relating to trenching, bedding or backfilling.
- 3.07 Piping - Open Cut Road Crossings and Parallel Installation Within Road
- A. Open cut road crossings shall be as shown on Drawings.
 - B. Haunching, initial and final backfill shall be Type A crushed aggregate (crusher run) compacted in maximum 6 inch layers (see Paragraph 3.06).
 - C. Bedding shall be as shown for each type pipe (see Paragraph 3.05).
 - D. Pavement replacement as shown on Drawings. Pavement replaced must be equal to or better than existing.
- 3.08 Piping - Open Cut Under Concrete Structures, Paving, Traffic Areas, and Parking Areas
- A. Same as Paragraph 3.07.
- 3.09 Tolerances
- A. Top Surface of Backfilling Under Paved Areas: Plus or minus one inch from required elevations.
- 3.10 Field Quality Control
- A. Field inspection and testing will be performed under provisions of Section 01400.
- 3.11 Protection of Finished Work
- A. Protect finished Work under provisions of Section 01500.
 - B. Recompact fills subjected to vehicular traffic.

END OF SECTION

[2244.5]
[11/97]

SECTION 02226
UTILITY TRENCHING, BEDDING AND BACKFILLING

PART 1 GENERAL

1.01 Section Includes

- A. Excavate trenches for utilities.
- B. Compacted bedding under fill over utilities.
- C. Backfilling and compaction.

1.02 Related Sections

- A. Applicable to Work of this Section are the Drawings and General Provisions of the Contract, including: Part IV, General and Supplementary Conditions; Part V, Special Conditions; Part VI, Technical Specifications; Division No. 1, General Requirements.

1.03 References

- A. ANSI/ASTM C136 - Method for Sieve Analysis of Fine and Coarse Aggregates.
- B. ANSI/ASTM D698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 lb Rammer and 12 inch Drop.
- C. ANSI/ASTM D1556 - Test Method for Density of Soil in Place by the Sand-Cone Method.
- D. ANSI/ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb Rammer and 18 inch Drop.
- E. ANSI/AWWA C600 - Installation of Ductile Iron Water Mains and Their Appurtenances.
- F. AWWA Manual No. M23 - PVC Pipe Design and Installation.
- G. Handbook of PVC Pipe Design and Construction by Uni-Bell Plastic Pipe Association.
- H. OSHA Construction Standard for Excavations - 29CFR Part 1926.650.652 Subpart P.

1.04 Field Measurements

- A. Verify that survey benchmark and intended elevations for the Work are as shown on Drawings.

PART 2 PRODUCTS

2.01 Fill Materials

- A. Type A - Crushed Aggregate: Pit run, natural stone (crusher run); free of shale, clay, friable material, sand, debris; graded in accordance with ANSI/ASTM C136 within the following limits and meeting the requirements of ALDOT Standard Specifications, Section 801, Size No. 410:

| SIEVE SIZE | PERCENT PASSING |
|--------------|-----------------|
| 2 Inches | 100 |
| 1-1/2 Inches | 85 to 100 |
| 1 Inch | 60 to 85 |
| 1/2 Inch | 30 to 60 |
| No. 4 | 18 to 30 |
| No. 8 | 11 to 20 |
| No. 16 | 8 to 15 |
| No. 50 | 5 to 9 |
| No. 200 | 2 to 6 |

- B. Type B - Coarse Aggregate: Natural stone; washed, free of clay, shale, organic matter; graded in accordance with ANSI/ASTM C136, to the following limits and meeting the requirements of ALDOT Standard Specifications, Section 801, Size No. 6.

| SIEVE SIZE | PERCENT PASSING |
|------------|-----------------|
| 1 Inch | 100 |
| 3/4 Inch | 90 to 100 |
| 1/2 Inch | 20 to 55 |
| 3/8 Inch | 0 to 15 |
| No. 4 | 0 to 5 |

- C. Type C - Coarse Aggregate: Natural stone; washed, free of clay, shale, organic matter; graded in accordance with ANSI/ASTM C136, to the following limits and meeting the requirements of ALDOT Standard Specifications, Section 801, Size No. 5.

| SIEVE SIZE | PERCENT PASSING |
|------------|-----------------|
| 1-1/2 Inch | 100 |
| 1 Inch | 90 to 100 |
| 3/4 Inch | 20 to 55 |
| 1/2 Inch | 0 to 10 |
| 3/8 Inch | 0 to 5 |

- D. Type D - Sand: Natural river or bank sand; washed: free of silt, clay, loam, friable or soluble materials or organic matter; graded in accordance with ANSI/ASTM C136, within the following limits:

| SIEVE SIZE | PERCENT PASSING |
|------------|-----------------|
| No. 4 | 100 |
| No. 14 | 10 to 100 |
| No. 50 | 5 to 90 |
| No. 100 | 4 to 30 |
| No. 200 | 0 |

- E. Subsoil: Reused or imported, graded, free of lumps larger than 6 inches, free of rocks, boulders and gravel larger than 3 inch size, debris, rubble and similar extraneous materials determined by the Engineer to be detrimental to the facility installed.
- F. Concrete: Lean concrete or structural concrete, minimum, compressive strength of 2000 psi.

PART 3 EXECUTION

3.01 Examination

- A. Verify that fill materials to be used or reused are acceptable by Engineer.

3.02 Preparation

- A. Identify required lines, levels, contours and datum.
- B. Maintain and protect existing utilities remaining, which pass through work area.
- C. Protect plant life, lawns and other features remaining as a portion of final landscaping.
- D. Protect bench marks, existing structures, fences, sidewalks, paving and curbs from excavation equipment and vehicular traffic.
- E. Protect above and below grade utilities which are to remain.

3.03 Excavation

- A. Excavate subsoil required for utility piping or conduits.
- B. Earth Excavation: Width of trench below top of pipe or conduit shall not be any greater than that necessary to provide room for pipelaying, jointing, bedding, haunching and compacting. Cut trenches only sufficiently wide to enable installation of utilities and allow inspection; maintain as narrow as practical (See 3.03J).
- C. Rock Excavation: Width of trench below top of pipe or conduit must be at least 12 inches wider than the pipe diameter regardless of the method used for rock excavation.
- D. Excavation shall not interfere with normal 45 degree bearing splay of foundations.
- E. Hand trim excavation as necessary. Hand trim for bell and spigot pipe joints. Remove loose matter.
- F. Remove lumped subsoil, boulders and rock up to 1/3 cubic yard, measured by volume. See Section 02229 for definition of size rock and its removal.
- G. Correct unauthorized excavation at no cost to Owner.
- H. Correct areas over-excavated by error with Type A crushed aggregate or Type B coarse aggregate as instructed by the Engineer.
- I. Where unstable or flowing soil condition is encountered in the trench wall, stabilization will be required before laying pipe.
- J. All trenches and particularly deep trenches (4 feet or more in depth) will be constructed with the safety of the construction workmen uppermost in mind. Trench walls shall be sloped or sheeted, shored, braced or similarly protected against unstable or flowing soil conditions as required by OSHA Construction Standard for Excavations.
- K. Construction trenching shall be in accordance with AWWA Manual No. M23, ANSI/AWWA C600 or Handbook of PVC Pipe Design and Construction, except as modified in the Specifications.
- L. When an unstable trench subgrade condition is encountered, which in the opinion of the Engineer will provide inadequate pipe support, the unsuitable material shall be removed and replaced with suitable foundation material (Type A or B aggregate, Section 02226, as approved by the Engineer) prior to placing any bedding material.
- M. Trenches shall be dewatered by pumping or other suitable means prior to any bedding or pipelaying.

3.04 Bury

- A. The critical controls for bury on a pipeline crossing are the low points in the highway cross-section. Usually, these are the bottoms of the longitudinal ditches.
- B. In establishing the depth of bury below an unpaved ditch, consideration should be given to potential increases in ditch depth, resulting from scour, ditch measurement operations or the need to increase the capacity of the ditch.
- C. On longitudinal installation, the critical controls for bury are the depths of lateral drainage facilities, landscaping, buried utility lines, bridge structures and likely highway maintenance operation.
- D. See highway permits for each specific installation.
- E. Unless indicated otherwise, the normal controls for the bury of the pipeline within the highway right-of-way are as follows:
 - 1. The minimum bury under ditches shall be 36 inches on freeways and high-grade highways and 30 inches on all other highways, unless otherwise indicated.
 - 2. Where ditches are not involved, such as curb and gutter sections, the minimum bury under pavement for new or relocated installations shall be 4 feet, unless otherwise indicated.
 - 3. The minimum bury for utility installation within the highway rights-of-way shall be 36 inches on freeway rights-of-way and other high-grade highways and 30 inches within the rights-of-way limits on all other types of highways, unless otherwise indicated.
 - 4. Where less than minimum bury is necessary because of other utilities, water tables, ordinances or similar reason, the pipe shall be re-routed or else protected with a casing or concrete slab not in contact with the pipeline or use shall be made of other suitable measures acceptable to the Alabama Department of Transportation (ALDOT). Where less than minimum bury is necessary, the utility or Contractor shall supply ALDOT the necessary documentation to show that minimum bury cannot be attained.
 - 5. Cover for pipelines carrying transmittances which are flammable, corrosive, expansive, energized or unstable, particularly if carried at high pressure or potential, should not be reduced below the minimum bury outlined in these standards.

3.05 Bedding

- A. Bedding shall be placed as required for the type of pipe (pressure or gravity, plastic or ductile iron) and excavation (earth or rock) as specified herein. Bedding as specified for fill materials in this Section. Piping to be supported during placement and compaction of bedding fill. All bedding to be firm, stable and level.
- B. Compaction: Bedding to be compacted to minimum 90 percent Standard Proctor Maximum Dry Density; minimum 95 percent Standard Proctor Maximum Dry Density under structures, concrete, pavement and streets (traffic area). Testing frequency see Field Quality Control.
- C. Plastic Piping
 - 1. Pressure Piping - Earth Excavation: Stable, firm, level, trench bottom providing uniform support for full length of pipe. Trench subsoil (free of rocks, boulders, rubble, cinders, ashes or debris which may be considered by the Engineer detrimental to the piping) may be used.

2. Pressure Piping - Rock Excavation: Minimum 6 inches compacted subsoil either excavated from trench or imported, meeting the approval of the Engineer, may be used. Contractor, at his option, may utilize Type A crushed aggregate (crusher run) or Type D sand.
3. Gravity (Non-Pressure) Piping - Earth or Rock Excavation: Minimum 6 inches compacted Type A crushed or Type B coarse aggregate used for cushioning and leveling purposes, as approved by the Engineer.
4. Pressure or Gravity Piping - Open Cut Under Concrete, Pavement or Streets (Traffic Area): Minimum 6 inches compacted Type A crushed aggregate (crusher run).

D. Ductile Iron or Steel Piping

1. Pressure Piping - Earth Excavation: Stable, firm, level trench bottom providing uniform support for full length of pipe. Trench subsoil (free of rocks, boulders, rubble, cinders, ashes and similar debris which may be considered by the Engineer to be detrimental to the piping) may be used unless otherwise indicated.
2. Pressure Piping - Rock Excavation: Minimum 6 inch Type D sand or Type A crushed aggregate (crusher run). Bedding shall be level and compacted.
3. Gravity Piping - Earth or Rock Excavation: Minimum 6 inches compacted Type A crushed or Type B coarse aggregate as approved by the Engineer used for cushioning and leveling.
4. Pressure or Gravity Piping - Open Cut Under Concrete, Pavement or Streets (Traffic Area): Minimum 6 inches compacted Type A crushed aggregate (crusher run).

3.06 Backfilling

- A. Backfill Material: See Part 2 of this Section.
- B. Backfill only after locations of pipe, valves and appurtenances have been recorded and the pipelaying, jointing and bedding have been approved by the Engineer.
- C. Frozen backfill materials will not be used.
- D. Backfill trenches to contours and elevations as shown, or to top of initial existing grade if no elevation is shown on Drawings. Windrow fill over trench to be provided to allow for natural settlement of the compacted fill unless otherwise indicated.
- E. Compaction of Backfill (Haunching, Initial and Final): Same as specified for Bedding.
- F. Haunching Backfill
 1. Pressure Piping: Same as bedding material (unless otherwise indicated in the specific piping section), compacted in maximum 6 inch layers to springline of pipe. Work in and around pipe to provide uniform support, fill all voids and prevent future movement or settling.
 2. Small Diameter Pressure Piping: Compacted haunching backfill not required in shallow (less than 5 feet deep) narrow trenches for small diameter (6 inch and less) pressure plastic or ductile iron pipe installation unless directed otherwise by the Engineer.
 3. Gravity Sewer Piping: See Section 02732.
 4. Storm Water Piping: See Section 02722.

G. Initial Backfill

1. Pressure Piping

- a. Subsoil excavated from trench, or imported meeting Specifications and approval of Engineer.
- b. No rocks, boulders, rubble, cinders, ashes or any debris which in the opinion of the Engineer may be detrimental to the pipe, will be placed as initial backfill.
- c. Initial backfill to be placed mechanically and compacted in maximum 6 inch layers around pipe and minimum 1 foot above top of pipe. Care shall be taken not to damage the pipe.
- d. In rock excavation, imported topsoil or subsoil meeting the approval of the Engineer will be required. Excavated rock during trenching operations, whether demolition required or not, will not be utilized for initial backfill.
- e. See 3.07 for road crossings.

2. Gravity Sewer Piping: See Section 02732.

3. Storm Water Piping: See Section 02722.

H. Final Backfill

1. The final backfill may be the on-site excavated topsoil and subsoil; however, this must be free of boulders, large rocks, frozen clumps of dirt and rubble, which in the opinion of the Engineer would be detrimental to the pipe.
2. If sufficient on-site excavated topsoil and subsoil meeting the approval of the Engineer is not available, then fill material meeting the approval of the Engineer must be imported by the Contractor and utilized as final backfill. The final backfill shall be mechanically compacted by vibrating compactors and/or the on-site construction equipment meeting the approval of the Engineer.
3. The final backfill over the trench shall be windrow fill minimum 8 inches above the adjacent existing grade to allow for settling due to natural compaction over time, unless otherwise indicated.
4. Excavated rocks, boulders, rubble and similar debris not acceptable as fill material shall be removed from the construction site and disposed as a part of the final clean-up operation as specified in Section 01700.
5. See 3.07 for road crossings.

I. General Backfill Requirements

1. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen or spongy subgrade surfaces.
2. Granular Fill: Place and compact material in continuous layers not exceeding 6 inches compacted depth.
3. Soil Fill: Place and compact material in continuous layers not exceeding 6 inches compacted depth.
4. Employ a placement method that does not disturb or damage adjacent structures or utilities.
5. Maintain optimum moisture content of backfill materials to attain required compaction density.

6. See each pipelaying Section for any special requirements relating to trenching, bedding or backfilling.

3.07 Road Crossings

- A. Open cut road crossings shall be as shown on Drawings.
- B. Haunching, initial and final backfill shall be Type A crushed aggregate (crusher run) compacted in maximum 6 inch layers. Compaction as specified for bedding.
- C. Pavement replacement as shown on Drawings. Pavement replaced must be equal or better than existing as approved by Engineer.

3.08 Tolerances

- A. Top Surface of Backfilling Under Paved Areas: Plus or minus one inch from required elevations.

3.09 Field Quality Control

- A. Testing by an independent laboratory per Section 01400 is not required for pipeline bedding or backfill.
- B. Engineer shall determine acceptance of compaction for bedding and backfill. Contractor may, at his option and expense, provide an independent testing laboratory to confirm that the minimum specified compaction is achieved should he not accept the Engineer's determination.

3.10 Protection of Finished Work

- A. Protect finished Work under provisions of Section 01500.
- B. Recompact fills subjected to vehicular traffic.

[2244]
[Rev. 03/2010]

END OF SECTION

SECTION 02281
TERMITE CONTROL

PART 1 GENERAL

- 1.01 Section Includes
 - A. Soil treatment for termite control below grade, at interior, and exterior foundation perimeter.
- 1.02 Related Sections
 - A. Applicable to Work of this Section are the Drawings and General Provisions of the Contract, including: Part IV, General and Supplementary Conditions; Part V, Special Conditions; Part VI, Technical Specifications; Division No. 1, General Requirements.
- 1.03 References
 - A. Environmental Protection Agency - Federal Insecticide, Fungicide and Rodenticide Act.
- 1.04 Submittals
 - A. Submit under provisions of Section 01300.
 - B. Product Data: Indicate products to be used, application rate, certificate of qualifications and certificate of producer approval.
- 1.05 Project Record Documents
 - A. Submit under provisions of Section 01700.
 - B. Accurately record, date and rate of application, areas of application and total amount of each chemical used in each area.
- 1.06 Maintenance Data
 - A. Submit under provisions of Section 01700.
 - B. Indicate re-treatment schedule as recommended by the exterminator.
- 1.07 Qualifications
 - A. Applicator: Company specializing in performing the Work of this Section with minimum 5 years documented experience, approved by manufacturer and licensed by the State of Alabama.
- 1.08 Regulatory Requirements
 - A. Conform to applicable code for requirements for application in accordance with EPA.
 - B. Provide certificate of compliance from authority having jurisdiction indicating approval of toxicants.
- 1.09 Sequencing
 - A. Sequence Work under the provisions of Section 01010.
 - B. Apply toxicant no sooner than 12 hours prior to installation of vapor barrier under slabs-on-grade.

1.10 Warranty

- A. Provide one year warranty under provisions of Section 01700.
- B. Warranty to include coverage for damage and repairs to building and building contents caused by termites, repair damage, re-treat where required.
- C. Inspect and report conditions at end of one year warranty to Owner in writing.

PART 2 PRODUCTS

2.01 Toxicant

- A. Cypermethrin (24.8 Percent): Two pounds Cypermethrin per gallon.
- B. Proprietary Products Provided They Meet the Following Requirements
 - 1. The Product has passed a five year field test conducted by the U. S. Forest Service.
 - 2. Approved for use by U.S. EPA for termite control.
 - 3. Proof is provided that no toxic effects to humans or to beneficial plant or animal life will result from the use of the Product.

2.02 Other Materials

- A. Diluent: As recommended by toxicant manufacturer.

2.03 Dilution Preparation

- A. Mix toxicant to manufacturer's instructions for the recommended dilution.

PART 3 EXECUTION

3.01 Examination

- A. Verify site conditions under provisions of Section 01039.
- B. Verify that soil surfaces are unfrozen, sufficiently dry to absorb toxicant and ready to receive treatment.
- C. Verify final grading is complete.

3.02 Application

- A. Spray apply or inject toxicant in accordance with manufacturer's instructions.
- B. Apply toxicant at locations indicated in "Schedule" at end of this Section.
- C. Prepare toxicant dilution as recommended by manufacturer.
- D. All holes drilled in construction elements for preconstruction treatments should be securely plugged following the application.

- E. Effective preconstruction treatment for subterranean termite prevention requires the establishment of vertical and/or horizontal chemical barriers between wood in the structure and the termite colonies in the soil.
- F. Horizontal Barriers: For horizontal barriers, applications shall be made using a low pressure spray after grading is completed and prior to the pouring of the slab or footing.
1. Apply a minimum of one gallon per 10 square feet of the toxicant dilution, as recommended by manufacturer, to provide thorough and continuous coverage of the area being treated.
 2. If the fill is washed gravel or other coarse material, it is important that a sufficient amount of dilution be used to reach the soil substrate beneath the coarse fill.
 3. If concrete slabs cannot be poured over the soil the same day it has been treated, a vapor barrier should be placed over the treated soil to prevent disturbance of the termiticide barrier.
- G. Vertical Barriers: Establish vertical barriers in areas such as around the base of foundations, plumbing lines, backfilled soil against foundation walls and other areas which may warrant more than just a horizontal barrier.
1. Apply the toxicant dilution at a minimum of four gallons per 10 linear feet per foot of depth as recommended by the manufacturer.
 2. Rodding and/or trenching applications should be made to reach the top of the footing. Rod holes should be spaced to provide a continuous barrier.
 3. Trenches need not be wider than six inches. Treat soil with the dilution as it is being replaced in the trench.
 4. Hollow block foundations or voids of masonry shall be treated to make a complete chemical barrier especially if the soil was not treated prior to pouring the footing. Apply the dilution at a rate of two gallons per 10 linear feet so that it reaches the top of the footing.
 5. For crawl spaces, establish a vertical barrier on both sides of the foundation and around all piers and areas where underground utilities exit the soil. Do not apply the dilution to the entire surface area intended as the crawl.
- H. Plenum Type Structures
1. For plenum type structures which use a sealed underfloor space to circulate heated and/or cooled air throughout the structure, apply the dilution at the rate of four gallons per linear feet per foot of depth.
 2. Soil adjacent to both sides of foundation walls, supporting piers, plumbing and conduits should be treated by trenching or rodding (where soil conditions permit) to a depth of six inches or, if less shallow, to the top of the footing.
 3. When conditions will not permit trenching or rodding, surface application adjacent to interior foundation walls may be made by a treated strip which shall not exceed a width of 18 inches, horizontally, from the foundation walls, piers or pipes.
 4. The surface application should be made at a rate of one gallon per 10 square feet as a very coarse spray under low pressure (not to exceed 20 P.S.I. when measured at the treating tool).
 5. After soil treatment, a polyethylene film or other suitable vapor barrier must be installed on the ground surface over the entire subfloor area and on the inside of the plenum walls, in accordance with the recommended practices for plenum type structures.

- I. Apply extra treatment to structure penetration surfaces such as pipe or ducts and soil penetrations such as grounding rods or posts.
- J. Re-treat disturbed treated soil with same toxicant as original treatment.
- K. If inspection or testing identifies the presence of termites, re-treat soil and re-test.

3.03 Protection of Finished Work

- A. Protect finished Work under provisions of Section 01500.
- B. Do not permit soil grading over treated Work.

3.04 Schedule

A. Locations

- 1. Under building slabs-on-grade.
- 2. Both sides, exterior side, and interior side of building foundation surface.

END OF SECTION

[2244]
[Rev. 12/06]

SECTION 02662
PLANT WATER PIPING, VALVES AND RELATED ITEMS

PART 1 GENERAL

1.01 Section Includes

- A. Potable and non-potable plant water distribution piping, fittings, valves, accessories, installation and testing.

1.02 Related Sections

- A. Applicable to Work of this Section are the Drawings and General Provisions of the Contract, including: Part IV, General and Supplementary Conditions; Part V, Special Conditions; Part VI, Technical Specifications; Division No. 1, General Requirements.

1.03 References

- A. ASTM A377 - Ductile Iron Pressure Pipe.
- B. ANSI/AWWA C151/A21.51 - Ductile Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds for Water or Other Liquids.
- C. ANSI/AWWA C104/A21.4 - Cement-Mortar Lining for Ductile Iron Pipe and Fittings for Water.
- D. ANSI/AWWA C111/A21.11 - Rubber Gasket Joints for Ductile Iron and Gray Iron Pressure Pipe and Fittings.
- E. ANSI/AWWA C115/A21.15 - Flanged Ductile Iron Pipe with Threaded Flanges.
- F. ANSI/AWWA C110/A21.10 - Ductile Iron and Gray Iron Fittings, 3 Inch through 48 Inch for Water and Other Liquids.
- G. ANSI/AWWA C600 - Installation of Ductile Iron Water Mains and Their Appurtenances.
- H. ANSI/AWWA C905 - Poly(Vinyl Chloride) (PVC) Water Transmission Pipe, Nominal Diameters 14 Inch Through 36.
- I. ANSI/AWWA C153/A21.53 - Ductile Iron Compact Fittings, 3 Inch Through 16 Inch for Water and Other Liquids.
- J. ASTM D1784 - Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds.
- K. ASTM D3139 - Standard Specification for Joints for Plastic Pressure Pipes Using Elastomeric Seals.
- L. Handbook of PVC Pipe Design and Construction - Uni-Bell Plastic Pipe Association (Uni-Bell Handbook).
- M. Alabama Department of Transportation Standard Specifications for Highway Construction (ALDOT Standard Specifications).
- N. ASTM D2774 - Standard Recommended Practice for Underground Installation of Thermo Plastic Pressure Piping.

- O. ANSI/AWWA C900 – Poly (Vinyl Chloride) (PVC) Pressure Pipe, 4 Inch Through 12 Inch for Water Distribution.
- P. ANSI/AWWA C901 - Polyethylene (PE) Pressure Pipe and Tubing, 1/2 Inch through 3 Inch for Water Service.
- Q. ANSI/AWWA C800 - Underground Service Line Valves and Fittings.
- R. ANSI/AWWA C506 - Backflow Prevention Devices - Reduced Pressure Principle and Double Check Valve Types.
- S. ANSI/AWWA C502 - Dry Barrel Fire Hydrants.
- T. ANSI/AWWA C500 - Gate Valves for Water and Sewerage Systems.
- U. ANSI/AWWA C504 - Rubber Seated Butterfly Valves.
- V. ANSI/AWWA C507 - Ball Valves 6 Inch Through 48 Inch.
- W. ANSI/AWWA C508 - Swing Check Valves for Waterworks Services, 2 Inch Through 24 Inch NPS.
- X. ANSI/AWWA C509 - Resilient Seated Gate Valves for Water and Sewerage Systems.
- Y. ASTM B88 - Specification for Seamless Copper Water Tubing.
- Z. ANSI/AWWA C651 - Standard for Disinfecting Water Mains.
- AA. Construction Standard for Excavations - OSHA (29CFR Part 1926.650.652, Subpart P).
- AB. OSHA Standards, Regulations and Guidelines.
- AC. AWWA Manual No. M23 - PVC Pipe Design and Installation.
- 1.04 Definitions
 - A. Bedding: Fill placed under, beside and directly over pipe, prior to subsequent backfill operations.
- 1.05 Submittals
 - A. Submit under provisions of Section 01300.
 - B. Product Data: Provide data indicating pipe, pipe accessories and fittings.
 - C. Manufacturer's Installation Instructions: Indicate any special products and any special procedures required to install products specified.
- 1.06 Project Record Documents
 - A. Submit documents under provisions of Section 01700.
 - B. Record location of pipe run, connections, valves, meters, services, fire hydrants and related items.
 - C. Identify and describe discovery of uncharted utilities.
- 1.07 Regulatory Requirements
 - A. Conform to applicable code for materials and installation of the Work of this Section.

- B. All applicable regulations and requirements of Alabama Department of Environmental Management shall apply to this Section.
 - C. Construction Standard for Excavations - OSHA (29CFR Part 192.6650.652, Subpart P).
 - D. OSHA Regulations and Guidelines.
- 1.08 Field Measurements
- A. Verify that field measurements and elevations are as indicated.
- 1.09 Coordination
- A. Coordinate Work under provisions of Section 01039.

PART 2 PRODUCTS and MANUFACTURERS

- 2.01 Pipe Materials
- A. Ductile Iron Pipe and Ductile Iron Fittings
 - 1. ASTM A746, AWWA C150 and AWWA C151; Pressure Class 350 (minimum thickness 0.25 inch) for pipe diameters 12 inch and smaller, Pressure Class 250 for pipe diameters 14 inch through 20 inch, Pressure Class 200 for pipe diameter 24 inch, and Pressure Class 150 for pipe diameters 30 inch and larger, unless specifically indicated otherwise on the Drawings.
 - 2. Slip Joint and Mechanical Joint Pipe and Fittings: ANSI/AWWA C111.
 - 3. Flanged Joint Pipe and Fittings: ANSI/AWWA C115.
 - 4. Compact Fittings: ANSI/AWWA C153.
 - 5. Standard Fittings: ANSI/AWWA C110.
 - 6. Interior of pipe and fittings shall be cement mortar lined as specified in ANSI/AWWA C104.
 - 7. Exterior of all ductile iron piping and fittings, except where specifically indicated to be primed and painted, shall have a standard asphaltic coating as specified in ANSI/AWWA C151.
 - 8. All exposed piping and fittings to be primed and painted.
 - 9. **Manufacturer: Ductile iron pipe and fittings shall be manufactured by U.S. Pipe & Foundry Company, American Cast Iron Pipe Company, McWane, Inc., or approved equal.**
 - B. Plastic (PVC) Pipe and Fittings: ASTM D1784 and ASTM 2241.
 - 1. Slip Joint Pipe and Fittings: ASTM D2241 with standard dimension ratios summarized as follows:

| PIPE CLASS (psi) | SDR |
|-----------------------------|------------|
| 125 | 32.5 |
| 160 | 26 |
| 200 | 21 |

2. Joints shall be watertight, slip type with elastomeric compression seal conforming to ASTM D3139. **Solvent weld joints will not be allowed.**
 3. Ductile Iron Fittings: For all PVC pipe 4 inch and larger, fittings shall be ductile iron in lieu of PVC. See Paragraph 2.01A.
- 2.02 Meter Box for 3/4-Inch Meter – **NOT USED.**
- 2.04 Pressure Reducing Valve for 3/4 Inch Meter Installation – **NOT USED.**
- 2.05 Master Meter - **NOT USED.**
- 2.06 Master Meter Box - **NOT USED.**
- A. Precast concrete box with minimum 4,000 psi compressive strength. Box to be waterproof.
 - B. Cover to be aluminum with aluminum hatch with hydraulically assisted doors. Total opening to be minimum four feet by six feet, using double doors.
 - C. Size as required for valve, piping and fittings (see Drawings).
- 2.07 Valve Box – **NOT USED.**
- 2.08 Tapping Sleeve and Valve – **NOT USED.**
- 2.09 Butterfly Valve – AWWA C504 – **NOT USED.**
- 2.10 Wafer-Style Butterfly Valve – **NOT USED.**
- 2.11 Gate Valve
- A. Valves 2-inch through 24-inch shall be resilient wedge type in compliance with AWWA C509, latest revision, with ductile iron wall thickness that meet or exceed AWWA C153 ductile iron fittings.
 - B. Gate valves shall be rated for 250 psi cold water working pressure and hydrostatically tested at 500 psi. Gate valves shall meet UL-FM Standards.
 - C. Valve body, bonnet, wedge and operating nut shall be constructed of ductile iron. The exterior of the wedge shall be 100 percent rubber encapsulated. The wedge shall be symmetrical and seal equally well with flow in either direction.
 - D. Gate valve 18-inch through 24-inch shall have gearing. Gate valves in horizontal position shall have bevel gearing and valves in vertical position shall have spur gearing.
 - E. Operating nut shall be constructed of ductile iron and shall have four flats at stem connection to ensure even input torque to the stem.
 - F. All gaskets shall be pressure energized O-rings. Bolts shall follow ANSI A16.1. **Allen screws or metric bolting shall NOT BE ALLOWED. Wax or plastic covering over nuts and bolts shall NOT BE ALLOWED.**
 - G. Stem shall be sealed by three O-rings. The top two O-rings shall be replaceable with valve fully opened and while subject to fully rated working pressure. **O-rings set in cartridge shall NOT BE ALLOWED.**

- H. Valve shall have two thrust washers with one located above and one below the thrust collar to assure troublefree operation of valve.
 - I. All internal and external surfaces of the valve body and bonnet shall have a fusion bonded epoxy coating complying with ANSI/AWWA C550, applied hydrostatically prior to assembly.
 - J. **Two valve wrenches to be furnished by the Contractor to the Owner unless indicated otherwise.**
 - K. **Manufacturer: Gate valves shall be M and H Style 4067 as manufactured by M and H Valve Co., Anniston, AL, or approved equal.**
- 2.12 Swing Check Valves – **NOT USED.**
- 2.13 In-Line Wye Strainer – **NOT USED.**
- 2.14 Fire Hydrants – **NOT USED.**
- 2.15 Post Hydrant – **NOT USED.**
- 2.16 Expansion Coupling – **NOT USED.**
- 2.17 Pressure Gage – **NOT USED.**
- 2.18 Concrete Kickblocks
- A. Concrete shall be mixture of Portland Cement, washed natural sand and washed graded gravel or crushed limestone with minimum compressive strength of 2000 pounds per square inch.
 - B. Size, type and location of kickblocks shall be as shown on the Drawings.
 - C. Note: Kickblocks may be eliminated for ductile iron piping where joint restraint connections are used. See 2.01 B and C. Coordinate with Engineer.
- 2.19 Bedding Materials
- A. Bedding for Earth Excavation: See Section 02225 or 02226.
 - B. Bedding for Rock Excavation: See Section 02225 or 02226.
- 2.20 **Underground Utility Marking Device for Plant Yard Piping – NOT USED.**

PART 3 EXECUTION

- 3.01 Trenching
- A. Excavate pipe trench in accordance with Section 02225 or 02226. Hand trim as required for placement of pipe.
 - B. Trenches shall be of sufficient width to ensure proper bedding, haunching, compaction and backfill under and around pipe in order to facilitate pipelaying, future maintenance and protect the installed pipe in both earth and rock excavation conditions. (See Section 02225 or 02226) In all cases, at all times, trench width shall be adequate for safety of all personnel.

3.02 Examination

- A. Verify that trench cut is ready to receive Work and excavations, dimensions and elevations are as shown on Drawings.

3.03 Preparation

- A. Hand trim excavations to required elevations as required.
- B. Remove large stones or other hard matter which could damage pipe or impede consistent backfilling or compaction.
- C. In general, all lines should be run parallel or perpendicular to the center line of the adjacent roadway or building. Coordinate with Engineer.

3.04 Bedding

- A. Place bedding material at trench bottom, level materials in continuous layer as specified in Section 02225 or 02226.
- B. Bedding material must be free from projecting rocks and with sufficient clearance at bell to ensure that dirt and small rocks are not caught when the jointing is made.

3.05 Installation - Pipe

- A. Ductile Iron Pipe: Install ductile iron pipe in accordance with ANSI/AWWA C600.
- B. PVC Pipe: Install PVC pipe in accordance with ASTM D2774, Handbook of PVC Pipe Design and Construction and PVC Pipe Design and Installation, AWWA Manual No. M23, except as modified herein.
- C. Interior of pipe and all joint surfaces shall be clean and wiped dry before pipe is lowered into trench.
- D. Position pipe carefully to insure full bedding and a true straight line. Breaks in line or grade shall not exceed one half the maximum deflection recommended for the joint.
- E. Construction, trenching, pipelaying, materials, depth of cover and related appurtenances in traffic areas and within Highway Department rights-of-way shall be as required by the ALDOT Std. Spec. and the applicable utility permits.
- F. All piping, valves and fittings to be field inspected by the Engineer and approved for use prior to installation. Any defective pipe or fittings, in the opinion of the Engineer, will not be acceptable for installation. Defects shall include, but not be limited to, ripples, cracks, chips, improper beveling, improper compression ring, improper jointing and brittle material.
- G. The Contractor shall allow no trench water or dirt to enter the pipe after laying. Watertight plug or cap shall be inserted into open end of pipe when pipelaying is not in progress.
- H. Piping Installed Under Structures: All piping installed under concrete slabs, foundations, buildings, structures and similar facilities shall be totally and completely flushed, cleaned and tested prior to the construction of the structure or facility over the pipe.
- I. Marking Tape: Install with pipe as specified in 2.20.

3.06 Backfill

- A. Backfill including haunching, initial backfill and final backfill as specified in Section 02225 or 02226.

- B. Backfill Material: See Section 02225 or 02226.
- C. Install underground utility marking tape as indicated in 2.20.

3.07 Valve Setting

- A. Clean and test working of each valve before setting.
- B. Set each valve with stem plumb and at location as shown on the Drawings unless otherwise directed by the Engineer. Set valve boxes plumb with tops at finished grade. Tamp backfill thoroughly. Record exact position.

3.08 Setting Fire Hydrants

- A. Before setting, remove any foreign material from the hydrant barrel and test for opening and closing.
- B. Set hydrants plumb as shown and at correct elevation for finished grade to match the ground line mark on the barrel. Set each hydrant on a concrete slab, extending upward behind the hydrant as shown on the Drawings.
- C. Place at least 4 cubic feet of coarse gravel or crushed stone, mixed with coarse sand, around the hydrant waste openings. Orient nozzles properly for individual location.
- D. Install 3/4 inch (minimum) threaded rods as indicated on Drawings.

3.09 Field Quality Control

- A. Request inspection prior to and immediately after placing bedding and prior to placing backfill.
- B. Field inspection and testing will be performed under provisions of Section 01400.

3.10 Pressure Testing

- A. After installation of piping and all related appurtenances including service taps, fill piping with water, opening hydrants or other outlets as necessary to expel all entrapped air from the section of pipe to be tested. The test section shall be between two adjacent valves. When necessary, temporary blind flanges, valves or whatever is required shall be installed at connections to existing piping in order to assure that the new piping passes all required testing.
- B. Pressure test the pipe section in presence of Engineer. Pressure test shall be minimum 2 hour duration. The test pressure shall be equal to the pressure rating (class) of the pipe.
- C. A recording pressure gage, minimum 10 inch diameter circular chart recorder, 24-hour type, shall be used throughout the entire test period. The recorded pressures shall be maintained as project records (see Section 01700), and shall be signed by the Engineer and the Contractor upon completion of the test.
- D. The original chart of the test record shall be furnished to the Engineer immediately after completion of each test.
- E. The Contractor shall furnish calibration information to the Engineer demonstrating the gage accuracy to the satisfaction of the Engineer.
- F. The maximum pressure loss shall not exceed 5 pounds per square inch at the end of the 2 hour test period for the section being tested.

- G. Hydrostatic testing procedures as required by AWWA C600 shall apply except as specifically modified herein.

3.11 Leakage Testing

- A. Immediately following the pressure test as outlined above, the same pipe section shall be tested for leakage. Hydrostatic testing procedures as required by AWWA C600 shall apply except as specifically modified herein.
- B. The leakage test shall be for a 4 hour duration and the recording pressure gage shall again be used for the entire 4 hour period as noted for the pressure test. The average test pressure shall be the same as the pressure rating (class) of the pipe.
- C. The maximum allowable leakage during the 4 hour test shall be based on the following formula:

$$L = ((1000)*(D)*(P^{0.5}))/266,400.$$

Where: L = Maximum allowable leakage, in gallons per hour per 1000 feet (GPH/1000 Feet).

D = Nominal diameter of pipe, in inches.

P = Average test pressure during the leakage test, in pounds per square inch (gage).

- D. Enclosed as Table No. 3.11 is a summary of the maximum allowable leakage (based on the above formula) for various pipe diameters for the three most common pipe classes. **The Contractor is advised that the maximum allowable leakage is more stringent than the allowable leakage as specified in AWWA C600.** For any pipe class (test pressure) or pipe diameter not listed, the formula as noted above shall be used to calculate the maximum allowable leakage.
- E. If the pipeline section under testing contains sections of pipe of various diameters, the maximum allowable leakage shall be the sum of the calculated allowable leakage for each section based on its length and diameter.

| TABLE NO. 3.11 | | | |
|---|---|-------|-------|
| ALLOWABLE LEAKAGE IN GALLONS PER HOUR PER 1000 FEET | | | |
| OF PIPELINE (GPH/1000 FEET) | | | |
| NOMINAL PIPE DIAMETER (Inches) | AVERAGE TEST PRESSURE (POUNDS PER SQUARE INCH) | | |
| | 250 | 200 | 160 |
| 2 | 0.119 | 0.106 | 0.095 |
| 3 | 0.178 | 0.159 | 0.142 |
| 4 | 0.237 | 0.212 | 0.190 |
| 6 | 0.356 | 0.319 | 0.285 |
| 8 | 0.475 | 0.425 | 0.380 |
| 10 | 0.594 | 0.531 | 0.475 |
| 12 | 0.712 | 0.637 | 0.570 |
| 14 | 0.831 | 0.743 | 0.665 |
| 16 | 0.950 | 0.849 | 0.760 |
| 18 | 1.068 | 0.956 | 0.855 |
| 20 | 1.187 | 1.062 | 0.950 |
| 24 | 1.424 | 1.274 | 1.140 |
| 30 | 1.781 | 1.593 | 1.425 |

3.12 Flushing Installed Piping

- A. All installed piping shall be completely flushed out using plant water.
- B. Test all valves to ensure full opening and closing.
- C. Repeat flushing as required until discharge runs clear.
- D. Coordinate flushing water supply and discharge with Engineer.
- E. Ensure that no cross connections exist with potable water system.

3.13 Disinfection of Plant Potable Water Lines

- A. Flush and disinfect (chlorinate) all plant potable water lines in accordance with ANSI/AWWA C-651 and the requirements of the Alabama Department of Environmental Management (ADEM).
- B. Perform bacteriological testing upon completion of the disinfection (chlorination) and final flushing processed in accordance with ANSI/AWWA C-651 and the requirements of ADEM.
- C. The plant potable water lines shall be flushed and disinfected (chlorinated) until the bacteriological testing meets the approval of ADEM.
- D. Coordinate flushing, disinfection, and testing procedures with Engineer.

3.14 Air Removal

- A. Removal of all entrapped air from the piping system is required. Air release valves, yard hydrants, and fire hydrants may be used for venting air from the system at appropriate high points.
- B. The Contractor shall provide any additional temporary air release valves as may be required to fully vent all entrapped air from the piping system. These temporary air release valves are not separate pay items and are included in the pipeline installation cost.

3.15 Schedule

- A. **See Drawings.**

END OF SECTION

[2244.5]
[Rev. 11/06]

SECTION 02675
DISINFECTION OF WATER DISTRIBUTION SYSTEMS

PART 1 GENERAL

1.01 Section Includes

- A. Disinfection of potable water distribution and transmission system.
- B. Testing and reporting results.

1.02 Related Sections

- A. Applicable to Work of this Section are the Drawings and General Provisions of the Contract, including: Part IV, General and Supplementary Conditions; Part V, Special Conditions; Part VI, Technical Specifications; Division No. 1, General Requirements.

1.03 References

- A. ANSI/AWWA B300 - Standard for Hypochlorites.
- B. ANSI/AWWA B301 - Standard for Liquid Chlorine.
- C. ANSI/AWWA C651 - Standards for Disinfecting Water Mains.
- D. Alabama Department of Environmental Management (ADEM) Administrative Code, Division No. 7.

1.04 Submittals

- A. Test Reports: Indicate results as required by ADEM Regulations.
- B. Certificate: Certify that cleanliness of water distribution system meets or exceeds specified requirements.

1.05 Project Record Documents

- A. Submit under provisions of Section 01700.
- B. Disinfection Report; Record
 - 1. Type, amount and form of disinfectant used.
 - 2. Date and time of disinfectant injection start and time of completion.
 - 3. Identification of all locations where hydrants, valves, etc., were opened or closed to ensure high strength disinfection of all line segments.
 - 4. Test locations.
 - 5. Initial and 24 hour disinfectant residuals in milligrams per liter (mg/l) for each outlet tested.
 - 6. Date and time of flushing start and completion.
 - 7. Disinfectant residual after flushing in mg/l for each outlet tested.

C. Bacteriological Report: Record

1. Date issued, project name, testing laboratory name, address and telephone number.
2. Time and date of water sample collection.
3. Name of person collecting samples.
4. Test locations.
5. Initial and 24 hour disinfectant residuals in mg/l for each outlet tested.
6. Coliform bacteria test results for each outlet tested.
7. Certification that water conforms, or fails to conform, to bacterial standards of ADEM.
8. Bacteriologist's signature and authority.

1.06 Quality Assurance

- A. Perform Work in accordance with ANSI/AWWA C651.

1.07 Qualifications

- A. Testing Firm: Company specializing in testing potable water systems, certified and approved by ADEM.

1.08 Regulatory Requirements

- A. Conform to applicable code or regulation for performing the Work of this Section.
- B. Provide certificate of compliance from ADEM indicating approval of water system.

PART 2 PRODUCTS

2.01 Disinfection Chemicals

- A. Hypochlorite: ANSI/AWWA B300, Hypochlorite.
- B. Storage: Store and protect as recommended by manufacturer. See Section 01600.
- C. Percent Available Chlorine: Verify with manufacturer that the indicated percent available chlorine is as specified and that the chemical shelf life has not been exceeded.

PART 3 EXECUTION

3.01 Examination

- A. Verify that piping system has been cleaned, inspected, flushed and pressure tested.
- B. Perform scheduling and disinfection activity with start-up, testing, adjusting and balancing, demonstration procedures, including coordination with related systems.

3.02 Pipe Disinfection Procedure

- A. Provide and attach required equipment to perform the Work of this Section.
- B. The method of chlorination utilized shall be at the discretion of the Contractor in accordance with ANSI/AWWA C651, summarized as follows:
1. Tablet Method: 25 mg/l minimum dose of calcium hypochlorite granules or tablets placed in the pipe during construction, with a minimum contact period of 24 hours prior to flushing. At the end of the contact period, the minimum chlorine residual shall be 10 mg/l.
 2. Continuous-Feed Method: Calcium hypochlorite granules placed in the pipeline during pipe installation plus an additional dose of calcium hypochlorite to produce a minimum chlorine dose of 25 mg/l throughout the system, with a minimum 24 hour contact period. At the end of the contact period, the chlorine residual shall be 10 mg/l minimum.
 3. Slug Method: Calcium hypochlorite granules placed in the pipeline during pipe installation plus an additional chlorination slug dose of 100 mg/l with a minimum contact period of 3 hours. The chlorine slug shall not be allowed to drop at any time below 50 mg/l at any point within the system.
 4. Hypochlorite Dosage (pounds/1,000 ft.): See Paragraph 3.05, Chlorine Dosage Table.
- C. Preliminary Flushing: Preliminary flushing between the initial chlorination during pipe installation and the final chlorination shall be as required by ANSI/AWWA C651.
- D. Final Flushing
1. After the minimum contact period, test the residual chlorine levels at the end of each line. If the chlorine residual is less than the amount required by the chlorination method, repeat the chlorination process.
 2. If the chlorine residual is greater than the minimum required at the end of the contact period for the chlorination method, proceed with flushing of the entire pipeline until all traces of chlorine residual are eliminated.
 3. The Contractor is advised that chlorinated water used for disinfecting piping and tanks may be toxic to fish and other aquatic animals. Dispose of flushed disinfecting water in accordance with ADEM Requirements.
- E. Valves and Hydrants: Open and close all valves and hydrants during the chlorination process.
- F. Bacteriological Testing
1. Upon completion of the chlorination process and after final flushing, with residual chlorine present in the system, the Contractor shall collect and submit samples for bacteriological testing as required by ANSI/AWWA C651 and the Alabama Department of Environmental Management (ADEM).
 2. One bacteriological sample is required for every 7,000 linear feet of pipe installed and one at each dead end line or as otherwise required by ADEM.
 3. Flushing, re-chlorination and re-sampling for bacteriological testing shall be provided by the Contractor as necessary to obtain approval for use by ADEM.
 4. No water within the distribution system shall be used for potable purposes nor provided to any customer until the system has been approved for use by ADEM.

3.03 Quality Control

- A. Provide analysis and testing of treated water under provisions of Section 01400.
- B. Provide all valves, taps and appurtenances as required for sampling, disinfecting, flushing and testing.
- C. Test samples in accordance with ANSI/AWWA C651.

3.04 Cost of Additional Water Required for Repeat Chlorination Procedures Due to Bacteriological Test Failures

- A. See Special Conditions for determination of the party (Owner or Contractor) responsible for cost of water required for the project construction.
- B. In the event the Owner is indicated in the Special Conditions as supplying the water for the construction project, the Contractor is advised that the cost of all water required for any additional, repeat pipeline chlorination procedures due to the failure of the bacteriological testing will be solely the responsibility of the Contractor.

3.05 Chlorine Dosage Table

| Pipe Size (in) | Volume of Water (Gallons.1000 ft.) | Pounds/1000 Ft. to Achieve Dosage | |
|-------------------|---------------------------------------|--|--|
| | | Calcium Hypochlorite (65% Available Chlorine) | Calcium Hypochlorite (65% Available Chlorine) |
| | | 25 mg/l dosage | 100 mg/l dosage |
| 3 | 367 | 0.12 | 0.47 |
| 6 | 1,469 | 0.47 | 1.89 |
| 8 | 2,611 | 0.84 | 3.35 |
| 10 | 4,080 | 1.31 | 5.24 |
| 12 | 5,875 | 1.89 | 7.54 |
| 14 | 7,996 | 2.57 | 10.27 |
| 16 | 10,444 | 3.35 | 13.41 |
| 18 | 13,218 | 4.24 | 16.97 |
| 24 | 23,499 | 7.54 | 30.17 |
| 30 | 36,717 | 11.79 | 47.14 |
| 36 | 52,873 | 16.97 | 67.89 |
| 42 | 71,966 | 23.10 | 92.40 |
| 48 | 93,996 | 30.17 | 120.69 |
| 54 | 118,964 | 38.19 | 152.75 |
| 60 | 146,869 | 47.14 | 188.58 |

NOTES:

1. Table indicates the various pounds of calcium hypochlorite dosage per 1,000 feet of the indicated pipe sizes to achieve a 25 mg/l and a 100 mg/l dosage.
2. Percentage of available chlorine may be reduced by extended or improper storage of chemicals. Verify with manufacturer.
3. Additional dosage may be required to meet the minimum residual chlorine requirements. Coordinate with Engineer.

4. For pipe sections less than 1,000 feet in length the dosage will be reduced in the same proportion as the reduction in pipe length. Coordinate with Engineer.
5. See Paragraph 3.02, this Specification Section.

END OF SECTION

[2244]
[Rev.01/01]

SECTION 02733

WASTEWATER PRESSURE PIPING, VALVES AND ACCESSORIES

PART 1 GENERAL

1.01 Section Includes

- A. Sanitary sewerage force main piping.
- B. Wastewater valves, fittings and accessories.

1.02 Related Sections

- A. Applicable to Work of this Section are the Drawings and General Provisions of the Contract, including: Part IV, General and Supplementary Conditions; Part V, Special Conditions; Part VI, Technical Specifications; Division No. 1, General Requirements.

1.03 References

- A. ASTM A377 - Ductile Iron Pressure Pipe.
- B. ANSI/AWWA C151/A21.51 - Ductile Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds for Water or Other Liquids.
- C. ANSI/AWWA C104/A21.4 - Cement-Mortar Lining for Ductile Iron Pipe and Fittings for Water.
- D. ANSI/AWWA C111/A21.11 - Rubber Gasket Joints for Ductile Iron and Gray Iron Pressure Pipe and Fittings.
- E. ANSI/AWWA C115/A21.15 - Flanged Ductile Iron Pipe with Threaded Flanges.
- F. ANSI/AWWA C110/A21.10 - Ductile Iron and Gray Iron Fittings, 3 Inch through 48 Inch for Water and Other Liquids.
- G. ANSI/AWWA C600 - Installation of Ductile Iron Water Mains and Their Appurtenances.
- H. ANSI/AWWA C905 – Poly (Vinyl Chloride) (PVC) Water Transmission Pipe, Nominal Diameters 14 Inch through 36.
- I. ANSI/AWWA C153/A21.53 - Ductile Iron Compact Fittings, 3 Inch through 16 Inch for Water and Other Liquids.
- J. ASTM D1784 - Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
- K. ASTM D3139 - Standard Specification for Joints for Plastic Pressure Pipes Using Elastomeric Seals.
- L. ASTM D3350 – Standard Specification for Polyethylene Plastics Pipe and Fitting Material.
- M. Handbook of PVC Pipe Design and Construction - Uni-Bell Plastic Pipe Association.
- N. Alabama Department of Transportation Standard Specifications for Highway Construction (ALDOT Standard Specifications).

- O. ASTM D2774 - Standard Recommended Practice for Underground Installation of Thermo Plastic Pressure Piping.
- P. ANSI/AWWA C600 - Installation of Ductile Iron Water Mains and Their Appurtenances.
- Q. ANSI/AWWA C901 – Polyethylene (PE) Pressure Pipe and Tubing, 1/2 Inch through 3 Inch for Water Service.
- R. ANSI/AWWA C906 – Polyethylene (PE) Pressure Pipe and Fittings, 4 Inch through 63 Inch for Water Service.
- S. Construction Standard for Excavation - OSHA (29CFR Part 1926.650.652 Subpart P).
- T. ASTM D1785 – Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80 and 120.
- 1.04 Submittals
 - A. Submit under provisions of Section 01300.
 - B. Product Data: Provide data indicating pipe, pipe accessories and fittings. Comply with Specifications.
 - C. Manufacturer's Installation Instructions: Indicate special products required to install products specified.
- 1.05 Project Record Documents
 - A. Submit documents under provisions of Section 01700.
 - B. Record location of pipe runs, connections, valves and related items.
 - C. Identify and describe discovery of uncharted utilities.
- 1.06 Regulatory Requirements
 - A. Conform to applicable code for materials and installation of the Work of this Section.
 - B. OSHA - Construction Standards for Excavations (29CFR Part 1926.650.652 Subpart P).
 - C. Comply with all OSHA Regulations and Guidelines.
- 1.07 Field Measurements
 - A. Verify that field measurements and elevations are as indicated.
- 1.08 Coordination
 - A. Coordinate Work under provisions of Section 01039.

PART 2 PRODUCTS

2.01 Pipe Materials

A. Ductile Iron Pipe and Fittings

1. ANSI/AWWA C151/A21.51 unless otherwise indicated on Drawings, pressure class of each pipe size shall be as follows:

| PIPE SIZE | PRESSURE CLASS (psi) |
|-----------|----------------------|
| 3" - 12" | 350 |
| 14" - 20" | 250 |
| 24" - 64" | 200 |

Nominal thickness specified per AWWA C151 shall be minimum thickness for each pipe size and pressure class.

2. Slip Joint and Mechanical Joint Pipe and Fittings: ANSI/AWWA C111.
3. Flanged Joint Pipe and Fittings: ANSI/AWWA C115.
4. Compact Fittings: ANSI/AWWA C153.
5. Standard Fittings: ANSI/AWWA C110.
6. Interior of Pipe and Fittings:
- a. Cement-mortar lined as specified in ANSI/AWWA C104 unless otherwise noted.
 - b. Where indicated on Drawings, piping subject to high corrosion (hydrogen sulfide, etc.) shall be polyethylene lined equal to Polybond as manufactured by ACIPCO, Protecto 401 Ceramic Epoxy (40 mil thick) as manufactured by Protecto Division of Vulcan Painters, Inc., Bessemer, AL, or equal.
7. Exterior Coating: Exterior of all ductile iron piping and fittings, except where specifically indicated to be primed and painted, shall have a standard asphaltic coating as specified in ANSI/AWWA C151.
8. Exposed Piping: All exposed piping to be primed and painted. See 09900.
9. **Manufacturer**: **Manufacturer of ductile iron pipe and fittings shall be U.S. Pipe & Foundry Company, American Cast Iron Pipe Company, McWane, Inc., or approved equal.**
- B. Plastic (PVC) Pipe and Fittings: ASTM D1784 and ASTM 2241.
1. Slip Joint Pipe and Fittings: ASTM D2241 with standard dimension ratios summarized as follows:

| PIPE CLASS (psi) | SDR |
|-----------------------------|------------|
| 125 | 32.5 |
| 160 | 26 |
| 200 | 21 |

2. Joints shall be watertight, slip type with elastomeric compression seal conforming to ASTM D3139.

3. Solvent weld joints WILL NOT BE ALLOWED.

4. Pipe shall be solid green in color to enable ease of identification as a wastewater line.

5. See Paragraph F. for piping smaller than 2 inches.

C. Plastic (PVC) Service Pipe and Fittings: ASTM D 1785.

1. Piping smaller than 2 inches shall be Schedule 40 conforming to ASTM D1785.

2. Solvent weld joints are allowed for service piping.

3. Piping is not required to be green in color.

2.02 Pipe Accessories

A. Fittings

1. Fittings 4 Inches Diameter and Smaller: Fittings shall be manufactured of same material with same pressure rating as the adjoining pipe, with same type of joint.

2. Ductile Iron Pipe: Fittings 6 inches diameter and larger will be ductile iron fittings, same class and pressure rating as the adjoining pipe with same type of joint.

3. PVC Pipe: Fittings 6 inches diameter and larger will be the same as specified above for ductile iron with same type of joint as the PVC pipe.

4. HDPE Pipe and Fusible PVC: All fittings shall be by the same manufacturer as the adjoining pipe. Fittings shall be of the same material, density, molecular weight, and pressure rating as the adjoining pipe, with same type of joint.

B. Valves and Accessories: All valves shall have joints suitable to the piping installation and shall be pressure rated equal to the adjoining pipe. With HUB adapters used for PVC pipe, concrete underlay required.

1. Check Valve

a. Flanged swing check, cast iron body, Class 125 flanges, 150 psi working pressure, stainless steel fitted, equipped with external backflush lever and stainless steel spring.

b. Valve shall be specifically designed for operation on discharge side of sewage pump as recommended by manufacturer. Valve shall be essentially leak free in preventing reverse flow. There shall be no leakage around the shaft.

- c. **Manufacturer:** Mueller Company, Decatur, IL; GA Industries, Inc., Mars, PA; Clow Valve Company, Oskaloosa, IA; or approved equal.

2.03 Bedding Materials

- A. See Section 02225.

2.04 Concrete Kickblocks

- A. Concrete shall be mixture of Portland Cement, washed natural sand and washed graded gravel or crushed limestone with minimum compressive strength of 2000 pounds per square inch.
- B. Size, type and location of kickblocks shall be as shown on the Drawings.
- C. All fittings, nuts and bolts to be wrapped and completely covered with 6 mil black polyethylene prior to pouring concrete kickblocks.

2.05 Underground Utility Marking Device

A. Detector Wire – Non-Metallic Pipe

1. Wire: Minimum 12-gauge solid or stranded, insulated copper wire.
2. Installation: The detector wire shall be installed with all non-metallic, buried wastewater lines.
3. Bury: The wire shall be buried in the trench below the pipe. The wire shall not touch or be in contact with the pipe at any point.
4. Marking Tape: For all installations of detector wire, non-detectable marking tape shall also be installed directly above pipe.

B. Non-Detectable Marking Tape – Metallic and Non-Metallic Pipe

1. Tape: Plastic (Ultra-high Molecular Weight Polyethylene); minimum 4.0 mil (0.004 inch) overall thickness; minimum two inches in width; alkaline and corrosion resistant; minimum 10.64 pounds/inch tensile break strength.
2. Detectable Core: None.
3. Color: The tape shall be color bonded with the AWWA recommended color for wastewater force mains – BROWN.
4. Lettering: The tape shall be inscribed with permanent, corrosion resistant, 1-1/2 inch tall black letters, repeated every 20 to 36 inches as follows.

“CAUTION SEWER LINE BELOW”

5. **Manufacturer:** The non-detectable marking tape shall be the "SHIELDTEC" as manufactured by Thor Enterprises, Inc., Sun Prairie, WI, or approved equal.
6. Installation: The non-detectable marking tape shall be installed with all metallic, buried wastewater lines and with all non-metallic, buried wastewater lines utilizing detector wire.

7. Bury: The burial depth shall not exceed 36 inches below the backfilled grade and shall be a minimum of 12 inches above the top of the pipe. The tape shall not touch or be in contact with the pipe at any point.

PART 3 EXECUTION

3.01 Trenching

- A. Excavate pipe trench in accordance with Section 02225. Hand trim as required for placement of pipe.
- B. Trenches shall be of sufficient width to ensure proper bedding, haunching, compaction and backfill under and around pipe in order to facilitate pipelaying, however, the trench width shall be maintained as narrow as possible, consistent with the pipelaying requirements. In all cases the trench shall be sufficient for the safety of the persons in and around the trench.

3.02 Examination

- A. Verify that trench cut is ready to receive Work and excavations, dimensions and elevations are as shown on Drawings.

3.03 Preparation

- A. Hand trim excavations to required elevations as required.
- B. Remove large stones or other hard matter which could damage pipe or impede consistent backfilling or compaction.
- C. In general, all lines should be run parallel or perpendicular to the center line of the adjacent roadway or building.

3.04 Bedding

- A. Place bedding material at trench bottom, level materials in continuous layer as specified in Section 02225.
- B. Bedding material must be free from projecting rocks and with sufficient clearance at bell to ensure that dirt and small rocks are not caught when the jointing is made.

3.05 Installation - Pipe

- A. Install ductile iron pipe in accordance with ANSI/AWWA C600.
- B. Install PVC pipe in accordance with ASTM D2774 and Handbook of PVC Pipe Design and Construction.
- C. Install HDPE pipe by butt fusion method in accordance with ASTM D2774 and manufactures instructions, except as modified herein.
- D. Interior of pipe and all joint surfaces shall be clean and wiped dry before pipe is lowered into trench.

- E. Position pipe carefully to insure full bedding and a true straight line. Breaks in line or grade shall not exceed one half the maximum deflection recommended for the joint.
 - F. Construction, trenching, pipelaying, materials, depth of cover and related appurtenances in traffic areas and within Highway Department rights-of-way shall be as required by the ALDOT Std. Spec..
 - G. All piping, valves and fittings to be field inspected by the Engineer and approved for use prior to installation. Any defective pipe or fittings, in the opinion of the Engineer, will not be acceptable for installation. Defects shall include, but not be limited to, ripples, cracks, chips, improper beveling, improper compression ring, improper jointing and brittle material.
 - H. The Contractor shall allow no trench water, mud, dirt or debris to enter the pipe before or after laying. Watertight plug or cap shall be inserted into open end of pipe when pipelaying is not in progress.
 - I. The Contractor shall lay all pipe continuous without any skips unless specifically authorized by the Engineer. No payment will be made for pipe installed contrary to this until the skips have been removed.
 - J. Piping Installed Under Structures: All piping installed under concrete slabs, foundations, buildings, structures and similar facilities shall be totally and completely flushed, cleaned, pressure tested and inspected prior to the construction of the structure or facility over the pipe.
 - K. Concrete Kickblocks: See Paragraph 2.04. Install against undisturbed earth.
 - L. Connection to Existing Manhole
 - 1. Core (saw) circular opening as small as possible in existing manhole wall.
 - 2. Install flexible piping sleeve inside cored opening. Connect pipe to sleeve with SS strap
- OR
- 3. Slide pipe through opening, seal cored opening with bentonite waterproofing strip, non-shrink grout and concrete collar as approved by Engineer.
 - 4. Test to determine that connection meets requirements for testing as outlined in this Section.
- 3.06 Backfill
- A. Backfill, including haunching, initial backfill and final backfill as specified in Section 02225.
 - B. Backfill Material: See Section 02225.
 - C. Install underground utility marking tape as indicated in 2.05 and 3.10.
- 3.07 Installation - Valves and Accessories
- A. Install valves as indicated for piping and as recommended by manufacturer.
 - B. Utility marker to be installed at all valve locations, where indicated on Drawings.

3.08 Field Quality Control

- A. Request inspection prior to and immediately after placing bedding, immediately after haunching, and immediately after initial backfill.
- B. Field inspection and testing will be performed under provisions of Section 01400.

C. Sewer Force Main Pressure Test

- 1. Fill pipe with water and expel all entrapped air (see Paragraph 3.08 F).
- 2. Test pressure shall be approximately equal to the pressure rating of the pipe. The test pressure shall not exceed the pipe pressure rating at the lowest elevation within the segment being tested. Tests shall be conducted between two adjacent valves, or provide temporary valves and/or plugs as necessary.
- 3. Test duration shall be 2 hours. A recording pressure gage will be used for the entire 2 hour period. The recorded pressures shall be maintained as Project Records (see Section 01700).
- 4. The maximum pressure loss shall not exceed 5 pounds per square inch at the end of the two hour test period for the section being tested.

D. Leakage Testing

- 1. Immediately following the pressure test as outlined above, the same pipe section shall be tested for leakage. Hydrostatic testing procedures as required by AWWA C600 shall apply except as specifically modified herein.
- 2. The leakage test shall be for a 4 hour duration and the recording pressure gage shall again be used for the entire 4 hour period as noted for the pressure test. The average test pressure shall be the same as the pressure rating (class) of the pipe.
- 3. The maximum allowable leakage during the 4 hour test shall be based on the following formula:

$$L = ((1000)*(D)*(p^{0.5}))/266,400.$$

Where: L = Maximum allowable leakage, in gallons per hour per 1000 feet (GPH/1000 feet).

D = Nominal diameter of pipe, in inches.

P = Average test pressure during the leakage test, in pounds per square inch (gage).

- 4. Enclosed as Table No. 02733-1 is a summary of the maximum allowable leakage (based on the above formula) for various pipe diameters for three common pipe classes. **The Contractor is advised that the maximum allowable leakage is more stringent than the allowable leakage as specified in AWWA C600.** For any pipe class (test pressure) or pipe diameter not listed, the formula as noted above shall be used to calculate the maximum allowable leakage.
- 5. If the pipeline section under testing contains sections of pipe of various diameters, the maximum allowable leakage shall be the sum of the calculated allowable leakage for each section based on its length and diameter.

| TABLE NO. 02733-1 ALLOWABLE LEAKAGE IN GALLONS PER HOUR PER 1000 FEET OF PIPELINE (GPH/1000 FEET) | | | |
|---|---|-------|-------|
| NOMINAL PIPE DIAMETER (Inches) | AVERAGE TEST PRESSURE (POUNDS PER SQUARE INCH) | | |
| | 250 | 200 | 160 |
| 2 | 0.119 | 0.106 | 0.095 |
| 3 | 0.178 | 0.159 | 0.142 |
| 4 | 0.237 | 0.212 | 0.190 |
| 6 | 0.356 | 0.319 | 0.285 |
| 8 | 0.475 | 0.425 | 0.380 |
| 10 | 0.594 | 0.531 | 0.475 |

- E. **Line Flushing:** Prior to any testing, all force mains will be thoroughly cleaned by flushing with an appropriate size sewer ball, squeegee or pig. Additional cleaning and flushing by high velocity water jet may be required by the Engineer, if deemed necessary. The force main will not be accepted by the Owner until the engineer is satisfied that the pipe has been thoroughly cleaned, flushed and tested.
- F. **Air Removal:** Removal of all entrapped air is required. The Contractor shall provide any temporary air release valves as may be required. The temporary air release valves are not separate pay items and are included in the pipeline cost.

3.09 Protection

- A. Protect finished installation under provisions of Section 01500.
- B. Protect pipe and aggregate cover from damage or displacement at all times.

3.10 Utility Marking Device

- A. See Part 2 for installation procedure.

3.11 Schedule

- A. See Drawings for quantity, size and type of piping, valves, fittings and related items required by the project.

[2244.5]
 [REV.08/2013]

END OF SECTION

ADDENDUM NO. 1

SECTION 02923
LANDSCAPE GRADING

PART 1 GENERAL

- 1.01 Section Includes
 - A. Final grade topsoil for finish landscaping.
- 1.02 Related Sections
 - A. Applicable to Work of this Section are the Drawings and General Provisions of the Contract, including: Part IV, General and Supplementary Conditions; Part V, Special Conditions; Part VI, Technical Specifications; Division No. 1, General Requirements.

PART 2 PRODUCTS - NOT USED.

PART 3 EXECUTION

- 3.01 Examination
 - A. Verify building and trench backfilling has been inspected.
 - B. Verify substrate base has been contoured and compacted.
- 3.02 Subsoil Preparation
 - A. Eliminate uneven areas and low spots. Maintain lines, levels, profiles and contours. Make changes in grade gradual. Blend slopes into level areas.
 - B. Remove debris, roots, branches, stones, in excess of 1/2 inch in size. Remove subsoil contaminated with petroleum products or any other toxic substance.
 - C. Scarify subgrade to depth of 3 inches where topsoil is scheduled. Scarify in areas where equipment is used for hauling and spreading topsoil and has compacted subsoil.
- 3.03 Placing Topsoil
 - A. See Section 02205, Topsoil.
- 3.04 Tolerances
 - A. Top of Topsoil: Plus or minus 1/2 inch.
- 3.05 Protection
 - A. Protect landscaping and other features remaining as final Work.
 - B. Protect existing structures, fences, sidewalks, utilities, paving and curbs.

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[9/93]

END OF SECTION

SECTION 03100
CONCRETE FORMWORK

PART 1 GENERAL

1.01 Section Includes

- A. Formwork for cast-in place concrete, with shoring, bracing and anchorage.
- B. Waterstops.
- C. Openings for other work.
- D. Form accessories.
- E. Form stripping.

1.02 Related Sections

- A. Applicable to Work of this Section are the Drawings and General Provisions of the Contract, including: Part IV, General and Supplementary Conditions; Part V, Special Conditions; Part VI, Technical Specifications; Division No. 1, General Requirements.

1.03 References

- A. ACI 347 - Recommended Practice For Concrete Formwork.
- B. ACI 301 - Structural Concrete for Buildings.

1.04 Design Requirements

- A. Contractor shall design, engineer and construct formwork, shoring and bracing to conform to code requirements and project needs; resultant concrete to conform to required shape, line and dimension.
- B. The design and construction of the formwork is solely and totally the responsibility of the Contractor. The Contractor shall utilize the services of experienced and qualified Engineers in the design of the formwork.
- C. The Contractor shall be totally responsible for all aspects of the Work including safety of all personnel and persons associated with the Work.

1.05 Quality Assurance

- A. Perform Work in accordance with ACI 347.

1.06 Regulatory Requirements

- A. Conform to applicable code for design, fabrication, erection and removal of formwork.

1.07 Coordination

- A. Coordinate work under provisions of Section 01039.
- B. Coordinate this Section with other Sections of work which require attachment of components to formwork.

- C. If formwork is placed after reinforcement resulting in insufficient concrete cover over reinforcement, request guidance from Engineer before proceeding. Appropriate steps will be taken by the Contractor as necessary to achieve the specified cover.

PART 2 PRODUCTS

2.01 Wood Form Materials

- A. Plywood: Plywood complying with U.S. Product Standard PS-1 "B-B (Concrete Form) Plywood", Class I, Exterior Grade or better, mill-oiled and edge-sealed, with each piece bearing legible inspection trademark.
- B. Lumber: Southern Yellow Pine No. 2 dense with grade clearly stamped.

2.02 Prefabricated Forms

- A. Preformed Steel Forms: Minimum 16 gage matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.
- B. Glass Fiber Fabric Reinforced Plastic Forms: Matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished concrete surfaces.
- C. Pan Type: Steel and glass fiber of size and profile required.
- D. Tubular Column Type: Round, glass fiber material, surface treated with release agent, non-reusable, of sizes required.

2.03 Formwork Accessories

- A. Form Ties: Snap-off type, metal, fixed length, with cone and waterproofing washer, free of defects that could leave holes larger than 1-1/4 inch in concrete surface.
- B. Form Release Agent: Colorless mineral oil which will not stain concrete, absorb moisture, or impair natural bonding or color characteristics of coating intended for use on concrete.
- C. Corners: Chamfered, wood strip type; 1 x 1 inch size; maximum possible lengths.
- D. Dovetail Anchor Slot: Galvanized steel, 22 gage thick, non-filled, release tape sealed slots, anchors for securing to concrete formwork.
- E. Flashing Reglets: Galvanized steel, 22 gage thick, longest possible lengths, with alignment splines for joints, non-filled, release tape sealed slots, anchors for securing to concrete formwork.
- F. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.
- G. Waterstops
1. Polyvinyl chloride plastic, minimum 2,250 psi tensile strength, minimum 50 degrees F to plus 175 degrees F working temperature range, 9 inch wide, maximum possible lengths, ribbed profile.
 2. Wall and Floor Slab: RB9-38H as manufactured by Vinylex, Everlastic, or equal.
 3. Bulkheads: RSB9-12 as manufactured by Vinylex, Everlastic, or equal.

4. Wall and Floor Slabs: (Installed only where indicated on Drawings) RB6-38H as manufactured by Vinylex, Everlastic, or equal.

H. Flexible Strip Waterproofing Compound

1. Chemical Composition: Butyl Rubber Hydrocarbon and Bentonite.
2. Designed for all temperature installation; delivered to site in coils; applied to substrate with adhesive or concrete cut nails.
3. Upon hydration, the compound swells to form a self-healing compression seal.
4. Manufacturer: Waterstop-RX as manufactured by American Colloid Company, Arlington Heights, FL, or approved equal.
5. Designed specifically to be used only where new concrete is to be placed against existing concrete and the use of a waterstop is impractical. See Drawings.
6. The use of the Strip Waterproofing Compound will not take the place of waterstops for normal concrete work. Approval of the Engineer is required prior to use.

PART 3 EXECUTION

3.01 Examination

- A. Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with Drawings.

3.02 Earth Forms

- A. Hand trim sides and bottom of earth forms. Remove loose soil prior to placing concrete.

3.03 Erection - Formwork

- A. Erect formwork, shoring and bracing to achieve design requirements, as a minimum, in accordance with requirements of ACI 301 and ACI 347.
- B. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to overstressing by construction loads.
- C. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.
- D. Align joints and make watertight. Keep form joints to a minimum.
- E. Obtain approval before framing openings in structural members which are not indicated on Drawings.
- F. Provide chamfer strips on external corners of beams columns, walls, elevated slabs and all other exposed edges.

3.04 Application - Form Release Agent

- A. Apply form release agent on formwork in accordance with manufacturer's recommendations.
- B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.

- C. Do not apply form release agent where concrete surfaces will receive special finishes or applied coverings which are effected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.

3.05 Inserts, Embedded Parts, And Openings

- A. Provide formed openings where required for items to be embedded in or passing through concrete work.
- B. Locate and set in place items which will be cast directly into concrete.
- C. Coordinate work of other Sections in forming and placing openings, slots, reglets, recesses, chases, sleeves, bolts, anchors, and other inserts.
- D. Install accessories in accordance with manufacturer's instructions, straight, level, and plumb. Ensure items are not disturbed during concrete placement.
- E. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.
- F. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.

3.06 Waterstops

- A. Install in accordance with manufacturer's instructions.
- B. Install waterstops continuous without displacing reinforcement.
- C. Heat seal all joints watertight.
- D. Install waterstops as specified herein even if not shown at all locations on the Drawings.
- E. Where "L", "T", crosses or other waterstop intersections occur, use manufacturers prefabricated intersections such that only butt welding will be necessary in the field.

3.07 Form Cleaning

- A. Clean and remove foreign matter within forms as erection proceeds.
- B. Clean formed cavities of debris prior to placing concrete.
- C. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.
- D. During cold weather, remove ice and snow from within forms. Do not use de-icing salts or water to clean out forms, unless formwork and concrete construction proceed within heat enclosure. Use compressed air or other means to remove foreign matter.

3.08 Formwork Tolerances

- A. Construct formwork to maintain tolerances required by ACI 301 and ACI 347.

3.09 Field Quality Control

- A. Contractor shall inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and that supports, fastenings, wedges, ties, and items are secure.

- B. Forms for beams and elevated slabs shall not be removed until the concrete has reached its specified strength, as a minimum.
- C. If surface appearance is important, forms should not be reused after damage from previous use. Do not patch formwork.

3.10 Form Removal

- A. Do not remove forms or bracing until concrete has gained sufficient strength to safely carry its own weight and all imposed loads.
- B. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.
- C. Store removed forms in manner that surfaces to be in contact with fresh concrete will not be damaged. Discard damaged forms.

3.11 Schedules

- A. Walls Not Exposed To View: Site fabricated plywood coated with form oil.
- B. Walls Exposed To View: Site fabricated plywood coated with form oil or glass fiber pan forms or steel pan forms.

END OF SECTION

[2244]
[Rev. 10/2022]

SECTION 03300
CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 Section Includes

- A. Cast-in-place concrete floors, shear walls, foundation walls and supported slabs.
- B. Floors and slabs on grade.
- C. Control, and expansion and contraction joint devices associated with concrete work, including joint sealants.
- D. Equipment pads, light pole base, thrust blocks, equipment support facilities and all other cast-in-place concrete not specifically addressed.

1.02 Related Sections

- A. Applicable to Work of this Section are the Drawings and General Provisions of the Contract, including: Part IV, General and Supplementary Conditions; Part V, Special Conditions; Part VI, Technical Specifications; Division No. 1, General Requirements.

1.03 References

- A. ACI 301 - Structural Concrete for Buildings.
- B. ACI 302 - Guide for Concrete Floor and Slab Construction.
- C. ACI 304 - Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.
- D. ACI 305R - Hot Weather Concreting.
- E. ACI 306R - Cold Weather Concreting.
- F. ACI 308 - Standard Practice for Curing Concrete.
- G. ACI 318 - Building Code Requirements for Reinforced Concrete.
- H. ACI 350.1R-93 (AWWA 400-93) - Testing Reinforced Concrete Structures for Watertightness.
- I. ANSI/ASTM D994 - Preformed Expansion Joint Filler for Concrete (Bituminous Type).
- J. ANSI/ASTM D1190 - Concrete Joint Sealer, Hot-Poured Elastic Type.
- K. ANSI/ASTM D1751 - Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
- L. ANSI/ASTM D1752 - Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
- M. ASTM B221 - Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes and Tubes.
- N. ASTM C33 - Concrete Aggregates.
- O. ASTM C94 - Ready-Mixed Concrete.

- P. ASTM C143 – Slump of Hydraulic Cement Concrete.
 - Q. ASTM C150 - Portland Cement.
 - R. ASTM C260 - Air Entraining Admixtures for Concrete.
 - S. ASTM C231 – Air Content of Freshly Mixed Concrete by the Pressure Method.
 - T. ASTM C330 - Light Weight Aggregates For Structural Concrete.
 - U. ASTM C494 - Chemicals Admixtures for Concrete.
 - V. ASTM C618 - Fly Ash and Raw or Calcinated Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete.
 - W. Alabama Department of Transportation - Standard Specifications for Highway Construction, 1989 Edition, Section 501 (ALDOT Standard Specifications).
- 1.04 Submittals
- A. Submit under provisions of Section 01300.
 - B. Product Data: Provide data on joint devices, attachment accessories and admixtures and all concrete ingredients in mix design.
 - C. Samples
 - 1. Submit two, 12 inch long samples of expansion/contraction joint material.
 - 2. Submit two, 12 inch long samples of each type of waterstop (see Section 03100).
 - 3. Submit one, 12 inch sample or two waterstop pieces properly welded together (see Section 03100).
 - D. Manufacturer's Installation Instructions: Indicate installation procedures and interface required with adjacent Work.
 - E. Submit concrete mix design and verification test results for review by the Engineer prior to Maximum Limit Test.
- 1.05 Project Record Documents
- A. Submit under provisions of Section 01700.
 - B. Accurately record actual locations of embedded utilities and components which are concealed from view.
 - C. Concrete Batch Ticket to be filled out for each concrete truck load delivered to jobsite. See enclosed "Concrete Batch Ticket".
- 1.06 Quality Assurance
- A. Perform Work in accordance with ACI 301 and all applicable codes and guidelines (see 1.03).
 - B. Acquire cement and aggregate from same source for all work.
 - C. Conform to ACI 305R when concreting during hot weather.

- D. Conform to ACI 306R when concreting during cold weather (Contractor to coordinate with Engineer).
- 1.07 Field Samples
 - A. Provide under provisions of Section 01400. Coordinate with Section 03100.
- 1.08 Coordination by Contractor
 - A. Coordinate work under provisions of Section 01039.
 - B. Coordinate the placement of joint devices with erection of concrete formwork and placement of form accessories.
- 1.09 Concrete Batch Plant
 - A. The Concrete Batch Plant supplying concrete for the project shall be certified by the National Ready Mix Concrete Association (NRMCA) and meet the requirements of the ALDOT Standard Specifications.

PART 2 PRODUCTS

- 2.01 Concrete Materials
 - A. Cement: ASTM C150, Type II - Air Entraining. The C_3A content shall not exceed 8 percent. **NOTE: All cement in any wastewater structure shall be Sulfide Resistant.**
 - B. Fine and Coarse Aggregates: ASTM C33. Maximum size of coarse aggregate shall be one inch.
 - C. Water: Clean and not detrimental to concrete. Chlorine content shall be less than 0.5 mg/l.
- 2.02 Admixtures
 - A. Air Entrainment: ASTM C260; except it shall be nontoxic after 30 days and shall contain no chlorides.
 - B. Chemical
 - 1. ASTM C494, Type A - Water Reducing, Type D - Water Reducing and Retarding admixture.
 - 2. Pozzolite as manufactured by Master Builders, Inc. of Cleveland, OH; WRDA-79 or WRDA, Hycol as manufactured by W. R. Grace, or approved equal.
 - C. Fly Ash: ASTM C618; Class C or Class F.
 - D. No admixture will be acceptable if it contains anything which is determined by the Engineer to be potentially harmful to the concrete and/or its intended purpose. No component will be allowed if it potentially decreases the sulfide resistance of the concrete.
 - E. All admixtures shall be supplied by the same manufacturer.
 - F. High Range Water Reducers: ASTM C494 shall be Daracum-100 as manufactured by the Construction Products Division of W. R. Grace and Company.
- 2.03 Accessories
 - A. Bonding Agent: Two part, epoxy resin, 100 percent solids system with strength greater than concrete strength, similar or equal to Polytops 40 as manufactured by ChemMasters.

- B. Vapor Barrier: 6 mil thick clear polyethylene film, type recommended for below grade application.
 - C. Non-Shrink Grout
 - 1. Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 2,400 psi in 48 hours and 7,000 psi in 28 days.
 - 2. EMBECO 636 as manufactured by Master Builders, Inc., Cleveland, OH, or approved equal.
 - D. Compounds, Hardeners and Sealers: See Section 03346, 2.02.
 - E. Plastic Bearing Strips, Shims and Spacers: Shall be 1/4 inch thick unless otherwise shown on the Drawings, equal to Korolath as manufactured by Korolath Corporation, Hudson, MA.
- 2.04 Joint Devices and Filler Materials
- A. Joint Filler Type A: ASTM D994; Asphalt impregnated fiberboard or felt, 1/2 inch thick; tongue and groove profile.
 - B. Joint Filler Type B: ASTM D1752; closed cell polyvinyl chloride foam, resiliency recovery of 95 percent if not compressed more than 50 percent of original thickness.
 - C. Construction Joint Devices: Integral galvanized steel, formed to tongue and groove profile, with removable top strip exposing sealant trough, knockout holes spaced at 6 inches, ribbed steel spikes with tongue to fit top screed edge.
 - D. Expansion and Contraction Joint Devices: ASTM B221 alloy, extruded aluminum; resilient neoprene filler strip with a Shore A hardness of 35 to permit plus or minus 25 percent joint movement with full recovery; extruded aluminum cover plate, of longest manufactured length at each location, flush mounted.
 - E. Sealant: See Section 07920.
- 2.05 Concrete Mix
- A. Mix concrete in accordance with ACI 304. Deliver concrete in accordance with ASTM C94.
 - B. Select proportions for normal weight concrete in accordance with ACI 301 Method 2.
 - C. Provide concrete to the following criteria:
 - 1. Compressive Strength (28 days): 4,000 psi minimum. Minimum 564 pounds of cement per cubic yard of concrete (See Paragraph 3.08C).
 - 2. Slump 3 to 5 inches: Superplasticizer 6 inches plus or minus 1 inch. Begin slump with superplasticizer at 2 to 3 inches.
 - 3. Maximum Water/Cement Ratio: 0.40 by weight. See ACI 301, Table 301-84.
 - 4. Air Entrainment: 5 percent, plus or minus 1 percent.
 - D. Use accelerating admixtures in cold weather only when approved by Engineer. Use of admixtures will not relax cold weather placement requirements.
 - E. Use set retarding admixtures during hot weather only when approved by Engineer.

- F. Add air entraining agent to normal weight concrete mix for work exposed to exterior or submerged under water.

2.06 Lean Concrete

- A. Lean concrete shall be 2,000 psi minimum compressive strength at 28 days.

PART 3 EXECUTION

3.01 Examination

- A. Verify site conditions under provisions of Section 01039.
- B. Verify requirements for concrete cover over reinforcement.
- C. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not cause hardship in placing concrete.

3.02 Preparation

- A. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent or bond breakers in accordance with manufacturer's instructions.
- B. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels (minimum insertion depth per ACI) and pack solid with a non-shrink grout equal to MET-OX Grout by ChemMasters.
- C. Clean forms, reinforcing steel and appurtenances of all dirt, debris and deleterious substances.

3.03 Placing Concrete

- A. Place concrete in accordance with ACI 304.
- B. Notify Engineer minimum 24 hours prior to commencement of operations.
- C. Ensure reinforcement, waterstops, inserts, embedded parts, formed joint fillers, joint devices and forms are not disturbed during concrete placement.
- D. Install vapor barrier under interior slabs on grade. Lap joints minimum 6 inches and seal watertight by taping edges and ends.
- E. Repair vapor barrier damaged during placement of concrete reinforcing. Repair with vapor barrier material; lap over damaged areas minimum 6 inches and seal watertight.
- F. Install joint fillers, primer and sealant in accordance with manufacturer's instructions.
- G. Separate slabs on grade from vertical surfaces with 1/2 inch thick joint filler.
- H. Extend joint filler from bottom of slab to within 1/2 inch of finished slab surface. Conform to Section 07920 for finish joint sealer requirements.
- I. Install joint devices in accordance with manufacturer's instructions.
- J. Install construction joint device in coordination with floor slab pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.

- K. Install joint device anchors. Maintain correct position to allow joint cover flush with floor and wall finish.
 - L. Install joint covers in their longest practical length, when adjacent construction activity is complete.
 - M. Apply sealants in joint devices in accordance with Section 07920.
 - N. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.
 - O. Place concrete continuously between predetermined expansion, control, and construction joints.
 - P. When wall heights exceeds 8 feet, new concrete should be placed on a 2 inch layer of cement mortar evenly spread over the previously placed concrete. This mortar shall be a mixture of cement, sand and water in the same proportions used in the concrete but with all coarse aggregate omitted.
 - Q. Do not interrupt successive placement; do not permit cold joints to occur.
 - R. Place floor slabs in checkerboard pattern indicated or as required to meet expansion requirements or as recommended by Engineer.
 - S. Saw cut joints where acceptable to Engineer, within 24 hours after placing. Using 3/16 inch thick blade, cut into slab 1/4 depth of slab thickness.
 - T. Screed floors and slabs on grade level, maintaining surface flatness of maximum 1/4 inch in 10 feet.
 - U. Where mixing occurs enroute, to the jobsite, no water shall be added to the concrete after the batch truck leaves the batch plant except that with the Engineers concurrence, up to a maximum one gallon per cubic yard concrete may be added at the jobsite if needed to attain the minimum slump.
- 3.04 Cold Weather and Hot Weather Concrete
- A. Cold Weather Placement: Place in accordance with ACI 306R - Recommended Practice of Cold Weather Concreting.
 - 1. Cold weather is defined by ACI Committee 306 as a period when for more than 3 successive days the average daily air temperature drops below 40°F and stays below 50°F for more than one-half of any 24 hour period.
 - 2. Normal concreting practices may be resumed once the ambient temperature is above 50°F for more than half a day.
 - B. Hot Weather Placement: Place in accordance with ACI 305 - Recommended Practice of Hot Weather Concreting.
- 3.05 Separate Floor Toppings
- A. Prior to placing floor topping, roughen substrate concrete surface and remove deleterious material. Broom and vacuum clean.
 - B. Place required dividers, edge strips, reinforcing and other items to be cast in.
 - C. Apply bonding agent to substrate in accordance with manufacturer's instructions.
 - D. Place concrete floor toppings to required lines and levels. Place topping in checkerboard panels, dimension not to exceed 20 feet.

- E. Screed toppings level, maintaining surface flatness of maximum 1/8 inch variation in 10 feet.

3.06 Concrete Finishing

- A. Provide formed concrete surfaces to be left exposed, concrete walls, columns, beams, with smooth rubbed sand float, rubbed finish as Scheduled in this Section.
- B. Finish concrete floor surfaces to requirements of Section 03346.

3.07 Curing and Protection

- A. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
- B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
- C. Cure concrete floor surfaces to requirements of Section 03370.

3.08 Field Quality Control

- A. Field inspection and testing will be performed in accordance with ACI 301 and under provisions of Section 01400.
- B. Provide free access to Work and cooperate with independent testing firm and other personnel.
- C. Submit proposed mix design of each class of concrete along with concrete strength test performance to Engineer for review and acceptance prior to commencement of Work.
- D. Tests of cement and aggregates shall be performed to ensure conformance with specified requirements.

E. Concrete Strength Tests

1. Three test cylinders will be required for each load of concrete placed daily in any particular structure.
2. All curing and testing should be done in accordance with ASTM C31, ACI 308 and related guidelines.
3. One additional test cylinder will be taken during cold weather concreting, cured on job site under same conditions as concrete it represents.

- F. Slump Test: One slump test will be taken for each set of test cylinders taken, in accordance with ASTM C143. Other slump tests will be taken as deemed desirable by the Engineer.

- G. Air Entrainment Test: One air entrainment test using a pressure meter per ASTM C231 shall be conducted for each load of concrete with air entrainment specified.

- H. Concrete Batch Tickets: Concrete batch tickets shall contain all required information as determined by the Engineer to allow easy verification of compliance with the Specifications and design mix requirements. Use the enclosed "Concrete Batch Ticket" form. Provide one copy, as directed, to the Engineer, for each concrete truck load delivered to the jobsite.

- I. Concrete Watertightness Test: All water retaining concrete structures shall be tested for watertightness in accordance with ACI 350.1R-93/AWWA 400-93, Testing Reinforced Concrete Structures for Watertightness.

3.09 Patching

- A. Allow Engineer to inspect concrete surfaces immediately upon removal of forms.
- B. Excessive honeycomb or embedded debris in concrete is not acceptable. Notify Engineer upon discovery.
- C. Patch imperfections as required for protection and appearance in accordance with ACI 301-9.2.

3.10 Defective Concrete

- A. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.
- B. Repair, rejection, removal or replacement of defective concrete will be determined by the Engineer.
- C. Do not patch, fill, touch-up, repair, or replace exposed concrete except with the express concurrence of Engineer for each individual area.

3.11 Loads and Backfill

- A. Do not load nor backfill concrete until it has reached its specified strength.

3.12 Schedule - Concrete Types and Finishes

A. Footings

- 1. Concrete: 4,000 psi minimum at 28 days.
- 2. Exposed Horizontal Surfaces: Broom finish.
- 3. Horizontal Surfaces to be Backfilled: Float finish.
- 4. Formed Vertical Surfaces to be Backfilled: Class 1 finish (ALDOT Standard Specifications).

B. Foundation and Retaining Walls

- 1. Concrete: 4,000 psi minimum at 28 days.
- 2. Exposed Vertical Formed Surfaces: Class II (ALDOT Standard Specifications) stone rubbed.
- 3. Formed Vertical Surfaces to be Backfilled: Class 1 finish (ALDOT Standard Specifications).
- 4. Horizontal Surfaces (Unless Otherwise Indicated): Broom finish.

C. Walls for Water Retaining Concrete Structures

- 1. Concrete: 4,000 psi minimum at 28 days.
- 2. Formed Vertical Exterior Surfaces and Horizontal Surface: Same as foundation and retaining walls.
- 3. Formed Vertical Interior Surface from Top Down to One (1) Foot Below Normal Water Level: Class II (ALDOT Standard Specifications) stone rubbed.
- 4. Formed Vertical Interior Surface from Bottom Up to One (1) Foot Below Normal Water Level: Class 1 finish (ALDOT Standard Specifications).

5. Horizontal Surface at Top of Aeration Basins: Trowel finish with hardener additive applied.

D. Concrete Flumes

1. Concrete: 4,000 psi minimum at 28 days.
2. Walls (Exterior): Same as foundation and retaining walls.
3. Walls (Interior): Class II (ALDOT Standard Specifications) stone rubbed.
4. Bottom Slab: Broom finish.

E. Floor Slabs

1. Concrete: 4,000 psi minimum at 28 days.
2. Top Finish: As specified in Section 03346.

F. Underside of Supported Floors, Walkways, Flumes and Structures Exposed to View

1. Concrete: 4,000 psi minimum at 28 days.
2. Exposed Finish: Class II (ALDOT Standard Specifications) stone rubbed.

G. Bottom Slabs, Top Slabs, Walkways and Sidewalks

1. Concrete: 4,000 psi minimum at 28 days.
2. Top Finish: Broom finish.

H. Lean Concrete

1. Lean Concrete: 2,000 psi minimum at 28 days.
2. Finish: Float finish.

I. Other Concrete Items Not Specifically Addressed

1. Concrete: 4,000 psi minimum at 28 days.
2. Finish: As required by Engineer depending upon location.

3.13 Concrete Batch Ticket

- A. Enclosed as Laddform33.

CONCRETE BATCH TICKET

GENERAL INFORMATION

PROJECT NAME: _____ DATE: _____
PROJECT LOCATION: _____ JOB NO.: _____
CONCRETE PLANT NAME: _____ LOCATION: _____
TRUCK NO.: _____ LOAD NO.: _____ TICKET NO.: _____
CONCRETE CLASS AND TYPE: _____ CUBIC YARDS: _____

CONCRETE PLANT

(1) TIME WATER INTRODUCED _____ AM/PM (8) ADMIXTURES BLENDED:
(2) MAXIMUM WATER ALLOWED _____ GAL * AIR ENTRAINMENT MIXTURE
(3) WATER USED AT PLANT _____ GAL BRAND _____
(INCLUDES FREE WATER) AMOUNT _____ oz
(4) MAXIMUM WATER THAT CAN BE ADDED * WATER REDUCING MIXTURE
AT THE JOBSITE _____ GAL BRAND _____
(5) NUMBER OF REVOLUTIONS AT MIXING AMOUNT _____ oz
SPEED AT PLANT _____ * SET RETARDING MIXTURE
(6) TOTAL BATCHED WEIGHT: BRAND _____
* CEMENT _____ LBS AMOUNT _____ oz
* FLY ASH _____ LBS
* WATER _____ LBS (9) I HEREBY CERTIFY THAT THE CONCRETE IN
* F.A. (MOISTURE _____%) _____ LBS THIS TRANSIT MIXER IS PROPORTIONED IN
* C.A. (MOISTURE _____%) _____ LBS ACCORDANCE WITH THE DESIGNATED
* OTHER _____ LBS APPROVED CONCRETE MIX STATED ABOVE,
(7) CONCRETE TEMP. AFTER MIXING _____ ° F AND THAT ALL MATERIALS CONFORM TO THE
PROJECT SPECIFICATIONS.

* ENTER ON THE FIRST TICKET EACH DAY AND EACH TIME A
CHANGE IS MADE, OMITTING NON-APPLICABLE INFORMATION

CONCRETE PLANT CERTIFIED REPRESENTATIVE

JOBSITE (FIELD)

(10) TIME TRUCK EMPTIED _____ AM/PM (14) CONCRETE TEMP. WHEN PLACED _____ ° F
(11) WATER ADDED AT JOBSITE _____ GAL (15) DELIVERY TIME ALLOWABLE _____
(12) TOTAL WATER IN LOAD _____ GAL (16) SLUMP _____ AIR _____
(13) NUMBER OF REVOLUTIONS AT MIXING (17) PLACED IN _____
SPEED AT PLANT _____

PROJECT ENGINEER'S CONSTRUCTION OBSERVER

SECTION 03370
CONCRETE CURING

PART 1 GENERAL

1.01 Section Includes

- A. Initial and final curing of horizontal and vertical concrete surfaces.

1.02 Related Sections

- A. Applicable to Work of this Section are the Drawings and General Provisions of the Contract, including: Part IV, General and Supplementary Conditions; Part V, Special Conditions; Part VI, Technical Specifications; Division No. 1, General Requirements.

1.03 References

- A. ACI 301 - Structural Concrete for Buildings.
- B. ACI 302 - Recommended Practice for Concrete Floor and Slab Construction.
- C. ACI 308 - Standard Practice for Curing Concrete.
- D. ASTM C171 - Sheet Materials for Curing Concrete.
- E. ASTM C309 - Liquid Membrane-Forming Compounds for Curing Concrete.
- F. ASTM D2103 - Polyethylene Film and Sheeting.
- G. Alabama Department of Transportation - Specifications for Highway Construction - 1989 Edition (ALDOT Standard Specifications).

1.04 Submittals

- A. Submit under provisions of Section 01300.
- B. Product Data: Provide data on curing compounds, product characteristics, compatibility and limitations.
- C. Manufacturer's Installation Instructions: Indicate criteria for preparation and application.

1.05 Quality Assurance

- A. Perform Work in accordance with ACI 301.
- B. Maintain one copy of document on site.

1.06 Delivery, Storage and Handling

- A. Deliver, store, protect and handle products under provisions of Section 01600.
- B. Deliver curing materials in manufacturer's packaging including application instructions.

PART 2 PRODUCTS

2.01 Materials

- A. Liquid Membrane Curing Compound: ASTM C309 Type 1, 1-D Acrylic type, clear without fugitive dye; polyseal manufactured by ChemMaster Corporation.
- B. Plastic Film: ASTM C171, 0.004 inch thick clear, white or black sheets.
- C. Reinforced Paper: ASTM C171, composed of two sheets of Kraft Paper cemented together with a bituminous adhesive and reinforced in fiber as manufactured by Fortifiber, or equal.

PART 3 EXECUTION

3.01 Examination

- A. Verify substrate conditions under provisions of Section 01039.
- B. Verify that substrate surfaces are ready to be cured.

3.02 Execution - Horizontal Surfaces

- A. Cure floor surfaces in accordance with ACI 308 and Alabama Department of Transportation, Section 501.
- B. Membrane Curing Compound: Apply curing compound in accordance with manufacturer's instructions in two coats with second coat at right angles to first.

3.03 Execution - Vertical Surfaces

- A. Cure surfaces in accordance with ACI 308 and ALDOT Standard Specifications, Section 501.
- B. Membrane Curing Compound: Apply curing compound in accordance with manufacturer's instructions in two coats with second coat at right angles to first.

3.04 Protection of Finished Work

- A. Protect finished Work under provisions of Section 01500.
- B. Do not permit traffic over unprotected floor surface.

END OF SECTION

[2244]
[9/93]

SECTION 04100
MORTAR AND GROUT

PART 1 GENERAL

1.01 Section Includes

- A. Mortar for masonry.
- B. Grout for masonry and similar work.

1.02 Related Work

- A. Applicable to Work of this Section are the Drawings and General Provisions of the Contract, including: Part IV, General and Supplementary Conditions; Part V, Special Conditions; Part VI, Technical Specifications; Division No. 1, General Requirements.

1.03 References

- A. ASTM C5 - Quicklime for Structural Purposes.
- B. ASTM C91 - Masonry Cement.
- C. ASTM C94 - Ready-Mixed Concrete.
- D. ASTM C144 - Aggregate for Masonry Mortar.
- E. ASTM C150 - Portland Cement.
- F. ASTM C207 - Hydrated Lime for Masonry Purposes.
- G. ASTM C270 - Mortar for Unit Masonry.
- H. ASTM C387 - Packaged, Dry, Combined Materials, for Mortar and Concrete.
- I. ASTM C404 - Aggregates for Masonry Grout.
- J. ASTM C476 - Grout for Masonry.
- K. ASTM C595 - Blended Hydraulic Cement.
- L. ASTM C780 - Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.

- M. ASTM C1019 - Method of Sampling and Testing Grout.

- N. Southern Standard Building Code.

1.04 Delivery, Storage, and Handling

- A. Deliver products to site under provisions of Section 01600
- B. Store and protect products under provisions of Section 01600.
- C. Maintain packaged materials clean, dry, and protected against dampness, freezing, and foreign matter.

1.05 Environmental Requirements

- A. Maintain materials and surrounding air temperatures to minimum 50 degrees F prior to, during and 48 hours after completion of masonry work.

PART 2 PRODUCTS

2.01 Materials

- A. Portland Cement: ASTM C150, Type I, gray or white color.
- B. Mortar Aggregate: ASTM C144, standard masonry type.
- C. Hydrated Lime: ASTM C207, Type S or SA.
- D. Grout Aggregate: ASTM C404.
- E. Water: Clean and potable.

2.02 Mortar Mixes

- A. Mortar for Foundations, Footings, Retaining Walls and Similar Exterior Below Grade Applications: ASTM C270, Type M, using the Property Method.
- B. Mortar for Exterior Above Grade Applications: ASTM C270, Type S, using the Property Method.
- C. Mortar for Interior Load Bearing Applications: ASTM C270, Type N, using the Property Method.
- D. Mortar for Interior Non-Load Bearing Applications: ASTM C270, Type N or O, using the Property Method.
- E. Mortar for Reinforced Masonry: ASTM C270, Type M, using the Property Method.
- F. Pointing Mortar: ASTM C270, Type N or O, using the Property Method.

2.03 Mortar Mixing

- A. Thoroughly mix mortar ingredients in quantities needed for immediate use in accordance with ASTM C270.
- B. Add mortar color, where indicated, in accordance with manufacturer's instructions. Provide uniformity of mix and coloration.
- C. Do not use anti-freeze compounds to lower the freezing point of mortar.
- D. If water is lost by evaporation, retemper only within two hours of mixing.
- E. Use mortar within two hours after mixing at temperatures of 80 degrees F, or two-and-one-half hours at temperatures under 50 degrees F.

2.04 Grout Mixes

- A. Bond Beams Lintels: Minimum 4,000 psi strength at 28 days; 7-8 inches slump; mixed in accordance with ASTM C476 fine or course grout (see Section 04300).

- B. Engineered Masonry: Minimum 3,000 psi strength at 28 days; 7-8 inches slump; mixed type in accordance with ASTM C476 fine or course grout (see Section 04300).
 - C. Premix Type: ASTM C94.
 - D. Steel Base Plates and Bearing Plates: Non shrink, pre-mixed grout; minimum 7,000 psi at 28 days (See Section 05120 - Structural Steel).
 - E. Concrete Basin Floors and Troughs: Minimum 4,000 psi strength at 28 days; 7 to 8 inches slump; mixed in accordance with ASTM C476 fine grout (see Section 03300).
- 2.05 Grout Mixing
- A. Thoroughly mix mortar ingredients in quantities needed for immediate use in accordance with ASTM C476 fine or course grout.
 - B. Add admixtures in accordance with manufacturer's instructions. Provide uniformity of mix.
 - C. Do not use anti-freeze compounds to lower the freezing point of grout.

PART 3 EXECUTION

- 3.01 Examination
- A. Request inspection of spaces to be grouted.
- 3.02 Preparation
- A. Apply bonding agent to existing concrete surfaces.
 - B. Plug cleanout holes with brick or block masonry units to prevent leakage of grout materials. Brace masonry for wet grout pressure.
- 3.03 Installation
- A. Install mortar in accordance with ASTM C780.
 - B. Install grout to requirements of the specific Section and as specified by the Southern Standard Building Code.
 - C. Work grout into masonry cores and cavities to eliminate voids.
 - D. Do not displace reinforcement while placing grout.
 - E. Remove grout spaces of excess mortar.
 - F. Install grout under steel base plates and bearing plates for full bearing area, free of voids.

[2244]
[9/93]

END OF SECTION

SECTION 04300
UNIT MASONRY SYSTEM

PART 1 GENERAL

1.01 Section Includes

- A. Concrete masonry units.
- B. Brick units.
- C. Reinforcement, anchorage and accessories.
- D. Parged masonry surfaces.

1.02 Related Sections

- A. Applicable to Work of this Section are the Drawings and General Provisions of the Contract, including: Part IV, General and Supplementary Conditions; Part V, Special Conditions; Part VI, Technical Specifications; Division No. 1, General Requirements.

1.03 References

- A. ANSI/ASTM C216 - Facing Brick (Solid Masonry Units Made From Clay or Shale).
- B. ASTM A525 - Steel Sheet, Zinc Coated, (Galvanized) by the Hot-Dip Process.
- C. ASTM A580 - Stainless and Heat-Resisting Steel Wire.
- D. ASTM A615 - Deformed and Plain Billet Steel Bars for Concrete Reinforcement.
- E. ASTM B370 - Copper Sheet and Strip for Building Construction.
- F. ASTM C90 - Hollow Load Bearing Concrete Masonry Units.
- G. IBC – International Building Code (Latest Edition).

1.04 Submittals

- A. Submit product data under provisions of Section 01300.
- B. Submit product data for brick and concrete masonry units, anchors, wall ties, joint reinforcement, joint materials.
- C. Submit samples under provisions of Section 01300.
- D. Submit four samples of face brick units to illustrate color, texture and extremes of color range.
- E. Submit manufacturer's certificate under provisions of Section 01400 that products meet or exceed specified requirements.

1.05 Qualifications

- A. Installer: Company specializing in performing the Work of this Section with minimum five years documented experience.

1.06 Regulatory Requirements

- A. Conform to International Building Code (Latest Edition) requirements for masonry construction.

1.07 Delivery, Storage and Handling

- A. Deliver products to site under provisions of Section 01600.
B. Store and protect products under provisions of Section 01600.

1.08 Environmental Requirements

- A. Maintain materials and surrounding air temperature to minimum 50 degrees F prior to, during and 48 hours after completion of masonry work.

1.09 Sequencing and Scheduling

- A. Coordinate Work under provisions of Section 01039.

PART 2 PRODUCTS

2.01 Concrete Masonry Units (CMU)

- A. Hollow Load Bearing Block Concrete Masonry Units (CMU): ASTM C90, Grade N, Type I - Moisture Controlled; normal weight.
- B. Split Face Concrete Masonry Units (CMU)
1. Split Face CMU shall conform to ASTM C90, Type 1 for load bearing units, and ASTM C129, Type 1 for non load-bearing units.
 2. Split Face CMU shape shall be as called for on the Drawings. Shapes available include the following:
 - a. Split Face.
 - b. Split Wide Profile.
 - c. Split 6 Fluted.
 - d. Split 8 Fluted.
 3. Manufacturer: The manufacturer shall be Nitterhouse Masonry Products, LLC, Chambersburg, PA, or approved equal.
- C. Concrete Masonry Units Size and Shapes: Nominal modular size of 8 x 16 x 8 inches or 8 x 16 x 12 inches or 8 x 16 x 4 inches as shown on Drawings. Provide special units for 90 degree corners, bond beams, lintels, coved base and bull nosed corners as shown on Drawings.
- D. Painting: Painting and coating of CMU's shall be as specified in Section 09900.

2.02 Brick Units – NOT USED.

2.03 Reinforcement and Anchorage

- A. Single Wythe Horizontal Joint Reinforcement: Truss type; hot dip galvanized after fabrication cold-drawn steel conforming to ANSI/ASTM A82, with No. 9 W 1.7 side rods and cross rods.

- B. Reinforcing Steel: As specified in Section 03200.
 - C. Column Anchor: Two piece - Bar type, 6 inches long, 1 inch wide, 1/4 inch thick, 2 inch bend on flange, 1-1/4 inch bend into masonry, electro-galvanized.
 - D. Corrugated Formed Sheet Metal Wall Ties: 7 x 7/8 inch size x 22 gage.
 - E. Wiremesh Intersecting Wall Ties: 2 inch x 2 inch (1/2 inch mesh) x 16 gage hot dipped galvanized wire mesh.
- 2.04 Flashings
- A. Aluminum Steel: ASTM B209 gage. Smooth finish.
- 2.05 Accessories
- A. Preformed Control Joints: Polyvinylchloride material. Provide with corner and tee accessories.
 - B. Joint Filler: Closed cell polyvinylchloride; oversized 50 percent to joint width; self-expanding; width as required for masonry.
 - C. Building Paper: No. 15 asphalt saturated felt.
 - D. Nailing Strips: Softwood, preservative treated for moisture resistance, dovetail shape, sized to masonry joints.
 - E. Cleaning Solutions: Non-acidic, not harmful to masonry work or adjacent materials.
- 2.06 Lintels
- A. Concrete Masonry Unit Opening
 - 1. Use U-block shape, ASTM C90, Grade N, Type I, normal weight, with reinforcing bars, cavity filled with grout, as indicated.
 - 2. Loose structural steel. Angle (ASTM A36) size as indicated.
 - B. Brick Veneer Opening: Loose structural steel. Angle (ASTM A36) size as indicated. (See Section 05500 - Metal Fabrications.)

PART 3 EXECUTION

- 3.01 Examination
- A. Verify that field conditions are acceptable and are ready to receive Work.
 - B. Verify items provided by other Sections of Work are properly sized and located.
 - C. Verify that built-in items are in proper location and ready for roughing into masonry work.
 - D. Beginning of installation means installer accepts existing conditions.
- 3.02 Preparation
- A. Direct and coordinate placement of metal anchors supplied to other Sections.

- B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

3.03 Coursing

- A. Establish lines, levels and coursing indicated. Protect from displacement.
- B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
- C. Lay concrete masonry units in running bond. Course one unit and one mortar joint to equal 8 inches. Form concave mortar joints.
- D. Lay brick units in running bond. Course three brick units and three mortar joints to equal 8 inches. Form concave mortar joints.

3.04 Placing and Bonding

- A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other Work.
- B. Lay hollow masonry units with face shell bedding on head and bed joints.
- C. Buttering corners of joints or excessive furrowing of mortar joints are not permitted.
- D. Remove excess mortar as Work progresses.
- E. Interlock intersections and external corners.
- F. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
- G. Perform jobsite cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
- H. Cut mortar joints flush where ceramic or quarry wall tile is scheduled, cement parging is required, resilient base is scheduled, cavity insulation vapor barrier adhesive is applied or bitumen dampproofing is applied.
- I. Isolate masonry partitions from vertical structural framing members with a control joint as indicated.
- J. Isolate top joint of masonry partitions from horizontal structural framing members and slabs or decks with compressible joint filler.

3.05 Weep Holes

- A. Install weep holes in veneer at 24 inches on center horizontally, above through-wall flashing, above shelf angles, lintels and at bottom of walls. Weep holes constructed by eliminating sufficient mortar at weep hole location points.

3.06 Cavity Wall

- A. Do not permit mortar to drop or accumulate into cavity air space or to plug weep holes.
- B. Build inner wythe ahead of outer wythe to receive cavity insulation air/vapor barrier adhesive.

- 3.07 Reinforcement and Anchorages - Concrete Masonry Units
- A. Install horizontal joint reinforcement 16 inches oc.
 - B. Place masonry joint reinforcement in first horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
 - C. Place joint reinforcement continuous in first joint below top of walls.
 - D. Lap joint reinforcement ends minimum 6 inches. Extend minimum 16 inches each side of openings.
 - E. Reinforce stack bonded unit joint corners and intersections with wire mesh 16 inches oc.
- 3.08 Reinforcement and Anchorages - Veneer Masonry
- A. Embed wall ties in masonry back-up for bonding veneer at maximum 16 inches oc vertically and 36 inches oc horizontally. Place at maximum 3 inches oc each way around perimeter of openings, within 12 inches of openings.
- 3.09 Reinforcement and Anchorages - Reinforced Unit Masonry
- A. Install truss type horizontal joint reinforcement 16 inches on center.
 - B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
 - C. Place joint reinforcement continuous in first joint below top of walls.
 - D. Lap joint reinforcement ends minimum 6 inches. Extend minimum 16 inches each side of openings.
 - E. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.
 - F. Embed anchors embedded in concrete. Embed anchorages in every second block joint.
- 3.10 Masonry Flashings
- A. Extend flashings through veneer, turn up minimum 8 inches and bed into mortar joint of masonry back-up.
 - B. Lap end joints minimum 6 inches and seal watertight.
- 3.11 Concrete Masonry Unit Construction
- A. Install reinforced unit masonry lintels over openings in concrete masonry unit walls as shown on Drawings.
 - B. U-Blocks to include number and size of reinforcing bars as indicated. Cavity to be filled with grout.
 - C. Use single piece reinforcing bars only.
 - D. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.
 - E. Place and consolidate grout fill without displacing reinforcing.
 - F. Allow masonry lintels to attain specified strength before removing temporary supports.

- G. Maintain minimum 8 inch bearing on each side of opening.

3.12 Lintels - Brick Veneer Construction

- A. Structural steel angle, sized as indicated.
- B. Maintain minimum 8 inch bearing in each side of opening.
- C. May also be used with Concrete Masonry Unit Construction as shown on Drawings.

3.13 Grouted Components

- A. Reinforce bond beam as indicated.
- B. Reinforce pilaster as indicated.
- C. Lap splices minimum 24 bar diameters.
- D. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.
- E. Place and consolidate grout fill without displacing reinforcing.
- F. At bearing locations, fill masonry cores with grout for a minimum 12 inches either side of opening.

3.14 Engineered Masonry

- A. Lay masonry units with core cells vertically aligned and cavities between wythes clear of mortar and unobstructed.
- B. Place mortar in masonry unit bed joints back 1/4 inch from edge of unit grout spaces, bevel back and upward. Permit mortar to cure 7 days before placing grout.
- C. Reinforce masonry unit cores and cavities with reinforcement bars and grout as indicated.
- D. Retain vertical reinforcement in position at top and bottom of cells and at intervals not exceeding 192 bar diameters. Splice reinforcement in accordance with Section 03200.
- E. Wet masonry unit surfaces in contact with grout just prior to grout placement.
- F. Grout spaces less than 2 inches in width with fine grout using low lift grouting techniques. Grout spaces 2 inches or greater in width with course grout using high or low lift grouting techniques.
- G. When grouting is stopped for more than one hour, terminate grout 1-1/2 inch below top of upper masonry unit to form a positive key for subsequent grout placement.
- H. Low Lift Grouting: Place first lift of grout to a height of 16 inches and rod for grout consolidation. Place subsequent lifts in 8 inch increments and rod for grout consolidation.
- I. High Lift Grouting:
 - 1. Provide cleanout opening no less than 4 inches high at the bottom of each cell to be grouted by cutting one face shell of masonry unit.
 - 2. In double wythe walls, omit every second masonry unit in one of the wythes for clean out and cell inspection purposes.

3. In double wythe walls, construct vertical grout barriers or dams between the masonry wythes, with masonry units every 30 feet maximum.
4. Clean out masonry cells and cavities with high pressure water spray. Permit complete water drainage.
5. Request the Engineer to inspect the cells and cavities. Allow 3 days advance notice of inspection.
6. After cleaning and cell inspection, seal openings with masonry units.
7. Pump grout into spaces. Maintain water content in grout to intended slump without aggregate segregation.
8. Limit grout lift to 48 inches and rod for grout consolidation. Wait 30 to 60 minutes before placing next lift.

3.15 Control and Expansion Joints

- A. Do not continue horizontal joint reinforcement through control and expansion joints.
- B. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.
- C. Size control joint in accordance with Section 07920.
- D. Form expansion joint as detailed.

3.16 Built-in Work

- A. As work progresses, build in metal door, frames, fabricated metal frames, window frames, wood nailing strips, anchor bolts, plates and other items furnished by other Sections.
- B. Build in items plumb and level.
- C. Bed anchors of metal door frames in adjacent mortar joints. Fill frame voids solid with grout. Fill adjacent masonry cores with grout minimum 12 inches from framed openings.
- D. Do not build in organic materials subject to deterioration.

3.17 Tolerances

- A. Maximum Variation from Alignment of Columns and Pilasters: 1/4 inch.
- B. Maximum Variation from Unit to Adjacent Unit: 1/32 inch.
- C. Maximum Variation from Plane of Wall: 1/4 inch in 10 feet; 1/2 inch in 20 feet or more.
- D. Maximum Variation from Plumb: 1/4 inch per story non-cumulative.
- E. Maximum Variation From Level Coursing: 1/8 inch in 3 feet; 1/4 inch in 10 feet; 1/2 inch in 30 feet or more.
- F. Maximum Variation of Joint Thickness: 1/8 inch in 3 feet.
- G. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch.

3.18 Cutting and Fitting

- A. Cut and fit for chases, pipes, conduit, sleeves, grounds and similar items. Coordinate with other Sections of Work to provide correct size, shape and location.
- B. Obtain Engineer approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.19 Parging

- A. Dampen masonry walls prior to parging.
- B. Scarify each parging coat to ensure full bond to subsequent coat.
- C. Parge masonry walls in two uniform coats of mortar to a total minimum thickness of 1/16 inch.
- D. Wood float surface smooth and flat with a maximum surface variation of 1/8 inch per foot.

3.20 Cleaning

- A. Clean Work under provisions of Section 01700.
- B. Remove excess mortar and mortar smears.
- C. Replace defective mortar. Match adjacent Work.
- D. Clean soiled surfaces with cleaning solution.
- E. Use non-metallic tools in cleaning operations.

3.21 Protection of Finished Work

- A. Protect finished installation under provisions of Section 01500.
- B. Without damaging completed Work, provide protective boards at exposed external corners which may be damaged by construction activities.

3.22 Schedule

- A. **See Drawings for type, size and location.**

END OF SECTION

[2244]
[REV. 03/2019]

SECTION 06112
FRAMING AND SHEATHING

PART 1 GENERAL

1.01 Section Includes

- A. Structural floor, wall and roof framing.
- B. Built-up structural beams and columns.
- C. Diaphragm trusses built on site.
- D. Floor, wall and roof sheathing.
- E. Sill gaskets and flashings.
- F. Preservative treatment of wood.
- G. Miscellaneous framing and sheathing.
- H. Telephone and electrical panel boards.
- I. Concealed wood blocking for support of toilet and bath accessories, wall cabinets and wood trim.

1.02 Related Sections

- A. Applicable to Work of this Section are the Drawings and General Provisions of the Contract, including: Part IV, General and Supplementary Conditions; Part V, Special Conditions; Part VI, Technical Specifications; Division No. 1, General Requirements.

1.03 References

- A. ALSC - American Lumber Standards Committee: Softwood Lumber Standards.
- B. ANSI A208.1 - Mat-Formed Wood Particleboard.
- C. ANSI/AHA A135.4 - Basic Hardboard.
- D. APA: American Plywood Association.
- E. AWPA (American Wood Preservers Association) C1 - All Timber Products Preservative Treatment by Pressure Process.
- F. AWPA (American Wood Preservers Association) C20 - Structural Lumber Fire Retardant Treatment by Pressure Process.
- G. NFPA: National Forest Products Association.
- H. SPIB: Southern Pine Inspection Bureau.

1.04 Submittals

- A. Submit under provisions of Section 01300.

- B. Shop Drawings for Site Fabricated Truss Frame: Indicate dimensions, wood species and grades, component profiles, drilled holes, fasteners, connectors, erection details and sequence.
 - C. Product Data: Provide technical data on insulated sheathing, wood preservative materials and application instructions.
- 1.05 Quality Assurance
- A. Perform Work in Accordance with the Following Agencies
 - 1. Lumber Grading Agency: Certified by ALSC.
 - 2. Plywood Grading Agency: Certified by APA.
 - B. In lieu of grade stamping exposed to view lumber and plywood, submit manufacturer's certificate under provisions of Section 01400 that products meet or exceed specified requirements.
- 1.06 Qualifications
- A. Design structural site fabricated trusses under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in the State of Alabama.
- 1.07 Delivery, Storage and Handling
- A. Deliver, store, protect and handle products to site under provisions of Section 01600.
 - B. Protect site framed structural site fabricated trusses from warping or other distortion by stacking in vertical position, braced to resist movement.

PART 2 PRODUCTS

- 2.01 Lumber Materials
- A. Lumber Grading Rules: SPIB.
 - B. Joist, Rafter and Beam Framing
 - 1. Species: Southern pine.
 - 2. Grade: No. 2 dense.
 - 3. Size Class: 2 inch to 4 inch thick, 5 inch and wider.
 - 4. Maximum Moisture Content: Fifteen percent.
 - 5. Kiln dried.
 - C. Non-Structural Light Framing
 - 1. Species: Southern pine.
 - 2. Grade: No. 2 dense.
 - 3. Size Class: 2 inch to 4 inch thick, 2 inch to 4 inch wide.
 - 4. Maximum Moisture Content: Fifteen percent.

5. Kiln dried.

D. Studding

1. Species: Southern pine.
2. Grade: No. 2 dense.
3. Size Class: 2 inch to 4 inch thick, 2 inch to 4 inch wide.
4. Maximum Moisture Content: Fifteen percent.
5. Kiln dried.

E. Pressure Treated

1. Species: Southern pine.
2. Grade: No. 2 dense.
3. Size Class: 2 inch to 4 inch thick, 2 inch and wider.
4. Maximum Moisture Content: Fifteen percent.
5. Pressure treated at factory.

2.02 Sheathing Materials

- A. Plywood Roof Sheathing: APA rated sheathing; Structural I, span rating 32/16; exposure durability 2; unsanded; 4 x 8 foot; thickness as shown on Drawings.
- B. Plywood Wall Sheathing: APA rated sheathing; Structural I; span rating 32/16; exposure durability 2; unsanded; 4 x 8 foot; thickness as shown on Drawings.
- C. Plywood Sub-Floor Sheathing: APA rated sheathing; Structural I; span rating 48/24; exposure durability 2; sanded; 4 x 8 foot; thickness as shown on Drawings.
- D. Plywood Exposed Ceiling: APA A-D rated sheathing; Structural I; span rating 24; exposure durability 2; sanded; 4 x 8 foot; thickness as shown on Drawings.

2.03 Underlayment Materials

- A. Plywood Underlayment: APA rated sheathing; Structural I; span rating 24; exposure durability 2; sanded; 4 x 8 foot; thickness as shown on Drawings.
- B. Plywood Sturd-I-Floor: At the option of the Contractor, the following may be substituted for the combination "subfloor and underlayment" as shown on the Drawings:
 1. APA Rated Sturd-I-Floor Panels; span rating 24; exposure durability 2; 4 x 8 foot; thickness as shown on Drawings.

2.04 Accessories

A. Fasteners and Anchors

1. Wood to Wood: Comply with fastening schedule (Table 1705.1), Standard Building Code.

2. Drywall Screws: Bugle head, hardened steel, power driven type, length minimum three times thickness of sheathing to achieve full penetration of sheathing substrate.
3. Anchors: Toggle bolt type for anchorage to hollow masonry. Expansion shield and lag bolt type for anchorage to solid masonry or concrete. Bolt or ballistic fastener for anchorages to steel.
4. Joist Hangers: Hot dipped galvanized steel, sized to suit framing conditions.
5. Sill Flashing (Under Sill Gasket): Size as shown on Drawings.
6. Subfloor Glue: APA AFG-01, waterproof of water base, air cure type, cartridge dispensed.
7. Building Paper: No. 15 asphalt felt.
8. Termite Shield: Galvanized sheet steel, size as shown on Drawings.

2.05 Factory Wood Treatment

- A. Wood Preservative (Pressure Treatment): AWPA Treatment C1 using water borne preservative with 0.25 percent retainage.

PART 3 EXECUTION

3.01 Framing

- A. Set structural members level and plumb, in correct position.
- B. Make provisions for erection loads and for sufficient temporary bracing to maintain structure safe, plumb and in true alignment until completion of erection and installation of permanent bracing.
- C. Place horizontal members flat, crown side up.
- D. Construct load bearing, framing and curb members full length without splices.
- E. Double members at openings as shown on Drawings. Space short studs over and under opening to stud spacing.
- F. Construct double joist headers at floor and ceiling openings and under wall stud partitions that are parallel to floor joists. Frame rigidly into joists.
- G. All wood in contact with masonry to be pressure treated with wood preservative.
- H. Bridge joists and framing in excess of 8 feet span as detailed. Fit solid blocking or bridging at ends of members.
- I. Place full width continuous sill flashings under framed walls on cementitious foundations. Lap flashing joint 4 inches.
- J. Curb roof openings except where prefabricated curbs are provided. Form corners by alternating lapping side members.
- K. Coordinate curb installation with installation of decking and support of deck openings, roofing vapor retardant and parapet construction.

3.02 Sheathing

- A. Secure roof sheathing perpendicular to framing members with ends staggered and sheet ends over firm bearing. Use sheathing clips between sheets between roof framing members. Provide solid edge blocking between sheets.
- B. Secure wall sheathing with long dimension parallel and perpendicular to wall studs, with ends over firm bearing and staggered.
- C. Place building paper horizontally over wall sheathing, weather lap edges and ends.
- D. Secure subfloor perpendicular to floor framing with end joints staggered and sheet ends over firm bearing. Attach with subfloor glue and drywall screws.
- E. Install plywood to simple span.
- F. Place building paper between floor underlayment and subflooring.
- G. Install flooring underlayment after dust and dirt generating activities have ceased and prior to application of finished flooring.
- H. Install telephone and electrical panel boards with plywood sheathing material where required. Over size the panel by 12 inches on all sides.

3.03 Tolerances

- A. Framing Members: One-fourth inch from true position, maximum.
- B. Surface Flatness of Floor: One-fourth inch in 10 feet maximum and 1/2 inch maximum in 30 feet.

END OF SECTION

[2244]
[9/93]

SECTION 06125
WOOD DECKING

PART 1 GENERAL

- 1.01 Section Includes
 - A. Plywood structural wood decking.
- 1.02 Related Sections
 - A. Applicable to Work of this Section are the Drawings and General Provisions of the Contract, including: Part IV, General and Supplementary Conditions; Part V, Special Conditions; Part VI, Technical Specifications; Division No. 1, General Requirements.
- 1.03 References
 - A. APA: American Plywood Association.
- 1.04 Quality Assurance
 - A. Perform Work in Accordance with the Following Agencies
 - 1. Plywood Grading Agency: Certified by APA.
- 1.05 Regulatory Requirements
 - A. Conform to Standard Building Code.
- 1.06 Delivery, Storage and Handling
 - A. Deliver, store, protect and handle products to site under provisions of Section 01600.
- 1.07 Field Measurements
 - A. Verify that field measurements are as shown on Drawings.

PART 2 PRODUCTS

- 2.01 Plywood Decking
 - A. APA Rated Sheathing; Structural I; span rating 32/16; exposure durability 1; interior veneer appearance grade; sanded; 4 x 8 foot; thickness as shown on Drawings.
- 2.02 Fasteners
 - A. Wood to Wood: Comply with fastening schedule (Table 1705.1), Standard Building Code.
- 2.03 Adhesive: APA AFG-01, waterproof, air cure type, cartridge dispensed.

PART 3 EXECUTION

3.01 Examination

- A. Verify that support framing is ready to receive decking.

3.02 Preparation

- A. Coordinate placement of bearing and support items.

3.03 Installation - Plywood Decking

- A. Install decking perpendicular to framing members, with ends staggered over firm bearing. On sloped surfaces, lay decking with tongue upward.
- B. Allow expansion space at edges and ends.
- C. Attach decking with adhesive and fasteners.
- D. Use sheathing clips at unsupported edges of plywood sheets between supporting framing members.

3.04 Tolerances

- A. Surface Flatness of Decking Without Load: 1/4 inch in 10 feet maximum and 1/2 inch maximum in 30 feet.

END OF SECTION

[2244]
[9/93]

SECTION 06193
PLATE CONNECTED WOOD TRUSSES

PART 1 GENERAL

1.01 Section Includes

- A. Shop fabricated wood trusses for roof framing.
- B. Bridging, bracing and anchorage.

1.02 Related Sections

- A. Applicable to Work of this Section are the Drawings and General Provisions of the Contract, including: Part IV, General and Supplementary Conditions; Part V, Special Conditions; Part VI, Technical Specifications; Division No. 1, General Requirements.

1.03 References

- A. ALSC - American Lumber Standards Committee: Softwood Lumber Standards.
- B. ASTM A167 - Stainless and Heat Resisting Chromium - Nickel Steel Plate, Sheet and Strip.
- C. ASTM A446 - Steel Sheet, Zinc Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality.
- D. AWP (American Wood Preservers Association) C1 - All Timber Products Preservative Treatment by Pressure Process.
- E. AWP (American Wood Preservers Association) C20 - Structural Lumber Fire Retardant Treatment by Pressure Process.
- F. NFPA: National Forest Products Association.
- G. SPIB: Southern Pine Inspection Bureau.
- H. 2006 International Building Code.

1.04 Submittals

- A. Submit under provisions of Section 01300.
- B. Shop Drawings: Indicate sizes and spacing of trusses, loads and truss cambers, framed openings. Submit design calculations by an Engineer licensed in the State of Alabama.
- C. Product Data: Provide truss configurations, bearing and anchor details, bridging and bracing.

1.05 Quality Assurance

- A. Perform Work in accordance with the following agencies:
 - 1. Lumber Grading Agency: Certified by ALSC.
 - 2. Plywood Grading Agency: Certified by APA.

- B. Truss Design, Fabrication and Installation: In accordance with Truss Plate Institute BWT-76, HET-80, PCT-80 including Supplement, TPI-85 including Supplement, QST-88.
 - C. The manufacturer of the trusses shall be fully responsible for the design and fabrication of the trusses. The manufacturer shall design the trusses to handle all loadings shown on the Drawings or required by codes, whichever is more stringent.
- 1.06 Qualifications
- A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
 - B. Design trusses under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed at the place where the Project is located.
- 1.07 Regulatory Requirements
- A. Conform to 2006 International Building Code for loads, seismic zoning, other governing load criteria and fire retardant requirements.
- 1.08 Delivery, Storage and Handling
- A. Deliver, store, protect and handle products to site under provisions of Section 01600.
 - B. Handle and erect trusses in accordance with TPI HET-80.
 - C. Store trusses in vertical position resting on bearing ends.
- 1.09 Field Measurements
- A. Verify that field measurements are as shown on Drawings.

PART 2 PRODUCTS

- 2.01 Materials
- A. Lumber Grading Rules: SPIB.
 - B. Wood Members: Single top and bottom chord, Southern Yellow Pine species No. 2 grade, 19 percent maximum and 7 percent minimum moisture content.
 - C. Steel Connectors: ASTM A446 steel, Grade B, hot dip galvanized; die stamped with integral teeth; size as recommended by manufacturer.
 - D. Truss Bridging: Type, size and spacing recommended by truss manufacturer.
- 2.02 Accessories
- A. Wood Blocking, Plating, Support Members, Framing for Openings: In accordance with Section 06114.
 - B. Fasteners: Hot dip galvanized steel, type to suit application.
 - C. Bearing Plates: Plain steel.

2.03 Fabrication

- A. Fabricate trusses to achieve structural requirements as shown on Drawings.
- B. Brace wood trusses in accordance with TPI BWT-76.

PART 3 EXECUTION

3.01 Examination

- A. Verify that supports and openings are ready to receive trusses.

3.02 Preparation

- A. Coordinate placement of bearing and support items.

3.03 Erection

- A. Install trusses in accordance with manufacturer's instructions.
- B. Set members level and plumb, in correct position.
- C. Make provisions for erection loads and for sufficient temporary bracing to maintain structure plumb and in true alignment until completion of erection and installation of permanent bracing.
- D. Do not field cut or alter structural members without approval of Engineer.
- E. Place headers and supports to frame openings required.
- F. Frame openings between trusses with lumber in accordance with Section 06114.
- G. Coordinate placement of decking with Work of this section.

3.04 Tolerances

- A. Framing Members: 1/2 inch maximum, from true position.

3.05 Schedules

- A. As shown on Drawings.

END OF SECTION

[2244]
[Rev. 10/07]

SECTION 07210

SPRAY POLYURETHANE FOAM INSULATION

PART 1 GENERAL

1.01 Section Includes

- A. Spray Polyurethane Foam Insulation (SPF) and vapor barrier in exterior wall and roof construction.

1.02 Related Sections

- A. Applicable to Work of this Section are the Drawings and General Provisions of the Contract, including: Part IV, General and Supplementary Conditions; Part V, Special Conditions; Part VI, Technical Specifications; Division No. 1, General Requirements.

1.03 References

- A. ASTM D-1622 – In-Place Density.
- B. ASTM D-1623 – Tensile Strength.
- C. ASTM C-518 – R-value Per Inch.
- D. ASTM E-9690 – Water Vapor Transmission.

1.04 Submittals

- A. Submit under provisions of Section 01300.
- B. Product Data: Provide data on product characteristics, performance criteria, limitations and R-value.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.05 Coordination

- A. Coordinate Work under provisions of Section 01039.

1.06 Material, Delivery and Storage

- A. Materials shall be delivered in the manufacturer's original, tightly sealed containers or unopened packages, all clearly labeled with the manufacturer's name, product identification, safety information and batch or lot numbers where appropriate.
- B. Containers shall be stored out of the weather and direct sun, where the temperatures are within the limits specified by the manufacturer.
- C. All materials shall be stored in compliance with local fire and safety requirements.

PART 2 PRODUCTS

2.01 Manufacturers - Insulation Materials

- A. AirTight Spray Foam, Rutledge, GA.
- B. North Carolina Foam Ind., Mount Airy, NC.

- C. BASF, Florham Park, NJ.
- D. Substitutions: Under provisions of Section 01600.

2.02 Materials

- A. Spray Polyurethane Foam (SPF): Spray Type, ASTM 518 with R-Value of 6.8 per inch for use in non-climate controlled areas.
- B. The polyurethane foam to be applied shall be a two component system made by combining an isocyanate (A) component with a polyol (B) component and shall possess the following physical characteristics:

| PROPERTIES (Sprayed in Place) | ASTM TEST | SI UNITS | US UNITS |
|----------------------------------|------------------------|--------------------------------|--------------------------------------|
| Density | D-1622 | 48 kg/m ³ | 1.5 – 3.0 lbs/ft ³ |
| Compressive Strength | D-1621 | 100 kPa (min.) | 16 lb/in ² (min.) |
| Closed Cell Content | D-2856 | 90% (min.) | 90% (min.) |
| R-Value | C-177, C-236, or C-518 | 1.1 K•m ² /W (min.) | 6.0°F•hr•ft ² /Btu (min.) |
| Flammability* | E-84 | < 75 | < 75 |
| Smoke* | E-84 | < 450 | < 450 |

PART 3 EXECUTION

3.01 Examination and Environmental Conditions

- A. Verify size conditions under provisions of Section 01039.
- B. Verify that substrate, adjacent materials and insulation are dry and ready to receive insulation.
- C. Do not apply the SPF below the temperature or above humidity specified by the manufacturer.

3.02 Installation

- A. Install insulation in accordance with insulation manufacturer's instructions.
- B. Install in exterior walls, ceiling, (and roof in pre-engineered metal buildings) without gaps or voids.
- C. Install insulation evenly leaving no gaps, voids or sags.

3.03 Sequence and Scheduling

- A. The SPF is installed when the foundation walls and penetrations have been completed. Subsequent penetration must be resealed. There should not be any other trades working in the immediate area when SPF and waterproofing are being installed.

3.04 Safety Requirements

- A. See API Bulletin AX-119, "MDI-Based Polyurethane Foam Systems: Guidelines for Safe Handling and Disposal."
- B. Refer to appropriate Material Safety Data Sheets (MSDS) for additional safety information.
- C. Proper disposal of waste materials and containers must be done in compliance with the manufacturer's guidelines and/or federal, state and local regulatory agencies.
- D. See OSHA 29 CFR 1926 "Safety and Health Regulations for Construction."

3.05 Application of Products

- A. The products intended for use in the building envelope insulation system must be applied within the manufacturer's guidelines for temperature, humid, and other atmospheric conditions. They must be sequenced so as to take into consideration substrate preparation, proper cure times, and inter-coat adhesion.

3.06 Substrate Consideration and Preparation

A. Concrete/Masonry

- 1. Remove loose dirt, dust, debris, or other contaminants prior to the application of the thermal and moisture protection system.
- 2. If priming is required, the primer shall be applied in accordance with Section 3.03.

B. Wood

- 1. Plywood shall contain no more than 18% water, as measured in accordance with ASTM D4449.
- 2. Priming may be required to achieve maximum adhesion of the SPF. If required, apply in accordance with Section 3.03.
- 3. The surface shall be free of contamination prior to primer or SPF application.

3.07 Primer Application

- A. When required, the primer shall be applied to the properly prepared substrate in accordance with the manufacturer's guidelines.

3.08 Spray Polyurethane Foam Application

A. Inspection

- 1. Prior to the application of the SPF, the substrate surface shall be inspected to insure that conditions required by Sections 3.02 and 3.03 have been satisfied.
- 2. Verify that temperature, humidity and other atmospheric conditions are within the SPF manufacturer's guidelines for the application of SPF.

B. Application

- 1. The SPF components (A) and (B) shall be processed in accordance with the manufacturer's instructions.

2. The SPF shall be sprayed in minimum 13 mm (1/2 inch) thick passes with the overall thickness to be a minimum of 2 inches. The full thickness of SPF to be applied within any given area should be completed in one day.
3. The SPF total thickness will be a minimum of 25 mm (one inch) or more if specified. The SPF shall be applied uniformly over the entire surface with a thickness tolerance of plus 7 mm per 25 mm (1/4" per inch) of specified thickness, minus zero.
4. Foamed in place fillets shall be smooth and uniform to allow positive drainage at the intersection of the foundation wall and the footing.
5. SPF shall be terminated in a clean, neat line.

C. Surface Finish

1. The final SPF surface shall be "smooth," "orange peel," "coarse orange peel", or "verge of popcorn." SPF surfaces designated as "popcorn" or "treebark" are not acceptable. These areas shall be removed and reformed to an acceptable surface texture.
2. Damage or defects to the SPF surface shall be repaired prior to the application of the waterproofing.

3.09 Waterproofing Application

- A. The SPF surface shall be free of contaminants that would impair the adhesion of the waterproofing.
- B. The waterproofing shall be applied to all SPF surfaces and extended two (2) inches above the SPF.
- C. Waterproofing shall be applied to achieve a dry film thickness as required by foam manufacturer.
- D. The waterproofing shall be allowed to fully cure prior to the installation of the protective board and backfill.

[2244.5]
[12/09]

END OF SECTION

SECTION 07611
STANDING SEAM METAL ROOF

PART 1 GENERAL

1.01 Section Includes

- A. Factory formed standing seam metal roofing.
- B. Flashings, trim, and accessories.

1.02 Related Sections

- A. Applicable to Work of this Section are the Drawings and General Provisions of the Contract, including: Part IV, General and Supplementary Conditions; Part V, Special Conditions; Part VI, Technical Specifications; Division No. 1, General Requirements.

1.03 References

- A. ASTM A653/A653M Standard Specification for Steel Sheets, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- B. ASTM A792/A792M Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy Coated by the Hot Dip Process.
- C. ASTM B209 Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- D. ASTM D2247 Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity.
- E. ASTM E1680 Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors Under Specified Pressure Differences Across the Specimen.
- F. ASTM E1646 Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Differences.
- G. ASTM G90 Standard Practice for Performing Accelerated Outdoor Weathering of Non-Metallic Materials Using Concentrated Natural Sunlight.
- H. AAMA 501.2 Field Check of Metal Curtain Walls for Water Leakage.
- I. SMACNA Architectural Sheet Metal Manual (Sheet Metal and Air Conditioning Contractor's National Association).

1.04 Submittals

- A. Submit under provisions of Section 01300.
- B. Product Data: Submit product data, including manufacturer's product sheet, for specified products.
- C. Shop Drawings: Submit shop drawings showing layout, profiles and product components, including anchorage, accessories, finish colors and textures.
 - 1. Indicate layout of roofing panels and roof panel sizes, including custom-fabricated roofing panels if indicated, indicate each item of trim and accessories.

2. Indicate in detailed drawings profile and gauge of interior and exterior sheets, and locations and types of fasteners; indicate locations, gauges, shapes and methods of attachment of roofing panels, trim and accessory items.
 3. Indicate products/materials required for construction activities of this section not supplied by manufacturer of products of this section.
- D. Samples: Submit samples for finishes, colors and textures.
- E. Manufacturer Installation Instructions.
- F. Manufacturer Warranty.
- G. Maintenance Data for Installed Products.
- 1.05 Design Requirements
- A. Roof Loads: Design shall comply with IBC (Latest Edition).
- B. Dead Loads: The dead load shall be the weight of the standing seal metal roof system (complete). Collateral loads (mechanical, sprinkler, electrical systems, ceilings, etc.) shall not be attached to the panels.
- C. Live Loads: Minimum uniform live load of 20 psf.
- D. Roof Snow Loads: As required by SBCII or applicable local building codes for the project location.
- E. Wind Loads: As required by SBCII or applicable loading building codes for the project location. The Safety Factors (SF) listed below shall be applied for each connection condition:
1. Single Fastener – 3.0 SF.
 2. Two or More Fasteners – 2.25 SF
- F. **Thermal Loads: Roof panels shall be free to move in response to the expansion and contraction forces resulting from temperature changes between -20°F and 120°F.**
- 1.06 Qualifications
- A. Manufacturer
1. Must have minimum five (5) years documented experience in manufacturing the specified standing seam metal room products.
 2. The manufacturer must have an extensive number of standing seam roof systems of comparative size and type installed within the United States with a long term history with Owners satisfied with their roof system.
 3. The manufacturer must meet the Sheet Metal Industry Standard and comply with the SMACNA Architectural Sheet Metal Manual.
- B. Installer
1. Must have minimum five (5) years documented experience installing standing seam metal roof systems.

2. The installer shall provide references from minimum of five (5) Owners of buildings with standing seam metal roofs installed by the installer which have been in service for a minimum of three (3) years.

1.07 Quality Assurance

- A. In accordance with Section 01401.

1.08 Regulatory Requirements

- A. Conform to International Building Code (Latest Edition), and all applicable local codes, rules and regulations.
- B. Conform to OSHA Regulations and Guidelines.

1.09 Delivery, Storage and Handling

- A. Deliver, store, protect and handle Products to site under provisions of Section 01600.

B. Delivery

1. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact. Identify fabricated components with UL 90 label where appropriate.

C. Packing, Shipping, Handling and Unloading

1. Bundle roofing panels in waterproof wrapping paper.
2. Package trim and accessories in waterproof wrapping paper.

D. Storage and Protection

1. Store materials protected from exposure to harmful conditions. Store material in dry, above-ground location.
2. Stack pre-finished material to prevent twisting, bending, abrasion, scratching and denting. Elevate one end of each skid to allow for moisture runoff.
3. Store products of this section in manufacturer's unopened packaging until installation of products.
4. Maintain dry, heated storage area for products of this section until installation of products.

1.10 Warranty

A. Contractor

1. Provide minimum one year warranty in accordance with Section 01700. Warranty period begins at date of written acceptance by Owner.

B. Manufacturer

1. **Manufacturer's standard warranty for a minimum of 20 years commencing on date of written acceptance by Owner.**
2. Warranty shall cover bare metal against rupture, structural failure, and perforation due to atmosphere corrosion.

3. Coating shall be warranted to resist cracking, checking, blistering, peeling, flaking, chipping, chalking, or fading.
4. The warranty shall include the manufacturer's standard weathertightness warranty.

PART 2 PRODUCTS

- 2.01 Manufacturer: McElroy Metal, Inc., Bossier City, LA; MBCI, Houston, TX; Wheeling Corrugating, Fort Payne, AL; or approved equal.**
- 2.02 Panel
- A. Type: Standing seal panel with male seam fold 1-5/8 inches deep and female seal fold 1-3/4 inches deep at longitudinal panel edges.
 - B. Size: Minimum 16-inch cover width; lengths as indicated on Drawings.
 - C. Material
 1. Galvalume steel sheet conforming to ASTM A 792, AZ 55 coating.
 2. Sheet Thickness: 24 gauge; UL 90 rated.
 - D. Finish
 1. Polyvinylidene fluoride color coat with minimum 70 percent polyvinylidene fluoride resin content (Kylar 500).
 2. Color to be applied to sight exposed face of sheet after pretreatment and priming in accordance with coating manufacturer's recommendations.
 - E. Sealant
 - A. Manufacturer to factory install a continuous butyl sealant bead inside female seam fold.
 - B. Joint sealants as recommended by manufacturer for installation. See 07920.
- 2.03 Trim
- A. Trim shall be manufacturer's standard sheet metal matching panel material and finish.
 - B. The trim shall be break-formed to profiles as indicated on the Drawings including, but not limited to flashings, valleys, fascias, ridge cap, copings, gravel stops, gutters and down spouts, and similar items as indicated on the Drawings.
 - C. See Drawings for trim items required for the project.
 - D. Color: Match panel finish; see Schedule.
- 2.04 Clips and Fasteners
- A. Manufacturer to supply all clips, fasteners, and similar items as required for the installation, and designed to withstand design loads.
 - B. All clips and fasteners shall be galvanized. Color shall match roof color when exposed.

- C. Provide neoprene washers under heads of exposed fasteners.

2.05 Prefabricated Curbs and Equipment Supports

- A. Comply with loading and strength requirements as indicated where units support work of other trades. Coordinate dimensions of curbs and supports with equipment supplier/manufacturer.
- B. Fabricate curbs of structural quality aluminum with the following minimum thickness:

| <u>Mechanical Gear Weight</u> | <u>Minimum Thickness</u> |
|-------------------------------|--------------------------|
| 1,000 lb. | 0.08 Inches |
| 1,001 – 2,000 lb. | 0.125 Inches |

- C. For mechanical equipment weighing more than 2,000 pounds, provide a two curb system as recommended by the manufacturer.
- D. Curbs shall be factory primed and prepared for field painting.
- E. The curb shall have mitered and welded corner joints.
- F. Provide integral cap cells and water diverter crickets. The upper flange of the curb must be a minimum of 18 inches above the water diverter.
- G. Curbs shall be designed for installation under metal roof system on the high side and over metal roof system on the low side.
- H. Minimum curb height above the finished metal roof system shall be 8 inches.
- I. Curbs shall be constructed to match the slope of the roof and provide a level top surface for mounting equipment.
- J. Curb flanges must be constructed to match the configuration of the metal roof panels and extend to a panel rib on each side. Minimum distance between curb wall and panel rib is 6 inches.
- K. Curb manufacturer will provide their own curb structural support system that can be installed between the purlins that will allow proper thermal movement of the curb with the roofing system.
- L. Shop Drawings

1. Submit roof curb manufacturer's shop drawings to metal roof system manufacturer for review prior to fabrications (refer to metal roof system manufacturer's standard installation details).
2. Metal roof system manufacturer shall review roof curb manufacturer's shop drawings for compatibility with metal roof system.
3. Submit in accordance with Section 01300. See 1.04.

- M. See Schedule and Drawings for location and size of curbs and supports as required for the project.

2.06 Prefabricated Roof Jacks

- A. Pipe flashings shall be a one piece EPDM (ethylene propylene diene monomer) molded rubber boot having a serviceable temperature range of -65°F to 212°F and shall be resistant to ozone and ultraviolet rays. Units shall have an aluminum flanged base ring.
- B. Do not install pipe flashings through any panel seams – install **ONLY** in the flat portion of the panel.

- C. Shop Drawings
 - 1. Metal roof system manufacturer shall review roof jack manufacturer's shop drawings for compatibility with metal roof system.
 - 2. Submit roof jack manufacturer's shop drawings in accordance with Section 01300. See 1.04.
 - D. See Schedule and Drawings for location and size of roof jacks as required for the project.
- 2.07 Metal Roof Substrate (Decking)
- A. Substrate: See Drawings for type of substrate (decking) to be utilized for installation of standing seam metal roof including, but not limited to the following:
 - 1. Oriented Strand Board (OSB).
 - 2. Gypsum Board.
 - 3. Plywood (Section 06125).
 - B. Underlayment: ANSI/ASTM D266, No. 15 unperforated asphalt saturated felts as recommended by manufacturer for use in waterproofing and in construction of built-up roofs. Felt to be secured with standard zinc coated roofing nails. No plastic discs to be used with nails.

PART 3 EXECUTION

- 3.01 Examination
- A. Verify that field conditions are acceptable and are ready to receive work.
 - B. Inspect work of other related trades and verify that such work is complete and ready for installation of the metal roof, in accordance with the recommendations of the manufacturer.
 - C. In the event of a discrepancy, notify Engineer. Do not proceed with installation until discrepancies have been resolved.
- 3.02 Preparation
- A. Verify that all required roofing materials, clips, fasteners, trim materials, and related materials are on hand and in good condition. Damaged materials will not be installed.
 - B. Clean and check substrate (decking). Verify substrate is ready for metal roof installation.
- 3.03 Metal Roof Installation
- A. Install metal roof system so that it is Weathertight, without waves, warps, buckles, fastening stresses or distortion, allowing for expansion and contraction.
 - B. Install metal roof system in accordance with manufacturer's instructions and approved shop drawings.
 - C. Provide concealed anchors at all panel attachment locations.
 - D. Install panels plumb, level and straight with seams and ribs parallel, conforming to design as indicated.

- E. Do not allow panels or trim to come in contact with dissimilar metals such as copper, lead or graphite. Water run-off from these materials is also prohibited. This specifically includes condensate from roof top units (i.e. air conditioning units).

3.04 Roof Curb and Roof Jack Installation

- A. Comply with metal roof system manufacturer's approved shop drawings, instructions and recommendations for installation.
- B. Refer to metal roof system manufacturer's standard installation details.
- C. Anchor curbs and jacks securely in place with provisions for thermal and structural movement.

3.05 Field Quality Control

- A. During Installation: Manufacturer shall provide a qualified technical representative for a minimum of two (2) on-site inspections of the roof installation including one to verify the substrate and the initial installation procedures, and one during the installation.
- B. Completion of Installation
 - 1. Manufacturer shall provide a final inspection to confirm that the roof has been properly installed in accordance with the manufacturer's recommendations.
 - 2. A report certifying that the metal roof has been installed in accordance with the Plans and Specifications and meeting the manufacturer's approval shall be provided to the Engineer.

3.06 Protection of Work

- A. Protect work against damage until final acceptance. Replace or repair to the satisfaction of the Engineer, any work that becomes damaged prior to final acceptance.
- B. Touch up minor scratches and abrasions with touch up paint supplied by the metal roof system manufacturer.

3.07 Final Clean-Up

- A. Dispose of excess materials and remove debris from site.
- B. Clean work in accordance with manufacturer's recommendations.
- C. See 01700.

3.08 Schedule

- A. See Drawings.

END OF SECTION

[2244.5]
[Rev. 11/10]

SECTION 07620

SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.01 Work Included

- A. Coping, parapet and cap flashings.
- B. Facias and scuppers.
- C. Roof and sill flashings.
- D. Counterflashings over bituminous base flashings.
- E. Roof joint cover flashings.
- F. Counterflashings at roof mounted mechanical equipment and vent stacks.
- G. Counterflashings for roof hatches.

1.02 Related Sections

- A. Applicable to Work of this Section are the Drawings and General Provisions of the Contract, including: Part IV, General and Supplementary Conditions; Part V, Special Conditions; Part VI, Technical Specifications; Division No. 1, General Requirements.

1.03 References

- A. ANSI/ASTM B32 - Solder Metal.
- B. ASTM A167 - Stainless and Heat-Resisting Chromium-Nickel Steel Plate.
- C. ASTM A525 - Steel Sheet, Zinc Coated, (Galvanized) by the Hot-Dip Process.
- D. ASTM B209 - Aluminum and Aluminum Alloy Sheet and Plate.
- E. ASTM B370 - Copper Sheet and Strip for Building Construction.
- F. ASTM D226 - Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
- G. SSPC (Steel Structures Painting Manual and Specifications).
- H. FS SS-C-153 - Cement, Bituminous, Plastic.

1.04 System Description

- A. Work of this Section is to physically protect membrane roofing and base flashings from damage that would permit water leakage to building interior.

1.05 Quality Assurance

- A. Applicator: Company specializing in sheet metal flashing work with 5 years minimum experience.

1.06 Submittals

- A. Submit shop drawings and product data under provisions of Section 01300.
- B. Describe material profile, jointing pattern, jointing details, fastening methods and installation details.
- C. Submit manufacturer's installation instructions under provisions of Section 01300.
- D. Submit samples under provisions of Section 01300.
- E. Provide 8 inch sized sample of metal flashing to be exposed as finish surface.

1.07 Storage and Handling

- A. Store products under provisions of Section 01600.
- B. Stack preformed and prefinished material to prevent twisting, bending, or abrasion and to provide ventilation.
- C. Prevent contact with materials during storage which may cause discoloration, staining, or damage.

PART 2 PRODUCTS

2.01 Sheet Materials

- A. Galvanized Steel: ASTM A525, G90; 24 gage core steel phosphatized, ready for painting.
- B. Precoated Galvanized Steel: ASTM A524, G90, 24 gage core steel, shop precoated with baked-on enamel; color as selected Engineer.

2.02 Accessories

- A. Fastener: Galvanized steel with soft neoprene washers at exposed fasteners. Finish exposed fasteners same as flashing metal.
- B. Underlayment: 6 mil polyethylene.
- C. Metal Primer: As specified in Section 09900, Painting.
- D. Protective Backing Paint: Bituminous.
- E. Slip Sheet: Rosin sized building paper.
- F. Bedding Compound: Rubber-asphalt type.
- G. Plastic Cement: FS SS-C-153, Type I-asphaltic base cement.
- H. Reglets: Surface mounted galvanized steel; or rigid extruded PVC; face and ends covered with plastic tape.
- I. Solder: FS QQ-S-571; ANSI/ASTM B32; 50/50 type with rosin flux.
- J. Bituminous Coating: SSPC - Paint 12, solvent type bituminous mastic, nominally free of sulfur, compounded for 15 mil dry film thickness per coat.
- K. Mastic Sealant: Polyisobutylene; nonhardening, nonskinning, nondrying, nonmigrating sealant.

- L. Elastomeric Sealant: ASTM C920; as specified in Section 07920 for the appropriate installation.
 - M. Epoxy Seam Sealer: 2-part noncorrosive metal seam cementing compound, recommended by metal manufacturer for exterior/interior non-moving joints including riveted joints.
 - N. Adhesives: Type recommended by flashing sheet manufacturer for waterproof/weather-resistant seaming and adhesive application of flashing sheet.
 - O. Metal Accessories: Provide sheet metal clips, straps, anchoring devices and similar accessory units as required for installation of work, matching or compatible with material being installed, noncorrosive, size and gage required for performance.
- 2.03 Fabrication
- A. General Metal Fabrication: Shop or factory fabricate work to greatest extent possible. Comply with details shown and with applicable requirement. Fabricate for waterproof and weather-resistant performance; with expansion provisions for running work, sufficient to permanently prevent leakage, damage or deterioration of the Work. Form work to fit substrates. Comply with material manufacturer instructions and recommendations for forming material. Form exposed sheet metal work without excessive oil-canning, buckling and tool marks, true to line and levels indicated, with exposed edges folded back to form hems.
 - B. Form sections true to shape, accurate in size, square and free from distortion or defects.
 - C. Fabricate cleats and starter strips of same material as sheet, interlockable with sheet.
 - D. Form pieces in longest practical lengths.
 - E. Hem exposed edges on underside 1/2 inch; miter and seam corners.
 - F. Seams: Fabricate nonmoving seams in sheet metal with flat-lock seams. Tin edges to be seamed, form seams and solder. Rivet joints for additional strength where required.
 - G. Solder and seal metal joints. After soldering, remove flux. Wipe and wash solder joints clean.
 - H. Fabricate corners from one piece with minimum 18 inch long legs; seam or solder for rigidity, seal with sealant.
 - I. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip.
 - J. Fabricate flashings to allow toe to extend 2 inches over roofing gravel or paver. Return and brake edges.
 - K. Form sheet metal pans 6 inch nominal square size, with 3 inch upstand and 4 inch flanges. Fill pans watertight with plastic cement.
- 2.04 Finish
- A. Shop prepare and prime exposed ferrous metal surfaces unless otherwise noted.
 - B. All exposed copings and fascias to be shop coated with baked-on enamel finish.
 - C. Backpaint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mils.

PART 3 EXECUTION

3.01 Examination and Preparation

- A. Field measure site conditions prior to fabricating work.
- B. Verify roof openings, curbs, pipes, sleeves, ducts, or vents through roof are solidly set.
- C. Verify membrane termination and base flashings are in place, sealed and secure.
- D. Beginning of installation means acceptance of existing conditions.

3.02 Installation

- A. Install in accordance with manufacturer's instructions and recommendations.
- B. Anchor units of work securely in place as indicated, providing for thermal expansion of metal units; conceal fasteners where possible and set units true to line and level as indicated. Install work with laps, joints and seams which will be permanently watertight and weatherproof.
- C. Install starter and edge strips and cleats.
- D. Install reglets to receive counter flashing as indicated.
- E. Install surface mounted reglets true to lines and levels. Seal top of reglets with sealant.
- F. Insert flashings into reglets to form tight fit. Secure in place with lead or plastic wedges at maximum 12 inches on center. Pack remaining spaces with lead wool. Seal flashings into reglets with sealant.
- G. Fit flashings tight in place. Make corners square, surfaces true and straight in planes and lines accurate to profiles.
- H. Bed flanges of work in a thick coat of bituminous roofing cement where required for waterproof performance.
- I. Secure flashings in place using concealed fasteners.
- J. Lap and seal all joints watertight.
- K. Apply plastic cement compound between metal flashings and felt flashings.
- L. Clean exposed metal surfaces, removing substances which might cause corrosion of metal or deterioration of finishes.
- M. Paint all exposed ferrous metal surfaces except shop coated baked-on enamel finishes. See Section 09900, Painting.

END OF SECTION

[2244]
[9/93]

SECTION 07631
GUTTERS AND DOWNSPOUTS

PART 1 GENERAL

1.01 Section Includes

- A. Prepainted aluminum gutters and downspouts.
- B. Precast concrete splash blocks.

1.02 Related Sections

- A. Applicable to Work of this Section are the Drawings and General Provisions of the Contract, including: Part IV, General and Supplementary Conditions; Part V, Special Conditions; Part VI, Technical Specifications; Division No. 1, General Requirements.

1.03 References

- A. ASTM B209 - Aluminum and Aluminum Alloy Sheet and Plate.
- B. Standard Building Code.

1.04 Submittals

- A. Submit shop drawings and product data under provisions of Section 01300.
- B. Indicate materials, general construction, configurations, jointing methods and locations, fastening methods, locations, installation details and product data on prefabricated components.
- C. Submit manufacturer's installation instructions under provisions of Section 01300.

1.05 Qualifications

- A. Manufacturer: Company specializing manufacturing Products specified in this Section with minimum five years documented experience.
- B. Installer: Company with minimum five years documented experience installing the Products specified in this Section.

1.06 Delivery, Storage and Handling

- A. Deliver Products to site under provisions of Section 01600.
- B. Store and protect products under provisions of Section 01600.
- C. Stack preformed and prefinished material to prevent twisting, bending or abrasion and to aid ventilation. Slope to drain.
- D. Prevent contact with materials during storage which are corrosive or may cause discoloration, staining or damage.

PART 2 PRODUCTS

2.01 Manufacturers

- A. Alcoa Building Products, Sidney, Ohio, or equal.

2.02 Gutter and Downspout Size and Shape

- A. Gutter: 5 inches x 6 inches, Ogee pattern, 0.032 gage.
- B. Downspouts: 3 inches x 4 inches, rectangular shape, 0.027 gage.
- C. Accessories

- 1. Roof Aprons: 0.027 gage.
- 2. End Caps: 0.019 gage.
- 3. Inside and Outside Miters: 0.032 gage.
- 4. Downspout Clips: 0.14 gage.
- 5. Expansion Joint: As recommended by manufacturer.
- 6. Hangers and Straps: As recommended by manufacturer.
- 7. Splash Block: Pre-cast concrete; size as indicated.
- 8. Downspout Outlet: As recommended by manufacturer.
- 9. All related items as recommended by manufacturer.

2.03 Materials

- A. Aluminum Sheet
 - 1. Minimum Tensile Strength: 26,000 psi.
 - 2. Minimum Yield Strength: 27,000 psi.
- B. Sealant Material: As recommended by manufacturer.

2.04 Corrosion Control

- A. Shop Coat
 - 1. Interior of gutter and downspout to have corrosion inhibiting finish.
 - 2. Exterior shall have two coat finish; corrosion inhibiting primer with baked-on high performance acrylic top coat.
 - 3. Color: As selected by Engineer.
- B. Field Coat: As required by Section 09900, Painting.

2.05 Fabrication

- A. Form gutters and downspouts of profiles and sizes indicated.
- B. Field measure site conditions prior to fabricating Work.
- C. Fabricate with required connection pieces.
- D. Form sections square, true and accurate in size, in maximum possible lengths and free of distortion or defects detrimental to appearance or performance. Allow for expansion at joints.
- E. Hem exposed edges of metal.
- F. Fabricate gutter and downspout accessories; seal watertight.

2.06 Warranty

- A. Gutters and downspouts shall both be covered by a written 20 year pro-rated and transferable warrant with the first three years full labor and materials. Contractor to furnish written warranty for Owner's file.

2.07 Gutters and Downspouts for Pre-Engineered Metal Buildings

- A. Gutters and downspouts for pre-engineered metal buildings are covered under Section 13121, Pre-Engineered Metal Buildings.

PART 3 EXECUTION

3.01 Examination

- A. Verify that surfaces are ready to receive Work and conditions are as shown on Drawings.
- B. Beginning of installation means acceptance of existing conditions and substrate.
- C. Verify dimensions; clean and repair, as necessary, any adjoining Work on which this Work is in any way dependent for its proper installation.

3.02 Installation

- A. Install gutters, downspouts and accessories in accordance with manufacturer's instructions and as shown on Drawings.
- B. Gutter runs shall be one piece seamless unless otherwise indicated.
- C. When required, join lengths with formed seams sealed watertight. Flash and seal gutters to downspouts and accessories.
- D. Provide expansion joints as recommended by manufacturer. As a minimum joints will be provided on all sides of hip roofs and on all runs 40 feet or longer.
- E. Slope gutters 1/16 inch per foot minimum.
- F. Front of gutter to be 1/2 inch lower than back.
- G. Seal metal joints watertight.

H. Set splash blocks under downspouts.

3.03 Schedule

A. **See Drawings.**

END OF SECTION

[2244]
[Rev.3/04]

SECTION 07720

CONTINUOUS RIDGE VENTS AND SOFFIT-LOUVER STRIPS

PART 1 GENERAL

1.01 Section Includes

- A. Ridge vents.
- B. Soffit vents.

1.02 Related Sections

- A. Applicable to Work of this Section are the Drawings and General Provisions of the Contract, including: Part IV, General and Supplementary Conditions; Part V, Special Conditions; Part VI, Technical Specifications; Division No. 1, General Requirements.

1.03 References

- A. NRCA (National Roofing Contractors Association) - Roofing and Waterproofing Manual.

1.04 Submittals

- A. Submit under provisions of Section 01300.
- B. Shop Drawings: Show specially configured ridge vents and continuous soffit vents, jointing methods and locations and installation details.
- C. Product Data: Provide data showing material characteristics, performance criteria, limitations and related data.
- D. Manufacturer's Installation Instructions: Show preparation required and installation procedures.
- E. Manufacturer's Certificate: Certify that Products meet or exceed specified requirements.

1.05 Quality Assurance

- A. Perform Work in Accordance with NRCA Manual.
- B. Contractor performing Work is to have minimum of three years experience. Reference to be provided upon request.

1.06 Regulatory Requirements

- A. Conform to applicable code for ANSI/ASTM D3018 Class A for shingle types specified.

1.07 Extra Materials

- A. Furnish under provisions of Section 01700.

PART 2 PRODUCTS

2.01 Manufacturer - Continuous Ridge and Soffit Vents

- A. Ridge Vents: AMPCOR, painted aluminum, easy up RV-10 Series as manufactured by Solar Group, Taylorsville, MS, or equal.
- B. Soffit-Louver Strips: AMPCOR, painted aluminum, perforated SP Series as manufactured by Solar Group, Taylorsville, MS, or equal.
- C. Other Acceptable Manufacturers Offering Equivalent Products: Lomanco, Jacksonville, AR.
- D. Substitutions: Under provisions of Section 01600.

2.02 Ridge Vents

- A. Shall be in 10 foot lengths, .019 thick embossed for resistance from weather damage, maintenance free, self flashing, complete with universal connector straps, end plugs, etc.. Color to match roof.

2.03 Soffit-Louver Strips

- A. Shall be in 8 foot lengths, painted aluminum. Color to match building.

PART 3 EXECUTION

3.01 Installation

- A. Continuous ridge vents and soffit-louver strips to be installed in accordance with manufacturer's instructions.

3.02 Field Quality Control

- A. Field inspection will be performed under provisions of Section 01400.
- B. Visual inspection of the Work will be provided by Engineer.

3.03 Protection of Finished Work

- A. Protect finished Work under provisions of Section 01500.
- B. Do not permit painting over perforated areas of vents.

END OF SECTION

[2244]
[9/93]

SECTION 07920
JOINT SEALANTS

PART 1 GENERAL

1.01 Section Includes

- A. Exterior building sealant and joint sealers.
- B. Interior building sealant.
- C. Sealant for plumbing fixtures.

1.02 Definitions

- A. Caulking: Non-elastic compound used to fill building joints.
- B. Sealant: Elastic or semi-elastic compound used to seal building joints from infiltration of air and moisture.

1.03 Description of Work

- A. This Section covers application of sealant or caulking as shown on Drawings, including the following:
 - 1. Perimeter of all window, door and other openings in exterior walls.
 - 2. Along top edge of all roof flashings.
 - 3. Between finished walls and all wall-hung lavatories and urinals.
 - 4. Under all door thresholds.
 - 5. Between hollow metal frames and masonry walls (interior and exterior).
 - 6. All locations indicated on Drawings and/or required to seal joints for water tightness or appearance.
 - 7. Under all perimeter surfaces of cut-in countertop items.

1.04 Related Sections

- A. Applicable to Work of this Section are the Drawings and General Provisions of the Contract, including: Part IV, General and Supplementary Conditions; Part V, Special Conditions; Part VI, Technical Specifications; Division No. 1, General Requirements.

1.05 References

- A. Standard Building Code.
- B. ASTM C834 - Latex Sealing Compounds.
- C. ASTM C920 - Elastomeric Joint Sealants.

1.06 Submittals

- A. Submit under provisions of Section 01300.

- B. Product Data: Provide data indicating sealant chemical characteristics, performance criteria, substrate preparation, limitations and color availability.
 - C. Manufacturer's Installation Instructions: Indicate special procedures, surface preparation, perimeter conditions requiring special attention.
- 1.07 Quality Assurance
- A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- 1.08 Qualifications
- A. Manufacturer: Company specializing in manufacturing the Products specified in this Section with minimum five years documented experience.
 - B. Applicator: Company specializing in performing the Work of this Section with minimum three years documented experience.
- 1.09 Environmental Requirements
- A. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.
- 1.10 Coordination
- A. Coordinate Work under provisions of Section 01039.
 - B. Coordinate the Work with all Sections referencing this Section.

PART 2 PRODUCTS

- 2.01 Exterior Building Sealants - Above Grade
- A. Silicone Sealant
 - 1. ASTM C920, Grade NS, Class 25, Type S elastomeric; single component, solvent curing, non-sagging, non-staining, non-bleeding; color as selected by Engineer.
 - 2. **Manufacturer: General Electric; Dow Corning; or approved equal.**
 - 3. Elongation Capability: 25 percent.
 - 4. Service Temperature Range: -65 to 180 degrees F.
 - 5. Shore A Hardness Range: 15 to 35.
- 2.02 Exterior Joint Sealer - Below Grade, Water Immersion
- A. Polysulfide Sealant
 - 1. ASTM C920, elastomeric, two component, chemical curing, non-staining, non-bleeding, capable of continuous water immersion, non-sagging or self-leveling type (as applicable), color as selected by Engineer, manufactured by Pecora Corporation, or equal.
 - 2. **Manufacturer: Pecora Corp.; Epoxy Systems, Inc.; or approved equal.**

3. Elongation Capability: 25 percent.
 4. Service Temperature Range: -40 to 180 degrees F.
 5. Shore A Hardness Range: 20 to 35.
 6. **NOTE: NOT TO BE USED IN CONTACT WITH WATER OR WASTEWATER IN WATER OR WASTEWATER BASINS OR TREATMENT FACILITIES. (SEE PARAGRAPH 2.03)**
- 2.03 Exterior - Joint Sealer, Below Grade, Above Grade, Water Immersion, Potable Water, Water and Wastewater Basins
- A. Polyurethane Sealant
1. ASTM C920, elastomeric, multi component, chemical curing, non-staining, non-bleeding, capable of continuous water immersion, non-sagging or self-leveling type as applicable, color as selected by Engineer.
 2. **Manufacturer: Sikaflex as manufactured by Sika Corp., or approved equal.**
 3. Elongation Capability: 50 percent.
 4. Service Temperature Range: -40 to 167 degrees F.
 5. Shore A Hardness Range: 25 to 40.
- 2.04 Interior Building Sealant - Paintable
- A. Acrylic Emulsion Latex
1. ASTM C834, single component, paintable.
 2. **Manufacturer: Tremco, Beachwood, OH; Siroflex, Inc., Greenville, SC; or approved equal.**
- 2.05 Interior - Plumbing Fixtures
- A. Silicone Sealant
1. ASTM C920, Grade NS, Class 25; elastomeric; single component, solvent curing, non-sagging, non-staining, fungus resistant, non-bleeding; color as selected by Engineer.
 2. Elongation Capability: 25 percent.
 3. Service Temperature Range: -65 to 180 degrees F.
 4. Shore A Hardness Range: 15 to 35.
 5. **Manufacturer: Sanitary 1700 Sealant as manufactured by General Electric; Dow Corning 786 Sealant as manufactured by Dow Corning Corporation; or approved equal.**
- 2.06 Accessories
- A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.
- B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.

- C. Joint Backing and Backer Rod: As recommended by sealant manufacturer to suit application.
- D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

PART 3 EXECUTION

3.01 Examination

- A. Verify that substrate surfaces and joint openings are ready to receive Work.
- B. Verify that joint backing and release tapes are compatible with sealant.

3.02 Preparation

- A. Remove loose materials and foreign matter which might impair adhesion of sealant.
- B. Clean and prime joints in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions.
- D. Protect elements surrounding the Work of this Section from damage or disfiguration.

3.03 Installation

- A. Install sealant in accordance with manufacturer's instructions.
- B. Measure joint dimensions and size materials to achieve 2:1 width/depth ratios.
- C. Install joint backing to achieve a neck dimension no greater than 1/3 of the joint width.
- D. Install bond breaker where joint backing is not used.
- E. Install sealant free of air pockets, foreign embedded matter, ridges and sags.
- F. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- G. Tool joints concave.

3.04 Cleaning

- A. Clean Work under provisions of Section 01700.
- B. Clean adjacent soiled surfaces.

3.05 Protection of Finished Work

- A. Protect finished installation under provisions of Section 01500.
- B. Protect sealants until cured.

3.06 Schedule

- A. As shown on Drawings.

END OF SECTION

[2244][REV 3/04]

SECTION 08111
STANDARD STEEL DOORS

PART 1 GENERAL

1.01 Section Includes

- A. Non-rated, fire rated, thermally insulated and acoustic steel doors and panels.
- B. Louvers.

1.02 Related Sections

- A. Applicable to Work of this Section are the Drawings and General Provisions of the Contract, including: Part IV, General and Supplementary Conditions; Part V, Special Conditions; Part VI, Technical Specifications; Division No. 1, General Requirements.

1.03 References

- A. ANSI A117.1 - Specifications for Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People.
- B. ANSI/SDI-100 - Standard Steel Doors and Frames.
- C. ASTM A525 - Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.
- D. ASTM E152 - Methods of Fire Tests of Door Assemblies.
- E. ASTM E413 - Classification for Determination of Sound Transmission Class.
- F. NFPA 80 - Fire Doors and Windows.
- G. NFPA 252 - Fire Tests for Door Assemblies.
- H. UL 10B - Fire Tests of Door Assemblies.
- I. Standard Building Code.

1.04 Submittals

- A. Submit under provisions of Section 01300.
- B. Shop Drawings: Indicate door elevations, dimensions, internal reinforcement, closure method and cut-outs for glazing, louvers and finish.
- C. Product Data: Indicate door configurations, location of cut-outs for hardware reinforcement.
- D. Manufacturer's Installation Instructions: Indicate special installation instructions.
- E. Manufacturer's Certificate: Certify that Products meet or exceed specified requirements.

1.05 Quality Assurance

- A. Conform to requirements of ANSI/SDI-100 and ANSI A117.1.

- B. Conform to Standard Building Code.
- 1.06 Qualifications
 - A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- 1.07 Regulatory Requirements
 - A. Fire Rated Door and Panel Construction: Conform to ASTM E152.
 - B. Fire Rated Door Construction: Rate of rise of 250 degrees F across door thickness.
 - C. Installed Door and Panel Assembly: Conform to NFPA 80 for fire rated class as indicated.
- 1.08 Delivery, Storage and Handling
 - A. Deliver, store, protect and handle Products to site under provisions of Section 01600.
 - B. Accept doors on site in manufacturer's packaging. Inspect for damage.
 - C. Break seal on-site to permit ventilation.
- 1.09 Field Measurements
 - A. Verify that field measurements are as shown on shop drawings.
- 1.10 Coordination
 - A. Coordinate Work under provisions of Section 01039.
 - B. Coordinate the Work with door opening construction, door frame and door hardware installation.

PART 2 PRODUCTS

- 2.01 **Door Manufacturers**
 - A. **AMWELD Building Products, Inc., Garrettsville, OH.**
 - B. **Ceco Door Division, Ceco Corporation, Oakbrook Terrace, IL.**
 - C. **Republic Builders Products, McKenzie, TN.**
 - D. **Approved equal.**
 - E. **Substitutions: Under provisions of Section 01600.**
- 2.02 Doors and Panels
 - A. Exterior Doors (Thermally Insulated): 1-3/4 inch, full flush, heavy duty, 18 gage, composite construction; polyurethane core; R=11.0; ANSI/SDI-100 Grade II, Model 2.
 - B. Interior Doors (Non-rated): 1-3/4 inch, full flush, heavy duty, 18 gage, hollow steel construction; honeycomb core; ANSI/SDI-100 Grade II, Model 1.

- C. Interior Doors (Fire Rated): 1-3/4 inch, full flush, heavy duty, 18 gage, composite construction; polyurethane core; UL labeled fire door; ANSI/SDI-100 Grade II, Model 2.
 - D. Interior Doors (Acoustic): 1-3/4 inch, full flush, 16 gage, composite construction; sound barrier core, STC rating of 42; ANSI/SDI-100 Grade II, Model 2.
- 2.03 Door Construction
- A. Face: Steel sheet in accordance with ANSI/SDI-100.
 - B. Polyurethane or honeycomb as specified for each type door.
 - C. Frame: As recommended by manufacturer for each door installation. See Section 08112.
- 2.04 Louvers - NOT USED.
- A. **Manufacturer: Anemostat Door Products, Carson, CA, Model AFDL; K. N. Crowder, Inc., Lewiston, NY; Lesue-Locke Home Environmental Products, Atlanta, GA; or approved equal**
 - B. Substitutions: Under provisions of Section 01600.
 - C. Material and Finish: Roll formed steel; 18 gage frame; 20 gage louver blades; galvanized; corners mitered and flush welded; countersunk mounting holes with metal fasteners.
 - D. Louver Blade: Inverted V blade, sight proof; fire rated to 1.5 hours with fusible link design to UL requirements.
 - E. Louver Free Area: Fifty percent.
 - F. Fire Rated Model: Where specified and indicated, louvers in fire rated doors shall be UL labeled as fire rated louver in accordance with ASTM E152-8.
- 2.05 Fabrication
- A. Fabricate doors with hardware reinforcement welded in place.
 - B. Attach fire rated label to each door unit as applicable.
 - C. Close top and bottom edge of exterior doors with inverted steel channel closure. Seal joints watertight.
 - D. Configure exterior doors with special profile to receive recessed weatherstripping.
 - E. Astragals for Double Doors: Steel; same finish as door; Z shaped, specifically for double doors.
- 2.06 Finish
- A. Shop Coat: Cleaned; chemical treated; one baked-on shop coat synthetic primer.
 - B. Field Coat: As specified in Section 09900.

PART 3 EXECUTION

- 3.01 Examination
- A. Verify substrate conditions under provisions of Section 01039.

- B. Verify that opening sizes and tolerances are acceptable.

3.02 Installation

- A. Install doors in accordance with ANSI/SDI-100 and manufacturer's instructions.
- B. Coordinate installation of glass and glazing.
- C. Install door louvers, plumb and level.
- D. Coordinate installation of doors with installation of frames specified in Section 08112 and hardware specified in Section 08710.

3.03 Erection Tolerances

- A. Maximum Diagonal Distortion: 1/8 inch measured with straight edge, corner to corner.

3.04 Adjusting

- A. Adjust Work under provisions of Section 01700.
- B. Adjust door for smooth and balanced door movement.

3.05 Schedule

- A. See Drawings.

END OF SECTION

[2244]
[REV.3/15]

SECTION 08112
STANDARD STEEL FRAMES

PART 1 GENERAL

1.01 Section Includes

- A. Non-rated, fire rated and thermally insulated steel frames.
- B. Interior and exterior glazed light frames.

1.02 Related Sections

- A. Applicable to Work of this Section are the Drawings and General Provisions of the Contract, including: Part IV, General and Supplementary Conditions; Part V, Special Conditions; Part VI, Technical Specifications; Division No. 1, General Requirements.

1.03 References

- A. ANSI A117.1 - Specifications for Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People.
- B. ANSI/SDI-100 - Standard Steel Doors and Frames.
- C. ASTM A525 - Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.
- D. ASTM E152 - Methods of Fire Tests of Door Assemblies.
- E. NFPA 80 - Fire Doors and Windows.
- F. NFPA 252 - Fire Tests for Door Assemblies.
- G. UL 10B - Fire Tests of Door Assemblies.
- H. Standard Building Code.

1.04 Submittals

- A. Submit under provisions of Section 01300.
- B. Shop Drawings: Indicate frame elevations, dimensions, reinforcement and finish.
- C. Product Data: Indicate frame configuration, anchor types and spacings, location of cut-outs for hardware, reinforcement.
- D. Manufacturer's Installation Instructions: Indicate special installation instructions.
- E. Manufacturer's Certificate: Certify that Products meet or exceed specified requirements.

1.05 Quality Assurance

- A. Conform to requirements of ANSI/SDI-100 and ANSI A117.1.

1.06 Qualifications

- A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

1.07 Regulatory Requirements

- A. Fire Rated Frame Construction: Conform to ASTM E152.
- B. Installed Frame Assembly: Conform to NFPA 80 for fire rated class same as fire door.

1.08 Delivery, Storage and Handling

- A. Deliver, store, protect and handle products to site under provisions of Section 01600.
- B. Accept frames on site in manufacturer's packaging. Inspect for damage.

1.09 Field Measurements

- A. Verify that field measurements are as shown on drawings and as instructed by manufacturer.

1.10 Coordination

- A. Coordinate Work under provisions of Section 01039.
- B. Coordinate the Work with frame opening construction, door and hardware installation.

PART 2 PRODUCTS

2.01 Frame Manufacturers

- A. **AMWELD Building Products, Inc., Garrettsville, OH; Ceco Door Division, Ceco Corporation, Oakbrook Terrace, IL; Republic Builders Products, McKenzie, TN; or approved equal.**

2.02 Frames

- A. Exterior Frames: 16 gage thick material, base metal thickness.
- B. Interior Frames: 16 gage thick material, base metal thickness.

2.03 Accessories

- A. Silencers: Resilient rubber, fitted into drilled hole.
- B. Stops: As recommended by manufacturer for each door installation.

2.04 Fabrication

- A. Fabricate frames as welded unit.
- B. Mullions for Double Doors: Removable type, of same profiles as jambs.
- C. Transom Bars for Glazed Lights: Fixed type, of same profiles as jamb and head.
- D. Fabricate frames with hardware reinforcement plates welded in place.

- E. Reinforce frames wider than 48 inches with roll formed steel channels fitted tightly into frame head, flush with top.
 - F. Terminate door stops 6 inches above finished floor. Cut angle as recommended by manufacturer.
 - G. Prepare frame for silencers. Provide three single silencers for single doors and mullions of double doors on strike side. Provide two single silencers on frame head at double doors without mullions.
 - H. Configure exterior frames with special profile to receive recessed weatherstripping.
 - I. Fabricate frames to suit masonry wall coursing with 2 inch head member.
- 2.05 Finish
- A. Shop Coat: Cleaned; chemical treated; one baked-on shop coat synthetic primer.
 - B. Field Coat: As specified in Section 09900.
 - C. Coat inside of frame profile with bituminous coating to a thickness of 1/16 inch (see Section 09900).

PART 3 EXECUTION

- 3.01 Examination
- A. Verify substrate conditions under provisions of Section 01039.
 - B. Verify that opening sizes and tolerances are acceptable.
- 3.02 Installation
- A. Install frames in accordance with ANSI/SDI-100 and manufacturer's instructions.
 - B. Coordinate with masonry wall construction for anchor placement.
 - C. Coordinate installation with door as specified in Section 08111.
 - D. Coordinate installation of frames with installation of hardware specified in Section 08710.
 - E. Install roll formed steel reinforcement channels between two abutting frames. Anchor to structure and floor.
- 3.03 Erection Tolerances
- A. Maximum Diagonal Distortion: 1/16 inch measured with straight edges, crossed corner to corner.
- 3.04 Schedule
- A. See Drawings.

END OF SECTION

[2244]
[Rev. 3/04]

SECTION 08113
WEATHERSTRIPPING

PART 1 GENERAL

- 1.01 Section Includes
 - A. Weatherstripping and thresholds for all exterior doors.
- 1.02 Related Sections
 - A. Applicable to Work of this Section are the Drawings and General Provisions of the Contract, including: Part IV, General and Supplementary Conditions; Part V, Special Conditions; Part VI, Technical Specifications; Division No. 1, General Requirements.
- 1.03 Submittals
 - A. Submit under provisions of Section 01300.
 - B. Product Data: Indicate unit dimensions, method of anchorage, details of construction, materials.
 - C. Manufacturer's Installation Instructions: Indicate special installation instructions.
- 1.04 Qualifications
 - A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
 - B. Installer: Company specializing in the installation of the Products specified in this Section with minimum three years documented experience.
- 1.05 Regulatory Requirements
 - A. Conform to International Building Code (Latest Edition).
- 1.06 Delivery, Storage and Handling
 - A. Deliver, store, protect and handle products to site under provisions of Section 01600.
 - B. Deliver to site in manufacturer's packaging. Inspect for damage.
- 1.07 Field Measurements
 - A. Verify that field measurements are as shown on drawings and as instructed by manufacturer.
- 1.08 Coordination
 - A. Coordinate Work under provisions of Section 01039.
 - B. Coordinate the Work with frame, door and hardware installation.

PART 2 PRODUCTS

2.01 Manufacturers

- A. **Weatherstripping and thresholds shall be manufactured by Zero International, Inc., Bronx, NY; Pemko Manufacturing Company, Memphis, TN; Sealeze Corporation, Richmond, VA; Reese Enterprises, Inc., Rosemont, MN; National Guard Products, Inc., Memphis, TN; or approved equal.**

2.02 Thresholds

- A. Flat saddle, non-interlocking, 5 inches wide, 0.020 inches thick, 0.50 inches high, bronze extrusion, mill finish.
- B. **Manufacturer: Zero Model No. 655, or approved equal.**

2.03 Sill Protection

- A. Sill protection sweep; 0.094 inches aluminum housing, bronze finish; 1/8 x 1-3/8 inch solid neoprene sweep.
- B. **Manufacturer: Zero Model No. 339, or approved equal.**

2.04 Head and Jamb Protection

- A. Extruded aluminum housing; 0.07 inches thick, bronze finish.
- B. Closed cell sponge neoprene seal, 3/16 x 1-1/4 inch.
- C. **Manufacturer: Zero Model No. 139, or approved equal.**

2.05 Meeting Stile Protection

- A. Extruded aluminum housing, 0.094 inches thick, bronze finish; 1/8 inch extruded neoprene seal.
- B. **Manufacturer: Zero Model No. 50-M, or approved equal.**

PART 3 EXECUTION

3.01 Examination

- A. Verify existing conditions under provisions of Section 01039.
- B. Verify door and frame installations are acceptable.

3.02 Installation

- A. Install in accordance with and manufacturer's instructions.
- B. Thresholds shall be full width of door opening; carefully cut around door stops.
- C. Set thresholds with expansion bolts of the type, size and spacing as recommended by manufacturer; finish to match Product; countersink boltheads.
- D. Seal under threshold with joint sealer as specified in Section 07920.

- E. Fit all weatherstripping tightly at corners; maintain continuity around periphery of doors.
- F. Set weatherstripping with self-tapping steel screws of the type, size and spacing as recommended by manufacturer. Finish to match Product.

3.03 Schedule

- A. See Drawings.

END OF SECTION

[2244]
[Rev. 10/10]

SECTION 08332
OVERHEAD COILING DOORS (STEEL)

PART 1 GENERAL

1.01 Section Includes

- A. Overhead coiling doors, operating hardware, manual operation.

1.02 Related Sections

- A. Applicable to Work of this Section are the Drawings and General Provisions of the Contract, including: Part IV, General and Supplementary Conditions; Part V, Special Conditions; Part VI, Technical Specifications; Division No. 1, General Requirements.

1.03 References

- A. ANSI/ASTM A526 - Steel Sheet, Zinc-coated (Galvanized) by the Hot-dip Process, Commercial Quality.
- B. ANSI/ASTM B221 - Aluminum-Alloy Extruded Bar, Rod, Wire, Shape and Tube.
- C. ASTM A480 - Flat Rolled Stainless and Heat Resisting Steel Plate, Sheet and Strip.
- D. ASTM A525 - General Requirements for Steel Sheet, Zinc-coated (Galvanized) by the Hot-Dip Process.
- E. Standard Building Code.

1.04 System Description

- A. Manual hand chain lift unit with overhead counter balance device.

1.05 Design Requirements

- A. Design door assembly to withstand wind/suction load of 20 psf, without undue deflection or damage to door or assembly components.

1.06 Submittals

- A. Submit under provisions of Section 01300.
- B. Shop Drawings: Indicate pertinent dimensioning, anchorage methods, hardware locations and installation details.
- C. Product Data: Provide general construction, component connections and details.
- D. Manufacturer's Installation Instructions: Indicate installation sequence and procedures, adjustment and alignment procedures.

1.07 Maintenance Data

- A. Submit under provisions of Section 01700.
- B. Maintenance Data: Indicate lubrication requirements and frequency, periodic adjustments required.

1.08 Regulatory Requirements

- A. Conform to applicable code.

1.09 Field Measurements

- A. Verify that field measurements are as shown on Drawings and as instructed by manufacturer.

1.10 Coordination

- A. Coordinate work under provisions of Section 01039.

PART 2 PRODUCTS

2.01 Manufacturers

- A. Pacific Rolling Door Company, San Lorenzo, CA; Ceco/Windsor Door Division of the Ceco Corporation, Little Rock, AR; Kinneer Division of Harsco Corporation, Columbus, OH; or approved equal.**
- B. Substitution: Under provisions of Section 01600.**

2.02 Materials

A. Steel Curtain Shall Conform to the Following

1. Slats: Interlocking, minimum 22 gage of ANSI/ASTM A526 galvanized steel.
2. Nominal Slat Size: 2-1/2 inches wide x required length.
3. Slat Ends: Alternating slat fitted with end locks to act as wearing surface in guides and to prevent lateral movement.
4. Curtain Bottom: Fitted with bottom bar (angles) to provide reinforcement and positive contact with floor in closed position. Replaceable weatherseal will be installed.

- B. Guides: Rolled formed steel; continuous, vertical mounted; galvanized steel mounting brackets; removable door stops; windlock bars as required to meet design windload.

- C. Roller Shaft Counterbalance: Steel pipe and helical steel spring system, capable of producing torque sufficient to assure smooth operation of curtain from any position; with adjustable spring tension.

- D. Hood Enclosure: 24 gage thick galvanized steel; internally reinforced to maintain rigidity and shape.

- E. Weatherstripping: Moisture and rot proof, resilient type, located at jamb edges, bottom of curtain and where curtain enters hood enclosure.

- F. Hardware: As recommended by door manufacturer.

- G. Insulation: Door shall have insulation between interior and exterior steel panels.

2.03 Electric Door Operators

- A. General: Provide electric door operator assembly of size and capacity recommended and provided by door manufacturer for door and operational life specified, with electric motor and factory-prewired

motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, remote-control stations, control devices, integral gearing for locking door, and accessories required for proper operation.

- B. Comply with NFPA 70.
- C. Disconnect Device: Provide hand-operated disconnect or mechanism for automatically engaging sprocket-chain operator and releasing brake for emergency manual operation while disconnecting motor, without affecting timing of limit switch. Mount disconnect and operator so they are accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.
- D. Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency auxiliary operator.
- E. Provide control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6, with NFPA 70 Class 2 control circuit, maximum 24-V, ac or dc.
- F. Door-Operator Type: Provide wall-, hood-, or bracket-mounted, jackshaft, gear-head hoist-type door operator unit consisting of electric motor, enclosed worm-gear running-in-oil primary drive, chain and sprocket secondary drive, and auxiliary chain-hoist and floor level disconnect.
- G. Door-Operator Type: Provide wall-, hood-, or bracket-mounted, jackshaft, gear-head hoist-type door operator unit consisting of electric motor, enclosed worm-gear running-in-oil primary drive, chain and sprocket secondary drive, and auxiliary chain-hoist and floor level disconnect.
- H. Electric Motors: Provide high-starting torque, reversible, continuous-duty, Class A insulated, electric motors, complying with NEMA MG 1, with overload protection, sized to start, accelerate, and operate door in either direction, from any position, at not less than 2/3 fps or more than 1 fps, without exceeding nameplate ratings or considering service factor.
 - 1. Type: Polyphase, medium-induction type.
 - 2. Service Factor: According to NEMA MG 1, unless otherwise indicated.
 - 3. Coordinate wiring requirements and electric characteristics of motors with building electrical system.
 - 4. Provide open dripproof-type motor, and controller with NEMA ICS 6, Type 1 enclosure.
 - 5. Provide totally enclosed, nonventilated or fan-cooled motors, fitted with plugged drain, and controller with NEMA ICS 6, Type 4 enclosure where indicated.
- I. Remote-Control Station: Provide momentary-contact, 3-button control station with push-button controls labeled "Open," "Close," and "Stop."
 - 1. Provide exterior units, full-guarded, standard-duty, surface-mounted, weatherproof type, NEMA ICS 6, Type 4 enclosure, key operated.
- J. Obstruction Detection Device: Provide each motorized door with indicated external automatic safety sensor able to protect full width of door opening. Activation of sensor immediately stops and reverses downward door travel.
 - 1. Photoelectric Sensor: Manufacturer's standard system designed to detect an obstruction in door opening without contact between door and obstruction.

- a. Self-Monitoring Type: Provide self-monitoring sensor designed to interface with door operator control circuit to detect damage to or disconnection of sensing device. When self-monitoring feature is activated, door operates to close only with constant pressure on close button.
- 2. Sensor Edge: Provide each motorized door with an automatic safety sensor edge, located within astragal or weather stripping mounted to bottom bar. Contact with sensor immediately stops and reverses downward door travel. Connect to control circuit using manufacturer's standard take-up reel or self-coiling cable.
 - a. Provide electrically actuated automatic bottom bar.
 - 1). Self-Monitoring Type: Provide self-monitoring, 4-wire configured device.
- K. Limit Switches: Provide adjustable switches, interlocked with motor controls and set to automatically stop door at fully opened and fully closed positions.
- L. Radio Control: Provide radio control system consisting of the following:
 - 1. 3-channel universal coaxial receiver to open, close, and stop door, 1 per operator.
 - 2. Multifunction remote control.
 - 3. Remote antenna mounting kit

2.04 Finish

- A. Shop Coat
 - 1. Curtains and Hood: Galvanized per ASTM A525 with baked-on prime coat.
 - 2. All Nongalvanized Exposed Ferrous Surfaces: One coat rust-inhibitive primer.
- B. Field Coat: As specified in Section 09900.

2.04 Operator

- A. Electric.
- B. See Electrical Drawings and Electrical Division No. 16.
- C. See Schedule.

PART 3 EXECUTION

3.01 Examination

- A. Verify openings under provisions of Section 01039.
- B. Verify that opening sizes, tolerances and conditions are acceptable.

3.02 Installation

- A. Install door unit assembly in accordance with manufacturer's instructions.

- B. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.
- C. Securely brace components suspended from structure. Secure guides to structural members only.
- D. Fit and align assembly including hardware; level and plumb, to provide smooth operation.
- E. Coordinate installation of sealants and backing materials at frame perimeter as specified in Section 07900.
- F. Install perimeter trim and closures.

3.03 Erection Tolerances

- A. Maintain dimensional tolerances and alignment with adjacent work.
- B. Maximum Variation from Plumb: 1/16 inch.
- C. Maximum Variation from Level: 1/16 inch.
- D. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch per 10 ft straight edge.

3.04 Adjusting

- A. Adjust work under provisions of Section 01700.
- B. Adjust door, hardware and operating assemblies.

3.05 Cleaning

- A. Clean work under provisions of Section 01700.
- B. Clean door and components.
- C. Remove labels and visible markings.

3.06 Schedules

- A. **See Drawings for size and location.**
- B. **Operator: Electric.**

END OF SECTION

[2244.5]
[Rev. 11/10]

SECTION 08710
DOOR HARDWARE

PART 1 GENERAL

1.01 Section Includes

- A. Hardware for wood, hollow steel and aluminum doors.
- B. Thresholds.
- C. Weatherstripping, seals and door gaskets.

1.02 Related Sections

- A. Applicable to Work of this Section are the Drawings and General Provisions of the Contract, including: Part IV, General and Supplementary Conditions; Part V, Special Conditions; Part VI, Technical Specifications; Division No. 1, General Requirements.

1.03 References

- A. ANSI A117.1 - Specifications for Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People.
- B. NFPA 80 - Fire Doors and Windows.

1.04 Submittals

- A. Submit under provisions of Section 01300.
- B. Shop Drawings: Indicate locations and mounting heights of each type of hardware.
- C. Product Data: Provide literature and manufacturer's data concerning materials of construction, finish, size and dimensions.
- D. Submit manufacturer's parts lists and templates.

1.05 Project Record Documents

- A. Submit under provisions of Section 01700.

1.06 Operation And Maintenance Data

- A. Submit under provisions of Section 01700.
- B. Maintenance Data: Include data on operating hardware, lubrication requirements and inspection procedures related to preventative maintenance.

1.07 Quality Assurance

- A. Perform Work in Accordance with the Following Requirements
 - 1. ANSI A117.1 - Specifications for Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People.

2. NFPA 80 - Fire Doors and Windows.

1.08 Qualifications

- A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

1.09 Regulatory Requirements

- A. Conform to applicable code for requirements applicable to fire rated doors and frames.
- B. Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories, Inc. as suitable for the purpose specified and indicated.

1.10 Delivery, Storage, and Handling

- A. Deliver, store, protect and handle Products to site under provisions of Section 01600.
- B. Package hardware items individually; label and identify each package with door opening code to match hardware schedule.
- C. Deliver keys to Owner by security shipment direct from hardware supplier.

1.11 Coordination

- A. Coordinate Work under provisions of Section 01039.
- B. Coordinate the Work with other directly affected sections involving manufacture or fabrication of internal reinforcement for door hardware.

1.12 Warranty

- A. One year warranty beginning with date of Owner's acceptance in accordance with Section 01700.

1.13 Maintenance Materials

- A. Provide maintenance materials under provisions of 01700.
- B. Provide special wrenches and tools applicable to each different or special hardware component.
- C. Provide maintenance tools and accessories supplied by hardware component manufacturer.

1.14 Extra Materials

- A. Furnish under provisions of Section 01700.
- B. Provide three extra key lock cylinders for each master keyed group.

PART 2 PRODUCTS

2.01 Manufacturers

A. Hinges

1. Hager Hinge Company, St. Louis, MO.
2. Stanley Hardware Division of The Stanley Works, New Britain, CT.

B. Latch Sets

1. Schlage Lock Company, Colorado Springs, CO.
2. Equal Manufacturers Include: Yale Security, Inc., Charlotte, NC; Corbin Architectural Hardware and Sargent Manufacturing Co., New Haven, CT.

C. Push/Pulls

1. Rockwood.
2. Hager Hinge Co., St. Louis, MO.
3. Brookline Industries, Inc., Franklin Park, IL.

D. Cylinder and Mortise Locks

1. Schlage Lock Company, Colorado Springs, CO, or approved equal.
2. Equal Manufacturers Include: Yale Security, Inc., Charlotte, NC; Corbin Architectural Hardware, A Black and Decker Company, Berlin, CT.

E. Exit Devices

1. Von Duprin or approved equal.
2. Equal Manufacturers Include: Yale Security, Inc., Charlotte, NC; Corbin Architectural Hardware, A Black and Decker Company, Berlin, CT and Sargent Manufacturing Co., New Haven, CT.

F. Closers

1. LCN Closers, Princeton, IL.
2. Equal Manufacturers Include: Yale Security, Inc., Charlotte, NC; Corbin Architectural Hardware, A Black and Decker Company, Berlin, CT and Sargent Manufacturing, New Haven, CT.

G. Combination Closer/Holder

1. Glynn Johnson
2. Norton Door Controls Division of Yale Security Inc., Charlotte, NC.
3. LCN Closers, Princeton, IL.
4. Sargent Manufacturing Company, Division of Essex Industries, Inc., New Haven, CT.

- H. Overhead Holder
 - 1. Sargent Manufacturing Company, Division of Essex Industries, Inc., New Haven, CT.
 - 2. Glynn-Johnson Company, Chicago, IL.
 - I. Manual Bolts (Chain and Foot)
 - 1. Stanley Hardware, Division of Stanley Works, New Britain, CT.
 - 2. Hager Hinge Company, St. Louis, MO.
 - 3. H. B. Ives (Harrow Company), Wallingford, CT.
 - J. Door Stops
 - 1. Hager Hinge Company, St. Louis, MO.
 - 2. Glynn-Johnson Company, Chicago, IL.
 - K. Protection Plates
 - 1. Hager Hinge Co., St. Louis, MO.
 - 2. H. B. Ives (Harrow Company), Wallingford, CT.
 - 3. Brookline Industries, Inc., Franklin Park, IL.
 - L. Substitutions
 - 1. Under provisions of Section 01600.
- 2.02 Hinges
- A. Standard
 - 1. Full mortise, 5 knuckle, flush ball bearing design with wide spaced bearings, thoroughly lubricated.
 - 2. Three butts to be provided unless otherwise indicated.
 - 3. Model, finish and size as indicated on "Schedule" at end of this Section.
- 2.03 Lockset
- A. Standard 2-3/4 inch backset; ANSI A156.2 Series 4000, Grade I; Standard 6-pin cylinder; anti-friction latch bolt; heavy duty; bored.
 - B. Model, finish and style as indicated on "Schedule" at end of this Section.
- 2.04 Closer
- A. Adjustable, meeting ANSI A117.1, rack and pinion, compression spring; closing speed, latching speed, and back check controlled by key operated valves; arms of heavy duty forged steel; standard top jamb mounting, or parallel mounting.

- B. Model and finish as indicated on "Schedule" at end of this Section.

2.05 Floor Stop

- A. Cast, 2-1/2 inches diameter, 3 inches high with rubber pap.
- B. Model as indicated on "Schedule" at end of this Section.

2.06 Keying

- A. All locks to be keyed the same.
- B. Number of Keys to be Supplied to Owner: Six.

PART 3 EXECUTION

3.01 Examination

- A. Verify site conditions under provisions of Section 01039.
- B. Verify that doors and frames are ready to receive Work and dimensions are as shown on shop drawings.

3.02 Installation

- A. Install hardware in accordance with manufacturer's instructions.
- B. Use templates provided by hardware item manufacturer.

3.03 Field Quality Control

- A. Field inspection and testing will be performed under provisions of Section 01400.

3.04 Adjusting

- A. Adjust Work under provisions of Section 01700.
- B. Adjust hardware for smooth operation.

3.05 Protection Of Finished Work

- A. Protect finished Work under provisions of Section 01500.
- B. Do not permit adjacent Work to damage hardware or finish.

3.06 Schedule

| MARK | A | NO. REQ'D EA. DOOR |
|-----------------|-------------------------------------|-------------------------------|
| Hinges | Hagar BB1199 4.5 x 4.5 (NRP) 630 | 3 |
| Rim Panic | Von Duprin 98L x 06 x 630 | 1 |
| Rim Cylinder | 626 | 1 |
| Kickplate | Rockwood 12" x 2" LDW x 630 | 1 |
| Closer | LCN 4041 x Cust x HO x 589 | 1 |
| Deadlock | N/A | 1 |
| Mortise Lock | N/A | 1 |
| Push Plate | N/A | 1 |
| Pull Plate | N/A | 1 |

END OF SECTION

[2244]
[10/04]

SECTION 09820

ACRYLIC EMULSION TEXTURED COATING AND CEMENTITIOUS-BASE
WATERPROOF COATING FOR CONCRETE**PART 1 GENERAL**1.01 Section Includes

- A. Waterproof, above grade coating system with cementitious-base coat and acrylic emulsion textured finish.
- B. Cementitious, above grade waterproof coating system with a brush finish.

1.02 Related Sections

- A. Applicable to Work of this Section are the Drawings and General Provisions of the Contract, including: Part IV, General and Supplementary Conditions; Part V, Special Conditions; Part VI, Technical Specifications; Division No. 1, General Requirements.

1.03 Submittals

- A. Submit under provisions of Section 01300.
- B. Product Data: Descriptive literature, materials, technical information, color, performance and all related information as required by Engineer for approval.
- C. Sample: Minimum 6 inch square sample of each coating system to be provided to Engineer.
- D. Manufacturer's Installation Instruction: Specialized installation instructions for each coating system.
- E. Manufacturer's Certificate: Certification from manufacturer that Products and coating systems meet or exceed specified requirements.

1.04 Project Record Documents

- A. Submit under provisions of Section 01700.
- B. Accurately record all locations and all surfaces coated with each type of coating system.

1.05 Quality Assurance

- A. Contractors shall be technically trained and accepted by the manufacturer. Applicator shall use mixing equipment and tools approved by the manufacturer and shall have manufacturer's installation instructions available while Work is in progress.
- B. Surfaces and surrounding air temperatures should not be below 40 degrees F or 5 degrees C for a minimum period of 48 hours before, during and after application of material.
- C. Job Mock Up: Prior to the application of the coating system, apply a sample using materials and details required for final Work. Apply sample at the site, where directed, of approximately 4 foot by 4 foot indicating the proposed color, texture and workmanship to be expected in the completed Work. Obtain the Engineer's acceptance of visual qualities of the sample before start of Work. Retain sample during construction as a standard for judging completed Work. Do not alter, move or destroy sample until Work is completed.
- D. Surfaces shall be protected to prevent rapid drying where heavy wind or hot sun exist.

1.07 Delivery, Storage and Handling

- A. Deliver Products to site under provisions of Section 01600.
- B. Store and protect Products under provisions of Section 01600.
- C. Deliver all materials to the jobsite in their original, unopened and sealed containers. Store all materials off the ground under watertight cover and away from sweating walls and other damp surfaces until ready for use. Damaged or deteriorated materials must be removed from premise immediately.

1.08 Project Site/Protection

- A. In cold and/or inclement weather, no Work shall be started until area is adequately covered temporarily, so that a temperature range of not less than 40 degrees F can be maintained during and up to completion of the drying process for all applications. Temporary heat shall be provided as recommended by manufacturer.
- B. Surfaces to receive material shall be free of all laitance, dirt, dust, grease, form release treatments, efflorescence, curing compounds, paint and any other foreign material.
- C. Do not apply materials to frozen or frost-filled surfaces or during snow or rain.

1.09 Qualifications

- A. Manufacturer: Company specializing in the manufacturing of the Products specified in this Section with minimum three years documented experience.
- B. Installer: Company specializing in the installation of the Products specified in this Section with minimum three years documented experience.

1.10 Warranty

- A. Provide minimum one year warranty in accordance with Section 01700. Warranty period begins with date of acceptance of facility by Owner.

PART 2 PRODUCTS

2.01 Manufacturer

- A. All materials shall be manufactured by Thoro System Products, Miami, FL, or approved equal.
- B. Substitutions: Under provisions of Section 01600.

2.02 Materials

- A. Acrylic Polymer Liquid Bonding Additive: Acryl 60 as manufactured by Thoro System Products, or approved equal.
- B. Cementitious-Base Waterproof Coating: Thoroseal as manufactured by Thoro System Products, or approved equal.
- C. Acrylic Emulsion Textured Coating: Thorocoat as manufactured by Thoro System Products, or approved equal.

2.03 Mixing

- A. Mix all materials in strict accordance with the manufacturer's instructions.
- B. Acrylic Polymer Liquid Bonding Additive
 - 1. Prepare a mixing solution as instructed by manufacturer of one part additive and three parts water.
 - 2. Mixed solution will be such that it will remain useable for several days if stored in tightly covered containers as recommended by the manufacturer.
- C. Cementitious-Base Waterproof Coating
 - 1. Mix in strict accordance with printed instructions of manufacturer. Mechanical mixers of a type as approved by manufacturer shall be used for mixing all materials. Frozen, caked or lumped materials shall not be used. Mechanical mixers and containers shall be cleaned after mixing; each batch shall be kept free of material from previous mixes.
 - 2. Coating mixture shall be thoroughly mixed using manufacturer's recommended amounts of mixing solution, until uniform in color and consistency.
 - 3. A pancake batter consistency is to be achieved.
 - 4. Let material set for 15 minutes, then temper back with mixing solution.
 - 5. The material may be tempered one more time as approved by manufacturer.
- D. Acrylic Emulsion Textured Coating: Mix each container of coating mixture by drill or boxing from one container to another until aggregate and color are evenly dispersed.

PART 3 EXECUTION

3.01 Examination

- A. Verify that field conditions are ready for installation.
- B. Verify that substrate is ready to receive Work.
- C. Verify that temperature, humidity and weather conditions are satisfactory for installation as recommended by manufacturer.
- D. Report in writing to the Engineer any conditions or surfaces which have adversely affected the installation.
- E. Do not proceed with this Work until all unsatisfactory conditions are corrected. Commencement of Work implies acceptance of surfaces and environmental conditions.

3.02 Application - Two Coat Cementitious-Base Waterproof Coating (Mark "TS")

- A. Dampen wall prior to and during application. Do not apply while wall is excessively wet.

- B. For the base coat, apply a heavy brush or broom coat of the cementitious-base coating to the surface at the maximum rate of 225 square feet (25 mil thickness) per 50 pound bag unless otherwise recommended by the manufacturer.
 - C. Using a wet and clean brush or broom, finish the base coat in a horizontal manner. Do not let the material set or harden before beginning finishing.
 - D. Let the base coat cure for a 24-hour period.
 - E. Apply the second coat to a dampened surface at the rate of 450 square feet (15 mil thickness) per 50 pound bag.
 - F. Using a clean, wet brush or broom finish the second coat in a vertical manner. Do not stop at the end, but finish past that point to eliminate buildup. Do not let material harden before finishing.
- 3.03 Application - One Coat Cementitious - Base Waterproof Coating and One Coat Acrylic Emulsion Textured Coating (Mark "TS-TC")
- A. Preparation and base coat same as noted above for two coat cementitious-base coating system (Mark "TS").
 - B. Apply the acrylic emulsion textured second coat to the brushed surface with a plaster-type sprayer, brush, or 3/4 inch nap roller. If applied manually, dampen wall before coating. If sprayed, back roll after application. Coating should be applied at the rate not to exceed 100 square feet (dry film mil thickness 7.75) per gallon.
- 3.04 Cleaning and Protection
- A. Clean Work under provisions of Section 01700.
 - B. The applicator shall promptly remove all temporary coverings and protections of adjacent work areas and will clean these areas of all foreign materials resulting from their Work.
 - C. Clean all tools and equipment with water immediately after application.
- 3.05 Field Quality Control
- A. Field inspection and testing will be performed under provisions of Section 01400.
- 3.06 Schedule
- A. **See Section 03300.**
 - B. **See Drawings.**

END OF SECTION

[2244]
[Rev. 04/04]

SECTION 09900

PAINTING**PART 1 GENERAL**1.01 Section Includes

- A. Surface preparation and field application of paints and coatings.

1.02 Related Sections

- A. Applicable to Work of this Section are the Drawings and General Provisions of the Contract, including: Part IV, General Conditions; Part V, Special Conditions; Part VI, Technical Specifications; Division No. 1, General Requirements.

1.03 References

- A. SSPC (Steel Structures Painting Council) - Steel Structures Painting Manual and Specifications.
- B. ASTM B117 – Method of Salt Spray (Fog) Testing.
- C. ASTM D149 – Method for Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating Materials of Commercial Power Frequencies.
- D. ASTM D3359 – Method for Measuring Adhesion by Test Tape.
- E. ASTM D3363 – Method for Film Hardness by Pencil Test.
- F. ASTM D4060 – Method for Abrasion Resistance of Organic Coating by the Taber Abraser.
- G. ASTM D4541 – Method for Pull-Off Strength of Coats Using Portable Adhesion Testers.
- H. ASTM 4585 – Practice for Testing the Water Resistance of Coatings Using Controlled Condensation.
- I. ASTM G53 – Practice for Operating Light and Water Exposure of Nonmetallic Materials.

1.04 Submittals

- A. Submit under provisions of Section 01300.
- B. Product Data: Provide data on all painting products and special coatings, including color selection charts.
- C. Manufacturer's Instructions: Indicate special surface preparation procedures, substrate conditions requiring special attention and any special application requirements.

1.05 Qualifications

- A. Manufacturer: Company specializing in manufacturing the Products specified in this Section with minimum five years documented experience.
- B. Applicator: Company specializing in performing the Work of this Section with minimum five years documented experience.

1.06 Regulatory Requirements

- A. Conform to applicable code.

1.07 Delivery, Storage and Handling

- A. Deliver, store, protect and handle products to site under provisions of Section 01600.
- B. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- C. Container label to include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation and instructions for mixing and reducing.
- D. Store paint materials at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area and as required by manufacturer's instructions.

1.08 Environmental Requirements

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Do not apply exterior coatings during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer and as specified herein.

C. Minimum Application Temperatures for Latex Paints

- 1. 45 degrees F for interiors; 50 degrees F for exterior; unless required otherwise by manufacturer's instructions.
- 2. For temperatures below 65 degrees refer to cold cure products by manufacturer for the specific service condition.

- D. Minimum Application Temperature for Varnish Finishes: 65 degrees F for interior or exterior, unless required otherwise by manufacturer's instructions.

1.09 Extra Materials

- A. Furnish under provisions of Section 01700.
- B. Provide 1 gallon of each color, type and surface texture to Owner.
- C. Label each container with color, type, texture and locations in addition to the manufacturer's label.

1.10 Description of Work

- A. Extent of painting Work is shown on Drawings and schedules and as herein specified.
- B. The Work includes painting and finishing of interior and exterior exposed items and surfaces throughout project, except as otherwise indicated. Surface preparation, priming and coats of paint specified are in addition to shop-priming and surface treatment specified under other Sections of Work.
- C. The Work includes field painting of exposed bare and covered pipes and ducts and of hangers, exposed steel and iron work and primed metal surfaces of equipment installed under mechanical and electrical work, except as otherwise indicated.

- D. Paint as used herein means all coating systems materials, including primers, emulsions, enamels, stain sealers and fillers and other applied materials whether used as prime, intermediate or final top coat.
- E. Paint exposed surfaces whether or not colors are designated in schedules, except where natural finish of material is specifically noted as a surface not to be painted. Where items or surfaces are not specifically mentioned, paint same as adjacent similar materials or areas. If color or finish is not designated, Engineer will select these from standard colors available for material systems specified.
- F. Prefinished items are not included as part of field-applied finish Work, or are included in other Sections of these Specifications.
- G. Unless otherwise specified, shop priming of ferrous metal items is included under various Sections for structural steel, miscellaneous metal, hollow metal work and similar items. Also, for fabricated components such as architectural woodwork, wood casework and shop-fabricated or factory-built mechanical and electrical equipment or accessories.
- H. For pre-finished items, unless otherwise indicated, do not include painting when factory-finishing or installer finishing is specified for such items as, but not limited to, metal toilet enclosures, prefinished partition systems, acoustic materials, architectural woodwork and casework, finished mechanical and electrical equipment including light fixtures, switch-gear and distribution cabinets, elevator entrance frames, doors and equipment.
- I. Unless otherwise indicated, painting is not required on surfaces such as walls or ceilings in concealed areas and generally inaccessible areas, foundation spaces, furred areas, utility tunnels, pipe spaces, duct shafts and elevator shafts.
- J. Metal surfaces of anodized aluminum, stainless steel, chromium plate, copper, bronze and similar finished materials will not require finish painting, unless otherwise indicated.
- K. Moving parts of operating units, mechanical and electrical parts, such as damper and valve operators, linkages, sensing devices, motor and fan shafts will not require finish painting, unless otherwise indicated.
- L. Do not paint over any code-required labels, such as Underwriter's laboratories and Factory Mutual, or any equipment identification, performance rating, name or nomenclature plates.
- M. **For field painting of shop primed or coated items, coordinate with manufacturer of shop coated item to verify compatibility with proposed field coat as indicated herein.**
- N. **Pre-Engineered Metal Buildings Structural Steel: Field painting of shop primed structural steel members, supports, braces, columns, purlins, joists and all related items in pre-engineered metal buildings shall be required (See Section 13121).**
- O. Potable Water Tanks, Vessels, Basins and Equipment: Internal and exterior painting and coating of all steel water holding tanks and equipment (filters, clarifiers, settling basins, clearwells, flocculators, etc.) which are included in potable water treatment plants shall be as specified in Section 09901. All painting and coating products which will be in contact with potable water must meet the requirements of NSF/ANSI, AWWA and ADEM for potable water coating systems.

PART 2 PRODUCTS

2.01 Materials - General

- A. Coatings: Ready mixed, except field catalyzed coatings. Process pigments to a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating; good flow and brushing properties; capable of drying or curing free of streaks or sags.
- B. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners and other materials not specifically indicated but required to achieve the finishes specified, of commercial quality.
- C. Patching Materials: 100% Solids Epoxy Filler & Surfacer.
- D. Fastener Head Cover Materials: 100% Solids Epoxy Filler & Surfacer.

2.02 Finishes

- A. Refer to schedule shown on Drawings for surface finish schedule.

2.03 Manufacturer

- A. **The paint products as specified herein shall be manufactured by the TNEMEC Co., North Kansas City, MO, or approved equal.**

2.04 Materials - Specific for Surface and Exposure

- A. Structural Steel, Tanks, Piping, Equipment and Other Ferrous Metals (Non-Potable Water Condition)

1. Exterior - Not Submerged

- a. Surface Preparation: SSPC-SP6.
- b. Coating System: Aliphatic Acrylic Polyurethane (66/1074 or 1075).
- c. Finish: Gloss.
- d. First Coat (Field Prime): Epoxy Polyamide applied at 4.0 – 6.0 mils DFT (Dry Film Thickness).
- e. Second Coat(Top): Aliphatic Acrylic Polyurethane applied at 2.0 – 3.0 mils DFT.
- f. Total Coating: 6.0 – 9.0 mils DFT.

2. Submerged (Interior and Exterior)

- a. Surface Preparation: SSPC-SP10.
- b. Coating System: Aliphatic Acrylic Polyurethane (66/66).
- c. Finish: Semi-gloss.
- d. First Coat (Field Prime): Epoxy Polyamide: 4.0 – 6.0 mils DFT.
- e. Second Coat (Top): Epoxy Polyamide: 4.0 – 6.0 mils DFT.
- f. Total Coating: 8.0 – 12.0 DFT.

3. Interior - General
 - a. Surface Preparation: SSPC-SP6.
 - b. Coating System: Polyamide Epoxy (66/66).
 - c. Finish: Semi-Gloss.
 - d. First Field Coat: Polyamide Epoxy: 4.0 – 6.0 mil DFT.
 - e. Field Finish Coat (Top): Polyamide Epoxy: 4.0 – 6.0 mil DFT.
 - f. Total Coating: 8.0 – 12.0 mil DFT.
 - g. **NOTE: If not shop coated, coordinate with paint manufacturer and verify if field prime coat required (coordinate with Engineer).**
 - h. **NOTE: NOT FOR USE WHERE EXPOSED TO CONTINUALLY WET OR DAMP CONDITIONS OR TO CHEMICAL EXPOSURE [SEE 2.04(A)(4)].**
 4. Interior - Wet Condition or Chemical Exposure
 - a. Surface Preparation: SSPC-SP6.
 - b. Coating System: Epoxy-Polyamide (66/66).
 - c. First Coat (Prime): Epoxoline Primer: 4.0 – 6.0 mil DFT.
 - d. Second Coat (Top): Epoxy-Polyamide: 4.0 – 6.0 mil DFT.
 - e. Total Coating: 8.0 – 12.0 mil DFT.
 5. Steel Potable Water Storage Tanks and Package Water Treatment Plant Water Holding Tanks:
See Section 09901.
- B. Galvanized Steel and Non Ferrous Metals (Non-Potable Water Condition)
1. Exterior - Not Submerged
 - a. Surface Preparation: SSPC-SP1.
 - b. Coating System: Aliphatic Acrylic Polyurethane (66/1074 or 1075).
 - c. Finish: Gloss.
 - d. First Coat (Prime): Epoxy Polyamide: 4.0 – 6.0 mils DFT.
 - e. Second Coat (Top): Aliphatic Acrylic Polyurethane: 2.0 – 3.0 mils DFT.
 - f. Total Coating: 6.0 – 9.0 mils DFT.
 2. Interior-Non-Submerged:
 - a. Surface Preparation: SSPC-SP1.
 - b. Coating System: Epoxy-Polyamide (66).

- c. Finish: Semi-gloss.
- d. Coat: Epoxoline Primer; 4.0 – 6.0 mils DFT.
- e. Total Coating: 4.0 – 6.0 mils DFT.

C. Porous Masonry

1. Exterior - Above Ground

- a. Surface Preparation: Clean and dry. Stone rub to remove loose and small particles.
- b. Coating System: Modified Waterborne Acrylate (130/156/156).
- c. Finish: Matt.
- d. First Coat (Filler): Waterborne Cementitious Acrylic Masonry Filler; 75 - 100 square feet per gallon coverage.
- e. Second Coat (Intermediate): Modified Waterborne Acrylate Elastomer; minimum 4.0 – 8.0 mils DFT.
- f. Third Coat (Top): Modified Waterborne Acrylate 4.0 – 8.0 mils DFT.
- g. Total Coating: 8.0 – 16.0 mils DFT (excluding filler).

2. Interior:

- a. Surface Preparation: Clean and dry. Stone rub to remove loose and small particles.
- b. Coating System: Epoxy-Polyamide (84/84).
- c. Finish: Semi-gloss.
- d. First Coat (Filler): Epoxy-Aliphatic Amine 80 to 100 square feet per gallon.
- e. Second Coat (Top): Epoxy-Aliphatic Amine; 6.0 – 8.0 mils DFT.
- f. Total Coating: 6.0 – 8.0 mils DFT (excluding filler coat).

D. Concrete, Dense Masonry

1. Exterior, Non-Immersion

- a. Surface Preparation: Clean and dry.
- b. Coating System: Acrylic Emulsion (180 or 181).
- c. Finish: Flat.
- d. First Coat: Acrylic Emulsion; 6.0 – 8.0 mils DFT.
- e. Total Coating: 6.0 – 8.0 mils DFT.

2. Immersion or Interior Non-Immersion

- a. Surface Preparation: Brush-off Blast.

- b. Coating System: Amine Epoxy (63/104/104).
 - c. Filler Coat: Modified Amine Epoxy in all voids.
 - d. First Coat: Cycloaliphatic Amine Epoxy; 6.0 – 10.0 mils DFT.
 - e. Second Coat: Cycloaliphatic Amine Epoxy; 6.0 – 10.0 mils DFT.
 - f. Total Coating: 12.0 – 20.0 mils DFT.
 - g. Use Series FC21 Pota-Pox 80 in Potable Water.
3. Interior, Exposed to High Levels of Hydrogen Sulfide and Sulfuric Acid Condensate
- a. Surface Preparation: Brush-off blast.
 - b. Coating System: Epoxy Polyamine Mortar (218/434/435).
 - c. Surfacer: Waterborne Epoxy Mortar, as required.
 - d. First Coat: Epoxy, Polyamine mortar; 125.0 mils DFT.
 - e. Second Coat: Epoxy, Polyamine; 30.0 – 40.0 mils DFT.
 - f. Total Coating: 155.0 – 165.0 mils DFT.
4. Fluoride Room, Floor and Walls
- a. Surface Preparation: Brush-off blast.
 - b. Surfacer: Vinyl Ester Filler and Surfacer for bug holes.
 - c. Coating System: Vinyl Ester (120/120).
 - d. First Coat: Vinyl Ester, Beige Primer; 12.0 – 18.0 mils DFT.
 - e. Second Coat: Vinyl Ester, White; 12.0 – 18.0 mils DFT.
 - f. Total Coating: 24.0 – 36.0 mils DFT.
5. Chemical Storage and Containment Areas (Floor, Trench, Tank Pad and 3' – 6" Band on Walls
- a. Surface Preparation: Brush-off blast.
 - b. Coating System: Polyamine Epoxy (201/275/282).
 - c. First Coat: Polyamine epoxy; 6.0 – 8.0 mils DFT.
 - d. Second Coat: Polyamine Novolac Epoxy; 25.0 – 40.0 mils DFT.
 - e. Third Coat: Polyamine Novolac Epoxy; 6.0 – 8.0 mils DFT.
 - e. Total Coating: 37.0 – 56.0 mils DFT.
6. Interior, Pipe Gallery Walls

- a. Surface Preparation: Clean and dry.
 - b. Coating System: Epoxy, Aliphatic Amine (84/84).
 - c. First Coat: Aliphatic Amine Epoxy; 6.0 – 8.0 mils DFT.
 - d. Second Coat: Aliphatic Amine Epoxy; 6.0 – 8.0 mils DFT.
 - e. Total Coating: 12.0 - 16.0 mils DFT.
7. Immersion, Potable or Non-Potable Water
- a. Surface Preparation: Brush-off blast.
 - b. Coating System: Amine Epoxy (63/104/104).
 - c. Filler Coat: Modified Amine Epoxy in all voids.
 - d. First Coat: Cycloaliphatic Amine Epoxy; 6.0 – 10.0 mils DFT.
 - e. Second Coat: Cycloaliphatic Amine Epoxy; 6.0 – 10.0 mils DFT.
 - f. Total Coating: 12.0 – 20.0 mils DFT.
- E. Plaster and Gypsum Wallboard
1. Surface Preparation: Clean and dry.
 2. Coating System: Epoxy-Polyamide (51-792/114).
 3. Finish: Gloss.
 4. First Coat (Sealer): Vinyl-Acrylic Latex Dry Wall Sealer; 1.0 – 2.0 mil DFT.
 5. Second Coat (Top): Waterborne Acrylic Epoxy; 4.0 – 6.0 mils DFT.
 6. Total Coating: 5.0 –8.0 mils DFT.
- F. Wood
1. Exterior or Interior
 - a. Surface Preparation: Clean and dry.
 - b. Coating System: Acrylic Emulsion (7/7).
 - c. Finish: Semi-Gloss.
 - d. First Coat (Prime): Emulsified Acrylic Coating 2.0 – 3.0 mils DFT.
 - e. Second Coat (Top): Emulsified Acrylic Coating 2.0 – 3.0 mil DFT.
 - f. Total Coating: 4.0 – 6.0 mils DFT.
 2. Wood Cabinets and Shelving
 - a. Surface Preparation: Clean and dry.

- b. Coating System: Oil stain and varnish.
 - c. Sealer: Seal and sand lightly as instructed by manufacturer.
 - d. First Coat: Oil stain.
 - e. Second Coat: Bleached shellac.
 - f. Third Coat: Rubbing varnish.
 - g. Fourth Coat: Rubbing varnish.
 - h. **NOTE: SAND LIGHTLY BETWEEN COATS.**
- G. PVC Pipe (Interior)
1. Surface Preparation: Clean and dry, lightly scarify surface.
 2. Coating System: Epoxy-Polyamide (66).
 3. Finish: Semi-gloss.
 4. Coat: Epoxy-Polyamide; 4.0 – 6.0 mils DFT
 5. Total Coating: 4.0 – 6.0 mils DFT.
- H. PVC Pipe (Exterior)
1. Surface Preparation: Clean and dry; lightly scarify surface.
 2. Coating System: Epoxy-Polyamide (66/1075).
 3. Finish: Semi-gloss.
 4. First Coat: Epoxy-Polyamide; 4.0 – 6.0 mils DFT.
 5. Second Coat: Aliphatic Acrylic Polyurethane; 2.0 – 3.0 mils DFT.
 6. Total Coating: 6.0 – 9.0 mils DFT.
- I. Ductile Iron Pipe (Immersion)
1. Surface Preparation: Brush off blast, in accordance with NAPF 500-03.
 2. Coating System: Epoxy-Polyamide (66/66).
 3. Finish: Semi-gloss.
 4. First Coat (Prime): Epoxoline Primer; 3.0 – 5.0 mils DFT.
 5. Second Coat (Top): Epoxy-Polyamide; 4.0 – 6.0 mils DFT.
 6. Total Coating: 7.0 – 11.0 mils DFT.
 7. Note: For potable water, use Series 20 Pota-Pox in lieu of Series 66.

J. Ductile Iron Pipe (Exterior)

1. Surface Preparation: Brush off blast, in accordance with NAPF 500-03.
2. Coating System: Epoxy-Polyamide (66/1075).
3. Finish: Semi-gloss.
4. First Coat (Prime): Epoxoline Primer; 4.0 – 6.0 mils DFT.
5. Second Coat (Top): Acrylic Polyurethane; 3.0 – 5.0 mils DFT.
6. Minimum Total Coating: 7.0 – 11.0 mils DFT.

K. Ductile Iron Piping (Interior)

1. Surface Preparation: Brush off blast, in accordance with NAPF 500-03.
2. Coating System: Epoxy-Polyamide (66).
3. Finish: Semi-gloss.
4. Coat: Epoxy-polyamide; 4.0 – 6.0 mils DFT.
5. Total Coating: 4.0 – 6.0 mils DFT.

L. Insulated Pipe (Interior)

1. Surface Preparation: Clean and dry.
2. Coating System: Acrylic Emulsion (6/6).
3. Finish: Low Sheen.
4. First Coat: Emulsified Acrylic Coating; 2.0 – 3.0 mils DFT.
5. Second Coat (Top): Emulsified Acrylic Coating; 2.0 – 3.0 mils DFT.
6. Total Coating: 4.0 – 6.0 mils DFT.

M. Concrete Floor (Interior)

1. Decorative - Crystal Floor
 - a. Surface Preparation: Acid etch or brush blast.
 - b. First Coat: 201 Epoxoprime at 6.0 – 8.0 mils DFT.
 - c. Second Coat: 222 Color DECO – Tread at 1/16-inch (doubleseed).
 - d. Third & Fourth Coat: 284 DECO – Clear seal coat(s) and flaks.
2. Decorative – Flake Floor
 - a. Surface Preparation: Mechanically abrade. ICRI CSP 2.
 - b. 1st Coat: 205-Color Terra-Treade at 3.0 5.0 mils DFT.

- c. 2nd Coat: 281-Color Tnemec-Glaze at 6.0 – 12.0 mils DFT.
 - d. Flake: Broadcast Random Flake into wet 281.
 - e. Seal Coat: 284 Deco-Clear at 14.0 – 16.0 mils DFT.
 - f. Finish Coat: 295 Clear CRU at 2.0 – 3.0 mils DFT.
- N. Exterior Concrete Slabs: See Section 03346 for sealer.
- 2.05 Product Substitution
- A. Contractors desiring to use coatings other than those specified shall submit their proposal in writing to the Engineer no later than ten days prior to the bid opening.
 - B. Substitutions which decrease the film thickness, the number of coats applied, change the generic type of coating or fail to meet the performance criteria of the specified materials will not be approved.
 - C. Requests for substitution shall be in accordance with Section 01600 and shall include manufacturer's literature for each product giving the name, generic type, descriptive information and evidence of satisfactory past performance on similar projects.
 - D. Additional information may be requested by the Engineer in order to adequately consider any product submitted for approval as equal to the specified product.
 - E. Materials supplied by other manufacturers may be considered for substitution if the following prevailing conditions exist:
 - 1. Performance criteria of the specified materials are exceeded by the submitted alternate materials and detailed on the technical data sheets of each specified product.
 - 2. The submittal must compare the performance criteria of the specified material with that of the submitted material and be documented in a side by side manner for the Engineer/Owner to review.
 - 3. Substitute materials must be for complete systems and not individual products combined with the specified materials. The performance criteria for all products within a system must meet or exceed the specified materials.

PART 3 EXECUTION

- 3.01 Examination
- A. Verify site conditions under provisions of Section 01039.
 - B. Verify that surfaces and substrate conditions are ready to receive Work as instructed by the product manufacturer.
 - C. Examine surfaces scheduled to be finished prior to commencement of Work. Report any condition that may potentially affect proper application.
 - D. Test shop applied primer for compatibility with subsequent cover materials.
 - E. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:

1. Plaster and Gypsum Wallboard: 12 percent.
2. Masonry, Concrete and Concrete Unit Masonry: 12 percent.
3. Interior Wood: 15 percent.
4. Exterior Wood: 15 percent.
5. Concrete Floors: 8 percent.

3.02 Preparation

- A. Remove or mask electrical plates, hardware, light fixture trim, escutcheons and fittings prior to preparing surfaces or finishing.
- B. Correct defects and clean surfaces which affect Work of this Section. Remove existing coatings that exhibit loose surface defects.
- C. Seal with shellac or other approved sealer, all product marks which may bleed through surface finishes (coordinate with Engineer).
- D. Impervious Surfaces: Remove mildew by scrubbing with solution of tri-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- E. Aluminum Surfaces Scheduled for Paint Finish: Remove surface contamination by steam or high pressure water. Remove oxidation with acid etch and solvent washing. Apply etching primer immediately following cleaning.
- F. Asphalt, Creosote or Bituminous Surfaces Scheduled for Paint Finish: Remove foreign particles to permit adhesion of finishing materials. Apply latex based compatible sealer or primer.
- G. Insulated Coverings: Remove dirt, grease and oil from canvas and cotton.
- H. Concrete Floors: Remove contamination, acid etch and rinse floors with clear water. **Verify required acid-alkali balance is achieved. Allow to dry.**
- I. Gypsum Board Surfaces: Fill minor defects with filler compound. Sand lightly. Spot prime defects after repair.
- J. Galvanized Surfaces: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.
- K. Concrete and Unit Masonry Surfaces Scheduled to Receive Paint Finish: Remove dirt, loose mortar, scale, salt or alkali powder and other foreign matter. Remove oil and grease with a solution of tri-sodium phosphate; rinse well and allow to dry. Remove stains caused by weathering of corroding metals with a solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.
- L. Plaster Surfaces: Fill hairline cracks, small holes and imperfections with latex patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.
- M. Uncoated Steel and Iron Surfaces: Remove grease, mill scale, weld splatter, dirt and rust. Where heavy coatings of scale are evident, remove by hand or power tool, wire brushing or sandblasting; clean by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts and nuts are similarly cleaned. Spot prime paint after repairs.

- N. Shop Primed Steel and Iron Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Contractor to verify compatibility of field coat with shop coat. Coordinate with manufacturer and Engineer.
 - O. Interior Wood Items Scheduled to Receive Paint Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats.
 - P. Interior Wood Items Scheduled to Receive Transparent Finish: Wipe off dust and grit prior to sealing, seal knots, pitch streaks and sappy sections with sealer. Fill nail holes and cracks after sealer has dried; sand lightly between coats.
 - Q. Exterior Wood Scheduled to Receive Paint Finish: Remove dust, grit and foreign matter. Seal knots, pitch streaks and sappy sections. Fill nail holes with tinted exterior caulking compound after prime coat has been applied.
 - R. Wood and Metal Doors Scheduled for Painting: Seal top and bottom edges with primer.
- 3.03 Application
- A. Apply Products in accordance with manufacturer's instructions.
 - B. Do not apply finishes to surfaces that are not dry.
 - C. Apply each coat to uniform finish to minimum coating thickness (dry film) as specified.
 - D. Apply each coat of paint slightly darker than preceding coat unless otherwise approved.
 - E. Sand wood and metal lightly between coats to achieve required finish.
 - F. Vacuum clean surfaces free of loose particles. Use tack cloth just prior to applying next coat.
 - G. Allow applied coat to dry before next coat is applied.
 - H. Where clear finishes are required, tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.
 - I. Unless otherwise indicated, painting of concealed surfaces of interior and exterior woodwork is not required.
 - J. Prime concealed surfaces of interior woodwork scheduled to receive stain or varnish finish with gloss varnish reduced 25 percent with mineral spirits.
 - K. Apply additional coats when undercoats, stains or other conditions show through final coat of paint or minimum Dry Film Thickness (DFT) is less than specified, until paint film is of specified thickness, uniform finish, color 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.
 - L. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Paint surfaces behind permanently fixed equipment or furniture with prime coat only before final installation of equipment.
 - M. Finish exterior doors on tops, bottoms and side edges same as exterior faces, unless otherwise shown on Drawings.

- N. Apply materials at not less than manufacturer's instructions spreading rate to establish a total dry film thickness as indicated or, if not indicated, as instructed by coating manufacturer.

3.04 Finishing Mechanical and Electrical Equipment

- A. Refer to Section 15190 and Section 16195 for schedule of color coding and identification banding of equipment, duct work, piping and conduit.
- B. Paint shop primed equipment.
- C. Remove unfinished louvers, grilles, covers and access panels on mechanical and electrical components and paint separately.
- D. Prime and paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, except where items are prefinished.
- E. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
- F. Paint interior surfaces of air ducts that are visible through grilles and louvers with one coat of flat black paint, to visible surfaces. Paint dampers exposed behind louvers and grilles to match face panels.
- G. Paint exposed conduit and electrical equipment occurring in finished areas.
- H. Paint both sides and edges of plywood backboards for electrical, control and telephone equipment before installing equipment.
- I. Color code equipment, piping, conduit and exposed duct work in accordance with requirements indicated. Color band and identify with flow arrows, names and numbering.
- J. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons and fittings removed prior to finishing.

3.05 Field Quality Control

- A. Field inspection and testing will be performed under provisions of Section 01400.

3.06 Cleaning

- A. Clean Work under provisions of 01700.
- B. Collect waste material which may constitute a fire hazard, place in closed metal containers and remove daily from site.

3.07 Finish Schedule and Color

- A. **See Schedule as shown on Drawings.**
- B. **Colors: Unless selected differently by Engineer during submittal review, colors are to conform to the following standards:**

| ITEM | GENERIC COLOR | COLOR IDENTIFICATION |
|-----------------------------|------------------------------|--|
| WATER | | |
| Raw Water | Olive Green | 110GN Clover |
| Settled or Clarified Water | Aqua | GB36 Aqua Sky |
| Finished or Potable Water | Dark Blue | 11SF Safety Blue |
| Reclaimed Water | Purple | |
| WASTEWATER | | |
| Sewage Plant Effluent | Clay | 07RD Terra Cotta |
| Backwash Waste | Light Brown | 68BR Twine |
| Sludge | Dark Brown | 84BR Weathered Bark |
| Sewer (Sanitary or Other) | Dark Gray | GR28 Fossil |
| CHEMICAL | | |
| Alum or Primary Coagulant | Orange | O4SF Safety Orange |
| Ammonia | White | 11WH White |
| Carbon Slurry | Black | 35GR Black |
| Caustic | Yellow with Green Band | 02SF Safety Yellow with 09SF Safety Green |
| Chlorine (Gas and Solution) | Yellow | 02SF Safety Yellow |
| Fluoride | Light Blue with Red Band | 25BL Fountain Blue with 06SF Safety Red |
| Lime Slurry | Light Green | PA 30 Daiquiri Ice |
| Ozone | Yellow with Orange Band | 02SF Safety Yellow with 04SF Safety Orange |
| Phosphate Compounds | Light Green with Red Band | PA30 Daiquiri Ice with 06SF Safety Red |
| Polymers or Coagulant Aids | Orange with Green Band | 04SF Safety Orange with 09SF Safety Green |
| Potassium Permanganate | Violet | 14SF Safety Purple |
| Soda Ash | Light Green with Orange Band | PA30 Daiquiri Ice with 04SF Safety Orange |
| Sulfuric Acid | Yellow with Red Band | 02SF Safety Yellow with 06SF Safety Red |
| Sulfur Dioxide | Light Green with Yellow Band | PA30 Daiquiri Ice with 02SF Safety Yellow |
| OTHER | | |
| Compressed Air | Dark Green | 91GR Balsam |
| Gas Tile | Red | 28RD Monterrey |
| Other Lines | Light Gray | 32GR Light Gray |
| Hoists/Trolleys | Yellow | 02SF Safety Yellow |
| Fire Protection | Red | 06SF Safety Red |

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END OF SECTION

SECTION 11320
PROGRESSIVE CAVITY WASTEWATER AND SLUDGE PUMPS

PART 1 GENERAL

- 1.01 Section Includes
 - A. Progressive cavity pumps.
 - B. Electrical and controls.
 - C. Valves, discharge piping, fittings and related appurtenances.
- 1.02 Related Sections
 - A. Applicable to Work of this Section are the Drawings and General Provisions of the Contract, including: Part IV, General and Supplementary Conditions; Part V, Special Conditions; Part VI, Technical Specifications; Division No. 1, General Requirements.
- 1.03 Submittals
 - A. Submit under provisions of Section 01300.
 - B. Product Data: Descriptive literature, shop drawings, details, dimensions, specified operating parameters, materials of construction, connections, electrical and control facilities, piping, valves, fittings, enclosure and all related items.
 - C. Manufacturer's Installation Instructions: Indicate special installation requirements, configurations, elevations, dimensions, equipment and related items.
- 1.04 Operational and Maintenance Data
 - A. Submit under provisions of Section 01700.
 - B. Maintenance Data: Include all required start-up, operational, routine maintenance requirements, troubleshooting, including specific operational and maintenance instructions.
- 1.05 **Spare Parts**
 - A. **One complete set of spare parts as recommended by manufacturer shall be furnished (See Paragraph 2.06).**
- 1.06 Delivery, Storage and Handling
 - A. Deliver Products to site under provisions of Section 01600.
 - B. Store and protect Products under provisions of Section 01600.
- 1.07 Project Record Documents
 - A. Accurately record actual location of all equipment and concealed utilities in accordance with Section 01700.

1.08 Quality Assurance

- A. In accordance with Section 01400.

1.09 Qualifications

- A. **Manufacturer:** Must have minimum five years documented experience in manufacturing the specified equipment.
- B. **Installer:** Must have minimum five years documented experience in the installation of the equipment and facilities.

1.10 Regulatory Requirements

- A. All components and the completed total assembly installation shall comply with all OSHA Requirements, NEC – National Electrical Code, IMC – International Mechanical Code and all other applicable codes, regulations and guidelines.

1.11 Field Measurements

- A. Verify that field measurements are as shown on Drawings and as instructed by manufacturer.
- B. Verify that all concrete work, shape, configuration, elevations and dimensions meet equipment manufacturers' approval prior to installation of equipment.

1.12 Warranty

- A. Provide minimum one year warranty in accordance with Section 01700 on all equipment furnished. Warranty period begins at date of written acceptance by Owner.

PART 2 PRODUCTS

2.01 General Description

- A. The pumps shall be of the heavy duty, positive displacement, single stage, progressive cavity type.
- B. The pumps shall be specifically designed to pump wastewater sludges, digested sludges with 3 to 5 percent solids and similar wastewater flows in a municipal wastewater treatment plant environment.
- C. **Manufacturer:** The pump shall be the Moyno Progressing Cavity Pump as manufactured by Robbins & Myers, Inc., Springfield, OH, or approved equal. Equal manufacturer includes NETZSCH Inc., Exton, PA, Tarby, Inc., Claremore, OK (see Schedule for specific model, size and pump characteristics).
- D. Pump Construction
 - 1. The pumps shall be cradle mounted to allow the normally vertical suction port to be rotated in 90 degree increments perpendicular to the centerline to facilitate piping connections.
 - 2. The bearing and suction housings of the pump shall be thick-walled cast iron. All cast parts will be free of sand holes, blow holes and other defects. The suction housing shall incorporate two rectangular inspection ports, 180 degree apart, to permit access to the suction housing interior without disconnecting piping.

3. The suction and discharge connections shall be flat face flanges with bolt hole dimensions and spacing to ANSI Standards.
 4. The alloy steel rotor shall be machined and polished single helix with a nominal chrome plate thickness of .010 inches for maximum abrasion resistance.
 5. The stator shall be of double helix configuration with the molded Nitrile elastomer chemically bonded to a steel tube. The stator shall be fastened to the suction housing and discharge flange with removable clamp rings to facilitate stator removal. The stator seals shall be designed to prevent the material being pumped from contacting the stator bonding and tube.
 6. The gear joints shall be of the grease lubricated crowned gear type, totally enclosed and protected by a wire reinforced elastomeric seal. Mechanical components of the gear joints shall be designed to operate for 10,000 hours at the manufacturer's published maximum speeds and pressures.
 7. A rigid, splined connecting rod shall connect the gear joints of the drive shaft and eccentrically moving rotor. The connecting rod shall pass through the shaft seal area inside the hollow drive shaft quill so that no eccentric loads are imparted on the shaft seal area.
 8. The drive shaft shall be of one piece construction through the bearings and shaft seal area. This design shall permit disassembly of the universal joints without affecting the alignment of the shaft in the shaft sealing area.
 9. The quill portion of the shaft shall be hard chrome plated.
 10. The bearings will be of the grease lubricated, tapered roller bearing type with diverging pressure angles for maximum shaft stability. Bearings are to be designed for a minimum B-10 life of 30,000 hours under maximum operating conditions and will not require periodic relubrication. The bearings shall be protected from contaminants by means of a bearing cover plated bolted to the bearing housing.
 11. The stuffing box shall be equipped with a split packing gland and split Teflon lantern ring to permit repacking of the pump without removing the bearings or drive shaft components. Fittings will be provided for grease lubrication of the package.
 12. The connecting rod and drive shaft shall be protected by a fiber deflector from the accumulative build-up of rags, hair and all other fibrous materials. The fiber deflector shall consist of a shroud that completely covers the exposed connecting rod within the suction casing, preventing debris and stringy material from wrapping around the connecting rod. The non-rotating shroud shall be fixed to the suction casing and shall be suitable for use with or without a shaft sleeve. It shall be designed to operate without periodic cleaning for a minimum of twelve months.
 13. The pump shall be factory assembled complete with drive unit, mounted on baseplate, ready for installation.
- E. Drive Unit: The drive unit shall be geared motor drive with flexible coupling, TEFC, heavy duty, 1.15 service factor designed for severe duty in the corrosive atmosphere of a wastewater treatment plant. Horsepower and electrical characteristics as indicated on Schedule.
1. Gear Reducer: The gear reducer shall be the Eurodrive C-Face Reducer, or approved equal. Gear ratio shall be 5.95:1. Shaft diameter shall be as recommended by manufacturer.
 2. Coupling: The flexible coupling shall be the SURE-FLEX elastomeric type coupling as manufactured by T. B. Woods, or approved equal. Size shall be as recommended by manufacturer.

3. Drive Horsepower: The drive horsepower shall be adequate for the pump specified and shall not be overloaded at any point along the pump curve.
4. Turndown: The drive shall be a high premium efficiency drive designed to handle a minimum 5:1 turndown.

2.02 Electrical and Controls

- A. See Division No. 16.
- B. Pump manufacturer to provide complete control and coordinated system including:
 1. Control panel (NEMA 4).
 2. Controls, indicators, alarms, lights, resets, etc.
 3. Starters, breakers, wiring, etc.
 4. Variable frequency drive controllers.
 5. Fluid detection control.
- C. Control Panel: Provide the following controls and indicators:
 1. Pump on/off selector - each pump.
 2. Pump on/off run indicator light - each pump.
 3. Ammeter - each pump.
 4. Elapsed time meter - each pump.
 5. High pressure/run dry (low pressure) indicator light and alarm (coordinate with fluid detection control).
 6. Reset buttons as required.
 7. Variable frequency drive controller digital readout (complete) - each pump.
- D. Fluid Detection Control
 1. The pump manufacturer shall furnish with the pumps, a high pressure/run dry (low pressure) protector.
 2. The control shall utilize a pressure sensor/isolator to separate the process fluid from the pressure sensing instrumentation. The process fluid pressure shall be transmitted by liquid silicone oil sealed between a carbon steel housing and a flexible elastomer element of Buna-N.
 3. The pressure shall be monitored by a nonindicating pressure switch in a NEMA 4 enclosure.
 4. The pressure switch shall be dual set point, to stop the pump if low pressure (indicating no flow) or high discharge pressure occurs.
 5. The pressure sensor shall be compatible with 150 pound ANSI flanges.

6. A control panel (may be incorporated into main or pump control panel; coordinate with Division No. 16) shall be furnished which will include the following:
 - a. Indicating light for low pressure trip.
 - b. Indicating light for high pressure trip.
 - c. Start/stop/reset buttons for each pump (coordinate with pump controls).
 - d. Alarm for high or low pressure trip; alarm silencer and reset.
 - e. Adjustable timer for pump prime.
 - f. Contacts for pump motor starters.

E. Variable Frequency Drive Controller

1. Pump manufacturer to provide a digital AC drive, variable frequency inverter. The inverter shall incorporate microprocessor digital control, surface mount technology and shall be equal to the E-TRACT WFC Series as manufactured by Woods, or approved equal.
2. The controller shall provide digital control and parameter settings for easy operator adjustment of the drive speed.
3. A 2-line by 16 character alpha-numeric display on the operator keyboard shall show the operator the operating condition of the drive.
4. Remote control and monitoring shall be provided.
5. Controls and digital readout shall be included in NEMA 4X control panel (coordinate with main or pump control panel).

2.03 Piping and Fittings

- A. Flanged, ductile iron, see Section 02733 and Section 15410.

2.04 Plug Valve

- A. See Section 02733.

2.05 Corrosion Protection

- A. See Section 09900.
- B. Shop Prime: Pump equipment shall be shop primed or coated as recommended by manufacturer for the installed environment and anticipated operating conditions (severe duty).
- C. Field Coat: As required by Section 09900 and as recommended by manufacturer.
- D. Colors: Shall be applied in accordance with ANSI A13.1 - Scheme for the Identification of Piping Systems and as required by Section 15190.

2.06 Spare Parts

- A. **One complete set of spare parts as recommended by manufacturer shall be furnished.**

- B. As a minimum, the following spare parts shall be provided:**
 - 1.
 - 2.
 - 3.
 - 4.
- C. Spare parts shall be delivered to the Owner for storage and use as required, prior to project closeout.**
- D. Any spare parts consumed during the course of equipment startup shall be replaced by the equipment manufacturer.**
- E. Complete parts lists, indicating parts recommended for normal stock by the Owner, shall be provided as part of the Operation and Maintenance Manuals provided by the equipment manufacturer.**

PART 3 EXECUTION

3.01 Examination

- A. Verify site conditions under provisions of Section 01039.
- B. Verify that concrete, piping, anchor bolts and all related structural supports are ready to receive Work and dimensions are as shown on Drawings and meeting the approval of the manufacturer.
- C. Verify that electric power is available and of the correct characteristics.

3.02 Preparation

- A. Verify all dimensions, elevations, concrete foundation, piping and all related items.
- B. Verify all concrete work conforming to Drawings and meeting approval of the manufacturer.
- C. Clean thoroughly the installation area. Remove all debris.
- D. Inspect all equipment for damage prior to installation. Damaged equipment shall not be installed.

3.03 Installation

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with standards required by authority having jurisdiction.
- C. Anchor equipment securely in place.
- D. Sequence installation to insure piping and electrical connections are provided in a correct, orderly and expeditious manner.
- E. Assemble all components as instructed by manufacturer.
- F. Grout in place all installed equipment and facilities as instructed by manufacturer.
- G. Shim all equipment as required with machinery wedges as recommended by manufacturer.

- H. Level and plumb all equipment and piping. Verify installation elevations.
 - I. Install all pumps, drives and motors as recommended by manufacturer. Check rotation.
 - J. Install electrical and control equipment as instructed by manufacturer and in accordance with Division No. 16. Provide connection to electrical service.
 - K. Lubricate all mechanical equipment as required by manufacturer prior to start-up.
- 3.04 Adjusting
- A. Adjust Work under provisions of 01650.
 - B. Check all mechanical components for freedom of movement and rotation.
 - C. Check all anchors and supports. Tighten as required.
- 3.05 Field Quality Control
- A. Perform field inspection and testing under provisions of Section 01400.
- 3.06 Start-Up
- A. Provide start-up under provisions of Section 01650.
- 3.07 Schedule
- A. Progressing Cavity Pump
 - 1. General Service Conditions: 120 GPM at 28 feet TDH; maximum static lift at pump = 10 feet; 3 percent solids (more or less) digested sludge.
 - 2. Maximum Pump Speed: 300 RPM.
 - 3. Pump Performance at 300 RPM

| Flow (GPM) | Differential Pressure (PSI) |
|------------|-----------------------------|
| 150 | 0 |
| 148 | 20 |
| 136 | 30 |

- 4. Number Stages: 1.
- 5. Pump Model Number: Moyno Series 2000, Model 1F050G1; Type CDG; trim AAA with rectangular fabricated steel base, coupling, guard; 6 inch diameter 125 pound suction and discharge flanges.
- 6. Drive: 7-1/2 horsepower, high premium efficiency, 1725 RPM, 3-phase, 60 Hz, 460 volt, with gear reducer and 7-1/2 horsepower AC variable frequency drive.
- 7. Number Pumps Required: 2 (complete).

[2244.5]
[Rev. 01/11]

END OF SECTION

SECTION 11326
SUBMERSIBLE EFFLUENT PUMP (PACKAGED SYSTEM)

PART 1 GENERAL

- 1.01 Section Includes
- A. Submersible effluent pump.
 - B. Fiberglass wetwell.
 - C. Guiderails.
 - D. Controls.
 - E. Piping, valves and related items.
- 1.02 Related Sections
- A. Applicable to Work of this Section are the Drawings and General Provisions of the Contract, including: Part IV, General and Supplementary Conditions; Part V, Special Conditions; Part VI, Technical Specifications; Division No. 1, General Requirements.
- 1.03 References
- A. NEC – National Electrical Code.
 - B. IMC – International Mechanical Code.
- 1.04 Submittals
- A. Submit under provisions of Section 01300.
 - B. Shop Drawings: Indicate dimensions, elevations, sizes, mounting, assembly, layout and all related items.
 - C. Product Data: Descriptive literature, shop drawings, details, dimensions, materials of construction, connections, electrical and controls and all related items.
 - D. Manufacturer's Installation Instructions: Submit manufacturer's installation requirements and instructions.
- 1.05 Operation and Maintenance Data
- A. Submit under provisions of Section 01700.
 - B. Maintenance Data: Include all required start-up, operational, routine maintenance requirements, troubleshooting, including specific operational and maintenance instructions.
- 1.06 Spare Parts
- A. **Provide one complete set of spare parts as recommended by manufacturer shall be furnished (See Paragraph 2.10).**

1.07 Delivery, Storage and Handling

- A. Deliver, store, protect and handle Products as instructed by manufacturer and in accordance with Section 01600.

1.08 Qualifications

- A. Manufacturer: Company specializing in the manufacturing of the Products specified in this Section with minimum three years documented experience.
- B. Installer: Company specializing in the installation of the Products specified in this Section with minimum three years documented experience.

1.09 Warranty

- A. Provide minimum one year warranty in accordance with Section 01700. Warranty period begins with date of written acceptance of facility by Owner.

1.10 Field Measurements

- A. Verify that field measurements are as shown on Drawings and as instructed by manufacturer.

1.11 Regulatory Requirements

- A. All components and the completed total assembly installation shall comply with all OSHA Requirements, NEC – national Electrical Code, IMC – International Mechanical Code and all other applicable codes, regulations and guidelines.

1.12 Quality Assurance

- A. In accordance with Section 01400.

1.13 Project Record Documents

- A. Accurately record actual location of all equipment and concealed utilities in accordance with Section 01700.

PART 2 PRODUCTS

2.01 General

- A. Contractor shall furnish all labor, materials, equipment and incidentals required to provide duplex pumping system as specified herein. The system shall be by the same manufacturer as supplying the pump and motor control panel so as to insure suitability and assurance of experience in matching the equipment together and to insure single source responsibility for the equipment.
- B. System shall consist of single submersible, sewage effluent pumps, level control switches, discharge plumbing with hydraulically sealed discharge flange, pump mounting plates with bottom rail supports, upper rail supports, lifting chain, pedestal mount and cord sealing plate for panel or NEMA 4 junction box; to be installed in factory fabricated fiberglass basin with cover. A weatherproof control box shall be supplied for mounting at the site or remote from the basin as required. Structure and dimensions to be as shown on Drawings.
- C. The effluent pump shall be designed to handle sewage effluent from septic tanks or similar effluent applications. See Schedule for minimum size solids handling.

- D. **Manufacturer:** The manufacturer shall be Barnes Pumps, Inc., Mansfield, OH, or approved equal.

2.02 Pump Performance

- A. Each pump shall have the necessary characteristics and be properly selected to perform under its specific operating conditions.
- B. The specific operating conditions are as specified for each separate pump facility under Schedule at the end of this Section.
- C. The pump motor shall be non-overloading throughout the entire range of operation without employing service factor. The pump motor shall reserve a minimum factor of 1.15.

2.03 Pump Construction

- A. Each pump shall be of the sealed submersible type. The pump volute, motor and seal housing shall be high quality gray cast iron, ASTM A-48, Class 30. All external mating parts shall be machined and Buna-N Rubber O-ring sealed on a beveled edge. Gaskets shall not be acceptable. All fasteners exposed to the pumped liquids shall be 300 Series stainless steel.
- B. Electrical Power Cord
1. Electrical power cord shall be water resistant 600 Volts, 60 degrees C., UL and or CSA approved and applied dependent on amp draw for size.
 2. The pump shall be protected with compression fitting and epoxy potted area at the power cord entry to the pump. A separation between the junction box areas of the pump and the motor by a stator lead sealing gland or terminal board shall not be acceptable.
 3. The power cable entry into the cord cap assembly shall first be made with a compression fitting. Each individual lead shall be stripped down to bare wire, at staggered intervals, and each strand shall be individually separated. This area of the cord cap shall then be filled with an epoxy compound potting which will prevent water contamination to gain entry even in the event of wicking or capillary attraction.
 4. The power cord leads shall then be connected to the motor leads with extra heavy connectors having brass inserts with a screwed wire to wire connection, rather than a terminal board that allows for possible leaks.
 5. The cord cap assembly where bolted to the connection box assembly shall be sealed with a Buna-N Rubber O-ring on a beveled edge to assure proper sealing.
- C. Motor: The stator, rotor and bearings shall be mounted in a sealed submersible type housing. The stator windings shall have Class F insulation, (155 degrees C or 311 degrees F), and a dielectric oil filled motor, NEMA B design (3-phase), NEMA L design (single phase). Air-filled motors shall not be acceptable.
- D. The pump and motor shall be specifically designed so that they may be operated partially dry or completely submerged in the liquid being pumped. The pump shall not require cooling water jackets. Dependence upon, or use of, water jackets for supplemental cooling shall not be acceptable.
- E. Stators shall be securely held in place with a removable end ring and threaded fasteners so they may be easily removed in the field without the use of heat or a press. Stators held by a heat shrink fit shall not be acceptable. Stators must be capable of being repaired or rewound by a local motor service station. Units which required service only by the factory shall not be acceptable. No special tools shall be required for pump and motor disassembly.

- F. Pump shall be equipped with heat sensors. The heat sensor(s) (one on single phase, two on three phase) shall be a low resistance, bi-metal disc that is temperature sensitive. It (they) shall be mounted directly in the stator and sized to open at 120 degrees C or 130 degrees C and automatically reset at 30-35 degrees C differential. The sensor shall be connected in series with the motor starter coil so that the starter is tripped if a heat sensor opens. The motor starter shall be equipped with overload heaters so all normal overloads are protected by external heater block.
- G. Bearings and Shaft: An upper radial bearing and a lower thrust bearing shall be required. These shall be permanently lubricated by the dielectric oil which fills the motor housing. Sealed grease packed bearings shall not be acceptable. Bearings which require lubrication according to a prescribed schedule shall not be acceptable. Bearings shall be locally available. Units which require the use of more than two bearings shall not be acceptable.
- H. The shaft shall be machined from a solid 416 stainless steel and be a design which is of large diameter with minimum overhang to reduce shaft deflection and prolong bearing life.
- I. Seals: The pump shall have a single seal. John Crane Type seals shall be used with the rotating seal face being carbon and the stationary seal face being ceramic. Units which require the use of tungsten-carbide seals or foreign manufactured seals shall not be acceptable. Seals shall be locally available.
- J. Impeller: Impeller shall be of **polypropylene** construction and non-overloading. Impeller shall be of the multi-vane, semi-open design with pump-out vanes on the backside of the impeller to prevent grit and other materials from collecting in the seal area. Impeller shall not require coating. Performance data submitted shall be based on performance with an uncoated impeller. Attempts to improve efficiency by coating impeller shall not be acceptable.
- K. Impellers shall be hydraulically and statically balanced. The tolerance values shall be as listed below according to the International Standard Organization grad 6.3 for rotors in rigid frames. The tolerance is to be split equally between the two balance planes which are the two impeller shrouds.

| RPM | Tolerance |
|------|------------------------------------|
| 3500 | .01 In.-Oz./Lb. of Impeller Weight |
| 1750 | .02 In.-Oz./Lb. of Impeller Weight |

- L. Painting: The pump shall be painted after assembly, but before testing, with a lead free air dried enamel. The paint shall be applied in one coat, with a minimum mil thickness of 2.0 mils.
- M. Testing: Commercial testing shall be required and include the following:
 1. The pump shall be visually inspected to confirm that it is built in accordance with the specification as to HP, voltage, phase and hertz.
 2. The motor and seal housing chambers shall be hi-potted to test for moisture content and/or insulation defects.
 3. Pump shall be allowed to run dry to check for proper rotation.
 4. Discharge piping shall be attached, the pump submerged in water and amp readings shall be taken in each leg to check for an imbalanced stator winding. If there is a significant difference in readings, the stator windings shall be checked with a bridge to determine if an unbalanced resistance exists. If so, the stator will be replaced.

2.04 Operational/Control System

- A. System shall operate as an automatic, pumping system with low water cut-off and high water alarm.
- B. On sump level rise lower switch shall first be energized, then upper level switch shall next energize and the pump. With the pump operating, sump level shall lower to low switch turn-off setting and pump shall stop. If level continues to rise when the pump is operating, alarm switch shall energize and signal the alarm, where used. All level switches shall be adjustable for level setting, from the surface.
- C. Sump Level Controls: Float switches shall be supplied to control sump level and alarm signal. The switches shall be sealed in a solid polypropylene float for corrosion and shock resistance. The support wire shall have a heavy Neoprene jacket. A weight shall be attached to cord above the float to hold switch in place in sump and efficiently prevent sharp bends in the cord when the float operates.
- D. Control Panel: Complete control panel including starters, breakers, wiring, contacts, HOA switches and all electrical and control facilities shall be included as required for automatic pump operation. The panel shall be **NEMA 3R**, adequate for all weather outdoor operation. The panel shall be complete, ready for connection to electrical source. Panel shall include a run light, circuit breaker and pump overload reset button (each pump) and a high water level alarm and light.
- E. Provide SPDT contacts for use by Owner.
- F. See Division No. 16.

2.05 Check Valve and Piping

- A. The discharge piping shall include a ball check valve with hydraulically sealed discharge flange and a ball valve for each pump. Discharge from station shall be fitted with NPT coupling(s). All piping external to the station shall be furnished and installed by the Contractor.

2.06 Fiberglass Basin

- A. Unless otherwise indicated, the plastic terminology used in this Specification shall be in accordance with the definitions given in American Society for Testing and Materials (ASTM) designations D3299-81. This Specification is for the hand lay-up, chopped spray technique and filament wound methods for manufacturing of vertical underground fiberglass basins.
- B. The resin used shall be of a commercial grade and shall be evaluated as a laminate by test or determined by previous service to be acceptable for the environment. The resins used may contain the minimum amount of fillers or additives required to improve handling properties. Up to 5 percent by weight of thixotropic agent which will not interfere with visual inspection may be added to the resin for viscosity control. Resins may contain pigments and dyes by agreement between fabricator and Engineer, recognizing that such additions may interfere with visual inspection of laminate quality.
- C. The reinforcing material shall be a commercial grade of glass fiber having a coupling agent which will provide a suitable bond between the glass reinforcement and the resin.
- D. The laminate shall consist of an inner surface, an interior layer and a filament-wound structural exterior layer of laminate body.
- E. The inner surface shall be free of cracks and crazing with a smooth finish and with an average of not over two pits per square foot, providing the pits are less than 1/8 inch in diameter with not over 1/32 inch deep and are covered with sufficient resin to avoid exposure of inner surface fabric. Some waviness shall be permissible as long as the surface is smooth and free of pits. Between 0.100 and 0.020 inches of resin-rich surface shall be provided.

- F. A minimum of 0.100 inch of the laminate next to the inner surface shall be reinforced with 30 percent by weight of chopped-strand fiber having fiber lengths from 0.5 to 2.0 inches.
 - G. Subsequent reinforcement shall be continuous-strand roving fiberglass. The thickness of the filament-wound portion of the tank shell shall vary with the tank height to provide the aggregate strength necessary to meet the tensile and flexural requirements. If additional longitudinal strength is required, the use of other reinforcement, such as woven fabric, chopped-strand mat, or chopped strands shall be interspersed in the winding to provide additional strength. Glass content of this filament-wound structural layer shall be 50 to 80 percent by weight. The exterior surface shall be relatively smooth with no exposed fibers or sharp projections. Hand work finish shall be present to prevent fiber exposure.
 - H. The tank wall must be designed to withstand wall collapse based on hydrostatic type loading by backfill with a density of 120 pounds per cubic foot plus a highway surcharge of 600 pounds per square foot. The tank wall laminate must be constructed to withstand or exceed two times the assumed loading for any depth of basin.
 - I. For the tank bottom, subsequent reinforcement shall be of 1.5 ounces per foot 2 chopped strand fiber or woven roving to a thickness to withstand applicable hydrostatic uplift pressure, with a safety factor of 2. In saturated conditions, the center deflection of any empty tank bottom shall be less than 3/8 inch (elastic deflection) and will not interfere with bottom pump mounting requirements nor rail system.
 - J. The width of the first layer of joint overlay shall be 3 inches minimum. Successive layers shall uniformly increase in width to form a smooth contour laminate that is centered on the joint plus or minus 1/2 inch. A highly filled resin paste may be placed in the crevices between joined pieces leaving a smooth surface for lay-up. The cured resin surface of the parts to be joined shall be roughened to expose glass fiber. This roughened area shall extend beyond the lay-up areas so that no reinforcement is applied to an unprepared surface. Surfaces shall be clean and dry before lay-up. The entire roughened area shall be coated with resin after joint overlay is made.
 - K. The finished laminate shall be as free as commercially practicable from visual defects such as foreign inclusions, dry spots, air bubbles, pinholes, pimples and delamination.
 - L. The surfaces shall be relatively smooth, hand finish is acceptable, with no exposed fibers or sharp projections.
 - M. Tanks shall be mounted on cradles if shipping is horizontal, or on a suitable skid or pallet if shipping in the vertical position. The tank shall be secured to the cradles or skid so that there can be no movement of the tank in relation to the skid or cradle under normal handling.
 - N. The tank bottom shall extend past the tank walls so that the O.D. is approximately 4 inches larger in diameter than the O.D. of the sidewalls. This larger diameter shall serve as an anti-flotation flange. Contractor shall place the tank on a concrete pad and secure with stainless steel anchors as shown on Plans.
 - O. Tank shall include NPT discharge fitting(s). A 4 caulking type bolt-on thermoplastic influent hub shall be provided for mounting in the field. The hub shall be beveled approximately three degrees to accommodate gravity pipe coming in from various angles.
- 2.07 Cover
- A. Cover shall be aluminum, sized and designed to fit the top flange of the basin and meet all standard requirements, as recommended by manufacturer.
 - B. The cover shall include access doors for pump removal by guiderails.

- C. The cover shall be bolted to the basin with stainless steel bolts sized as recommended by manufacturer and as shown on the Plans.

2.08 Guiderails

- A. "T" bar type guiderail, quick disconnect discharge flange and chain shall be provided to permit individual removal and replacement of each pump as required for repair and/or maintenance.
- B. "T" bar, chain and all fittings shall be stainless steel.

2.09 Piping, Valves, Fittings and Pressure Gauge

- A. See Section 02733.

2.10 Spare Parts

- A. One complete set of spare parts as recommended by manufacturer shall be furnished.**
- B. Spare parts shall be delivered to the Owner for storage and use as required, prior to project closeouts.**
- C. Any spare parts consumed during the course of equipment startup shall be replaced by the equipment manufacturer.**
- D. Complete parts lists, indicating parts recommended for normal stock by the Owner, shall be provided as part of the Operation and Maintenance Manuals provided by the equipment manufacturer.**

PART 3 EXECUTION

3.01 Examination

- A. Verify site conditions under provisions of Section 01039.
- B. Verify that concrete, piping, and all related items are ready to receive Work and dimensions are as shown on Drawings and meeting the approval of the manufacturer.
- C. Verify that electric power is available and of the correct characteristics.
- D. Verify electrical, mechanical, piping, drives and control equipment are available and ready for installation.

3.02 Preparation

- A. Verify all dimensions, elevations, piping, concrete, foundation and all related items.
- B. Verify all concrete work conforming to Drawings and meeting approval of the manufacturer.
- C. Clean thoroughly the sump basin. Remove all debris.
- D. Inspect all equipment for damage prior to installation. Damaged equipment shall not be installed.
- E. Verify anchor bolt placement.

3.03 Installation

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with standards required by authority having jurisdiction.
- C. Anchor equipment as recommended by manufacturer.
- D. Sequence installation to ensure piping and electrical connections are provided in a correct, orderly and expeditious manner.
- E. Assemble all components as instructed by manufacturer.
- F. Level and plumb all equipment and piping. Verify installation elevations.
- G. Install all pumps, drives and motors as recommended by manufacturer. Check rotation. Connect piping.
- H. Install electrical and control equipment as instructed by manufacturer and in accordance with Division No. 16. Provide connection to electrical service.
- I. Lubricate all mechanical equipment as required by manufacturer prior to start-up.

3.04 Adjusting

- A. Adjust Work under provisions of Section 01650.
- B. Check all mechanical components for freedom of movement and rotation.
- C. Check all anchors and supports. Tighten as required.
- D. Adjust all level control settings as recommended by manufacturer and as shown on Plans.

3.05 Field Quality Control

- A. Perform field inspection and testing under provisions of Section 01400.
- B. The Contractor shall be totally responsible for furnishing a complete and fully operational system, including all details, equipment and facilities as required for a total and complete installation with first class workmanship and materials and equipment of the highest quality meeting these Specifications, the Drawings and the intent of the Contract Documents.
- C. Electrical controls, switches, conduit, relays, wiring and all related items required for operation of the equipment, shall be of the highest quality with regard to materials and workmanship and shall meet all applicable codes.
- D. All pumps shall be tested on-site in accordance with the manufacturers instructions. Certified test results shall be provided to the Engineer indicating that each pump meets or exceeds its required capacity head curve as indicated in the Schedule.

3.06 Start-Up

- A. Provide start-up under provisions of Section 01650.
- B. Manufacturer's Services: The services of a factory trained, qualified service representative of the equipment manufacturer shall be provided to inspect the complete installations to insure that it is installed in accordance with the Manufacturer's recommendations, make all adjustments necessary to

place the system in trouble free operation and instruct the operating personnel in the proper care and operation of the equipment furnished.

3.07 Schedule

A. Pump Station

1. **Pump**: Barnes Model No. EH522L or approved equal.
2. **Impeller Size**: 3.88 inches.
3. **Horse Power**: 0.5.
4. **RPM**: 3,450.
5. **Electrical**: 200 volts, single phase, 60 Hz.
6. **Number of Pumps Required**: 1.
7. **Discharge Diameter**: 2 inches.
8. **Drives**: Single Speed.
9. **Performance (Each Pump)**

| Flow | Head |
|--------|---------|
| 0 GPM | 49 Feet |
| 26 GPM | 38 Feet |
| 58 GPM | 28 Feet |

END OF SECTION

[2244.5]
[Rev.1/11]

SECTION 11353
CHEMICAL METERING PUMPS

PART 1 GENERAL

1.01 Section Includes

- A. Chemical metering pumps for sodium hypochlorite, sodium bisulfite.
- B. Controls.
- C. Related accessories.

1.02 Related Sections

- A. Applicable to Work of this Section are the Drawings and General Provisions of the Contract, including: Part IV, General and Supplementary Conditions; Part V, Special Conditions; Part VI, Technical Specifications; Division No. 1, General Requirements.

1.03 Submittals

- A. Submit under provisions of Section 01300.
- B. Product Data: Descriptive literature, shop drawings, details, dimensions, specified operating parameters, materials of construction, connections, electrical and control facilities and all related items.
- C. Manufacturer's Installation Instructions: Indicate special installation requirements, configurations, elevations, dimensions, equipment and related items.
- D. Chemical Resistance: Submittal data shall include chemical resistance information indicating that the materials of construction are appropriate for each chemical feed system.
- E. Electrical: An electrical and instrumentation wiring schematic clearly showing the numbered terminals to be used for field wiring connections.

1.04 Operation and Maintenance Data

- A. Submit under provisions of Section 01700.
- B. Maintenance Data: Include all required start-up, operational, safety, routine maintenance requirements, troubleshooting, including specific operational and maintenance instructions.

1.05 Spare Parts

- A. **One complete set of spare parts as recommended by manufacturer shall be furnished (See Paragraph 2.03).**

1.06 Delivery, Storage and Handling

- A. Deliver Products to site under provisions of Section 01600.
- B. Store and protect Products under provisions of Section 01600.
- C. See 2.04.

1.07 Project Record Documents

- A. Accurately record actual location of all equipment and concealed utilities in accordance with Section 01700.

1.08 Quality Assurance

- A. In accordance with Section 01400.
- B. All pumps to be the product of one manufacturer.
- C. Pumps to be manufacture's standard catalog product.
- D. **Manufacturer Warranty: Drive and pumpheads shall have three (3) year manufacturer's warranty from date of written acceptance of facility owner.**
- E. Pumps shall be manufactured under ISO 9001.

1.09 Qualifications

- A. Manufacturer: Must have minimum five years documented experience in manufacturing the specified equipment. The manufacturer must have an extensive number of USA installation of comparable size and complexity with a history of long term operation and maintenance within the USA.
- B. Installer: Must have minimum five years documented experience in the installation of the equipment and facilities.

1.10 Regulatory Requirements

- A. All components and the completed total assembled installation shall comply with all OSHA Requirements, National Electrical Code (Latest Edition), International Mechanical Code (Latest Edition) and all other applicable codes, regulations and guidelines.

1.11 Field Measurements

- A. Verify that field measurements are as shown on Drawings and as instructed by manufacturer.
- B. Verify that all concrete work, structures, piping, sizes, shape, configuration, elevations, dimensions and all related items meet equipment manufacturers' approval prior to installation of equipment.

1.12 Warranty

- A. Contractor to provide minimum one year warranty in accordance with Section 01700 on all equipment furnished. Warranty period begins at date of written acceptance of facility by Owner.
- B. See 1.08 D for equipment manufacturer's warranty.

1.13 Equipment Installation Data

- A. The manufacturer shall furnish complete, clear, concise and adequate shop drawings, details, diagrams, bill of materials, installation instructions and all other information and data as required for the proper installation of the equipment.
- B. The manufacturer shall include any sequence of operations or installation activities which must be followed during the installation of the equipment.

PART 2 PRODUCTS

2.01 General

- A. The Contractor shall furnish and install chemical metering pumps and related accessories for the following chemicals:
 - 1. Liquid sodium bisulfite.
 - 2. Liquid sodium hypochlorite.
- B. The chemical metering systems shall be completely self-contained and designed to safely feed metered amounts of all chemicals as listed under Service Conditions. Each chemical metering skid shall include chemical metering pumps, accessories, controls and options as indicated in this specification and the contract drawings.
- C. Manufacturer: Metering pump shall be Watson Marlow, Verder, or approved equal.

2.02 Chemical Metering Pump

- A. Pumps shall be positive displacement peristaltic type complete with spring load pumphead, self contained variable speed drive, and flexible extruded tube as specified.
- B. Peristaltic pumping action shall be created by the compression of the flexible tube between the pumphead rollers and track, induced forward fluid displacement within the tube by the rotation of the pump rotor, and subsequent vacuum-creating restitution of the tube.
- C. Pumps shall be dry self priming, capable of being run dry without damaging effects to pump or tube, and shall have a maximum suction lift capability of up to 30 feet vertical water column. Max pressure rating shall be 30 psi.
- D. Pumps shall use no check valves or diaphragms and shall require no dynamic seals in contact with the pumpage. Process fluid shall be contained within pump tubing and shall not directly contact any rotary or metallic components.
- E. Flow shall be in the direction of the rotor rotation which can be reversed and shall be proportional to rotor speed.
- F. Pumphead
 - a. Technology: Provide tool-free ReNu cartridge-style peristaltic pumphead technology.

For operator safety, pumphead must be serviceable as a single replaceable component. Pumps that require an operator to open the pumphead for tube replacement, cleaning, or rebuilding or that require tools for maintenance are unacceptable.
 - b. Max Rating: Qdos 50 psi of discharge pressure.
 - c. Max Suction Rating: Self priming with a maximum suction lift capacity of 30 feet vertical water column.
 - d. Housing Construction: Corrosion resistant and high impact resistant glass filled PPS or PPE/PS.
 - e. Geometry: Pumphead shall consist of sealed track housing with in-line porting. Suction and discharge ports shall be 180 degrees apart with bottom suction and top discharge.
 - f. Rotor: Pumphead rotor shall be constructed of glass filled Nylon, sealed within the track housing, and supported by its own bearings. Peristaltic occlusion level shall be factory set to ensure flow

accuracy of +/- 1% and repeatability performance of +/- 0.5% and shall not require any field adjustment.

- g. Contact Materials: All pumphead components in the fluid path must be NSF61 listed and shall be of materials specified by the manufacturer as compatible with the process fluid.
- h. Leak Containment/Detection: In the event of peristaltic element failure, the leak sensor shall shut the pump down immediately with all process fluid contained within the sealed pumphead.
 - 1. Sensor Type: Utilize non-contacting optical sensor. Sensor shall not come in contact with the process fluid, shall contain no moving parts, shall not depend on the capacitance of the process fluid, shall not require fluid to leak out of the pump housing for engagement, nor shall require any sensitivity or calibration adjustment.
 - 2. Alarm: Sensor shall shut down the pump, give a visual indication on the drive controller, and if specified shall provide an output general alarm signal.
 - 3. For operator and environmental safety, pumps which do not have leak containment, leak sensor, and shutdown are not acceptable. For additional overpressure safety, sealed pumphead shall have a controlled drain-to-waste port.
- i. Port Connections: Pumphead shall utilize polypropylene compression fittings which shall mate to 10mm ID reinforced, transparent PVC interface hose.

G. Tubing

- 1. Pump tubing shall be in contact with the inside diameter of the track (housing) through an angle of 180 degrees and be held in place on the suction and discharge by a spring loaded self adjusting clamp mechanism. The tubing shall be replaceable with no disassembly of the pumphead and without the use of tools.
- 2. Pump tubing shall be constructed of Marprene II, a thermoplastic elastomer with a 64 Shore A durometer and 3/32" wall thickness. Pump shall readily accept tubing ID's of 1/16" 1/8" 3/16" 1/4" and 5/16" without pump adjustment or replacement. If required for chemical compatibility, pump manufacturer shall recommend an alternate tubing material.
- 3. Supply minimum 50 foot roll of each specified tubing size as required for the specified pumps.

H. Drive

- 1. Rating: Continuous 24 hour operation, 45° C ambient.
- 2. Voltage: Drive shall be suitable for 100-240VAC, 60Hz, 1-Phase with an internal switch-mode power supply. Supply nine-foot length mains power cord with standard 115VAC three-prong plug.
- 3. Max Drive Power Consumption: 190VA.
- 4. Enclosure: NEMA 4X constructed out of corrosion and impact resistant engineering plastic, 20% Glass filled PPE/PS. By nature of the environmental conditions, painted or unpainted metallic housing including 316SS are not acceptable. Enclosure shall house the drive motor and all control circuitry in one integrated unit. Separate VFDs and motors are not acceptable.
 - a. Direct coupled pumphead with fully protected drive
 - i. Pumphead shall direct couple mount to the controller via a splined drive shaft and shall be locked in place by two tool-free thumbscrews or lever mechanism.

- ii. Pumphead shall be fully sealed to prevent any contamination of the controller or drive shaft by process fluid.
 - iii. Pumphead shall contain its own rotor bearings and not impart an overhung load on its pump shaft
 - iv. Pumpheads shall be supplied mounted to the left or right side of the drive enclosure as specified in the drawings. If not specified, pumpheads shall mount to right side of the enclosure.
 - v. Drive shall stop rotation and give visual alarm in the event the pumphead is removed
5. Drive motor: brushless DC motor with integral gearbox and closed loop tachometer feedback.
 6. Circuitry complete with temperature and load compensation protection.

I. Electrical and Controls

1. Manual Control Interface: Pumps must meet the following minimum requirements for human-machine interface (HMI) manual operator functionality. Pumps not meeting this minimum functionality will not be accepted.
 - a. Display: Backlit graphical TFT Display capable of up to 8 lines of text with up to 26 characters per line to display pump tag number, flow rate, and programming instructions. Display shall also provide visual indication of running status via screen color: Blue = Running, White = Stopped and Red = Warning.
 - b. Keypad: Keypad for start, stop, speed increment, speed decrement, rapid prime, and programming.
 - c. Flow Units: Programmable in either ml/min or gallons/hour.
 - d. Security: Programmable in either ml/min or gallons/hour.
 - e. Auto Restart: Feature to resume pump status in the event of power outage interruption.
 - f. Multilingual Menu: Include programming menus in nine languages, including at a minimum English, Spanish and French.
 - g. Fluid Level Monitor: Programmable flow totalization to advise operator when their supply tank is low.
2. Remote Control I/O
 1. Supply auto control features to meet the minimum functionality requirements for the use with Scada System. Pumps not meeting this minimum functionality will not be accepted.
 - a. Speed Control Input: Analog 4-20mA speed input with 1,600:1 turndown with incremental steps of 10 microamps.
 - i. Run/Stop Input: Either 5-24V industrial logic, dry contact or powered 110 VAC contacts as shown per the process and instrumentation drawings.
 - ii. Run/Stop and General Alarm Status Outputs: Either 24VDC Open Collector, 24VDC Status Relay, or 110V AC Status Relay as shown per the process and instrumentation drawings.

2. Status Output: Two status output 24VCD Open Collector, 24VDC Status Relay, or 110VAC Status Relay as required by the process and instrumentation drawings, software configurable to indicate the following:
 - a. General Alarm status.
 - b. Running/Stopped status.
 - c. Manual Mode status.
 - d. Analog Mode status.
 - e. Contact Mode status.
 - f. Fluid Level status.
 - g. Leak Detected status.
3. HMI, analog connections, and mains power shall be accessible from the front or side of the enclosure.

2.03 Chemical Metering Skid

A. Chemical Metering Skid General Description

1. The chemical metering skids shall be CNC Routed from HDPE sheet or Co Polymer Polypropylene sheet stock with a minimum thickness of 1/2 inch. The design of the skid shall include gussets and supports as required for all components and shall be self-supporting. The skid shall be designed with a minimum of a 2-1/2" containment lip to contain spills. All components of the chemical metering system shall be contained within the skid. The skid shall be manufactured using continuous welding technology; bolted construction is not acceptable. Pump stands shall be provided shall be provided to elevate the metering pumps above the skid base.
2. The pre piped skid mounted system shall include pressure relief valve(s); diaphragm protected pressure gauge(s); calibration column(s), and all required piping, isolation valves and supports as required to serve pumps shall be pre piped on the skid. The pump(s) shall be piped to provide service to the main chemical feed point.
3. Piping shall include isolation valves and unions for all serviceable components. The chemical supply piping shall feature a calibration column designed for independent use with any of the metering pumps while other pump(s) remain in active service. The pump connections shall be designed with replaceable pipe sections on the suction and discharge via union or flange so that pump replacement or upgrade can be accomplished without cutting into skid piping. Provided flexible tubing connections and quick connects between fixed piping and suction and discharge of the pumps.
4. The piping shall be attached to the chemical metering skid with a non-metallic corrosion resistant support system. All support extensions shall be factory attached to the skid. The straps shall be removable and reusable to allow for servicing of the system. All inlet/outlet connections, valves and pump accessories shall be clearly labeled on the skid for easy identification.
5. The chemical feed skid manufacturer shall be responsible for providing a NEMA 4X interface box with labeled terminal strips per pump for inlet and output control wires. The chemical feed skid manufacturer is also responsible for installing all control wiring from the pumps to the NEMA 4X interface. Box and installing input and output control wires on the terminal strips. Class 1 wiring shall be separated from Class 2/3 wiring in accordance with the National Electrical Code.

6. The chemical feed skid manufacturer shall be responsible for providing a prewired and piped 120V receptacle with an "Extra Duty," "In-Use" weatherproof cover for each skid mounted pump completely independent from the control wiring. Each skid will have an electrical junction box that has been prewired from the 120V receptacle for the electrical contractor to tie into. The electrical contractor is responsible for running conduit and tying into skid mounted electrical junction box and installing 120V supply power to the skid.
7. The chemical metering skids shall be completely assembled and tested by the manufacturer prior to delivery to the job site.
8. The design and fabrication of the chemical metering skids shall comply with the following criteria:
 - a. All piping shall be fabricated to production drawings that detail all pipe nipples, fittings, valves, metering accessories, supports, etc.
 - b. The manufacturer prior to delivery shall hydraulically and electrically test each system. Testing shall be documented and include verification of pump performance and response to remote systems using simulation equipment as required.

B. Accessories

1. Calibration Columns

- a. A clear calibration column made of materials compatible with pumped fluid shall be provided in the chemical supply piping. Calibration column shall be direct reading in both ml/minute and Gallons/Hour and sized to at least a 30-second drawdown.

2. Pressure Relief Valves

- a. Pressure relief valves shall be provided in the discharge piping of each metering pump, prior to any valves, to eliminate the buildup of excess pressure in the system. The pressure relief valves shall be fully adjustable from 10 – 150 psi with bodies compatible with the pumped fluid. Spring loaded valve shall have a Teflon diaphragm and no metal parts in contact with the chemical. Output of the pressure relief valves shall be field piped to return to the day tanks.

3. Diaphragm Protected Pressure Gauges

- a. Liquid filled pressure gauges with isolators shall be provided for indication of system pressure in the suction piping and discharge piping of each metering pump. Industrial quality all 316 Stainless Steel gauges shall be utilized. The isolators shall have housings compatible with the pumped fluid. Isolation diaphragm shall be Teflon. The process connection shall feature a SS reinforcement ring not in contact with the chemical. A fabricated PVC bracket shall be provided for each pressure gauge to secure the isolator and prevent lateral movement of the pressure gauge. Gauge face shall be 2-1/2" inches diameter.

2.04 Piping and Valves

A. Polyvinylchloride (PVC)

1. Pipe and fittings shall be manufactured of Rigid Poly Vinyl Chloride (PVC) Schedule 80. Fittings shall be heavy-duty Schedule 80 molded fittings.
2. All pipe and fittings shall bear the company's name or trademark, material designation, size, applicable IPS schedule, and the NSF mark as indicative of compliance with this specification.

3. All fittings shall be injection molded of PVC fitting compound of cell classification 12454-B and of CPVC fitting compound of cell classification 23447-B as described in ASTM D-1784 Standard Specification for Rigid Poly Vinyl Chloride Compounds.
4. Workmanship shall be in accordance with good commercial practice. Fittings shall be homogeneous throughout and free from visible cracks, holes, foreign inclusions or other injurious defects. The fittings shall be commercially uniform in color, opacity, density and other physical properties.
5. All molded threads, internal or external, shall be "blunt start" threads. All threads shall conform to thread standard ANSI/ASME B1 .20.1 for tapered pipe threads. Threads shall measure not more than 1 1/2 threads large or small when checked with a plug gauge or ring gauge.
6. Dimensions and tolerances of sockets shall conform to PVC IPS Schedule 80 Socket Dimensions. All reducer bushings shall be designed so as to provide for a positive and sufficient grip for cementing bushings in place.
7. Waterways shall be smooth and commercially free of flash and irregularities. On tees and 90° elbows, bond lines shall not coincide with the maximum stress area (crotch).
8. Assembly shall be performed in a controlled shop, environment by the skid manufacturer. All pipe shall be squarely cut on precision equipment with the guidelines set by the pipe/fitting manufacturer for proper clearing, priming and gluing procedures. A heavy bodied solvent suitable for use with Sodium Hydroxide shall be used. All threaded connections will utilize Teflon tape, a suitable thread sealant or a combination of both. Threaded connections shall utilize stainless steel reinforcement rings where applicable to reduce the risk of cracking.

B. Isolation Valves

1. All ball valves, sizes 1/2" to 4", shall be of true union design with two-way blocking capability. All O-rings shall be EPDM or FPM based on chemical being pumped. Seats shall have elastomeric backing cushion of the same material as the valve seals. Stem shall have double O-rings and be of blowout-proof design. The ball valves shall have a pressure rating of 230 psi for sizes 1/2" to 3" and 150 psi for 4" at 70°F. Ball valves must carry a two-year guarantee. Ball valves shall be equal to Hayward TB Series as manufactured by Hayward Flow Control.

2.05 Spare Parts

- A. **Provide the following spare parts to the Owner for each chemical metering skid upon delivery of the pump skid. Spare parts shall include all parts required for two (2) years of normal maintenance of all components of the chemical metering system. All parts shall be in one box labeled with Skid ID Information:**

1. **(2) Replacement pump heads for each model of pump.**
2. **P/M kit for each pressure relief valve.**
3. **Spare valve of each size for each pump skid.**
4. **Parts list for all serviceable components.**

2.06 Shipping

- A. See 1.06.
- B. Ship pump and drive assembled complete. Ship tubing separately packed in a continuous length. Required length for installation shall be cut by the Contractor with remaining tubing being stored for spare replacement.

- C. Pack all additional spare parts in containers bearing labels clearly designating contents and pieces of equipment for which intended.
 - D. Deliver spare parts at the same time as pertaining equipment. Deliver to Owner after completion of work.
- 2.07 Pipe Identification
- A. Color code piping and apply plastic identification markers for all pumps and exposed chemical lines at junction boxes, chemical room and injection points.
 - B. Coordinate color and markers with Engineer.
 - C. See 15190.

PART 3 EXECUTION

- 3.01 Examination
- A. Verify site conditions under provisions of Section 01039.
 - B. Verify that concrete, piping, anchor bolts and all related structural supports are ready to receive Work and dimensions are as shown on Drawings and meeting the approval of the manufacturer.
 - C. Verify that electric power is available and of the correct characteristics.
- 3.02 Preparation
- A. Verify all dimensions, elevations, concrete supports, piping and all related items.
 - B. Verify storage tank installation.
 - C. Verify all concrete work conforming to Drawings and meeting approval of the manufacturer.
 - D. Clean thoroughly the installation area. Remove all debris.
 - E. Inspect all equipment for damage prior to installation. Damaged equipment shall not be installed.
- 3.03 Installation
- A. Install in accordance with manufacturer's instructions, and as shown on Drawings.
 - B. Unions shall be used at all equipment and valve connections to facilitate removal of equipment for repairs.
 - C. Contractor to utilize hose barb-to-process line adapters for connection of pump tubing to process lines. Hose barbs to be secured to the pump tubing via a hose clamp tightened around the OD of the tubing.
 - D. Install in accordance with standards required by authority having jurisdiction.
 - E. Anchor equipment securely in place.
 - F. Sequence installation to ensure piping and electrical connections are provided in a correct, orderly and expeditious manner.

- G. Install in accordance with National Electrical and International Mechanical Codes (Latest Edition), OSHA Regulations and Guidelines and all applicable codes, regulations and guidelines.
- H. Assemble all components as instructed by manufacturer.
- I. Level and plumb all equipment and piping. Verify installation elevations. Make all piping connections.
- J. Install all drives and motors as recommended by manufacturer. Check rotation.
- K. Install electrical and control equipment as instructed by manufacturer and in accordance with Electrical Drawings and Electrical Division No. 16. Provide connection to electrical service.
- L. Coordinate installation with Plant SCADA System.
- M. Lubricate all mechanical equipment as required by manufacturer prior to start-up.

3.04 Adjusting

- A. Adjust Work under provisions of 01650.
- B. Check all mechanical components for freedom of movement and rotation.
- C. Check all anchors and supports. Tighten as required.
- D. Check all piping. Repair all leaks as required.

3.05 Start-Up

- A. Provide start-up under provisions of Section 01650 and as indicated herein.
- B. Prior to plant start-up, all equipment shall be thoroughly cleaned and flushed to remove debris. All strainer elements shall be removed and cleaned after the equipment and piping have been thoroughly flushed. After cleaning, all equipment shall be inspected for proper alignment, quiet operation, proper connections, and specified performance by means of a functional test. The Contractor shall prepare and submit a log of all tests performed and shall advise the Owner of the testing schedule for each equipment item at least five (5) days in advance.
- C. The equipment manufacturer shall furnish the services of a factory trained representative for a minimum of two eight-hour days at the jobsite to monitor the installation, start-up, the initial operation of the equipment and the complete training and instruction of the plant operating personnel in proper operation and maintenance including safety procedures and precautions.
- D. The equipment manufacturer shall provide the following start-up services and shall include these services in the total cost of the equipment.
 - 1. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence or other conditions which may cause damage.
 - 2. Verify that all items listed in manufacturer's instructions have been checked prior to start-up.
 - 3. Verify that all safety equipment, devices and mechanisms are properly installed, connected and fully operable.
 - 4. Verify that all equipment protective devices including, but not limited to, overload switches/alarms, shutdown switches/alarms, and similar equipment and devices are properly installed, connected and fully operable.

5. Verify that tests, meter readings and specified electrical characteristics agree with those required by the equipment or system manufacturer.
6. Verify wiring and support components for equipment are complete and tested.
7. Verify that all equipment and controls are properly installed, supported, connected and ready for operation.
8. Verify that all equipment and control are properly set and adjusted for proper operation.
9. Verify type piping, fittings, and valves installed are adequate for each chemical feed system.
10. Demonstrate start-up, operation, controls, adjustment, troubleshooting, servicing, maintenance, alarms, safety features, shutdown and all other miscellaneous features of each item of equipment to the Owner.
11. A complete set of operation and maintenance data and manuals shall be furnished to the Owner with the equipment delivery.
12. Manufacturer shall demonstrate fully to the satisfaction of the Owner and Engineer that the equipment meets the required performance and is properly set and adjusted for its intended purpose in the overall plant operation.
13. Manufacturer shall certify in writing to the Owner that the equipment as installed and started up meets the requirements and the intent of the Contract Documents.

D. Chemicals. The chemicals for each chemical metering pump shall be furnished by the Owner.

3.06 Schedule

A. Sodium Bisulfate Pump

1. Number Required: 2.
2. Capacity: 0 to 16 gal/hour.
3. Head: 0 – 50 psi.

B. Sodium Hypochlorite Pump

1. Number Required: 2.
2. Capacity: 0 to 16 gal/hour.
3. Head: 0 - 50 psi.

END OF SECTION

[2244.5]
[Rev. 11/10]

SECTION 11363
POLYMER FEED UNIT

PART 1 GENERAL

1.01 Section Includes

- A. Polymer feed system.
- B. Related appurtenances.
- C. Controls.

1.02 Related Sections

- A. Applicable to Work of this Section are the Drawings and General Provisions of the Contract, including: Part IV, General and Supplementary Conditions; Part V, Special Conditions; Part VI, Technical Specifications; Division No. 1, General Requirements.

1.03 Submittals

- A. Submit under provisions of Section 01300.
- B. Product Data: Descriptive literature, shop drawings, details, dimensions, specified operating parameters, materials of construction, connections, electrical and control facilities and all related items.
- C. Manufacturer's Installation Instructions: Indicate special installation requirements, configurations, elevations, dimensions, equipment and related items.

1.04 Operation and Maintenance Data

- A. Submit under provisions of Section 01700.
- B. Maintenance Data: Include all required start-up, operational, safety, routine maintenance requirements, troubleshooting, including specific operational and maintenance instructions.

1.05 **Spare Parts**

- A. **One complete set of spare parts as recommended by manufacturer shall be furnished (See 2.07).**

1.06 Delivery, Storage and Handling

- A. Deliver Products to site under provisions of Section 01600.
- B. Store and protect Products under provisions of Section 01600.

1.07 Project Record Documents

- A. Accurately record actual location of all equipment and concealed utilities in accordance with Section 01700.

1.08 Quality Assurance

- A. In accordance with Section 01400.

1.09 Qualifications

- A. Manufacturer: Must have minimum five years documented experience in manufacturing the specified equipment. The manufacturer must have an extensive number of USA installation of comparable size and complexity with a history of long-term operation and maintenance within the USA.
- B. Installer: Must have minimum five years documented experience in the installation of the equipment and facilities.

1.10 Regulatory Requirements

- A. All components and the completed total assembled installation shall comply with all OSHA Requirements, National Electrical Code (Latest Edition), International Mechanical Code (Latest Edition) and all other applicable codes, regulations and guidelines.

1.11 Field Measurements

- A. Verify that field measurements are as shown on Drawings and as instructed by manufacturer.
- B. Verify that all concrete work, structures, piping, sizes, shape, configuration, elevations, dimensions and all related items meet equipment manufacturers' approval prior to installation of equipment.

1.12 Warranty

- A. Provide minimum one year warranty in accordance with Section 01700 on all equipment furnished. Warranty period begins at date of written acceptance of facility by Owner.

1.13 Equipment Installation Data

- A. The manufacturer shall furnish complete, clear, concise and adequate shop drawings, details, diagrams, bill of materials, installation instructions and all other information and data as required for the proper installation of the equipment.
- B. The manufacturer shall include any sequence of operations or installation activities which must be followed during the installation of the equipment.

PART 2 PRODUCTS

2.01 General

- A. The polymer feed unit shall be standard equipment of the manufacturer who shall be regularly involved in the manufacturing of Polymer Feed Systems. (See 1.09).
- B. Equipment to be provided with the polymer feed unit shall include the following:
 - 1. Mixing Chamber.
 - 2. Dilution water controls.
 - 3. Neat polymer pump.
 - 4. System Controls.

- C. The polymer system shall be a skid mounted system with interconnecting piping and wiring complete within skid limits.
- D. The polymer dilution/feed unit shall be capable of automatically metering, diluting, activating and feeding a liquid polymer with water.
- E. Unit shall be open frame design to allow easy access to all components.
- F. Mixing chamber shall be easily disassembled and reassembled to allow access to all parts exposed to neat polymer.

2.02 System Description

A. Multi-Zone Mixing Chamber

- 1. Polymer and water shall be mixed in a chamber designed to create sufficient mixing energy.
 - a. This design may include a motor driven impeller to create high fluid shear.
 - b. Solution shall undergo a tapered mixing intensity slope as it exits the initial shear zone and passes through a second zone, isolated by a baffle.
 - c. Polymer activation efficiency shall be consistent over the dilution water range.
- 2. Mixing chamber shall be transparent, or a section of discharge piping shall be transparent, to allow viewing of mixing intensity. An opaque mixing chamber and discharge piping combination shall be unacceptable.
- 3. Multi-zone mixing chamber may also be a hydrodynamic mixing chamber, with motor required. Mixing chamber may include either a stainless-steel injection check valve or a PVC check valve with a stainless steel check valve ball.

B. Dilution Water Control

- 1. Dilution water shall be split into two streams, if required by the manufacturer design.
 - a. Primary water flow shall supply the mixing chamber.
 - b. Secondary water flow shall be used to post dilute the activated polymer stream.
 - c. These two streams shall be completely blended by a static mixer prior to exiting the unit.
- 2. Each stream shall have an electronic flow sensor with immersed in-line element capable of transmitting a signal to the unit micro controller for display of flow rate. Element shall be removable without plumbing disassembly.
- 3. Each stream shall have a rate control valve for isolation of or throttling of water flow.
- 4. Unit may have an electric solenoid valve for on/off control of total dilution water flow.
- 5. Dilution water and solution output connections shall include 304 stainless steel unions connected to the chassis.

C. Pump

1. Unit shall have a neat polymer metering pump. Pump shall be positive displacement progressing cavity type and include thermal flow sensor for low polymer alarm with indication and manual reset. Polymer pump head shall have a 316 stainless steel rotor, Viton stator and a mechanical seal. Pumps with packing or lip seals shall not be acceptable.
2. Pump shall include a pressure relief valve located on the discharge side of the pump and piped to the pump suction. Pressure relief valve shall be PVC construction with Viton Seals. Systems utilizing pressure relief on the mix chamber discharge and requiring a connection to drain shall not be considered equal.
3. Pump shall be supplied with a 0.5 HP, 230 VAC, 3-PH, TEFC gearmotor.

D. Controls

1. Unit shall be operated with a programmable micro controller. Controller shall have polycarbonate touchpad membrane with four digit LED readout. Enclosure shall be non-metallic and of waterproof design.
2. Micro controller shall pace polymer metering pump based on operator programmed data or based on a 4-20 mA analog input signal. Operator shall be able to determine mode of operation at touchpad, internal or external.
3. Internal mode shall allow for automatic polymer pump pacing based on programmed set point. Operator shall be able to enter a make up concentration set point. Controller will compute a ratio of polymer to water from primary dilution water flow rate signal generated by flow element. Controller will generate signal to pace pump accordingly. As primary dilution water flow changes, set point concentration will be automatically maintained by controller.
4. External mode shall allow for automatic polymer pump pacing based on a 4-20 mA analog input signal.
5. Unit shall be powered through an on-off-remote circuit. In the remote mode, the unit shall accept a run signal. Unit is manually powered in the on mode. Controller shall indicate mode of operation with LED.
6. Unit shall have a dilution water loss of flow sensor which, sensing that water flow has been interrupted for any reason, will place the polymer pump and mix chamber on standby and will restart it automatically when flow is restored. An integral timer shall monitor loss of flow and energize contacts indicating alarm after 15 seconds of continuous loss. Controller shall indicate loss of water alarm with LED.
7. Controller LED display shall indicate:
 - a. Primary water flow display.
 - b. Secondary water flow
 - c. Polymer flow
 - d. Make up solution concentration in mixing chamber
 - e. Discharge solution concentration including post dilution
8. Controller shall have pre-programmed auto-flush cycle which will disable polymer pump yet allow dilution water to flow through system for a pre-set time at each shutdown.

9. Controller shall have dry contacts for these outputs:
 - a. General alarm
 - b. Run status
10. Controller shall have additional LED indication of these:
 - a. Loss of water flow alarm
 - b. (1) additional configurable alarm
 - c. Run status

11. Controller shall have 4-20 mA data output proportional to 0-100% pump speed.

2.03 Unit Connections

A. Plumbing

1. Dilution water inlet: 1-1/2" FNPT.
2. Neat polymer inlet: 1/2" FNPT.
3. Solution discharge: 1-1/2" FNPT.
4. Sizes may vary based on manufacturer's design.

B. Electrical

1. Standard, grounded male plug: 120/1/60, 21 amps.
2. Terminal blocks: 4-20 mA signal input.
3. Terminal blocks: dry contact input for remote start.
4. Terminal blocks: dry contact alarm output.
5. Terminal blocks: dry contract run output.

2.04 Polymer Feed Unit Materials

A. Dimensions

1. Frame, 36" wide x 20" deep x 40" high.
2. Dimensions may vary based on manufacturer's design.

B. Materials of Construction

1. Structural frame: 304 stainless steel.
2. Plumbing: PVC.
3. Mixing Chamber: PVC, acrylic or 304 stainless steel.

2.05 Polymer Feed Unit Accessories

A. Calibration Cylinder

1. A suitably sized calibration cylinder shall be supplied for the neat polymer feed pump. Cylinder shall be mounted to frame with PVC isolation ball valves.
2. Cylinder shall be calibrated in mL, and be constructed of clear PVC with slip on cap and 1/2-inch NPT vent connection.

B. Pressure Reducing Valve

1. A suitably sized pressure reducing valve shall be supplied for installation in the dilution water line.
2. Pressure reducing valve shall be constructed of bronze with adjustable output pressure of 25-75 psig to reduce incoming line pressure variations.
3. **Manufacturer: Watts Regulator Company, North Andover, MA; Superior Specialty Company, Pittsburg, PA; or approved equal.**

2.06 Spare Parts

- A. **One complete set of spare parts as recommended by manufacturer shall be furnished.**
- B. **Spare parts shall be delivered to the Owner for storage and use as required, prior to project closeout.**
- C. **Any spare parts consumed during the course of equipment startup shall be replaced by the equipment manufacturer.**
- D. **Complete parts lists, indicating parts recommended for normal stock by the Owner, shall be provided as part of the Operation and Maintenance Manuals provided by the equipment manufacturer.**
- E. **As a minimum, the following items shall be provided:**
 1. **Mechanical Seal for Mix Chamber.**
 2. **Mechanical Seal for Metering Pump.**
 3. **Mixing Chamber O-Rings.**
 4. **Injection Check Valve.**
 5. **Pump Stator.**

2.07 Manufacturer

- A. Polymer feed unit to be Poly Blend as manufactured by UGSI Water Technologies, Vineland, NJ; Tempest 2.0 as manufactured by Equip-Solutions, Roselle, IL; Prominent, Pittsburgh, PA; Fluid Dynamic, North Wales, PA, or approved equal.

PART 3 EXECUTION

3.01 Examination

- A. Verify site conditions under provisions of Section 01039.
- B. Verify that concrete, piping, anchor bolts and all related structural supports are ready to receive Work and dimensions are as shown on Drawings and meeting the approval of the manufacturer.
- C. Verify that electric power is available and of the correct characteristics.

3.02 Preparation

- A. Verify all dimensions, elevations, concrete supports, piping and all related items.
- B. Verify anchor bolt placement.
- C. Verify all concrete work conforming to Drawings and meeting approval of the manufacturer.
- D. Clean thoroughly the installation area. Remove all debris.
- E. Inspect all equipment for damage prior to installation. Damaged equipment shall not be installed.

3.03 Installation

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with standards required by authority having jurisdiction.
- C. Anchor equipment securely in place.
- D. Sequence installation to ensure piping and electrical connections are provided in a correct, orderly and expeditious manner.
- E. System shall have been shipped with all equipment mounted in place, factory pre-piped and pre-wired, ready for installation.
- F. Install in accordance with National Electrical and International Mechanical Codes (Latest Edition), OSHA Regulations and Guidelines and all applicable codes, regulations and guidelines.
- G. Assemble all components as instructed by manufacturer.
- H. Level and plumb all equipment and piping. Verify installation elevations. Make all piping connections.
- I. Lubricate all mechanical equipment as required by manufacturer prior to start-up, check rotation.

3.04 Adjusting

- A. Adjust Work under provisions of 01650.
- B. Check all mechanical components for freedom of movement and rotation.
- C. Check all anchors and supports. Tighten as required.
- D. Check all piping. Repair all leaks as required.

3.05 Start-Up

- A. Provide start-up under provisions of Section 01650 and as indicated herein.
- B. The equipment manufacturer shall furnish the services of a factory trained representative for a minimum of two eight-hour days at the jobsite to monitor the installation, start-up, the initial operation

of the equipment and the complete training and instruction of the plant operating personnel in proper operation and maintenance including safety procedures and precautions.

- C. Polymer shall be furnished by the Owner.

3.06 Schedules

- A. Polymer Feed Unit

- 1. Performance Requirements

- a. Dilution Water: 3,000 GPH.
 - b. Metering Pump: 30 GPH Neat Polymer.

- 2. Accessories: As specified.

- B. Number of Complete Polymer Feed Units Required: 1.

- C. The City has an existing Poly Blend Model M1200-P4AB as manufactured by UGSI Chemical Feed, Inc. in place. Supplier may, in lieu of a new unit, ship this existing unit to its facility and upgrade to the required capacities. Available submittal information on the existing unit are enclosed as ATTACHEMENT "A". Bid price shall include shipping both from and back to the City of Fort Payne Wastewater Treatment Plant. Upgrade shall be completed by the original equipment manufacturer and the upgraded feeder shall include a one (1) year manufacturer's warranty.

[2244.5]
[Rev. 11/10]

END OF SECTION

SECTION 13206

HIGH DENSITY LINEAR POLYETHYLENE (HDLPE) LIQUID CHEMICAL
DOUBLE WALL STORAGE TANKS AND RELATED ITEMS

PART 1 GENERAL

1.01 Section Includes

- A. Liquid chemical storage tanks (HDLPE) and related accessories.

1.02 Related Sections

- A. Applicable to Work of this Section are the Drawings and General Provisions of the Contract, including: Part IV, General and Supplementary Conditions; Part V, Special Conditions; Part VI, Technical Specifications; Division No. 1, General Requirements.

1.03 Reference Standards

- A. ASTM D-618. Conditioning Plastics and Electrical Insulating Materials for Testing.
- B. ASTM D-638. Tensile Properties of Plastics.
- C. ASTM D-790. Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
- D. ASTM D-883. Definitions of Terms Relating to Plastics.
- E. ASTM D-1505. Density of Plastics by the Density-Gradient Technique.
- F. ASTM D-1525. Test Method of Vicat Softening Temperature of Plastics.
- G. ASTM D-1693. Test Method for Environmental Stress-Cracking of Ethylene Plastics.
- H. ASTM D-1998. Standard Specification for Polyethylene Upright Storage Tanks.
- I. ASTM D-2765. Degree of Crosslinking in Crosslinked Ethylene Plastics as Determined by Solvent Extraction.
- J. ASTM D-2837. Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials.
- K. ASTM D-3892. Practice for Packaging/Packing of Plastics.
- L. ASTM F-412. Definitions of Terms Relating to Plastic Piping Systems.
- M. Association of Rotational Molders (ARM) Low Temperature Impact Resistance (Falling Dart Test Procedure).
- N. ANSI B16.5. Pipe Flanges and Flanged Fittings.
- O. OSHA Standards and Regulations.
- P. IMC – International Mechanical Code (Latest Edition).
- Q. UBC – Uniform Building Code.

1.04 Submittals

- A. Submit under provisions of Section 01300.
- B. Shop Drawings: Indicate dimensions, elevations, sizes, mounting, assembly, layout, fittings, attachments, bolt and gasket material and all related items.
- C. Product Data: Descriptive literature, shop drawings, details, dimensions, materials of construction, connections, fittings and all related items.
- D. Chemical Resistance: Submittal data shall include chemical resistance information indicating that the materials of construction including tank liner are appropriate for each chemical storage tank.
- E. Wall Thickness Calculations.
- F. Accessories. Locations and size of all fittings, attachments, manway openings, and similar items.
- G. Resin used for tank construction and its specification.
- H. Tank weights.
- I. Certification of hydrostatic shop testing performed with all fittings installed.
- J. ISO 9001 Certification.
- K. Samples. Representative samples of HDLPE tanks shall be furnished at the time of shop drawings review. These samples shall be from plant production and shall be representative of quality and impact resistance of tanks to be furnished. The ENGINEER may reject any tank which does not meet the standard of the representative samples.
- L. Submit manufacturer's installation requirements.

1.05 Delivery, Storage and Handling

- A. Deliver, store and handle Products to site under provisions of Section 01600.
- B. Store and protect Products as instructed by manufacturer and in accordance with Section 01600.

1.06 Qualifications

- A. Manufacturer: Company specializing in the manufacturing of the Products specified in this Section with minimum ten years documented experience.
- B. Installer: Company specializing in the installation of the Products specified in this Section with minimum three years documented experience.

1.07 Warranty

- A. Provide minimum one year warranty in accordance with Section 01700. Warranty period begins with date of substantial completion and use of facility by Owner.

1.08 Field Measurements

- A. Verify that field measurements are as shown on Drawings and as instructed by manufacturer.

1.09 Quality Assurance

- A. In accordance with Section 01400.
- B. All tanks shall be the product of one manufacturer.
- C. The tanks shall be manufactured by a company with a nationally accepted quality standard (i.e. ISO 9001, or equal).
- D. The finished tank wall shall be free, as commercially practicable, of visual defects such as foreign inclusions, air bubbles, pinholes, pimples, crazing, cracking, delaminations, and similar items that will impair the serviceability of the vessel.
- E. The liner for each tank shall be as recommended by the manufacturer for each chemical stored.

PART 2 PRODUCTS

2.01 Manufacturer

- A. **The high density linear polyethylene (HDLPE) storage tanks shall be manufactured by Tolplast Company, Inc., Lacey's Spring, AL; Snyder Industries, Inc, Lincoln, Nebraska; Chem-Tainer Industries, Inc., Babylon, NY; Poly Processing Company, Monroe, LA; or approved equal.**

2.02 Storage Tanks - General

- A. The HDLPE storage tanks shall be upright, double walled with flat bottoms and domed or conical tops. The inner primary tank shall be a vertical cylinder and the outer secondary tank shall be octagonal. The outer tank shall hold a minimum of 115% of the normal fill capacity of the primary tank.
- B. The tanks are designed for above ground vertical installation, capable of containing chemicals at atmosphere pressure.
- C. The tanks are classified as Type II which are molded from linear polyethylene resin and NOT from cross-linkable resin.
- D. Each storage tank shall be one-piece seamless construction by the rotational molding process.
- E. **The following items shall be included for the storage tanks:**
 - 1. **Flanged fill connection.**
 - 2. **Flanged vent/overflow connection.**
 - 3. **Access manway.**
 - 4. **Suction/drain flanged connections.**
 - 5. **Clear sight tube with scale graduated in gallons (adhesive decal) installed directly on tank behind the sight tube for both the primary and secondary tank.**
 - 6. **Adhesive contents label.**
 - 7. **Flanged connection in top for future level transmitter.**

- G. Location, numbers, size, orientation, and details for the above noted items are as indicated on the Drawings and in the Schedule. Verify all dimensions and location of connections prior to fabrication See 1.04.
- H. When a tank liner is utilized it shall be as recommended by the manufacturer for each individual chemical tank. See Schedule.

2.03 Materials

- A. **Resin Manufacturer: The linear polyethylene resin shall be manufactured by Exxon Mobil Chemical or resin of equal physical and chemical properties.**
- B. The material used shall be virgin polyethylene resin as compounded and certified by the manufacturer.
- C. All polyethylene resin material shall contain a minimum of a U.V. 8 stabilizer as compounded by the resin manufacturer. Pigments may be added at the purchaser's request, but shall not exceed 0.25% (dry blended) of the total weight.
- D. Mechanical Properties of HDLPE (Type II) Tank Material:

| <u>PROPERTY</u> | <u>ASTM</u> | <u>VALUE</u> |
|--|-------------|------------------|
| Density (Resin) | D1505 | 0.940-0.948 g/cc |
| Tensile (Yield Stress 2"/min.) | D638 | 2,950 PSI |
| Elongation at Break (2"/min.) | D638 | > 1,000% |
| ESCR (100% Igepal, Cond. A, F50) | D1693 | 550 hours |
| ESCR (10% Igepal, Cond. A, F50) | D1693 | 48 hours |
| Vicat Softening Degrees F. Temperature | D1525 | 235 |
| Flexural Modules | D790 | 129,000 PSI |

2.04 Design Requirements

A. Wall Thickness

1. The minimum required wall thickness of the cylindrical shell at any fluid level shall be determined by the following equation, but shall not be less than 0.187 in. thick.

$$T = P \times O.D. / 2 SD = 0.433 \times S.G. \times H \times O.D. / 2 SD$$

T = Wall Thickness
 SD = Hydrostatic Design Stress, PSI
 P = Pressure (.433 x S.G. x H), PSI
 H = Fluid Head, Ft.
 S.G. = Specific Gravity, g/cm³
 O.D. = Outside Diameter, In.

2. The hydrostatic design stress shall be determined by multiplying the hydrostatic design basis, determined by ASTM D2837 using rotationally molded samples, with a service factor selected for the application.
3. The hydrostatic design stress is 600 PSI at 73 degrees Fahrenheit for Type II materials.
4. In accordance with the wall thickness formula above the tank shall have a straitform (tapered wall thickness) wall.

5. The hydrostatic design stress shall be derated for service above 100 degrees Fahrenheit and for mechanical loading of the tank.
 6. The standard design chemical specific gravity shall be 1.9.
- B. The minimum required wall thickness for the cylinder straight shell must be sufficient to support its own weight in an upright position without any external support.
- C. Secondary containment tanks shall be designed as above for thickness requirements. The secondary containment shall be configured to allow shipment of the primary tank inside of the secondary tank. The shipment shall be done without the aid of additional spacer blocks which can be lost during shipment causing tank damage.
- D. Top Head.
1. The top head must be integrally molded with the cylinder shell.
 2. The minimum thickness of the top head shall be equal to the top of the straight wall.
 3. The top head of tanks with 2,000 or more gallons of capacity shall be designed to provide a minimum of 1,300 square inches of flat area for fitting locations.
 4. The primary tank top shall be configured to prevent rain water from entering the secondary containment tank.
 5. The primary tank shall be keyed to the secondary tank preventing primary tank rotation.
- 2.05 Dimensions and Tolerances
- A. All dimensions will be taken with the tank in the vertical position, unfilled. Tank dimensions will represent the exterior measurements.
 - B. The tolerance for the outside diameter, including out of roundness, shall be per ASTM D1998.
 - C. The tolerance for fitting placements shall be +/- 0.5 in. in elevation and 2 degrees radial at ambient temperature.
- 2.06 Shop Testing
- A. Quality control procedures shall be followed by the tank manufacturer to ensure that the tank fabrication complies with these specifications.
 - B. The process inspections as well as a final inspection shall be provided by the manufacturer with a written record of all inspections for each tank. These inspection records shall be provided upon request of the Engineer.
 - C. Test specimens shall be taken from fitting location areas or piggy-back test molds.
- D. Low Temperature Impact Test
1. Test specimens shall be conditioned at -40 degrees Fahrenheit for a minimum of 2 hours.
 2. The test specimens shall be impacted in accordance with the standard testing methods as found in ASTM D1998. Test specimens < 1/2" thickness shall be tested at 100 ft.-lb. Test specimens > 1/2" thickness shall be tested at 200 ft.-lb.

E. Ultrasonic Tank Thickness Test

1. All tanks 2,000 gallons or larger shall be measured for tank wall thickness at 6", 1 ft., 2 ft. and 3 ft. on the tank sidewall height at 0° and 180° around the tank circumference with 0° being the tank manway and going counter-clockwise per ANSI standard drafting specifications. All tanks shall meet design thickness requirements and tolerances.
2. Tanks smaller than 2,000 gallons shall be periodically measured at the start of a production run or after any design changes.

F. Hydrostatic Test: Each tank shall be filled with water and checked for leaks no less than four hours after filling. No leakage shall be allowed.

G. A visual test for the workmanship requirements in the following paragraph shall be performed.

2.07 Workmanship

- A. The finished tank wall shall be free, as commercially practicable, of visual defects such as foreign inclusions, air bubbles, pinholes, pimples, crazing, cracking and delaminations that will impair the serviceability of the vessel. Fine bubbles are acceptable with Type II tanks to the degree in which they do not interfere with proper fusion of the resin melt.
- B. All cut edges where openings are cut into the tanks shall be trimmed smooth.
- C. No grinding is allowed on the interior wall surface.

2.08 Fittings

A. Threaded Bulkhead

1. Threaded bulkhead fittings shall be used for above liquid installation only. Fittings must be placed away from tank knuckle radius' and flange lines. The maximum allowable size for bulkhead fittings placed on a curved cylindrical section of tanks 48 in. to 142 in. in diameter is 2 inch. Tank wall thickness shall be considered for bulkhead fitting placement. The maximum wall thickness for each fitting size is shown below.

| Fitting Size | Maximum Wall Thickness |
|---------------------|-------------------------------|
| 1/2 in. | 0.750 in. |
| 3/4 in. | 0.875 in. |
| 1 in. | 0.875 in. |
| 1-1/4 in. | 0.875 in. |
| 1-1/2 in. | 0.875 in. |
| 2 in. | 1 in. |
| 3 in. | 1.125 in. (Flat Surface Only) |

2. The bulkhead fittings shall be constructed of PVC. Gaskets shall be a minimum of 1/4" thickness and constructed of 40 – 50 durometer EPDM or 80 – 70 durometer Viton.

B. Bolted Double 150 lb Flange Fittings

1. Bolted double flange fittings shall be used for all below liquid level installation and other fittings as noted. Fittings must be placed away from tank knuckle radius' and flange lines.
2. Allowable fittings sizes based on tank diameter for curved surfaces are shown below.

| Tank Diameter | Maximum Bolted Fittings Size Allowable |
|-------------------|--|
| 48 in. – 86 in. | 3 in. |
| 90 in. – 102 in. | 6 in. |
| 120 in. – 142 in. | 8 in. |

3. The bolted double flange fittings shall allow tank wall thickness up to 2-1/2 in.
4. The bolted double flange fittings shall be constructed with two (2) 150 lb. flanges, two (2) 150 lb. flange gaskets, and the correct number and size of all-thread bolts for the flange specified by the flange manufacturer. The flanges shall be constructed of PVC Type I, Grade I. Gaskets shall be a minimum of 1/4" thickness and constructed of 40 – 50 durometer EPDM or 60 – 70 durometer Viton.
5. There shall be a minimum of four (4) each full thread bolts. The bolts may have gasketed flanged metal heads or bolt heads encapsulated in Type II polyethylene material. The encapsulated bolt shall be designed to prevent metal exposure to the liquid in the tank and prevent bolt rotation during installation. The polyethylene encapsulation shall fully cover the bolt head and a minimum of 1/4" of the threads closest to the bolt head. The polyethylene shall be color coded to distinguish bolt material (white – 316 S.S., yellow – Hastelloy C276, red – Monel, green – Titanium). Each encapsulated bolt shall have a gasket to provide a sealing surface against the inner flange.
6. Standard orientation of bolted double flange fittings shall have bolt holes straddling the principal centerline of the tank in accordance with ANSI/ASME B-16.5.

C. Flexible Containment Seal

1. A flexible containment seal between the inner primary tank and the outer secondary containment tank shall be used in combination with all flange fittings to provide access for connecting piping to the inner primary tank while maintaining containment integrity between the inner primary tank and the outer secondary containment tank.
2. The fitting outlet shall consist of one (1) flexible polyethylene containment boot, one (1) appropriate fitting gasket, one (1) gasket, one (1) solid 304 stainless steel flange, one (1) split 304 stainless steel flange, and twelve (12) 3/8 inch 304 stainless steel bolt assemblies. Gaskets shall be a minimum of 1/4-inch thickness and constructed of 40 – 50 durometer EPDM or 60 – 70 durometer Viton.

D. Siphon Tube Fitting: Siphon tubes shall be added to the fittings specified above for all drainage fittings.

E. All tank fitting attachments shall be equipped with flexible couplers or other movement provisions provided by the tank manufacturer. Tank piping flexible couplers shall be designed to allow 4%

design movement. Movement shall be considered to occur both outward in tank radius and downward in fitting elevation from the neutral tank fitting replacement. Tank manufacturer shall supply flexible couplers as part of their scope.

- F. Flanged fittings shall be provided in the tank top for fill and/or vent piping connections.
- G. The tank top fittings shall be bulkhead type and shall include Sch. 80 companion flange assemblies and flexible pipe connections as required and indicated above for the suction/outlet fittings.
- H. Level Sensing
 - 1. Each tank shall be equipped with level sensing devices installed in the inner primary tank, arranged to provide an electrical signal to activate an overflow alarm device, and in the outer secondary tank, arranged to identify chemical leakage and provide an electrical signal to the plant SCADA system. Level sensing devices shall be identified for use with the associated chemical and shall have electrical contacts rated for, not less than, 5 Ampere at 125 VAC. The tank manufacturer shall install, calibrate and wire the level sensing devices. Devices shall be wired to a common junction box external to the tank using "Class 1" wiring methods, as defined by the National Electrical Code.
- I. See Drawings for location and size of the flanged fittings.

2.09 Tank Attachments

- A. Accessway Opening
 - 1. Access opening shall be located on the tank top.
 - 2. The access cover shall be hinged type lid manufactured out of HDLPE.
 - 3. See Schedule for diameter of accessway opening.
- B. Lifting Lugs
 - 1. Each tank 2,000 gallons or larger shall have a minimum of three (3) lifting lugs integrally molded into the top head. Tanks less than 2,000 gallons shall have a minimum of two (2) lifting lugs.
 - 2. The lifting lugs shall be designed to allow erection of the empty primary and secondary tanks.
 - 3. Tanks shall be capable of being lifted into position as a unit (primary and secondary tanks).
 - 4. Number and design of the lifting lugs shall be as recommended by the manufacturer.
- C. Hold Down Lugs
 - 1. Hold down lugs shall be provided for each tank, integrally molded into the top head.
 - 2. The number of lugs shall be as recommended by the manufacturer based on a tank either empty or full of chemicals without tank damage and located in the appropriate Seismic Zone of the installation. The minimum number of lugs shall be four (4).
 - 3. The lugs shall include plates, anchor bolts, nuts and washers as required for the proper and safe anchoring of the tank to its concrete foundation. The size of the plates and anchor bolts shall be as recommended by the manufacturer. All items shall be stainless steel.

4. The primary/secondary tank unit shall be configured to allow direct primary tank base retention for seismic load conditions. The base retention unit shall be anchor bolted to an appropriate structure and not require additional spacer blocks.

D. Clear Sight Tube Gauge

1. Each storage tank shall have an exterior mounted, clear sight tube gauge for both the primary and secondary tanks.
2. The clear sight tube material shall be as recommended by the manufacturer for each storage tank.
3. Sight tube shall be one (1) inch diameter, mounted on the outside of the tank with a graduated (gallons) scale (adhesive decal) mounted on the tank directly behind the sight tube gauge.
4. The sight tube connection at the bottom of the tank wall shall be connected to the tank with a flanged connection.
5. The sight tube shall be adequately supported and structurally mounted to the tank sidewall as recommended by the manufacturer.
6. Location of each sight tube gauge for operator monitoring shall be coordinated with Engineer prior to fabrication and tank installation. See 1.04.

E. External Fill Pipe

1. External fill pipes shall be provided as per Contract Drawings and Specifications. All external fill pipes shall be supported at 3 ft. maximum intervals with a support structure independent of the tank (ground supported).
2. All external fill pipes shall be constructed of PVC.

F. External Vent

1. Each tank must be properly vented to the exterior for the type of material and flow rates expected. Vents must comply with OSHA 1910.106 (F) (iii) (2) (IV) (9) normal venting for atmospheric tanks, or shall be as large as the filling or withdrawal connection, whichever is larger but in no case less than 4 inch nominal inside diameter.
2. See Drawings.

G. Tie Down System

1. The tie down system shall be designed to withstand 110 MPH wind loads. Tie down systems must meet seismic zone 4 requirements per UBC 1997 code.
2. The tie down system shall be 304 stainless steel.

2.10 Marking, Packing and Packaging

- A. The tanks shall be marked to identify the product, date (month and year) of manufacturer, capacity, and serial number. The tank shall be shipped with a 3 of 9, HRI bar code label containing tank description, manufacturing order number, part number, serial number, manufacturer, and date.
- B. All packing, packaging, and marking provisions of ASTM Practice D3892 shall apply to this standard.

- C. All fittings that do not interfere with tank shipment shall be installed unless otherwise specified. Fittings and accessories that interfere with tank shipment or could be broken during shipment shall be shipped separately.

2.11 Chemical Fill Station

- A. Provide chemical fill station as required by chemical supplier.
- B. Location, size, and fittings as indicated on Drawings.
- C. Provided laminated sign on building wall indicating chemical to be filled. See Section 10426.

PART 3 **EXECUTION**

3.01 Examination

- A. Verify site conditions under provisions of Section 01039..
- B. Verify that concrete, piping, anchor bolts and all related structural supports are ready to receive Work and dimensions are as shown on Drawings and meeting the approval of the manufacturer.

3.02 Preparation

- A. Verify all dimensions, elevations, concrete supports, piping and all related items.
- B. Level and plumb all tanks and piping.
- C. Verify anchor bolt placement.
- D. Verify all concrete work conforming to Drawings and meeting approval of the manufacturer.
- E. Clean thoroughly the installation area. Remove all debris.
- F. Inspect all tanks for damage prior to installation. Damaged tanks shall not be installed.

3.03 Installation

- A. Install in accordance with Drawings and manufacturer's instructions.
- B. Install in accordance with standards required by authority having jurisdiction.
- C. Install in accordance with International Mechanical Code (Latest Edition), UBC Building Code, OSHA Regulations and Guidelines, and all applicable codes, regulations and guidelines.
- D. All fitting connections must be installed with flexible pipe connections meeting the approval of the tank manufacturer.**
- E. Tanks and support members shall be anchored in their final position in accordance with the manufacturer's recommendations.

3.04 Adjusting

- A. Adjust Work under provisions of 01650.
- B. Check all anchors and supports. Tighten as required.

- C. Check all piping. Repair all leaks as required.

3.05 Field Quality Control

- A. Field inspection and testing will be performed under provisions of Section 01400.

3.06 Field Testing

- A. After installation is completed, each tank its connecting pipes and valves shall be field tested for leakage.
- B. The tank shall be filled for a minimum of 24 hours with water and no water loss, evidence of weeping or capillary action shall be evident in order for the tank installation to be accepted by the Engineer.
- C. Piping shall be tested in accordance with Section 02660.
- D. After testing, the tanks shall be thoroughly cleaned and dried.
- E. The Engineer shall inspect each tank for defects, damage, proper installation, and conformance with the Drawings and Specifications.
- F. Should any defects become evident during inspection, testing, or start-up the Contractor shall repair or replace the defective tank, fitting, or accessory as required meeting the approval of the Engineer.

3.07 Start-Up

- A. Provide start-up under provisions of Section 01650 and as indicated herein.
- B. At his option, the Contractor shall provide the services of a factory trained representative as required and deemed necessary for proper start-up or correction of any noted defects during the tank installation, field testing, or start-up procedures.
- C. Instruct owner's personnel in operational, maintenance, and trouble shooting procedures.

3.08 Cleaning

- A. Clean Work under provisions of Section 01700.

3.09 Schedule

A. Polyquaternary Amine Double Wall Storage Tank

1. **Capacity: 3,000 gallons.**
2. **Primary Tank Diameter: 7' – 6".**
3. **Sidewall Height: 10' – 2".**
4. **Overall Maximum Tank Height: 10' – 5-1/2".**
5. **Chemical Stored: Polyquaternary Amine, CAS No. 42751-79-1, 50% solution, specific gravity 1.14 – 1.18, temperature to 175°F.**
6. **Minimum Wall Thickness: As Required by Specifications.**

7. **Accessories:** As indicated herein and on Drawings.
8. **Accessway:** Required; minimum 24" opening.
9. **Sight Tube Gauge:** Required for both primary and secondary tanks.
10. **External Fill Pipe:** 3" PVC.
11. **External Vent Pipe:** 4" PVC minimum. See Specifications.
12. **Drain/Dosing Pump Suction Outlet:** 2" flanged.
13. **Future Connection in Top of Tank:** 3" flanged (Plugged for Future Use).
14. **Color:** As selected by Owner.
15. **Number of Tanks Required:** 4.

END OF SECTION

[2244.5]
[Rev. 11/10]

SECTION 15010
BASIC MECHANICAL REQUIREMENTS

PART 1 GENERAL

- 1.01 Section Includes
 - A. Basic Mechanical Requirements specifically applicable to Division 15 Sections, in addition to Division 1 - General Requirements.
- 1.02 Related Work
 - A. Applicable to Work of this Section are the Drawings and General Provisions of the Contract, including: Part IV, General and Supplementary Conditions; Part V, Special Conditions; Part VI, Technical Specifications; Division No. 1, General Requirements.
- 1.03 Work Sequence
 - A. Install work in stages to accommodate Owner's occupancy requirements during the construction period. Coordinate mechanical schedule and operations with Engineer.
- 1.04 Future Work
 - A. Provide for future work under requirements of Section 01010.
- 1.05 Unit Prices
 - A. See Part V, Special Conditions.
- 1.06 Alternates
 - A. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at the Owner's option. Accepted Alternates will be identified in Owner-Contractor Agreement.
 - B. Coordinate related work and modify surrounding work as required.
- 1.07 Submittals
 - A. Submit under provisions of Section 01300.
 - B. Submit shop drawings and product data grouped to include complete submittals of related systems, products, and accessories in a single submittal.
 - C. Mark dimensions and values in units to match those specified.
- 1.08 Regulatory Requirements
 - A. General Building Construction: Conform to IBC – International Building Code.
 - B. Fire Protection: Conform to IFC – International Fire Code.
 - C. Plumbing: Conform to IPC – International Plumbing Code.
 - D. Mechanical: Conform to IMC - International Mechanical Code.

- E. Conform to all OSHA Rules, Regulations and Requirements.
- F. Obtain permits, and request inspections from authority having jurisdiction.
- 1.09 Project/Site Conditions
 - A. Install Work in locations shown on Drawings, unless prevented by Project conditions.
 - B. Prepare drawings showing proposed rearrangement of Work to meet Project conditions, including changes to Work specified in other Sections. Obtain permission of Engineer before proceeding.
- 1.10 Sequencing and Scheduling
 - A. Construct Work in sequence under provisions of Section 01010.
- 1.11 Warranty
 - A. All mechanical installations shall be warranted for one year in accordance with Section 01600. Warranty period begins with date of plant acceptance by Owner.

PART 2 PRODUCTS - NOT USED.

PART 3 EXECUTION - NOT USED.

END OF SECTION

[2244.5]
[1/11]

SECTION 15410
PLUMBING PIPING

PART 1 GENERAL

1.01 Section Includes

- A. Pipe and pipe fittings.
- B. Valves.
- C. Sanitary sewer piping system.
- D. Domestic water piping system.
- E. Stormwater piping system.
- F. Natural gas piping system.
- G. Chemical solution piping system.
- H. Diesel fuel piping system.

1.02 Related Sections

- A. Applicable to Work of this Section are the Drawings and General Provisions of the Contract, including: Part IV, General and Supplementary Conditions; Part V, Special Conditions; Part VI, Technical Specifications; Division No. 1, General Requirements.

1.03 References

- A. ASTM A47 - Ferritic Malleable Iron Castings.
- B. ASTM A53 - Pipe, Steel, Black and Hot-Dipped Zinc Coated, Welded and Seamless.
- C. ASTM A74 - Cast Iron Soil Pipe and Fittings.
- D. ASTM A120 - Pipe, Steel, Black and Hot-Dipped Zinc Coated (Galvanized), Welded and Seamless, for Ordinary Uses.
- E. ASTM A234 - Pipe Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures.
- F. ASTM B32 - Solder Metal.
- G. ASTM B42 - Seamless Copper Pipe.
- H. ASTM B43 - Seamless Red Brass Pipe.
- I. ASTM B75 - Seamless Copper Tube.
- J. ASTM B88 - Seamless Copper Water Tube.
- K. ASTM B251 - Wrought Seamless Copper and Copper-Alloy Tube.

- L. ASTM B302 - Threadless Copper Pipe (TP).
- M. ASTM B306 - Copper Drainage Tube (DWV).
- N. ASTM C14 - Concrete Sewer, Storm Drain, and Culvert Pipe.
- O. ASTM C425 - Compression Joints for Vitrified Clay Pipe and Fittings.
- P. ASTM C443 - Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.
- Q. ASTM C564 - Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
- R. ASTM C700 - Vitrified Clay Pipe, Extra Strength, Standard Strength, and Perforated.
- S. ASTM D1785 - Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
- T. ASTM D2235 - Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings.
- U. ASTM D2241 - Poly (Vinyl Chloride) (PVC) Plastic Pipe (SDR-PR).
- V. ASTM D2466 - Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
- W. ASTM D2513 - Thermoplastic Gas Pressure Pipe, Tubing and Fittings.
- X. ASTM D2564 - Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings.
- Y. ASTM D2683 - Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe.
- Z. ASTM D2729 - Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- AA. ASTM D2751 - Acrylonitrile-Butadiene-Styrene (ABS) Sewer Pipe and Fittings.
- AB. ASTM D2846 - Chlorinated Polyvinyl Chloride (CPVC) Pipe, Fittings, Solvent Cements and Adhesives for Potable Hot Water Systems.
- AC. ASTM D2855 - Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings.
- AD. ASTM D3034 - Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- AE. ASTM D3309 - Polybutylene (PB) Plastic Hot Water Distribution System.
- AF. ASTM F477 - Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
- AG. ASTM F493 - Solvent Cements for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe and Fittings.
- AH. ASTM F845 - Plastic Insert Fittings for Polybutylene (PB) Pipe.
- AI. AWWA C105 - Polyethylene Encasement for Ductile Iron Piping for Water and Other Liquids.
- AJ. AWWA C110 - Ductile-Iron and Gray-Iron Fittings 3 Inches through 48 Inches for Water and Other Liquids.
- AK. AWWA C111- Rubber-Gasket Joints for Ductile Iron and Gray-Iron Pressure Pipe and Fittings.
- AL. AWWA C151 - Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water or Other Liquids.

- AM. AWWA C651 - Disinfecting Water Mains.
- AN. International Mechanical Code (Latest Edition).
- AO. International Fuel Gas Code (Latest Edition).
- AP. International Plumbing Code (Latest Edition).
- 1.04 Submittals
 - A. Submit under provisions of Section 01300.
 - B. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.
- 1.05 Project Record Documents
 - A. Submit under provisions of Section 01700.
 - B. Record actual locations of valves.
- 1.06 Operation and Maintenance Data
 - A. Submit under provisions of Section 01700.
 - B. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.
- 1.07 Quality Assurance
 - A. Valves: Manufacturer's name and pressure rating marked on valve body.
- 1.08 Qualifications
 - A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum five years documented experience.
 - B. Installer: Company specializing in performing the work of this section with minimum five years documented experience.
- 1.09 Regulatory Requirements
 - A. Perform Work in accordance with International Plumbing Code (Latest Edition), International Mechanical Code (Latest Edition), International Fuel Gas Code (Latest Edition) and all other applicable codes.
 - B. Conform to ADEM Requirements for installation of backflow prevention devices.
 - C. Conform to all OSHA Regulations, Rules and Guidelines.
- 1.10 Delivery, Storage and Handling
 - A. Deliver, store, protect and handle products to site under provisions of Section 01600.
 - B. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
 - C. Provide temporary protective coating on cast iron and steel valves.

- D. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- E. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.11 Environmental Requirements

- A. Do not install underground piping when bedding is wet or frozen.

PART 2 PRODUCTS

2.01 Sanitary Sewer Piping, Buried Beyond 5 Feet Of Building

- A. See Section 02732 - Gravity Sanitary Sewerage System.

2.02 Sanitary Sewer Piping, Buried Within 5 Feet Of Building

- A. Ductile Iron Pipe and Fittings: ANSI/AWWA C151/A21.51 unless otherwise indicated on Drawings, pressure class of each pipe size shall be as follows:

| PIPE SIZE | PRESSURE CLASS (psi) |
|------------------|-----------------------------|
| 3 - 12 Inch | 350 |
| 14 - 20 Inch | 250 |
| 24 - 64 Inch | 200 |

Nominal thickness specified per AWWA C151 shall be minimum thickness for each pipe size and pressure class.

- 1. Slip Joint and Mechanical Joint Pipe: ANSI/AWWA C111.
 - 2. Flanged Pipe: ANSI/AWWA C115.
 - 3. Fittings: Same material and jointing as pipe; compact fittings, ANSI/AWWA C153; standard, ANSI/AWWA C110.
 - 4. Interior: Cement-mortar lined, ANSI/AWWA C104.
 - 5. Exterior: Standard asphaltic coating, ANSI/AWWA C151.
- B. Plastic Buried Gravity Sewer Pipe
 - 1. ASTM D3034, Type PSM Poly(Vinyl Chloride) (PVC).
 - 2. Elastomeric gasket joints shall provide a watertight seal and meet the requirements of ASTM D3212.
 - 3. Minimum wall thickness shall be based on SDR 35.
 - C. Plastic Pipe: ASTM D1785, Schedule 40, Poly(Vinyl Chloride) (PVC) material; bell and spigot style solvent sealed joint end. **COLOR TO BE WHITE ONLY.**

- D. Fittings: Same material as pipe, molded, cast or formed to suit pipe size and end design, in required tee, bends, elbows, cleanouts, reducers, traps and other configurations required.
- E. Cleanouts
 - 1. Cleanout Adapter and Plug: ASTM D3034.
 - 2. Piping and Fittings: ASTM D3034.
 - 3. Base Pad: Cast-in-place concrete of type specified in Section 03300.
- 2.03 Sanitary Sewer Piping, Above Grade
 - A. Ductile Iron Pipe and Fittings: ASTM A476 and AWWA C151; Class 51 for pipe 4 inch diameter and smaller; Class 50 for pipe larger than 4 inch diameter.
 - 1. Flanged Joint Pipe and Fittings: ANSI/AWWA C115.
 - 2. Fittings: Same material and jointing as pipe; compact fittings, ANSI/AWWA C153; standard, ANSI/AWWA C110.
 - 3. Interior: Cement-mortar lined, ANSI/AWWA C104.
 - 4. Exterior: Coated in accordance with Section 09900.
 - B. Plastic Pipe: ASTM D1785, Schedule 40, Poly(Vinyl Chloride) (PVC) material.
 - 1. Fittings: PVC Schedule 40.
 - 2. Joints: Solvent weld.
- 2.04 Water Piping, Buried Beyond 5 Feet Of Building
 - A. See Section 02660 - Water Distribution Piping, Valves and Related Items.
- 2.05 Water Piping, Buried Within 5 Feet Of Building
 - A. Plastic (PE) Service Tubing: ANSI/AWWA C901.
 - 1. Service Tubing: Polyethylene (PE) Pressure Tubing made from polyethylene resin PE3406, with dimension ratio (DR) = 9, designed for 160 pounds per square inch working pressure. The standard nominal dimensions are as follows:

| SIZES | OUTSIDE DIAMETER | MINIMUM WALL THICKNESS |
|----------|------------------|------------------------|
| 3/4 Inch | 0.875 Inch | 0.097 Inch |
| 1 Inch | 1.125 Inch | 0.125 Inch |
 - 2. Warranty: Tubing shall carry a 25 year replacement cost warranty.
 - 3. Jointing: Compression type with bronze stop and coupling nut, stainless steel stiffener, Buna-N Rubber gasket and specifically designed for use with the service tubing to be joined.
 - B. Copper Service Tubing: ASTM B88 and ANSI/AWWA C800.
 - 1. Type K soft copper tubing specifically manufactured for underground water service.

2. Jointing: Compression fitting procedure unless otherwise indicated. Joint fitting shall be similar as specified above for polyethylene (PE) service tubing and shall be specifically designed for use with copper service tubing. No stainless steel stiffener required.

C. Plastic (PVC) Pipe and Fittings: ASTM D1784 and ASTM 2241.

1. Slip Joint Pipe and Fittings: ASTM D2241 with standard dimension ratios summarized as follows:

| PIPE CLASS (psi) | SDR |
|-----------------------------|------------|
| 125 | 32.5 |
| 160 | 26 |
| 200 | 21 |

2. Joints shall be watertight, slip type with elastomeric compression seal conforming to ASTM D3139. **Solvent weld joints will not be allowed.**

D. Ductile Iron Pipe and Fittings: Same as Paragraph 2.02 A.

2.06 Water Piping, Above Grade

A. Ductile Iron Pipe and Fittings: Same as Paragraph 2.03 A.

B. Plastic Pipe (PVC Schedule 40): Same as Paragraph 2.03 B.

C. CPVC Pipe: ASTM D2846.

1. Fittings: ASTM D2846, CPVC.

2. Joints: ASTM D2846, solvent weld with ASTM F493 solvent cement.

D. Copper Tubing: ASTM B88 Type L, Hard Drawn.

1. Fittings: ASME B16.18, cast bronze or ASME B16.22, wrought copper and bronze.

2. Joints: ASTM B32, solder, Grade 95TA.

E. Steel Pipe: ASTM A53 or A120, Schedule 40, Galvanized.

1. Fittings: Cast Iron.

2. Joints: Grooved mechanical couplings.

2.07 Storm Water Piping, Buried Beyond 5 Feet Of Building

A. See Section 02722 - Storm Sewerage System.

2.08 Storm Water Piping, Buried Within 5 Feet of Building

A. Same as Paragraph 2.02 - Sanitary Sewer Piping Buried Within 5 Feet of Building.

2.09 Storm Water Piping, Above Grade

A. Ductile Iron: Same as Paragraph 2.02 A.

2.10 Natural Gas Piping, Buried Beyond 5 Feet of Building

A. Steel Pipe

1. ASTM A53 or A120, Schedule 40 black.
2. Fittings: ASTM A234, forged steel welding type, with AWWA C105 polyethylene jacket or double layer, half-lapped 10 mil polyethylene tape.
3. Joints: Welded.

B. Polyethylene Pipe

1. ASTM D2513, SDR 11.5.
2. Fittings: ASTM D2683 or ASTM D2513 socket type.
3. Joints: Fusion welded.

2.11 Natural Gas Piping, Buried Within 5 Feet of Building

- A. Steel Pipe: Same as Paragraph 2.10 A.

2.12 Natural Gas Piping, Above Grade

A. Steel Pipe

1. ASTM A53 or A120, Schedule 40 black.
2. Fittings: ASME B16.3, malleable iron, or ASTM A234, forged steel welding type.
3. Joints: NFPA 54, threaded or welded.

2.13 Propane Gas Piping, Buried Within 5 Feet of Building

- A. Steel Pipe: Same as Paragraph 2.10 A.

- B. Copper Tubing: Same as Paragraph 2.13 B.

2.14 Flanges, Unions, and Couplings

A. Pipe Size 2 Inches and Under

1. Ferrous Pipe: 150 psig malleable iron threaded unions.
2. Copper Tube and Pipe: 150 psig bronze unions with soldered joints.

B. Pipe Size Over 2 Inches

1. Ferrous Pipe: 150 psig forged steel slip-on flanges; 1/16 inch thick preformed neoprene gaskets.
2. Copper Tube and Pipe: 150 psig slip-on bronze flanges; 1/16 inch thick preformed neoprene gaskets.

C. Grooved and Shouldered Pipe End Couplings

1. Housing: Malleable iron clamps to engage and lock, designed to permit some angular deflection, contraction, and expansion; steel bolts, nuts, and washers; galvanized for galvanized pipe.
 2. Sealing Gasket: "C" shape composition sealing gasket.
- D. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.
- 2.15 Chemical Solution Piping, Valves and Fittings
- A. Pipe and Fittings: Schedule 80 PVC; ASTM D1785; bell and spigot style solvent sealed joints. Corrosion resistant, designed specifically for chemical solution piping. **All Schedule 80 PVC pipe, valves and fittings to be grey color only. White colored Schedule 80 PVC piping, valves or fittings WILL NOT BE ALLOWED** (Schedule 40 PVC piping, valves and fittings to be white ONLY).
 - B. Ball Valve: Corrosion resistant Type I PVC body, CPVC integral ball and stem, self lubricating Teflon seats, Viton seals. Designed specifically for use with Schedule 80 PVC chemical solution piping and fittings. Must be rated for vacuum service.
 - C. Ball Check Valve: Corrosion resistant Type I PVC, body, Viton seal/seat. Seat/seal design to permit flow in only one direction. Designed specifically for use with Schedule 80 PVC chemical solution piping. May be installed either vertically or horizontal. Must be rated for full vacuum service.
 - D. Swing Check Valve: Corrosion resistant, Type I PVC body Teflon seat, Viton seal, PVC disc, automatic closure with swinging disc. May be installed in either horizontal or vertical position. Top entry for valve maintenance. Must be rated for vacuum service.
- 2.16 Gate Valves
- A. Manufacturers
 1. **Milwaukee Valve Co., Milwaukee, WI; Stockham Valves & Fittings, Inc., Birmingham, AL; Lunkenheimer, Cincinnati, OH; Nibco, Inc., Elkhart, IN; or approved equal.**
 - B. Up to and Including 2 Inches
 1. Bronze body, bronze trim, non-rising stem, handwheel, inside screw, single wedge or disc, solder or threaded ends.
 - C. Over 2 Inches
 1. Iron body, bronze trim, rising stem, handwheel, OS&Y, single wedge, flanged ends.
- 2.17 Globe Valves
- A. Manufacturers: **See Gate Valves.**
 - B. Up to and Including 2 Inches: Bronze body, bronze trim, rising stem, handwheel, inside screw, renewable composition disc, screwed ends, with back seating capacity (repackable under pressure).
 - C. Over 2 Inches: Iron body, bronze trim, rising stem, handwheel, OS&Y, plug-type disc, flanged ends, renewable seat and disc.

2.18 Ball Valves

- A. **Manufacturers: Milwaukee Valve Co., Milwaukee, WI; Stockham Valve & Fittings, Inc., Birmingham, AL; Apollo Division, Conbraco Industries, Pageland, SC; Nibco, Inc., Elkhart, IN; or approved equal.**
- B. Up to and Including 2 Inches: Bronze two piece body, chrome plated steel ball, Teflon seats and stuffing box ring, lever handle, solder or threaded ends.
- C. Over 2 Inches: Cast steel body, chrome plated steel ball, Teflon seat and stuffing box seals, lever handle or gear drive handwheel for sizes 10 inches and over, flanged.
- D. Electrically Operated Ball Valves: Electrically operated ball valves shall have a NEMA 4 (waterproof) housing; manual override; 5 second cycle time; 120 volt, 60 Hz, single phase; integral thermal overload protection with automatic reset.
- E. For PVC chemical solution ball valve see Paragraph 2.18.

2.19 Plug Valves

- A. **Manufacturers: Dezurik, Sartell, MN; Henry Pratt Co., Aurora, IL; or approved equal.**
- B. Up to and Including 2 Inches: Bronze body, bronze tapered plug, non-lubricated, Teflon packing, threaded ends.
- C. Over 2 Inches: Cast iron body and plug, nonlubricated, Teflon packing, flanged ends.

2.20 Butterfly Valves

- A. **Manufacturers: Milwaukee Valve Co., Milwaukee, WI; Stockham Valves & Fittings, Inc., Birmingham, AL; Mueller Co., Decatur, IL; or approved equal.**
- B. Bronze body, stainless steel disc, resilient replaceable seat, threaded ends, extended neck, 10 position lever handle.
- C. Cast or ductile iron body, chrome plated ductile iron disc, resilient replaceable EPDM seat, wafer, lug or flanged ends, extended neck, 10 position lever handle.

2.21 Flow Control Valves

- A. **Manufacturers: Watts Automatic Control Valve Co., Houston, TX; Cla-Val Co., Newport Beach, CA; OVC Control Valves, Tulsa, OK; Ross Valve Manufacturing Co., Inc., Troy, NY; or approved equal.**
- B. Construction: Brass or bronze body with union on inlet, temperature and pressure test plug on inlet blowdown/backflush drain.
- C. Calibration: Control flow within 5 percent of selected rating, over operating pressure range of 10 times minimum pressure required for control, maximum minimum pressure 3.5 psig.

2.22 Swing Check Valves

- A. **Manufacturers: Milwaukee Valve Co., Milwaukee, WI; Stockham Valves & Fittings, Inc., Birmingham, AL; Nibco Inc., Elkhart, IN; Hammond Valve Corporation, Hammond, IN; or approved equal.**

- B. Up to and Including 2 Inches: Bronze swing disc, screwed ends.
 - C. Over 2 Inches: Iron body, bronze trim, swing disc, renewable disc and seat, flanged ends.
 - D. For PVC chemical solution swing check valve see Paragraph 2.18.
- 2.23 Spring Loaded Check Valves
- A. **Manufacturers: See Swing Check Valves.**
 - B. Iron body, bronze trim, stainless steel spring, renewable composition disc, screwed, wafer, or flanged ends.
- 2.24 Water Pressure Reducing Valves
- A. **Manufacturers: See Flow Control Valves.**
 - B. Up to 2 Inches: Bronze body, stainless steel and thermoplastic internal parts, fabric reinforced diaphragm, strainer, threaded and single union ends.
 - C. Over 2 Inches: Cast iron body, bronze fitted, elastomeric diaphragm and seat disc, flanged.
- 2.25 Pressure Relief/Sustaining Valves
- A. **Manufacturers: Watts Automatic Control Valve Co., Houston, TX; Mueller Co., Decatur, IL; Lunkenheimer, Cincinnati, OH; or approved equal.**
 - B. Bronze body, Teflon seat, steel stem and springs, automatic, direct pressure actuated, capacities ASME certified and labeled.
- 2.26 Strainers
- A. **Manufacturers: Watts Automatic Control Valve Co., Houston, TX; Mueller Co., Decatur, IL; GA Industries, Inc., Mars, PA; Cuno, Inc., Meriden, CT; or approved equal.**
 - B. Size 2 Inch and Under: Screwed brass or iron body for 175 psig working pressure, Y pattern with 1/32 inch stainless steel perforated screen.
 - C. Size 2-1/2 Inch to 4 Inch: Flanged iron body for 175 psig working pressure, Y pattern with 3/64 inch stainless steel perforated screen.
 - D. Size 5 Inch and Larger: Flanged iron body for 175 psig working pressure, basket pattern with 1/8 inch stainless steel perforated screen.
- 2.27 Valves General
- A. For specific valves used in water distribution piping, sewage force main piping and water or sewage pumping facilities, see the appropriate Section as applicable.
- 2.28 Pressure Switch for Pump
- A. Adjustable pressure switch shall consist of a diaphragm assembly fitting either pipe fitting, tube or flare fitting; 1/4 inch NPT connection; snap action toggle and moveable contacts switch; screw drive adjusted pressure settings.

- B. Features shall include:
 - 1. Disconnect lever.
 - 2. Automatic cut-off to shut switch when pressure drops below set point.
 - 3. Pulsation plug to prevent unnecessary cycling due to fluctuating water pressures.
 - 4. Reverse action feature shall operate (cuts-in) on rising pressure and open (cuts-out) on falling pressure.
- C. Pressure switch shall be sized (pressure range, voltage, phase, etc.) for point of application. See applicable pump specification section; see Division No. 16, Electrical.
- D. Enclosure shall be NEMA rated for point of installation. NEMA 1 - interior; NEMA 4X - exterior, corrosive atmosphere; NEMA 4 - exterior, watertight, dusttight.

PART 3 EXECUTION

3.01 Examination

- A. Verify excavations under provisions of Section 01039.
- B. Verify that excavations are to required grade, dry, and not over-excavated.

3.02 Preparation

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt, on inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

3.03 Installation

- A. Install in accordance with manufacturer's instructions.
- B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- C. Route piping in orderly manner and maintain gradient.
- D. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- E. Provide clearance for installation of insulation and access to valves and fittings.
- F. Provide access where valves and fittings are not exposed.
- G. Establish elevations of buried piping outside the building to ensure not less than 3 feet of cover.
- H. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
- I. Provide support for utility meters in accordance with requirements of utility companies.

- J. Prepare pipe, fittings, supports, and accessories not prefinished, ready for finish painting. Refer to Section 09900.
 - K. Excavate in accordance with Sections 02222 for Work of this Section.
 - L. Backfill in accordance with Sections 02223 and 02225 for Work of this Section.
 - M. Install bell and spigot pipe with bell end upstream.
 - N. Install valves with stems upright or horizontal, not inverted.
 - O. Provide one plug valve wrench for every ten plug valves sized 2 inches and smaller, minimum of one. Provide each plug valve sized 2-1/2 inches and larger with a wrench with set screw.
 - P. Pipe vents from gas pressure reducing valves to outdoors and terminate in weatherproof hood.
 - Q. Any damage to galvanized piping caused by cutting, threading, couplings or any other installation procedure shall be repaired to the satisfaction of the Engineer by a thorough spray coating of an approved spray galvanizing compound.
- 3.04 Application
- A. Use grooved mechanical couplings and fasteners only in accessible locations.
 - B. Install unions downstream of valves and at equipment or apparatus connections.
 - C. Install brass male adapters each side of valves in copper piped system. Sweat solder adapters to pipe.
 - D. Install gate, ball or butterfly valves for shut-off and to isolate equipment, part of systems, or vertical risers, as shown on Drawings.
 - E. Install globe, ball or butterfly valves for throttling, by-pass, or manual flow control services as shown on Drawings.
 - F. Provide spring loaded check valves on discharge of water pumps unless otherwise shown on Drawings.
 - G. Provide plug valves in natural gas systems for shut-off service.
 - H. Provide flow controls in water recirculating systems where indicated.
- 3.05 Erection Tolerances
- A. Establish invert elevations, slopes for drainage to 1/8 inch per foot minimum. Maintain gradients.
 - B. Slope water piping and arrange to drain at low points.
- 3.06 Disinfection of Domestic Water Piping System
- A. Refer to Section 02675.
- 3.07 Service Connections
- A. Provide new sanitary sewer services. Before commencing Work, check invert elevations required for sewer connections, confirm inverts and ensure that these can be properly connected with slope for drainage and cover to avoid freezing.

- B. Provide new water service as shown on Drawings. Include as applicable, reduced pressure, double check backflow preventer, water meter with by-pass valves, and sand strainer.

3.08 Testing

- A. All piping installed under concrete slabs, foundations, buildings, structures and similar facilities shall be flushed, cleaned, inspected and tested completely prior to construction of the structure or facility over the pipe.
- B. All plumbing piping shall be pressure tested as required by the applicable IBC Code or to a minimum of twice the maximum anticipated peak operating pressure for its point of installation, or to the pressure rating of the pipe, as required by the Engineer.

3.09 Schedule

- A. See Drawings.

END OF SECTION

[2244.5]
[REV11/10]

SECTION 16010
ELECTRICAL-GENERAL PROVISIONS

PART 1 GENERAL

1.01 General Conditions

- A. The accompanying General Conditions shall apply to and form a part of this Section.

1.02 General Requirements

- A. Carefully examine General Conditions, other specification Sections, and other drawings (in addition to electrical), in order to be fully acquainted with their effect on electrical work.
- B. Do all work in compliance with all applicable codes, laws and ordinances, the National Electrical Code (hereinafter referred to as "Code" or "NEC"), and the regulations of the local authorities having jurisdiction and, where applicable, utility companies. Obtain and pay for any and all required permits, inspections, certificates of inspections and approval, and the like, and deliver such certificates to the Engineer.
- C. Cooperate with other trades and contractors at job. Perform work in such manner and at such times as not to delay work of other trades. Complete all work as soon as the condition of the structure and installation of equipment will permit. Patch, in a satisfactory manner and by the proper craft, any work damaged by electrical workmen.
- D. It is the intent of these plans and specifications to direct attention to the absolute necessity to use safe techniques and to provide quality installations in compliance with good practice and the plans and specifications of Divisions 16.

1.03 Drawings

- A. Indicate only diagrammatically the extent, general character and approximate location of work. Where work is indicated but with minor details omitted, furnish and install it complete and so as to perform its intended functions. For building details and mechanical equipment follow architectural, structural, and mechanical drawings and fit electrical work thereto.
- B. Take finish dimensions at the job site in preference to scale dimensions.
- C. Except as above noted, make no changes or deviations from the work as shown or specified except on written order of the Engineer.
- D. Obtain from manufacturer's data on all equipment, the dimensions of which may affect electrical work. Use this data to coordinate proper service characteristics, entry locations, etc., and to ensure minimum clearances are maintained.

1.04 Qualifications Of Contractor

- A. The electrical contractor shall have had experience of at least the same size and scope as this project, on at least two other projects, within the last 5 years in order to be qualified to bid this project.
- B. Workmen shall be experienced in their respective trade. Workmanship of installed work shall be first class and will be so judged by the Engineer. Substandard work shall be removed and replaced.

- C. Qualifications stated for the electrical contractor shall also apply to any subcontractors employed by the electrical contractor during the course of this work.

1.05 Site Visit

- A. The Bidders shall visit the site to thoroughly familiarize themselves with existing conditions prior to submitting their bid. No allowances will be made for lack of knowledge of existing conditions.

1.06 Electrical Service Characteristics:

- A. Main services shall be as shown on drawings.

1.07 Warranty

- A. See GENERAL CONDITIONS (One Year warranty of conformance with drawings and specifications).
- B. In addition to the foregoing warranty, Contractor shall and does hereby warrant all materials and equipment furnished under this Division of the Specifications to be free from defects and to function or operate satisfactorily for one year after final acceptance of the work, and that any items not meeting this requirement will be made good by him without cost to owner, provided such defects or failures are not due to abuse, neglect, or lack of reasonable and ordinary maintenance.

PART 2 PRODUCTS

2.01 Approved Materials And Devices

- A. Where not otherwise specified, provide only new, standard first grade materials throughout, conforming to standards established by Underwriter's Laboratories, Inc., and so marked and labeled, together with manufacturer's brand or trademark. All equipment is subject to approval of Engineer before installation. All like items shall be of one manufacturer.

2.02 Electrical Equipment

- A. Where shown on the drawings or specified herein, furnish and install electrical equipment.
- B. Furnish all materials, hardware, equipment, labor and services required for the installation of complete and properly working installations as shown on the drawings and described herein.
- C. References in these specifications to a particular manufacturer or model number shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition. Equipment by manufacturers other than those specified shall be submitted for review in accord with Section 16011.
- D. All equipment shall be installed by qualified workmen who shall have reviewed all manufacturer's data for purposes of coordinating service characteristics, entry locations, mounting requirements, dimensions, etc.
- E. The contractor shall cooperate with the Owner, other trades, etc. for coordination of their requirements or the effects of the installed equipment on the overall project.

2.03 Auxiliary Systems

- A. Where shown on the drawings or specified herein, furnish and install electrical auxiliary systems. Auxiliary systems shall consist of instrumentation systems, control systems, SCADA systems or others as specified.
- B. Furnish all materials, hardware, equipment, labor and services required for the installation of complete and properly working systems as shown on the drawings and described herein.
- C. References in these specifications to a particular manufacturer or model number shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition. Equipment by manufacturers other than those specified shall be submitted for review in accord with Section 16011.
- D. All systems equipment shall be installed by qualified systems technicians in the employ of the systems contractor, or by qualified workmen in the employ of the Contractor under the supervision of qualified representatives of the manufacturer. "Qualified representatives" shall be factory authorized or certified by the systems equipment manufacturer.
- E. The systems technicians and/or contractor shall cooperate with the Owner, other trades, etc. for coordination of their requirements or the effects of the installed systems on the overall project.

PART 3 EXECUTION

3.01 Workmanship

- A. The work shall be in accordance with the NEC and the rules and regulations of local bodies having jurisdiction.
- B. All work shall be executed in a workmanlike manner and shall present a neat and mechanical appearance upon completion.
- C. Care shall be exercised that all items are plumb, straight, level.
- D. Care shall be exercised so that not less than code clearance is allowed for all panels, switchboards, motor control centers, etc. Do not allow other trades to infringe on this clearance. Minimum code clearance shall be as required by Article 110 of the NEC.
- E. Care shall be exercised that no piping, ducts, or equipment foreign to the electrical equipment or architectural appurtenances shall be allowed to be installed in, enter or pass through the exclusively dedicated spaces above, adjacent to and below switchboards and panelboards as set forth in Article 110, paragraph 26, of the NEC.

3.02 Equipment Testing

- A. During the course of the work, field tests shall be performed to demonstrate that all cables, switchgear and transformers installed under this contract, are properly manufactured and installed to meet accepted industry standards. Testing shall be performed by technicians skilled in the use of the tools and instruments involved. Material failing to meet test criteria shall be repaired or replaced after which it shall be retested.
- B. Tests shall be conducted per IEEE Standards 43-1974 2000 and 62-1995 and as follows:

1. Cables 600 Volts: Test all feeders and branch circuits Number 6 AWG and larger with a 1000 VDC insulation resistance tester, 0 - 500 megohms full scale. Test branch circuits for one minute with readings recorded at one minute intervals.
 2. Grounds: Ground connections for new service equipment and for any new motors over 5HP shall be tested with a ground resistance tester. Ground connections having a resistance greater than 5 ohms shall be augmented with additional rods and conductor.
 3. Motors:
 - a. During the course of the work, all new process motors shall be subjected to an insulation resistance test before being placed in service.
 - b. Motors 5 HP and less shall have 500 volts DC applied with an insulation resistance tester for one minute with readings at 30 seconds and one minute. 480 volt motors with an insulation resistance less than 1.5 megohms or at 60/30 second rates of less than 1.3 shall not be energized.
 - c. Motors larger than 5 horsepower shall be tested for 10 minutes with readings recorded at the end of each minute. Motors with a 10/1 minute reading rates of less than 2 shall not be energized.
- C. Results of the test shall be recorded on a test record card similar to that available from the James G. Biddle Company. Data recorded shall include the name and location of the equipment, date, value of test results, temperature of the motor at the time of the test and insulation resistance corrected for temperature. Record cards shall be turned over to the owner for use in future maintenance testing.

3.03 Acceptance Testing

- A. Upon completion of work, the entire wiring system shall be tested, and shall be shown to be in perfect working condition in accordance with the intent of the specifications and drawings. It shall be the responsibility of the Electrical Contractor to have all systems ready for operation and to have an electrician available to operate same in accordance with and under the supervision of the inspection representative of the Engineer. The electrician shall be available to assist in removal of panelboard fronts, etc., to permit inspection as required.

END OF SECTION

[2244]
[10/2023]

SECTION 16011
ELECTRICAL-SCOPE OF WORK

1.01 Work Required

- A. Arrange with local utility companies for such services as shown or herein specified.
- B. Removal or relocation of all electrical services located on or crossing through the project property, either above or below grade, which would obstruct the construction of the project or conflict in any manner with the completed project or any code pertaining thereto.
- C. Complete electric lighting systems, power systems and auxiliary systems as shown or herein specified.
- D. Alterations and additions to existing electrical systems.
- E. Furnishing and installation of all electrical items shown on plans or herein specified, unless shown or specified otherwise.
- F. Connection of all equipment requiring electrical connection, mentioned in this Section or shown on drawings, whether furnished by electrical contractor or others.
- G. Alterations and additions to ground ring system.
- H. Alterations and additions to existing SCADA system.

PART 2 PRODUCTS

2.01 Proposed Substitutes

- A. Submit to Engineer no less than ten (10) days prior to bid date, any items which are proposed as substitutes for those specified.

2.02 Shop Drawings And Catalog Data

- A. Submit to Engineer within fifteen (15) days after award of contract, prior to purchasing, six (6) copies of manufacturer's shop drawings and catalog data for the items listed below.
- B. All shop drawings of a specific item or system shall be in one submittal and shall be marked to clearly identify the manufacturer, the intended use of the item, and if not readily apparent, the intended location for installation of the item.
- C. Shop drawings of all power equipment shall contain exact details of device placement, phasing and numbering, in form of elevations, for each piece of equipment.

D. Shop drawings submittals shall include:

| | |
|--|-------------------|
| Panelboards | Lighting Fixtures |
| Starters | Wiring Devices |
| Safety Switches | Scada System |
| Circuit Breakers | Exhaust Fans |
| Transformers | Unit Heaters |
| Cable | Louvers/Dampers |
| As Required By Individual Sections Of These Specifications | |

E. Shop Drawings for the following items may consist of typewritten lists, listing manufacture with description, to be used (one only for each item).

| | |
|---------------------|-----------------|
| Building Wire | Conduit, PVC |
| Conduit: Rigid | Wire Connectors |
| Grounding Materials | |

F. None of the above items shall be installed until shop drawings or catalog data has been accepted in writing. Any listed item not submitted even if specified shall be considered not acceptable and shall be removed if directed.

G. Shop drawings shall include large scale plan layouts and elevations of each electrical equipment room or other space having panelboards, switchboards, or major electrical equipment installed therein. Plans shall be one half inch equal one foot scale minimum and shall show all required clearances and all pertinent conditions.

H. Utilities confirmation as specified below under "Clearance with Utilities".

PART 3 EXECUTION

3.01 Motors Starters And Controls

- A. Unless otherwise specified or shown, all motors will be furnished and installed under other sections of these specifications.
- B. Unless otherwise specified or shown, all individually mounted starters and/or equipment control contactors shall be furnished and installed under this section of these specifications.
- C. Unless otherwise specified or shown, all control items will be furnished, installed and wired in conduit under this section of these specifications. Where control items are noted as furnished with equipment, the electrical contractor shall coordinate with equipment supplier to produce a coordinated system, functioning as specified.

3.02 Excavation, Cutting, Patching

- A. Perform all excavating and cutting as required to receive electrical work, and after inspection and approval of work by Engineer, do all required backfilling, patching and repairing. Obtain specific approval of Engineer before cutting into any structural members.
- B. For all such work employ competent workmen, and finish a neat and workmanlike manner, equal to quality and appearance to adjacent work.

3.03 Painting

- A. Finish painting of any exposed raceways is not included in this Section. (See Painting and Finishing Section).

3.04 Identification

- A. Identification nameplates shall be laminated plastic.
- B. Each switchboard, motor control center and panelboard shall be equipped with a nameplate with 1/4" minimum letters.
- C. Each individual mounted circuit breaker, switch, starter, contactor and/or any other control or protective device shall be equipped with a nameplate with 1/4" minimum letters. Nameplates on fusible equipment shall state fuse size.
- D. Each branch circuit in a switchboard, motor control center and panelboard shall be identified.
 - 1. Panelboards with covers and directory pockets shall have typewritten directories.
 - 2. Switchboards, motor control centers and panelboards without directories shall have a nameplate with 1/8" minimum letters installed adjacent to each circuit device stating equipment fed and fuse size, if applicable.
- E. Nameplates shall be white micarta with black core.
- F. All wires shall be clearly numbered at each end using Brady Co. Bradysleeve wire marking sleeves or heat-shrink type wire markers or approved equal. Wire bundles shall be identified by using Bradey non-adhesive cable tags or approved equal.

3.05 Storage Of Materials

- A. Store all materials to prevent damage from rust, corrosion, physical injury, etc.
- B. Keep site clean of accumulation of cartons, trash, debris, etc.

3.06 Alterations And Additions To Electrical Systems In Existing Facilities

- A. Work in existing facilities shall be performed as indicated or required to perform its intended function on Electrical and Architectural plans. This Contract shall include removing, relocating, extending, etc., any items of electrical nature required to facilitate work as indicated. All circuits interrupted by rework shall be extended and left energized. All contractors bidding on the project shall visit the site to determine the extent of work, removal, etc., required to implement the work indicated on the drawings.

3.07 Modifications To Existing Panelboards, Motor Control Centers (MCCs) And Switchboards

- A. New circuit breakers shall be installed in existing panelboards, MCCs and/or switchboards as shown on the drawings.
- B. New Circuit breakers installed in existing panelboards, MCCs or switchboards shall be by the same manufacturer as the panelboard or switchboard and shall be mechanically and electrically identical to existing circuit breakers.

- C. Furnish and install all necessary hardware as required for the addition of new circuit breakers. Where existing conditions do not permit installation of additional circuit breakers in the existing enclosure, install subfeed lugs and extend the existing panelboard feeder to a new panelboard section and install the new circuit breakers therein. New panelboard sections, when required, shall be of the same or greater ampere and voltage rating as the existing panelboard.

3.08 "As Built" Drawings

- A. During the progress of the work, the Contractor shall maintain an accurate set of "record" electrical drawings. The information contained on these drawings shall be delivered to the Engineer at the completion of the work. "Record" drawings shall be kept on the job site during the progress of the work and shall be available for review by the Engineer at any time.
- B. The information contained in the "record" drawings shall include but not be limited to the following:
 - 1. Accurate location and routing of all concealed conduit within the buildings and/or structures.
 - 2. Accurate locations of all underground duct banks, manholes and pull boxes.
 - 3. Terminal numbers of connections of all control and instrumentation conductors.
 - 4. Circuit numbers of all outlets and appliances fed from lighting and power panels if different from that shown on the drawings.
 - 5. Any variations in size or number of conductors from that shown on the drawings.
 - 6. Any field changes in control circuits.
 - 7. Accurate locations of any outlets or appliances when different from that shown on the drawings.
- C. The "record" drawings delivered to the Engineer at the completion of the work shall be accompanied by complete record drawings of all electrical equipment and electrical controls and components furnished as part of mechanical equipment.

3.09 Operations And Maintenance Instruction

- A. At the completion of the job, the electrical contractor shall turn over to Owner one (1) set of marked "as built" drawings, three (3) sets of all equipment catalog and maintenance data and three (3) sets of shop drawings on all equipment requiring same. The contractor shall explain and demonstrate all systems to the Owner's representative(s).

END OF SECTION

[2244]
[10/2023]

SECTION 16012
DEMOLITION-ELECTRICAL

PART 1 GENERAL

1.01 Scope

- A. This section outlines the quality, requirements and materials of Electrical Demolition.
- B. The electrical contractor shall visit the site to determine the extent of demolition work as required by the drawings and specifications.
- C. Exposed electrical conduit, wiring, devices, fixtures, etc. shall be removed as required to allow for the new construction. Any abandoned as a result of new construction, or currently not in service shall also be removed as part of this contract. Electrical conduits concealed in floors, walls and above non-accessible ceilings may be capped and abandoned.
- D. Where new HVAC and Plumbing work requires relocation of existing electrical work such relocation shall be provided.
- E. All active devices, wiring and feeders shall remain in service.

PART 2 PRODUCTS

2.01 New Materials

- A. Where existing electrical conduits, junction boxes and wiring are required to be relocated, new materials used shall match existing. Furnish and install conduits, wiring, hardware, boxes, disconnect switches, etc. as required for extension of existing circuits and/or relocation of existing electrical equipment. New cable splices, if required, shall be made with insulated compression type butt splices.

2.02 Materials Removed

- A. All materials removed, unless otherwise specified, shall be removed from the site and disposed of by the contractor. Lighting fixtures, panelboards, and circuit breakers shall, at the Owner's option, be disposed of by the contractor or retained for spare parts by the Owner.

2.03 Materials Removed And Reinstalled

- A. Any equipment or materials shown on the drawings or specified to be removed and reinstalled shall be cleaned and, if necessary, repaired to first class condition prior to reinstallation.
- B. Lighting fixtures shall be checked, cleaned, repaired and replace any broken or "yellow" lens.

PART 3 EXECUTION

3.01 Workmanship

- A. The contractor shall take care not to damage adjacent equipment, structure, etc. not to be demolished. Where existing devices or equipment are removed, existing finishes shall be repaired where such repair is not shown under new work.

END OF SECTION

[2244]
[10/2023]

SECTION 16100
BASIC MATERIALS AND METHODS

PART 1 GENERAL

1.01 Scope

- A. This section outlines the intent of Division 16 with regard to Basic Materials and Methods.

PART 2 PRODUCTS

2.01 Materials Furnished As Specified

- A. Material proposed to be furnished as specified shall be in strict accordance with the plans and specifications of Division 16. Shop drawings shall be furnished as required by Section 16011. All materials furnished are subject to the approval of the Engineer and his authority of approval is final.

2.02 Material Substitutions

- A. No material substituted for specified, except by written approval of Engineer. Specified catalog numbers are used for description of equipment and standard of quality only. Equivalent material will be given consideration only if adequate comparison data including samples are provided.

2.03 Samples

- A. Samples of materials shall be furnished where required by plans and/or specifications of division 16, or as requested by the Engineer on items proposed as substitutes.

PART 3 EXECUTION

3.01 Safety

- A. Maximum consideration shall be given to job safety and only such methods as will ensure the safety of all persons shall be employed. The codes and regulations of OSHA shall be given strict compliance as well as such other codes, laws, and regulations as may be applicable.

3.02 Technique

- A. It is the intent of these plans and specifications to direct attention to the absolute necessity to use safe techniques and to provide quality installations in compliance with good practice and the plans and specifications of Division 16.

END OF SECTION

[2244]
[10/2023]

SECTION 16110
RACEWAYS - METAL

PART 1 GENERAL

1.01 Scope

- A. This section deals with the materials to be used as metal raceways, connections, and supports and the installation of all raceways.

PART 2 PRODUCTS

2.01 Material Type

- A. Conduit: Rigid metal conduit shall be galvanized outside and inside by hot dipping. Conduit shall be as manufactured by Republic, Wheatland, Allied Tube and Conduit or approved equal.
- B. Rigid, heavy wall aluminum conduit shall conform to ASA standards and be as manufactured by Republic, Wheatland, Allied Tube and Conduit or approved equal. Installation shall be in accordance with manufacturer's recommendation. Conduit expansion fittings shall be installed where required.
- C. Watertight flexible metal conduit shall consist of flexible galvanized steel tubing with a liquidtight jacket of PVC. All flexible conduit shall have a copper bonding conductor wound into conduit body.
- D. Flexible steel conduit shall be continuous spiral wound and interlocked galvanized material conforming to UL standards for flexible metal conduit. Fittings for flexible metal conduit shall be galvanized steel, insulated throat, UL approved for grounding means.
- E. Couplings and connectors on rigid conduit shall be standard threaded type, galvanized outside and inside by hot dipping. Clamp type and threadless are not acceptable. Couplings and connectors, for rigid conduit shall be as manufactured by Raco or Appleton.
- F. Connectors raintight: Meyers or approved equal.
- G. Bushings on rigid conduit shall be threaded malleable iron with integral noncombustible insulator. Rigid conduit bushings shall be O-Z/Gedney "IBC" series, T & B BIM series, Midwest Electric series 1031 - 1043 or equal by Penn Union. Grounding bushings shall be O-Z/Gedney "IBC-L" series, T & B 3870 - 3999 series, Midwest Electric GLL series or equal by Penn Union.
- H. Fittings for aluminum conduit shall be aluminum with less than 0.4% copper content for use in contaminated atmospheres. On exterior locations, fittings shall be provided with gasketed covers. Aluminum fittings shall be as manufactured by Thomas and Betts, Crouse-Hinds, Appleton, Pyle-National or equal.
- I. Fittings for flexible liquid-tight conduit shall be malleable iron sealing type with insulated throat and cast integral grounding lugs. Fittings shall be O-Z/Gedney, Burndy, Appleton or equal.
- J. Conduit clamps and supports shall be as manufactured by T & B, Midwest Electric, or O-Z/Gedney.
- K. Conduit fittings shall be manufactured by Pyle National, Appleton, Crouse Hinds, O-Z/Gedney, Killark or Russellstoll.

2.02 Hardware

- A. All hardware such as expansion shield, machine screws, toggle bolts, "U" or "J" bolts and machine bolts shall be of corrosion resistant materials.
- B. Corrosion resistance shall be accomplished by plating, galvanizing or use of stainless steel or other approved corrosion resistant materials. All shall be furnished by the Contractor.
- C. Hardware in contact with aluminum conduit, handrails, plates and structural members and hardware outdoors and in corrosive areas shall be stainless steel.

PART 3 EXECUTION

3.01 Conduit, Type Of Installation

- A. Unless shown or specified otherwise, rigid steel conduit shall be used in all locations. Minimum conduit size shall be 3/4" trade size.
- B. Aluminum conduit shall be used in all exposed locations outdoors and in process areas subject to corrosive gases. In no case shall Aluminum conduit be installed in concrete.
- C. Provide watertight flexible metal conduit for connections to all motors, transformers or other equipment which has moving or vibrating parts.
- D. EMT may be utilized for branch circuits and auxiliary systems where concealed in ceiling or cavity walls in dry locations only.

3.02 Installation Of Conduit

- A. Conduits shall be sized in accordance with the latest National Electrical Code except where shown to be larger on the drawings or when required by local Code.
- B. Follow methods which are shown on the drawings. Where not otherwise shown, specified, or approved in a particular case, run all conduits exposed.
- C. Exposed conduits shall be run parallel with or at right angle to building walls and shall be supported on walls or ceilings. Conduit supports attached to concrete or masonry construction shall be made by means of expansion anchors or power tool driven inserts, Phillips Red Head or equal.
- D. Where rigid conduits enter boxes they shall be secured in place by approved locknuts and bushing.
- E. Conduit ends shall be plugged during construction.
- F. The use of running threads is absolutely prohibited. All conduit shall be jointed with approved conduit couplings. All couplings on rigid conduit shall be threaded.
- G. Before installing raceways for motors and fixed appliances, check location of motor and appliances connections to locate and arrange raceways appropriately. Provide flexible conduit connections to all motors and/or any equipment which has moving or vibrating parts. Flexible conduit shall generally not exceed 24" in length and shall in all cases be equipped with a ground wire, bonded at both ends.

- H. Fasten conduit securely in place by means of approved conduit clamps, hangers, supports and fastenings. Arrangement and methods of fastening all conduits shall be subject to Engineer's direction and approval.
- I. All exposed conduit threads or breaks in the galvanizing, exposed to the elements or exterior of building, shall be treated with cold galvanizing compound.
- J. All conduits shall be supported within 3 feet of each coupling, fitting, outlet box, junction box, cabinet or equipment enclosure. Conduit supports shall be independent of ducts, plumbing piping, ceiling supports, etc. Conduits shall not be supported by junction boxes, pull boxes, fixtures, etc.
- K. All conduit connections to sheet metal cabinets or enclosures subject to the elements shall be terminated by use of raintight hubs.
- L. A 100 pound test nylon pull cord shall be installed in each empty conduit.
- M. Apply two coats of asphaltum paint to all underground metallic conduit. Carefully retouch any breaks in paint and allow to dry before covering with earth. Leave exposed until after Engineer's inspection. In exposed wet or outdoor installations coating shall extend 6" above slab.
- N. No conduit with an external diameter larger than 1/3 the thickness of the slab, shall be placed in the slab and conduits in the slab shall not be spaced closer than 3 diameters on center.
- O. No conduit shall be run in slag or fill under the ground floor slab. Where running in the slab is not permissible, conduits shall be run in trenches, 18" minimum, below grade and backfilled.
- P. Any conduit stubbed out for future shall be capped and marked with a 2" minimum red metal tag which identifies conduit origin. Conduits stubbed up above grade or roof shall be tagged on the conduit. Conduits stubbed out below grade shall be tagged on nearest building wall, curb, etc., directly over the conduit run.
- Q. Conduit runs through walls below grade shall be installed with watertight fittings, OZ/Gedney FSK, Century-Line or equal.
- R. Conduits to meters and other electronic devices below grade level shall be provided with a conduit seal and drain, Crouse-Hinds type EYS and ECD, Appleton, or equal to prevent moisture in conduit from entering enclosure.
- S. Except as shown otherwise, communications and shielded signal conductors shall not be run in raceways containing power or control voltage conductors. Communications and shielded signal conductor conduits shall be separated from power conduits one foot or more as recommended by IEEE Standard 518-1982. Such conductors shall not enter the same junction box or pull box used for power or control voltage conductors. All communications and shielded signal conductors shall be run in steel conduit.
- T. Conduit runs between buildings or structures shall be grouped in duct banks. All conduit runs outside buildings shall be encased in a minimum of 3 inches of concrete on all sides. Concrete shall be steel reinforced as shown on the plans. All conduit runs outside buildings shall be a minimum of 30 inches below grade except within 10 feet of a structure where conduit must rise to enter the structure. Where conditions dictate less depth, add two (2) additional inches of concrete for each twelve (12) inch reduction.
- U. Concrete for underground conduit shall have the top surface tinted red.

- V. All conduit runs shall be identified by means of a round brass or copper tag with stamped identification as shown on the conduit schedule and shall be attached with soft brass wire or non-corrodible chain at conduit terminations and all junctions or pull boxes.

END OF SECTION

[2244]
[10/2023]

SECTION 16111
RACEWAYS – NON-METALLIC

PART 1 GENERAL

1.01 Scope

- A. This section deals with the materials to be used as raceway where shown on the plans or specified as non-metallic conduit.

1.02 Where Used

- A. Non-metallic conduit shall be used for branch circuits, 120 volt control circuits and feeders where below grade between buildings or structures. Non-metallic conduit shall, however, convert to rigid metal conduit prior to leaving concrete in areas where conduit would be exposed. Conduit adapters shall be used for transitions.
- B. Non-metallic conduit shall be used where indicated on the plans.
- C. Non-metallic conduit shall be used in lieu of metallic conduit in all instances for individual grounding conductors.

PART 2 PRODUCTS

2.01 Composition

- A. Conduits and fittings shall be constructed of polyvinyl chloride compounds in accordance with the applicable requirements of UL, NEMA and the NEC.

2.02 Schedule 40, Rigid PVC

- A. Shall be U.L. listed for use with 90 degrees C. rated conductors and in conformity with Article 352 of the NEC.

2.03 Fittings

- A. All couplings, adapter, bells, reducers, etc., shall be of the same material and by the same manufacturer as conduit.

2.04 Cement

- A. Solvent cement shall be as recommended by the manufacturer.

2.05 Manufacturer

- A. The conduit manufacturer shall have had a minimum of 5 years experience in the manufacture of the products. Non-metallic conduit shall be as manufactured by Carlon, Queen City, Can-Tex, National Pipe, Allied Tube and Conduit or approved equal.

PART 3 EXECUTION

3.01 Installation

- A. All elbows, bends, etc., shall be either factory bends or made with an approved heat bender.
- B. All cuts shall be made with an approved saw and ends deburred.
- C. All joints shall be made as follows: Clean the outside of the conduit to depth of the socket, and the inside of socket with an approved cleaner. Apply solvent cement to the interior of the socket and exterior of conduit, making sure to coat all surfaces to be joined. Insert conduit into the socket and rotate 1/4 to 1/2 turn and allow to dry.
- D. No P.V.C. conduit shall be run exposed except as otherwise specified.

3.02 Duct Type

- A. Non-metallic conduit shall be Schedule 40 unless specifically noted otherwise.
- B. Duct lines shall be installed as shown on the drawings and as specified in Section 16110.

END OF SECTION

[2244]
[10/2023]

SECTION 16120

CONDUCTORS

PART 1 GENERAL

1.01 Scope

- A. This section outlines the quality and type of conductors to be used in the various systems, locations and conditions.

PART 2 PRODUCTS

2.01 Wire And Cable 600 Volt

- A. Conductors shall have current carrying capacities as per NEC, #12 minimum except for control cable specified below.
- B. Conductors shall be stranded copper.
- C. All conductor insulation shall be 600 volt.
- D. Insulation for all power conductors shall be cross-linked polyethylene insulation type XHHW.
- E. Conductors shall have permanently colored insulation. Conductor color codes shall be as set forth below.

2.02 Control Wire

- A. Control wire shall be not less than 14 AWG annealed uncoated copper (THHN/THWN), 600 volt. Type TC Control cable for use in accordance with Article 336 and 392 of the National Electrical Code may be used.

2.03 Instrumentation Wire And Cables

- A. Instrumentation loop (DC) cables - shielded shall not be less than #18 AWG, stranded bare copper conductors, insulated with 15 mils of 105 degree polyvinyl chloride, twisted into pairs, shielded with an aluminum mylar tape shield and tinned copper drain wire.
- B. Single pair cables shall have polyvinyl chloride jacket overall. Multi-pair cables shall have individually shielded pairs cabled, with an aluminum mylar tape shield and tinned copper drain wire, and polyvinyl chloride jacket overall. Three hundred volt 105 degrees C UL listed Power Limited (Low Energy) Circuit Cable.
- C. Instrumentation loop (DC) tray cables - shielded shall be not less than #18 AWG stranded Class B bare copper conductors, each insulated with 15 mils PVC, twisted into pairs, each numbered and shielded with a 0.85 mil aluminum mylar tape shield and a tinned 18 gauge copper drain wire. Multiple pair bundled with a jacket of 50 mil black flame retardant PVC. Cable shall be listed as 300 volt power limited control cable type TC.

2.04 Data Communications Cable

- A. Coaxial and twisted pair cables for data transmission shall be approved by the data communications equipment manufacturer and shall be furnished by the instrumentation and control system supplier.

- B. Category 6 UTP Data Transmission Cable: Four, thermoplastic-insulated, individually twisted pairs of conductors; No. 23 AWG solid copper, color-coded; gel filled enclosed in UV resistant LLDPE jacket; listed as complying with Category 6 TIA/EIA-568-B.

2.05 Manufacturer

- A. Wire and cable shall be manufactured by Cablec, Okonite, Kirite, Belden, Triangle, General or approved equal.

2.06 Wire And Cable Connectors And Terminals

A. 600 Volt Class and Less

1. Connections made in 20 amperes or less lighting or receptacle branch circuits may be made with solderless connectors, Ideal Wing nuts, 3 M Hyflex, T&B Marrette, or equal.
2. All power connections and connections of wire #12 and larger, except as previously noted, shall be made with compression or bolted connectors or terminals.
3. Compression connectors shall be of tin plated copper, properly sized for the conductor and installed with listed tools and dies.
4. Bolted connections shall be two or four bolt clamps of bronze or tin plated copper. Lugs shall be of bronze, tin plated copper or tin plated aluminum alloy.
5. Hardware for power connections shall be silicon bronze, stainless steel or cadmium plated steel. Wire nuts, crimp caps and split bolt connectors are prohibited, except as noted otherwise.
6. Terminal strips shall be as follows
 - a. Compression type, 300 or 600 volt rating, with numeric identifiers beside each connection; 600 volt rated for all power and control, 300 volt rated for DC signal connections.
 - b. Furnish as spare approximately 20% of the terminals used for each type of wiring, that is, dc signal wiring, dc control wiring and ac power and control wiring .
 - c. Terminal strips shall be Allen-Bradley, Buchanan or approved equal.
7. All instrumentation and control wire connections shall be made with solderless compression type connectors and terminals, Thomas and Betts Sta-Kon, Burndy Hylug, or equal.

B. Ground

1. All ground wire connections below grade or exposed to corrosive atmospheres shall be of the crucible weld process, Cadweld or Thermoweld.
2. Above grade ground connections shall be made with solderless type connectors and terminals designed specifically for grounding installations; all shall be as manufactured by Burndy, OZ or equal.
3. Ground bus in panels shall be fabricated of seamless copper tubing or bar with individual vee shaped holes and tightening screw. Ground bus shall be similar to ILSCO type CAN.

C. Category 6 Data Transmission Cable

1. Modular, color-coded, non-keyed RJ-45 receptacle units with integral insulation displacement connector type terminals; Comply with TIA/EIA-568-B.

PART 3 EXECUTION

3.01 Installation Of Wire And Cable

- A. No conductor shall be smaller than #12 except where designated on the drawings or hereinafter specified.
- B. Multi-wire branch circuits shall be used only as indicated and shall have provisions for simultaneously disconnecting all ungrounded conductors in accordance with NEC 210.4.B.
- C. All joints and splices in wire shall be made with approved solder-less connectors, and covered so that insulation is equal to the conductor insulation.
- D. No splices shall be pulled into conduit.
- E. Conductors and conduits shall be continuous between outlets.
- F. No conductor shall be pulled until conduit is cleaned of all foreign matter.
- G. Where installed in panelboards, cabinets, wireways, switches and equipment wire and cable shall be neatly formed and tied.
- H. Where conductors are run in parallel, each conductor making up the feeder shall be exactly the same length, the same size, and the same type of conductor with the same insulation. Further, each group of conductors making up a phase or neutral must be bonded at both ends in the same manner.
- I. In installing the main service, additional slack conductors shall be provided as required by the electric utility for connection to their equipment.

3.02 Outlets And Branch Circuits

- A. Outlets shall be connected to branch circuits as indicated on drawings by circuit number adjacent to outlet symbols. No more outlets than are indicated shall be connected to a circuit.

3.03 Installation Of Category 6 UTP Data Transmission Cable

- A. Install cables using techniques, practices, and methods that are consistent with Category 6 rating of components and that ensure Category 6 performance of completed and linked signal paths, end to end. Observe all manufacture recommendations on bend radius and pulling tension. Pull all cables in a single raceway simultaneously. Install cables without damaging conductors or jacket. Comply with all TIA/EIA-568-B and 569-A standards.
- B. Testing: After installation and termination engage a qualified testing and inspecting agency to inspect, field test, prepare test reports and certify performance of each cable. Use Class 2, bidirectional, Category 6 tester. Test for faulty connectors, splices, and terminations. Test according to TIA/EIA-TSB67, "Transmission Performance Specifications for Field Testing of Unshielded Twisted-Pair Cabling Systems." Link performance for UTP cables must meet minimum criteria of

TIA/EIA-568-B. Provide a complete set of test results and a copy of certification for the project with close out documents.

- C. Provide machine printed adhesive vinyl or vinyl-cloth wraparound tape markers, with unique alphanumeric cable designations at each end of cable.

3.04 Wire And Cable Color Coding

- A. A color coding system as listed below shall be followed throughout the entire network of branch circuits.

| | | | |
|---------|------------------|---------|---------|
| Voltage | 120/240 | 120/208 | 277/480 |
| Phase | Color | Color | Color |
| A | Black | Black | Yellow |
| B | Orange(high leg) | Red | Orange |
| C | RED | Blue | Brown |
| Neutral | White | White | Gray |
| Ground | Green | Green | Green |

- B. Conductors shall have permanently colored insulation as indicated above. Where permanently colored insulation is not available, color code with Scotch #35 tape in a half lapped pattern - ground conductors shall be taped for its entire exposed length, ungrounded conductors shall have a minimum of 2" wide band within 12" of each termination and in each enclosure, junction box, etc.
- C. Control Conductors: Shall be color coded by use of color coded "tracers".

END OF SECTION

[2244]
[10/2023]

SECTION 16130
OUTLET, JUNCTION AND PULL BOXES

PART 1 GENERAL

1.01 Scope

- A. This section outlines the quality, type and installation of outlet and junction boxes for general and special use.

PART 2 PRODUCTS

2.01 Ceiling And Wall Outlet Boxes

- A. Flush outlet boxes shall be standard type, with knockouts, made of hot dipped galvanized steel, Steel City, Racco, Appleton, or Bowers.
- B. Single wall outlet boxes shall be two gang with single gang trim rings. Appropriate gang boxes shall be used for mounting ganged switches.
- C. Ceiling outlet boxes shall be 4" octagon 1-1/2" deep or larger as required due to number of wires.
- D. Boxes shall be provided with approved 3/8" fixture studs when required to support stem mounted light fixtures.
- E. Outlet and device boxes on exposed conduit shall be cast metal boxes, type "FS" or "FD".

2.02 Junction Boxes And Gutters

- A. Sheet metal junction boxes for dry locations, through 4-11/16", shall be standard type of hot dipped galvanized steel, with knockouts, Steel City, Racco, Appleton, Bowers or approved equal.
- B. Cast metal junction boxes, through 4-11/16", shall be type FS, FD, JB, GS, or SEH as required for application.
- C. Sheet metal gutters and junction boxes for dry locations larger than 4-11/16" shall be NEMA 1, Code gauge steel, flush or surface mounted as indicated and shall be Hoffman or approved equal.
- D. Cast junction boxes larger than 4-11/16" shall be cast aluminum for all below grade and exterior use and where shown. Above grade shall be NEMA 4 and below grade shall be NEMA 6.
- E. Non-metallic junction boxes and gutters shall be of fiberglass reinforced epoxy. PVC boxes and gutters shall not be used except where specifically indicated. Non-metallic boxes shall be furnished with stainless steel hardware.
- F. Gutters indicated as weatherproof shall be oiltight lay-in wireway. Wireway shall be hinged cover, fully neoprene gasketed, and equipped with pull-down latches. Wireway shall be manufactured of 14 gauge steel with 10 gauge steel end flanges. Wireway shall be treated with a corrosion resistant phosphate treatment and painted with an electrostatically applied epoxy powder coating. Wireways that are shown to be NEMA 4X shall be manufactured with 304 stainless steel with 316 hardware.

- G. Sheet metal junction boxes for use outdoors, damp or wet locations or in process areas shall be of aluminum or stainless steel. Boxes and gutters shall be NEMA 4X with full gaskets, screw cover or hinged as indicated.

2.03 Outdoor And Process Area Boxes

- A. Boxes installed outdoors, in damp or wet locations or in process areas shall be cast metal, stainless steel, aluminum or, where indicated, non metallic. Painted or galvanized steel boxes shall not be allowed in such locations.

2.04 Below Grade Pull Boxes

- A. Concrete pull boxes shall be precast, reinforced for H-20 bridge loading, with a minimum inside dimension of four feet. Pull boxes shall be of size and depth as required for the duct lines. Pull boxes shall be furnished with the following features:
 1. Minimum size of 4'x 4'x 6' high inside except a minimum of 4' x 6' x 6' high in ductlines with more than 8 conduits.
 2. Pulling irons opposite each window.
 3. 15" x 15" x 4" deep sump with cover.
 4. Cable racks and supports as required for racking cable around walls. Racks shall be McGraw-Edison Series DU17B or approved equal.
 5. Manhole ring and cover: Neenah R-1640-C or approved equal, lettered "Electric". Manhole tops shall be 1-1/2 inches above finished grade, except flush in paved areas.
- B. Precast concrete manholes shall be manufactured by Foley Products Company, Oldcastle Infrastructure, Smith-Midland or approved equal.
- C. Metal pull boxes shall be heavy duty, flanged, watertight, with recessed checkered steel cover. Metal pull boxes shall be Appleton Type WYT or equivalent by Crouse-Hinds, O-Z/Gedney, Spring City, Hope or equal.

PART 3 EXECUTION

3.01 Installation Of Ceiling And Wall Outlet Boxes

- A. Outlet boxes shall be securely fastened to structural members and shall not be supported by dry wall, gypsum board, plaster, etc. The device or plate installed in conjunction with the outlet box shall not be used for support.
- B. Surface fixture outlet boxes shall be set so edge of cover comes flush with finished surface.
- C. There shall be no more knockouts opened in any outlet box than are actually required.
- D. Boxes shall be sealed during construction.

3.02 Installation Of Junction Boxes

- A. Provide junction or pull boxes where shown on the drawings and as required to facilitate installing conductors. Such boxes shall be "Code" sized unless required to be larger by the plans or other sections of these specifications. All junction boxes shall be accessible.
- B. Junction boxes shall be securely fastened to the building structure. Junction boxes shall not be supported by conduit fittings.
- C. There shall not be more knockouts opened in any box than are actually required. All unused openings shall be plugged.
- D. Boxes shall be properly protected during construction and shall be cleaned of all foreign matter before conductors are installed.
- E. Boxes to be imbedded in concrete shall be properly leveled and anchored in place before the concrete is poured.

3.03 Outdoor Boxes

- A. Boxes installed outdoors or in damp locations shall be cast metal, stainless steel or, where indicated, non metallic.

3.04 Below Grade Pull Boxes

- A. Pull boxes for underground duct lines shall be located as shown on the drawings with additional boxes if required to avoid exceeding the cable manufacturer's recommended pulling tension. Pull boxes for power ducts shall be concrete. Pull boxes for instrumentation ducts shall be cast iron or aluminum. Cast metal pull boxes shall be set flush in concrete; minimum four inches thick on sides and bottom.
- B. Boxes shall be sized as required for the ducts entering the box. Pull boxes for underground instruments duct lines shall be a minimum of 16" x 24" x 12" deep. Boxes shall be set in concrete, minimum of 4" all around.

END OF SECTION

[2244]
[10/2023]

SECTION 16140
WIRING DEVICES

PART 1 GENERAL

1.01 Scope

- A. This section outlines the quality and requirements of the Wiring Devices and Plates, switches, receptacles, etc., to be used and the installation instructions for the devices.

PART 2 PRODUCTS

2.01 Wiring Devices

- A. Switches and receptacles shall be nylon industrial specification grade AC type, side and back wired as manufactured by Arrow Hart, Hubbell, Leviton or Pass & Seymour.
- B. Switches shall be quiet operation toggle rated 20 amperes, 120/277 volts AC, Hubbell 1221 series or equal.
- C. Receptacles shall be industrial specification grade, in NEMA configuration as shown on drawings. 20 ampere, 120 volt duplex receptacles shall be Hubbell Catalog #5262 or equal.
- D. Where noted on the drawings, and/or required by code, receptacles shall be equipped with integral Class A ground fault protection. Unless noted otherwise all "GFCI" receptacles shall be duplex, rated 20 amperes, 120 volts with "TEST" and "RESET" buttons, LED indicator lights, and feed through feature for ground fault protection of all devices on the load side of the unit. "GFCI" receptacles installed outdoors shall be identified as "Weather Resistant". "GFCI" receptacles shall be Hubbell Catalog #GF-5362 or equal.

2.02 Plates And Accessories

- A. All devices shall have proper plates, trims, etc. Plates shall be standard size and of the same manufacturer as devices. Oversize plates are not acceptable.
- B. Where telephone and other outlets do not have plates furnished by others, appropriate plates shall be provided by this Contractor.
- C. Plates shall be 302 stainless steel except where otherwise specified or noted on the drawings.
- D. Receptacles installed in wet locations shall be equipped with a device plate and hinged outlet cover assembly which is UL listed for wet locations while in use and identified as "Extra Duty" rated. The hinged cover shall be equipped with reliefs on the bottom to permit cords to exit while the cover is closed and shall also be gasketed to seal to the outlet box. Wet location covers shall be cast aluminum as manufactured by RED-DOT or approved equal.
- E. Switches installed in wet locations shall be equipped with a cast aluminum, gasketed weatherproof cover plate with an external operating lever equal to Crouse Hinds #TP7260.
- F. Surface mounted devices with exposed conduit in unfinished areas shall have galvanized metal plates with rounded or beveled edges.

2.03 Finishes

- A. Devices and plates shall be grey with stainless steel or, grey with galvanized metal.

PART 3 EXECUTION

3.01 Mounting Heights And Locations

- A. Symbols on drawings and mounting heights are approximate. Exact locations and mounting heights shall be determined on the job and it shall be the Contractor's responsibility to coordinate with all trades to ensure correct installation, i.e., over counters in or above back-splashes, in block walls, tile, and other specific construction features.
- B. Outlets, unless otherwise shown shall be located with the center line of outlet boxes the following distance above the finished floor:

| | |
|----------------------------|------------------------------|
| Receptacles, General: | 1'-6" |
| Voice/Data Outlets: | 1'-6" |
| Receptacles Over Counters: | 3'-8" or 2" above backsplash |
| Switches, General: | 3'-10" |
- C. All device mounting heights shall be in accordance with the Americans with Disabilities Act (ADA) and all Federal, State, and Local requirements for making buildings accessible to the handicapped.

3.02 General Mounting

- A. Verify all door swings with Architectural. Locate boxes for light switches within 4 inches of door trim on the strike side.
- B. Where switches are shown grouped together they shall be installed under a single plate. Where required, barriers shall be provided in the outlet box.
- C. All receptacles within 6'- 0" of sinks, showers or normally wet or damp locations shall be equipped with ground fault protection.
- D. Where receptacles, voice/data outlets, and auxiliary system outlets are shown on the drawings grouped together they shall be installed with 4 inches between outlets.
- E. Devices and associated plates shall not be used as support. Outlet boxes shall be rigidly supported from structural members located on each side of the outlet. Far side box support brackets are not acceptable

END OF SECTION

[2244]
[10/2023]

SECTION 16170
SAFETY SWITCHES

PART 1 GENERAL

1.01 1.01 Scope

- A. This section deals with safety switches fused and non-fused. All safety switches shall be NEMA Heavy duty type, 600 volt.

1.02 1.02 Service Rating

- A. Where required, safety switches shall be labeled for use as service entrance equipment.

PART 2 PRODUCTS

2.01 Safety Switches

- A. Shall be quick-make, quick-break, fused or non-fused as shown. Switch blades shall be fully visible in the off position with the door open. The switch handle shall be a part of the box, not the cover.
- B. Fusible switches shall have provisions for dual element fuses, UL Class RK-5.
- C. Switch cover shall have a defeatable dual interlock to prevent inadvertent opening of the cover with the switch in the "ON" position. Provisions shall be made for padlocking in the "OFF" position.
- D. Switches shall be horsepower rated.
- E. Switches shall be equipped with ground lugs and where switches contain a neutral conductor shall be equipped with isolated neutral lugs.

2.02 Manufacturer

- A. Switches shall be as manufactured by ABB, Square "D", Eaton, Siemens or approved equal.

PART 3 EXECUTION

3.01 Safety Switches

- A. Safety switches shall be installed as shown on the plans and in accordance with the N.E.C.
- B. Disconnect switches for motors shall be rated in horsepower and shall be sized for motor served.
- C. Disconnect switches for non-motor loads shall be sized in accordance with equipment full load current.
- D. Safety switches shall be NEMA I enclosure except where installed in locations subject to moisture, in which case, safety switches shall have a watertight enclosure, NEMA 4X, except where other types of enclosures are shown on the plans.

- E. Adequate support shall be provided for mounting safety switches. Safety switches shall be securely attached to building structure in all possible instances.

END OF SECTION

[2244]
[10/2023]

SECTION 16181

FUSES

PART 1 GENERAL

1.01 Scope

- A. Furnish and install fuses as shown on the drawings and specified herein.

1.02 Manufacturer

- A. Fuses shall be as manufactured by Bussman, Ferraz-Shawmut, Littlefuse, or approved equal. Numbers shown in this Specification are those of Bussman.

PART 2 PRODUCTS

2.01 Fuses

- A. Shall be time-delay type U.L. listed with a minimum interrupting rating of 100,000 amperes symmetrical.
- B. 600 Amp and below shall be dual element rejection type, Class "RK-5."
- C. 601 Amp and above shall be time-delay Class "L."

PART 3 EXECUTION

3.01 Installation

- A. Fuses shall be sized in accordance with nameplate of equipment served or as shown on Drawings otherwise.
- B. One spare set of fuses shall be furnished for each size used. One additional spare set of fuses shall be furnished for each five sets of same size fuses used.

END OF SECTION

[2244]
[10/2023]

SECTION 16450

GROUNDING

PART 1 GENERAL

1.01 Scope

- A. This section deals with the grounding of service equipment, transformers, surge protection equipment, non-current carrying conductive surfaces of equipment, metal buildings, structures and other equipment.
- B. All grounded connections shall be installed in accordance with the National Electrical Code and all local codes and requirements. Such codes shall be considered minimum requirements and installation of the grounding system shall insure freedom from dangerous shock voltage exposure and provide a low impedance ground fault path to permit operation of overcurrent and ground fault protection devices.

PART 2 PRODUCTS

2.01 Conductors

- A. Grounding conductors shall be insulated copper unless specifically shown or specified otherwise.
- B. Grounding conductors shall be identified by green insulation or by green tape.
- C. All buried grounding system wire shall be bare, solid, soft-drawn, annealed, copper sized #2 AWG minimum, or as shown on drawings.

2.02 Ground Rods

- A. Ground rods shall be 5/8 inch by 10 feet, copperweld unless noted otherwise on the drawings.

2.03 Connections

- A. The connection of a grounding conductor to other ground conductors, ground rods, building steel or process piping shall be by means of a cadweld or thermoweld process.
- B. Grounding conductor connections to conduit terminations shall be made with approved ground bushings.

PART 3 EXECUTION

3.01 Grounding Electrode System

- A. Shall consist of each of the following electrodes bonded together by the grounding electrode conductors:
 - 1. The grounding grid.
 - 2. All underground metallic pipes.
 - 3. The metal reinforcement of concrete structures and building footings.

4. Driven Ground Rods: as shown on the drawings.
 5. Other grounding electrodes if available shall be connected to the grounding electrode system as described in Section 250-50 of N.E.C.
- B. A No. 2 ground wire shall be installed on top of the main duct runs and connected to the utility system ground and all ground mats around structures. Others shall be as shown on the drawings.
 - C. Ground grids as shown shall consist of bare copper conductors and ground rods. Conductors shall be Number 2 AWG unless shown otherwise and be 30" below finished grade. Ground rods shall be 5/8" by ten foot copper clad steel. All connections shall be exothermically welded.
 - D. An earth impedance tester shall be utilized to determine the actual resistance to ground. The maximum acceptable resistance to ground is 5 OHMS, if this value or less is not obtained, additional ground rods shall be driven and connected in parallel until an instrument reading of less than 5 OHMS is obtained. All test readings shall be recorded and submitted to the Engineer for review.
- 3.02 Cadwelding
- A. Cadwelding shall be performed in strict accordance with the manufacturer's requirements.
 - B. All personnel performing cadwelding shall have been trained by factory certified representatives and proof of this training shall be presented to the Architect/ Engineer at the time of Cadweld inspection.
 - C. Cadwelding shall not be performed during conditions of high humidity which inhibit the process from proper bonding. Consult the Manufacturer's instructions for acceptable conditions and do not attempt any Cadwelding during such times as these conditions do not exist.
 - D. Cadweld molds shall be sized and configured for the specific welding application. Molds which have been field modified for application other than their original purpose will not be utilized under any circumstance. Cadweld "one shot" connections shall not be utilized.
 - E. In no circumstances will worn out or loose Cadweld molds be utilized. Molds which experience "blow out" during the welding process shall be replaced immediately and any welds made which exhibit evidence of incomplete welding shall be cut off and rewelded.
- 3.03 Separately Derived Systems
- A. Separately derived systems (dry type transformers with primary and secondary electrically isolated and secondary having a grounded circuit neutral conductor) shall be grounded in accordance with NEC Article 250.
 - B. Separately Derived Systems shall be grounded to the site grounding system.
- 3.04 Equipment Grounding
- A. An equipment grounding conductor shall be installed in the same raceway with all circuit conductors.
 - B. Equipment grounding conductors shall be bonded at each enclosure. Where an equipment grounding bus, bonded to the equipment enclosure, is provided, all equipment grounding conductors shall be connected thereto. Where an equipment grounding bus is not provided, the contractor shall furnish and install ground bus as specified in Section 16120.

- C. Metal conduits shall be made electrically continuous and shall be suitable to serve as the required equipment ground. At terminating ends all conduits shall be strapped together and connected to ground. Flexible conduit connections shall be jumpered with a ground wire strapped to conduit ends or connected between conduit and equipment.
- D. All components of the instrument and control system shall have enclosures solidly connected to the plant grounding system. AC power sources to instrumentation and control equipment shall be grounded to the plant grounding system. Signal conductors shall be grounded at the device powering the loop. Signal conductor raceways shall be grounded.

END OF SECTION

[2244]
[10/2023]

SECTION 16459
DRY TYPE TRANSFORMERS

PART 1 GENERAL

1.01 1.01 Scope:

- A. This section outlines the quality, type and installation for Dry Type Transformers.
- B. Transformers shall be for indoor service unless shown exterior, single or three phase, and with KVA rating shown on the drawings.

PART 2 PRODUCTS

2.01 Transformer Insulation:

- A. Transformers shall have Class H insulation and shall be constructed so that under full load the average conductor temperature does not exceed 150°C rise.

2.02 Taps

- A. Transformers 30 KVA and above shall have 2 - 2 1/2% taps above and 4 - 2 1/2% taps below normal rated primary voltage.
- B. Transformers below 30 KVA shall have 2 - 5% taps below normal rated primary voltage except that single phase transformers up to 10 KVA shall not require taps.

2.03 Sound Rating

- A. The transformer core and coil shall be mounted on internal vibration isolator pads. Sound level shall not exceed the following:

| KVA | Design Sound Level |
|------------|---------------------------|
| 45 - 150 | 50 dB |
| 225 - 300 | 55 dB |
| 500 | 62 dB |

- B. Sound levels shall be determined in accordance with NEMA and ASA Standards and certified test data shall be submitted at the request of the Engineer.

2.04 Enclosures

- A. The transformer shall be protected by a ventilated metal enclosure. Ventilating openings shall have baffles. The enclosure shall be degreased, cleaned, phosphatized, primed and finished with baked enamel.

2.05 Vibration Isolators

- A. All interior units shall be mounted utilizing spring type vibration isolators. See "MOUNTING", sub-section 3.01 of this Section.

2.06 Manufacturer

- A. Transformers shall be Eaton, Square "D", ABB, or Siemens.

PART 3 EXECUTION

3.01 Mounting

- A. Transformers shall be floor or suspended from structure as shown.
- B. Maintain all required NEC 110.26 working clearances.
- C. Contractor shall use extreme care to eliminate noise and vibration.
 - 1. Interior floor mounting units shall be mounted on free standing spring isolators sized in accordance with actual weight of unit installed. Floor mounted spring isolators shall be Amber/Booth Type LXS, Consolidated Kinetics Type SM or approved equal.
 - 2. Suspended units shall be suspended from structure utilizing steel channel and threaded rods (4). Provide in each rod spring isolators Amber Booth Series BS, sized on actual weight of unit.
 - 3. All final connections to transformers shall be in flexible conduit.
- D. A minimum of 4 inch space shall be allowed around all ventilation openings.

END OF SECTION

[2244]
[10/2023]

SECTION 16461
PANELBOARDS-LIGHTING/RECEPTACLE

PART 1 GENERAL

1.01 Scope

- A. Furnish and install circuit breaker lighting and/or receptacle panelboards as shown on the drawings and as specified herein. Panelboards shall be dead front type manufactured in accordance with Underwriter's Laboratories, Inc., standard of panelboards and enclosing cabinets and be so labeled.
- B. Panelboards shall be factory assembled.
- C. Where required, lighting/receptacle panelboards shall be labeled for use as service entrance equipment.

PART 2 PRODUCTS

2.01 Panelboard Boxes

- A. Panelboard boxes shall be fabricated from sheet steel (galvanized or equivalent rust-resistant). The size of the wiring gutters and gauge of steel shall be in accordance with NEMA and U.L. Standards for panelboards unless shown or specified to be larger.
- B. Boxes shall not be furnished with prepunched knockouts except where otherwise noted.
- C. Boxes for panelboards with 18 or more single pole circuit breaker spaces shall be 20 inches wide.
- D. Boxes for outdoor use shall be rated NEMA 4X and be constructed of stainless steel.

2.02 Panelboard Fronts And Trims

- A. Fronts shall be designed for surface or flush mounting as shown on the drawings and shall include hinged door, lock and latch.
- B. Fronts for flush panels shall overlap the box by a minimum of 3/4 inch all around. Surface fronts shall have the same overall dimensions as the box.
- C. Nema 1 fronts shall be of double hinged door construction. The entire cover assembly shall be hinged and secured closed with screws. The cover assembly shall open to provide access to bussing and panelboard live parts without removal of the complete cover. A hinged inner door, with key lock, shall provide access to circuit breaker trip handles only and shall expose no live parts.
- D. Fronts shall be Code gauge steel with interior and exterior surfaces cleaned and finished with gray baked enamel over a rust-inhibiting phosphatized coating.
- E. All panelboards, except those installed in motor control centers, shall be furnished with locks. Locks shall be flush, cylinder type, held in place by concealed screws to a captive nuts welded to the inside of the door. All panelboard locks shall be keyed alike.
- F. A circuit directory with clear plastic cover shall be affixed to the inside of the door.

- G. Panelboards shall have no exposed or accessible live parts when the front is installed whether the door is open or closed.

2.03 Panelboard Bus Assembly

- A. Bus bars shall be silver plated copper and all connectors shall be plated.
- B. Bussing shall be arranged for distributed phase arrangement so that one, two, and/or three pole breakers may be installed in any location. The removal, replacement or installation of circuit breaker units shall be allowable without disturbing adjacent units and without drilling or tapping.
- C. Ampacity, service voltage, service entrance (main breakers or lugs) and branch breakers shall be as shown on the drawings.
- D. Neutral bars shall be full sized and equipped with lugs to accommodate all conductors to be connected.
- E. Ground bars shall be furnished in all panelboards, equipped with lugs to accommodate all conductors to be connected. Where more than one ground bar is furnished, each shall be interconnected with a conductor sized not less than the panelboard feeder grounding conductor.
- F. Multi-section panelboards shall be furnished, as indicated on the panelboard schedule or on the plans, in equal bus sections and mounted in equal sized enclosures.
- G. Unless noted otherwise, sub-feed lugs and feed through lugs shall utilize a full sized conventional main lug arrangement bolted directly to the main bus; branch mounted lug kits will not be accepted.

2.04 Circuit Breaker Arrangement

- A. Circuit breakers shall be bolt-on, factory installed.
- B. The entire left row shall be filled, then begin top right.
- C. Breakers shall be numbered vertically beginning top left. Multi-section panelboards shall be numbered consecutively through all sections.
- D. Circuit breaker numbers shall be plastic or metallic, permanently attached to trim. Stick-on paper numbers will not be accepted.

2.05 Circuit Breakers

- A. Circuit breakers shall be quick-make, quick-break, thermal magnetic, trip indicating, molded case type, alternating current. Breakers shall trip free of the handle and tripping shall be indicated by the handle assuming a position between "OFF" and "ON". Multiple pole breakers shall have internal common trip with single operating handle; external handle ties are not acceptable.
- B. Single pole breakers shall be UL listed as "Switching Breakers" and shall carry the "SWD" marking.
- C. Breakers shall be bolt-on type.

- D. Where noted on the panelboard schedule or on the plans ground fault protection breakers shall be provided:
 - 1. Circuit breakers identified as Ground Fault (GF) or GFCI sized 0-60 ampere, in 1, 2 and 3 pole configurations on systems rated 150 volts or less to ground, shall have integral UL labeled Class A ground fault protection (4-6 milliampere sensitivity). This feature shall not require additional panelboard space.
 - 2. Circuit breakers sized 0-100 ampere identified as Ground Fault Protection of Equipment (GFPE) shall have integral 30 milliampere sensitivity ground fault protection. This feature shall require no additional panelboard space, except that circuit breakers rated 277/480 volts may utilize one additional pole space.
- E. Main Breakers shall be thermal magnetic industrial frame equal to Square D "H" frame or larger. Main breakers shall not be branch mounted.
- F. Where branch breakers are noted to be equipped with breaker handle locking attachments: Attachments shall be capable of padlocking the breaker in either the on or off position and shall be arranged so that it cannot be readily removed, in accordance with the provisions of NEC 110.25.
- G. Other breaker accessories shall be furnished as shown on the drawings.

2.06 Panelboard Equipment Short Circuit Rating

- A. Each panelboard, as a complete unit, shall have a fully rated short circuit current rating equal to or greater than the rating shown on the panelboard schedule or on the plans. Where the rating is not shown larger on the drawings, the minimum short circuit rating shall be 10,000 amperes symmetrical for panelboards with up to 240 volt rating and 14,000 amperes symmetrical for panelboards with 277/480 volt rating. Panelboards shall be marked with their maximum short circuit current rating at the supply voltage.

2.07 Special Requirements

- A. Any special requirements on the drawings, such as for increased interrupting rating, ground fault protection, etc., shall supersede these specifications, but only insofar as that particular requirement is concerned.
- B. Panelboards larger than 400A shall conform to the requirements for power panels.

2.08 Manufacturer

- A. Panelboards shall be as manufactured by ABB, Siemens, Square D, Eaton or approved equal.

PART 3 EXECUTION

3.01 Installation

- A. All panelboard dimensions shall be carefully checked and coordinated with the proper trades to ensure proper mounting space and support.

- B. Panelboards to be surface mounted on exterior walls shall be secured to two (2) vertical runs of 7/8" x 1-5/8" steel strut each 8'- 0" minimum in length and securely anchored to the wall by means of lead anchors or toggle bolts.
- C. Where multi-wire branch circuits are used, provide a means to simultaneously disconnect all ungrounded conductors in accordance with NEC 210.4(B).
- D. Wiring in panelboard gutters shall be done in a neat and workmanlike manner. To avoid derating of conductors otherwise required by NEC 310.15(C) wiring shall not be bundled.
- E. Panelboard directories shall be typewritten and shall be field verified by the contractor to ensure accuracy. Directories shall include adequate descriptions to allow accurate identification of the load and location served.

END OF SECTION

[2244]
[10/2023]

ATTACHMENT "A"

EXISTING POLYBLEND MODEL 1200-P4AB DATA

PolyBlend Model M1200-P4AB

City of Fort Payne WWTP, AL

UGSI Project #551818

City of Fort Payne PO #1906

UGSI Chemical Feed, Inc.

Equipment Submittal

Submitted To:

Robin Campbell

2200 Industrial Blvd S.W.

Fort Payne, AL 35968

Phone: 256-845-4351

Manufacturer:

UGSI Chemical Feed, Inc.

1901 W. Garden Rd.

Vineland, NJ 08360

Phone: 856.896.2187

Fax: 856.457.5920

Project Manager – Richard Kretschmer

Prepared Date:

8/15/14

TABLE OF CONTENTS

| <u>SECTION</u> | <u>DESCRIPTION</u> |
|----------------|-------------------------------|
| 1 | Statement of Confidentiality |
| 2 | Project Schedule |
| 3 | Functional Description |
| 4 | Scope of Supply |
| 5 | Clarifications and Exceptions |
| 6 | Product Details and Drawings |
| 7 | Storage and Inspection |
| 8 | Warranty |

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PROJECT SCHEDULE

This schedule is our best effort to estimate the time between your receipt of this submittal and the equipment's arrival at the jobsite. There are factors, beyond our control, that could affect this schedule. These include final submittal approval, manufacturing holds for inspection, and/or post-approval change orders.

| | | |
|-----------------------------|--------------------|-----------|
| Submittal Issued | August 15, 2014 | (0 weeks) |
| Approved Submittal Returned | September 12, 2014 | (4 weeks) |
| Shipment from Factory | November 7, 2014 | (8 weeks) |
| Arrival at Jobsite | November 21, 2014 | (2 weeks) |

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FUNCTIONAL DESCRIPTION

PolyBlend M System – B Control

This unit is designed to provide batch or continuous delivery of a constant-strength, liquid polymer solution. The solution strength is set through automatic adjustment of the polymer metering pump based on the dilution water flow rate. This solution can be fed directly to the process or to an intermediate polymer feed tank.

The PolyBlend system starts operation by opening a solenoid valve that allows water to flow through the unit. Once water flow is detected, the mixing chamber and polymer metering pump are activated. If water flow is interrupted, the unit ceases operation until water flow is restored. In addition, this unit will automatically initiate a water flush cycle through the mixing chamber whenever power is turned off.

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SCOPE OF SUPPLY

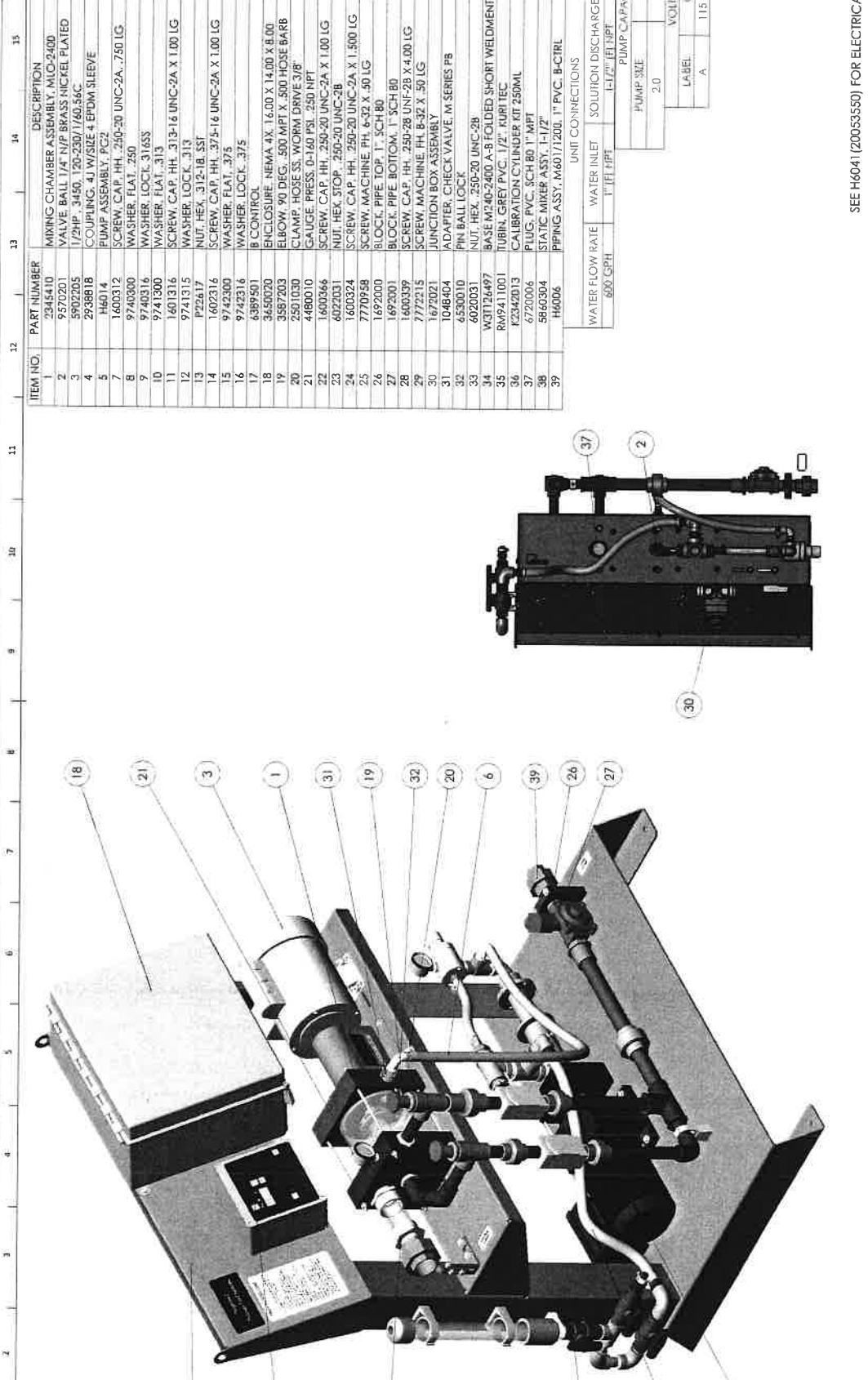
| Qty | Description |
|-----|---|
| | M UNIT WITH "B" CONTROL |
| 1 | PolyBlend M series polymer activation/feed system with: motor-driven, multi-zone, polymer activation chamber with brass impeller, progressive cavity feed metering pump with local or 4-20mA input control, solenoid valve for overall control of total dilution water, flow control valves with flow sensors for dilution water adjustment, static mixer for blending polymer solution with post-mix dilution water, programmable microcontroller with on-off-remote control circuit, constant polymer concentration based on water flow, 4-digit LED readout for operational parameters, 4-20mA output signal proportional to polymer pump speed, indicator lights for run, alarm, and low water flow, remote start contact, output contacts for run and alarm conditions fully-assembled and tested in a stainless steel, open chassis frame |
| 1 | Model number : M1200-P4AB Dilution water capacity: 60 - 1200 gph Polymer capacity : 0.4 - 4 gph System voltage : 120V-1ph-60Hz |
| 1 | Pressure reducing valve, Watts model 25AUB-Z3 |
| 1 | Drum Stick |
| 1 | Drum Mixer |
| 1 | Drum Dryer |
| | Spare Parts Package |
| 1 | Mixer Mechanical Seal |
| 2 | Mixing Chamber O-rings |
| 1 | Injection Check Valve |
| 1 | Pump Stator |

UGSI Chemical Feed, Inc.
 1901 West Garden Road
 Vineland, NJ 08360
 Phone: 856-896-2160
 Fax: 856-457-5920
www.ugsichemicalfeed.com

CLARIFICATIONS AND EXCEPTIONS

| Section | Part | Description |
|---------|-----------|--|
| 11363 | 3.06.A.1 | The Polymer blending unit model number has been changed to reflect M1200-P4AB to meet the 4 GPH neat polymer feed rate. The 4 GPH is specified in 3.06.A.2.c |
| 11363 | 2.02.C | The polymer pump head shall be stainless steel. |
| 11363 | 2.02.D.12 | The reference to 2.08 (see operational controls) is not present in specifications. |

UGSI Chemical Feed, Inc.
1901 West Garden Road
Vineland, NJ 08360
Phone: 856-896-2160
Fax: 856-457-5920
www.ugsichemicalfeed.com



A-8

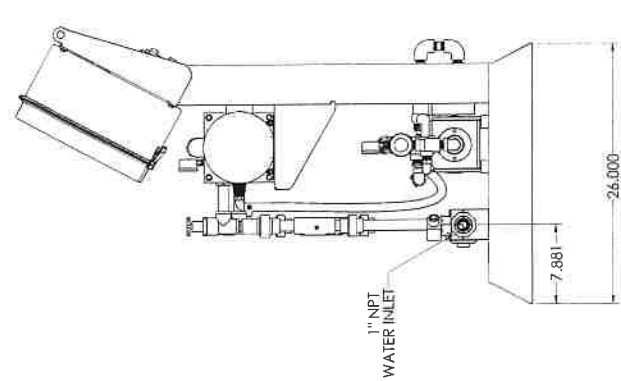
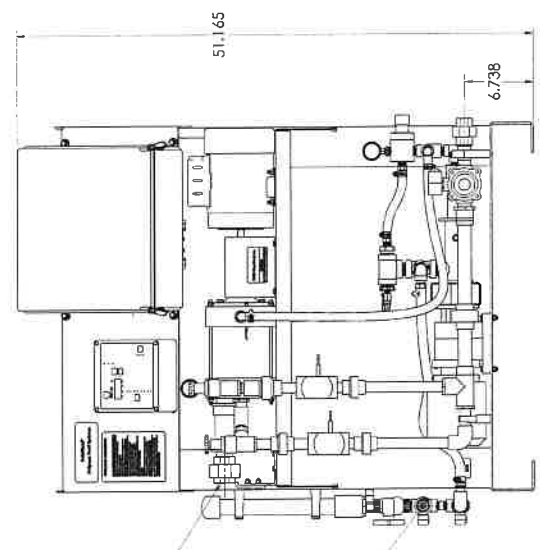
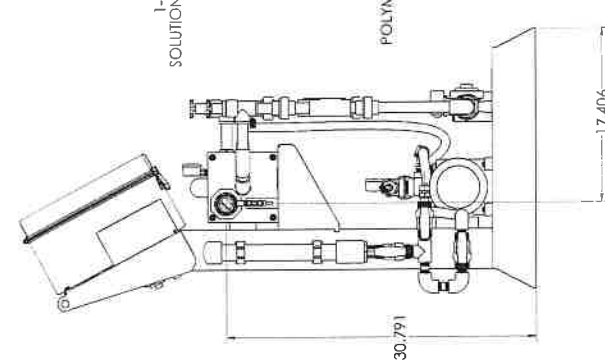
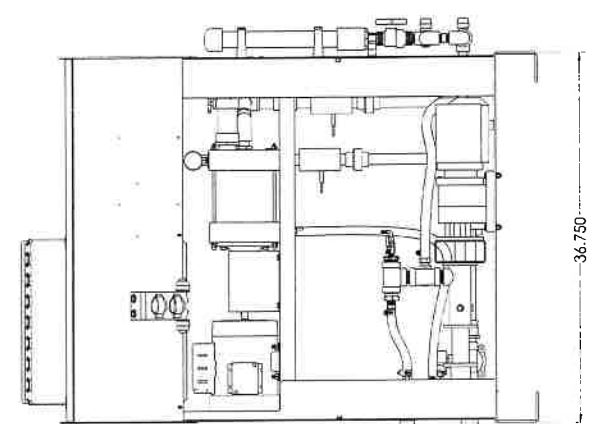
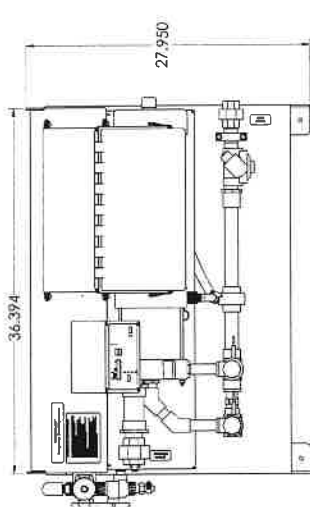
| ITEM NO. | PART NUMBER | DESCRIPTION | QTY. |
|----------|-------------|--|------|
| 1 | 2345410 | MIXING CHAMBER ASSEMBLY, M10-2400 | 1 |
| 2 | 9570201 | VALVE BALL, 1/4" NIP BRASS NICKEL PLATED | 1 |
| 3 | 5902005 | 1/4" NIP, 3/4", 120-280 / 1/60.56C | 1 |
| 4 | 2938818 | COUPLING, 4J W/ SIZE 4 EPDM SLEEVE | 1 |
| 5 | H60114 | PUMP ASSEMBLY, PC2 | 1 |
| 7 | 1600312 | SCREW, CAP, HH, 250-20 UNC-2A, .750 LG. | 8 |
| 8 | 9740300 | WASHER, FLAT, .250 | 30 |
| 9 | 9740316 | WASHER, LOCK, 316SS | 16 |
| 10 | 9741300 | WASHER, FLAT, .313 | 8 |
| 11 | 1601316 | SCREW, CAP, HH, 313-16 UNC-2A X 1.00 LG | 4 |
| 12 | 9741315 | WASHER, LOCK, .313 | 4 |
| 13 | P22617 | NUT, HEX, 312-18 SSF | 4 |
| 14 | 1602316 | SCREW, CAP, HH, 375-16 UNC-2A X 1.00 LG | 4 |
| 15 | 9742300 | WASHER, FLAT, .375 | 4 |
| 16 | 9742316 | WASHER, LOCK, .375 | 4 |
| 17 | 6389501 | B CONTROL | 1 |
| 18 | 3450020 | ENCLOSURE, NEMA 4X, 16.00 X 14.00 X 8.00 | 1 |
| 19 | 3587203 | ELBOW, 90 DEG, 500 MPT X .500 HOSE BARB | 1 |
| 20 | 2501030 | CLAMP, HOSE SS, WORM DRIVE 3/8" | 2 |
| 21 | 4480010 | GALUGE, PRESS, 0-160 PSI, 250 NPT | 1 |
| 22 | 1600366 | SCREW, CAP, HH, 250-20 UNC-2A X 1.00 LG | 2 |
| 23 | 4022031 | NUT, HEX, STOP, 250-20 UNC-2B | 1 |
| 24 | 1600324 | SCREW, CAP, HH, 280-20 UNC-2A X 1.500 LG | 2 |
| 25 | 7709588 | SCREW, MACHINE, FH, 6-32 X .50 LG | 2 |
| 26 | 1692000 | BLOCK, PIPE, TOP, 1", SCH 80 | 1 |
| 27 | 1692001 | BLOCK, PIPE, BOTTOM, 1", SCH 80 | 1 |
| 28 | 1600339 | SCREW, CAP, HH, 250-28 UNF-2B X 4.00 LG | 2 |
| 29 | 7772215 | SCREW, MACHINE, FH, B-32 X .50 LG | 2 |
| 30 | 1679021 | JUNCTION BOX ASSEMBLY | 1 |
| 31 | 1048404 | ADAPTER, CHECK VALVE, M SERIES PB | 1 |
| 32 | 4530010 | PIN BALL LOCK | 1 |
| 33 | 6020031 | NUT, HEX, 250-20 UNC-2B | 4 |
| 34 | W31126497 | BASE M740-2400 A-B FOLDED SHORT WELDMENT 304SS | 1 |
| 35 | RM9411001 | TUBING, GREY PVC, 1/2", RURI TEC | 1 |
| 36 | F2342013 | CALIBRATION CYLINDER KIT 250ML | 1 |
| 37 | 6720006 | PLUG, PVC, SCH 80 1" MPT | 1 |
| 38 | 5860304 | STATIC MIXER ASSY, 1-1/2" | 1 |
| 39 | H4006 | PIPING ASSY, M401/1200, 1" PVC, B-CIRI | 1 |

| UNIT CONNECTIONS | WATER INLET | SOLUTION DISCHARGE | POLYMER INLET |
|------------------------|-------------|--------------------|----------------|
| WATER FLOW RATE | 1" FT DIPT | 1-1/2" FT DIPT | 1-1/2" FT DIPT |
| 600 GPH | | | |
| PUMP CAPACITY | | | |
| 2.0 | | | |
| FLOWRATE | | | |
| 0.000 - 2.0 GPH | | | |
| VOLTAGE | | | |
| CONNECTION | | | |
| A | | | |
| 115 VAC / 60 HZ / 1 PH | | | |

SEE H4041 (20053550) FOR ELECTRICAL ASSEMBLY

| REV | DESCRIPTION | DATE | DRW | CHKD | APVD | UNLESS OTHERWISE SPECIFIED | CLIENT | TITLE | DRAWING NUMBER |
|-----|-------------|------|-----|------|------|--|---|---------------------------------------|---|
| | | | | | | DIMENSIONS EXCEPT MARKED TO DEPTH SHALL BE TO DIMENSION. ONE PLACE DEC ± .050 TWO PLACE DEC ± .010 THREE PLACE DEC ± .005 SURFACE FINISH 125/ | FORT PAYNE, AL | M1200-P4A8 | 551818-SA 1 |
| | | | | | | ALL WELD SYMBOL DIMENSIONS ARE MINIMUM. | UGSI Chemical Feed, Inc. Vineland NJ, USA - Tel: (856) 896-2160 Web - www.ugsichemicalfeed.com E-Mail - info@ugsichemicalfeed.com | CHK: KF ENG: KF MANG: KF | PROJECT NO: 551818 DATE: 18JUN14 |
| | | | | | | COMPANY CONFIDENTIAL THIS DOCUMENT AND ALL INFORMATION CONTAINED HEREIN ARE THE PROPERTY OF UGSI CHEMICAL FEED, INC. AND/OR ITS AFFILIATES. THE DESIGN AND CONSTRUCTION OF THIS EQUIPMENT IS THE SOLE PROPERTY OF UGSI CHEMICAL FEED, INC. AND IS NOT TO BE REPRODUCED, COPIED, OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, WITHOUT THE EXPRESS WRITTEN CONSENT OF UGSI CHEMICAL FEED, INC. IN NO EVENT SHALL UGSI CHEMICAL FEED, INC. BE LIABLE FOR ANY DAMAGES, INCLUDING CONSEQUENTIAL DAMAGES, ARISING FROM THE USE OF THIS EQUIPMENT. THIS DOCUMENT, INCLUDING ALL INFORMATION CONTAINED HEREIN, IS THE PROPERTY OF UGSI CHEMICAL FEED, INC. AND IS NOT TO BE REPRODUCED, COPIED, OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, WITHOUT THE EXPRESS WRITTEN CONSENT OF UGSI CHEMICAL FEED, INC. IN NO EVENT SHALL UGSI CHEMICAL FEED, INC. BE LIABLE FOR ANY DAMAGES, INCLUDING CONSEQUENTIAL DAMAGES, ARISING FROM THE USE OF THIS EQUIPMENT. | THIRD ANGLE PROJECTION TOLERANCES TO ASME Y14.5M | DESIGN CENTER: USA MODEL: M-SERIES | MATERIAL: DWG: 551818-SA-1-0100 WEIGHT: SHEET: 1 OF 2 |

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16



1-1/2" NPT SOLUTION OUTPUT
 1-1/2" NPT POLYMER INLET

A-9

| | | | | | |
|--|--------------|-------|-------------------------------|-------|-------|
| REV. | DESCRIPTION: | DATE: | DRW: | CHKD: | APVD: |
| | | | | | |
| <p>UNLESS OTHERWISE SPECIFIED</p> <p>DIMENSIONS EXCEPT MACHINED-HOLE DEPTH MARKED "DEEP"</p> <p>ONE PLACE DEC. ± 0.50</p> <p>TWO PLACE DEC. ± 0.10</p> <p>THREE PLACE DEC. ± 0.05</p> <p>SURFACE FINISH 125</p> <p>ALL WELD SYMBOL DIMENSIONS ARE MINIMUM.</p> <p>THIRD ANGLE PROJECTION</p> <p>DESIGN CENTER: USA</p> <p>TOLERANCES TO ASME Y14.5M</p> <p>MODEL: M-SERIES</p> | | | | | |
| <p>COMPANY CONFIDENTIAL</p> <p>THIS DOCUMENT AND ALL INFORMATION CONTAINED HEREIN ARE THE PROPERTY OF UGSI CHEMICAL FEED, INC. AND/OR ITS AFFILIATES. THE DESIGN CONCEPTS AND INFORMATION CONTAINED HEREIN ARE PROPRIETARY TO UGSI CHEMICAL FEED, INC. AND/OR ITS AFFILIATES. THIS DOCUMENT IS NOT TRANSFERABLE AND MUST BE USED ONLY FOR THE PURPOSE FOR WHICH THE DOCUMENT IS EXPRESSLY LOANED. THEY MUST NOT BE REPRODUCED, COPIED, EITHER WHOLLY OR IN PART, OR TRANSMITTED IN ANY MANNER WITHOUT THE EXPRESS WRITTEN CONSENT OF UGSI CHEMICAL FEED, INC. IN NO EVENT SHALL THIS BE USED IN ANY MANNER THAT RESULTS IN THE DISCLOSURE OF TRADE SECRETS OR OTHER INFORMATION THAT IS PROPRIETARY TO UGSI CHEMICAL FEED, INC. OR ITS AFFILIATES. PERMISSION TO MAKE COPIES AND EXTRACTS, AND TO REPRODUCE THIS DOCUMENT, SHALL BE GRANTED UPON THE DEMAND OF UGSI CHEMICAL FEED, INC. THIS DOCUMENT, ALONG WITH ALL COPIES AND EXTRACTS, AND ALL INFORMATION CONTAINED THEREIN, SHALL BE RETURNED TO UGSI CHEMICAL FEED, INC. ON DEMAND AS INSTRUCTED BY UGSI CHEMICAL FEED, INC. ACCEPTANCE OF THE DELIVERY OF THIS DOCUMENT CONSTITUTES AGREEMENT TO THESE TERMS AND CONDITIONS.</p> | | | <p>CLIENT: FORT PAYNE, AL</p> | | |
| <p>UGSI Chemical Feed, Inc. Vineland NJ, USA - Tel. (856) 896-2160 Web - www.ugsichemicalfeed.com E-Mail - info@ugsichemicalfeed.com</p> | | | <p>TITLE: M1200-P4AB</p> | | |
| <p>CHYK: KF</p> | | | <p>REV. 0</p> | | |
| <p>ENG: KF</p> | | | <p>SCALE: 1:4</p> | | |
| <p>MAN/G: KF</p> | | | <p>DRW: MSM</p> | | |
| <p>MATERIAL:</p> | | | <p>DWG: 551818-SA1-0100</p> | | |
| <p>WEIGHT:</p> | | | <p>SHEET: 1 OF 2</p> | | |
| <p>D</p> | | | <p>© 2014</p> | | |

ADDENDUM NO. 1

Electrical Drawings

Machine Wiring Notes

1. Panel wiring except where otherwise specified:
 - a) Single wires shall be UL listed MTW #16, 75° C or greater. It is permissible to substitute THHN or THWN. Use copper conductors only.
 - b) Single wires intended for Power circuits & Motor power circuits shall be #14 AWG, 90° C or greater.
 - c) Each wire to be identified with a permanent wire label fixed at each end.
 - d) Each wire shall be terminated or provided a means for site termination as required and identified for landing wire.
 - e) Single wire outer sheath color shall be:
 - Black - for ungrounded line, load, and AC motor conductors.
 - Red - for ungrounded AC control conductors.
 - White - for grounded AC conductor (neutral).
 - Blue - for ungrounded DC control conductors.
 - White w/Blue stripe - for grounded current carrying DC circuit conductors.
 - Green or Green w/Yellow stripe - for grounding conductor.
 - Orange - for ungrounded circuit conductors that remain energized when the supply disconnecting means is in the off position.
2. External wiring except where otherwise specified:
 - a) Single wires shall be UL listed THHN or THWN #14, 75° C or greater. Use copper conductors only.
 - b) Each wire to be identified with a permanent wire label fixed at each end.
 - c) Each wire shall be terminated or provided a means for site termination, as required and identified for landing wire.
 - d) Single wire outer sheath color shall be:
 - Black - for ungrounded line, load, and AC motor conductors.
 - Red - for ungrounded AC control conductors.
 - White - for grounded AC conductor (neutral).
 - Blue - for ungrounded DC control conductors.
 - White w/Blue stripe - for grounded current carrying DC circuit conductors.
 - Green or Green w/Yellow stripe - for grounding conductor.
 - Orange - for ungrounded circuit conductors that remain energized when the supply disconnecting means is in the off position.
3. Dashed lines are components wired external to control panel.
4. 10% spare terminal blocks and jumper strips should be furnished in the various panels. The terminal blocks can be located on the right side or bottom of the terminal strips. For long terminal strips, the spare TB points should be distributed throughout the strip - 1/4, 1/2, 3/4, and at the bottom of the strip.
5. Liquid tight flexible conduit may be used as long as the length does not exceed 3 feet.
6. Unless otherwise specified, Grounded or Isolated Instrument Ground terminal blocks shall be provided adjacent to any shielded cable terminal grouping. These terminals shall be labeled "shield".
7. In general, terminal blocks shall be arranged such that wires leaving the panel are placed on one side of the terminal strip, and internal panel wiring are placed on the other. Wires should not cross over the terminal strip. Panel exiting wires shall be tied neatly into combed bundles tucked adjacent to the back panel, wires internal to the panel shall be placed inside appropriately sized wire duct. Best practice methods shall be used, to the greatest extent possible, to segregate ungrounded line, load, and control conductors at line voltage, from control conductors. Additionally, segregate as much as possible low voltage DC control conductors from higher voltage AC control conductors.
8. **WARNING:** To maintain overcurrent, short-circuit, and ground-fault protection, the manufacturer's instructions for selection of overload and short circuit protection must be followed to reduce the risk of fire or electric shock.

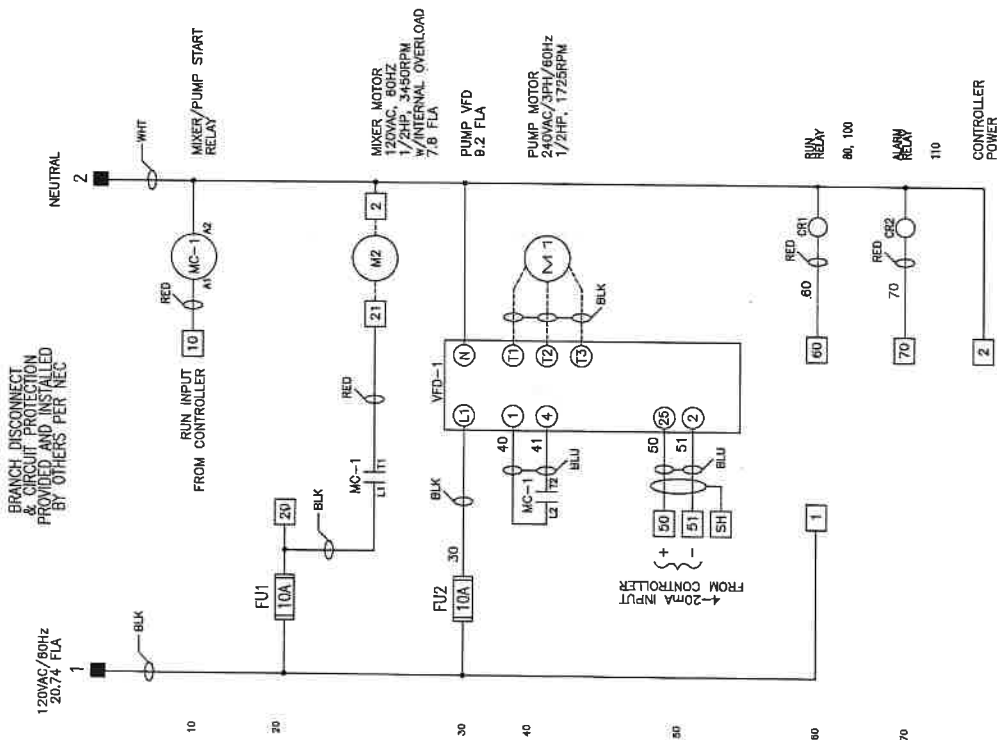
TABLE OF CONTENTS

| REV | DESCRIPTION | DATE | BY | CHKD | APP'D | REV | DESCRIPTION | DATE | BY | CHKD | APP'D |
|-----|------------------------|------|----|------|-------|-----|-------------|------------------------------|----|------|-------|
| 0 | RELEASE FOR PRODUCTION | | | | | 0 | 20053550 | TABLE OF CONTENTS | | | |
| 1 | UPDATE WIRE NOTES | | | | | 1 | 20053552 | SCHEMATIC | | | |
| 2 | AC-BUILT | | | | | 2 | 20053551 | SCHEMATIC | | | |
| 3 | AC-BUILT | | | | | 3 | 20053545 | GENERAL LAYOUT | | | |
| 4 | AC-BUILT | | | | | 4 | 20053554 | COMPLETE ELECTRICAL ASSEMBLY | | | |
| 5 | AC-BUILT | | | | | 5 | 20053556 | SPARE SHEET | | | |
| 6 | AC-BUILT | | | | | 6 | 20053557 | SPARE SHEET | | | |
| 7 | AC-BUILT | | | | | 7 | 20053556 | SPARE SHEET | | | |
| 8 | AC-BUILT | | | | | 8 | 20053556 | SPARE SHEET | | | |
| 9 | AC-BUILT | | | | | 9 | 20053556 | SPARE SHEET | | | |

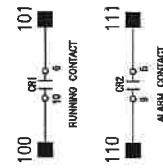
3-D: 804866-0002-29250-144-08
 WGT: 1891
 DIM: 1" AT 1/8" SCALE
 20053550
 WATER TECHNOLOGIES
 HOLLAND, MICHIGAN USA
 TEL: 616-772-0011
SIEMENS
 STANDARD W.T.119137 20053550 0 OF 4

NDN-DEFAULT VFD PARAMETERS

| Parameter | Value | Description | Units |
|-----------|---|----------------------|-----------------|
| P100 | 0 = keypad 1 = terminal strip 2 = remote keypad only 3 = network only 4 = term.strip or local keypad 5 = term.strip or remote keypad 6 = CTRL button select | start source | |
| P101 | 0 = keypad 1 = 0-10VDC 2 = 4-20mA 3 = Preset #1 4 = Preset #2 5 = Preset #3 6 = Network | speed source | |
| P103 | adjust to obtain specified maximum flow | maximum frequency | 67Hz |
| P104 | (P103 should match P161) | accel time | 5 |
| P105 | 0.0 - 3600 Seconds | decel time | 5 |
| P140 | 0 = None 1 = Run 2 = Reverse 3 = Fault (NC) 4 = Inverse Fault (NO) 5 = Fault Lockout 6 = At Speed | relay output | 3 |
| P161 | 25 | speed at max. signal | -999. - 1000 Hz |



CUSTOMER INTERFACE



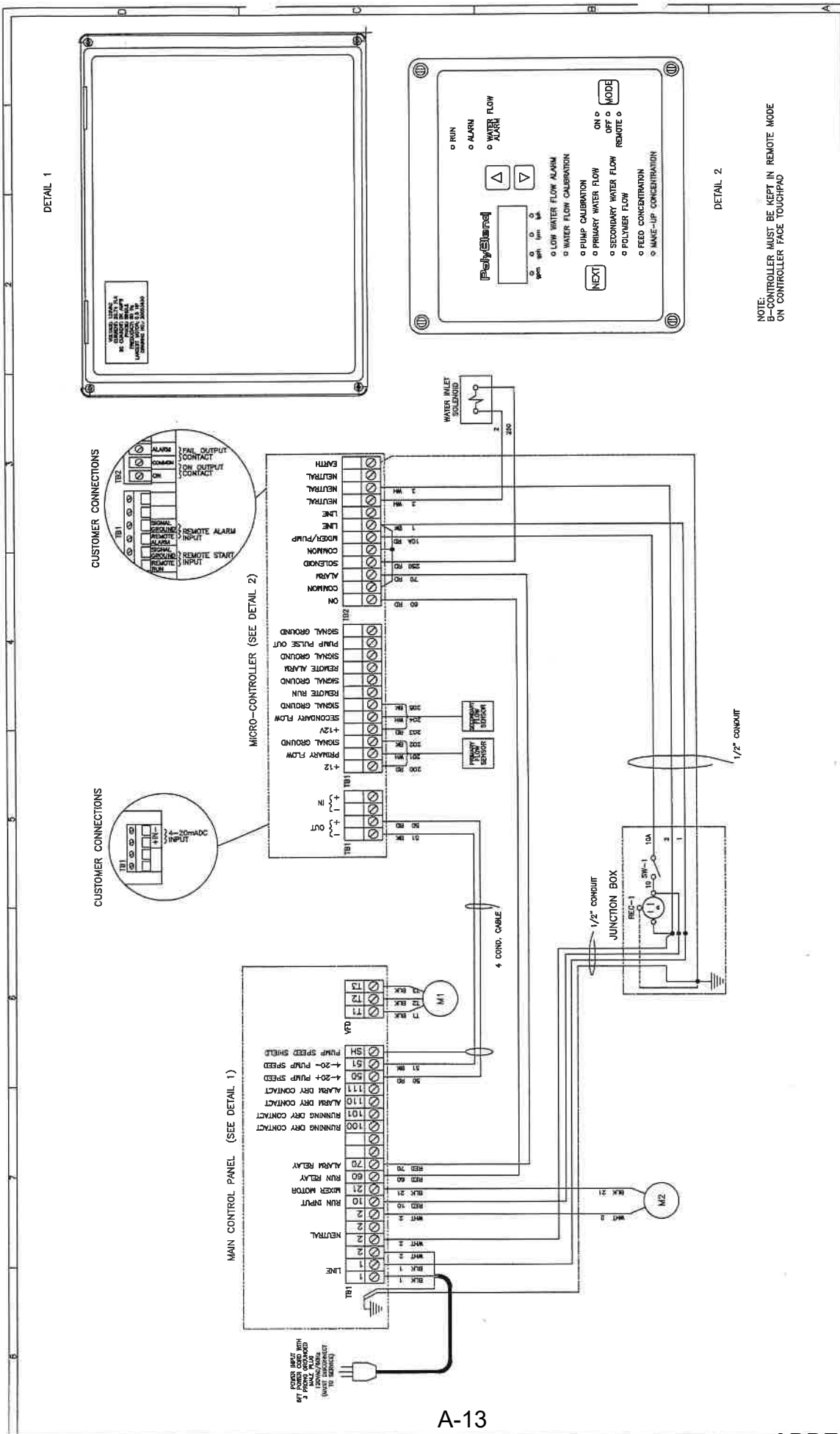
| NO. | DESCRIPTION | UNIT | TYPE | SCALE | REV. | DATE | BY | CHKD. |
|-----|------------------------------------|------|------|-------|------|------|----|-------|
| 1 | AS-BUILT | | | | | | | |
| 2 | ADD VFD, RELAYS | | | | | | | |
| 3 | ADD VFD IIRN-DEFAULT PARAMETERS | | | | | | | |
| 4 | MOVE CONTROLLER POWER FROM 20 TO 1 | | | | | | | |

| REVISION | DATE | BY | CHKD. | DESCRIPTION |
|----------|----------|----|-------|------------------------------------|
| 1 | 01/11/17 | WJ | WJ | AS-BUILT |
| 2 | 01/11/17 | WJ | WJ | ADD VFD, RELAYS |
| 3 | 01/11/17 | WJ | WJ | ADD VFD IIRN-DEFAULT PARAMETERS |
| 4 | 01/11/17 | WJ | WJ | MOVE CONTROLLER POWER FROM 20 TO 1 |

| FILE | SCHEMATIC DRAWINGS | DATE |
|---------------|--------------------|----------|
| M24G.1200-PAB | | 01/11/17 |

| | | | | | | |
|---------|----------|-----------|----------|---|----|---|
| PROJECT | STANDARD | WST119137 | 20053551 | 1 | OF | 6 |
|---------|----------|-----------|----------|---|----|---|

SIEMENS WATER TECHNOLOGIES
 1000 WEST 17TH AVENUE
 DENVER, CO 80202 USA
 TEL: 303.772.8000
 FAX: 303.772.8001



NOTE: B-CONTROLLER MUST BE KEPT IN REMOTE MODE ON CONTROLLER FACE TOUCHPAD

| REVISION | DATE | BY | DESCRIPTION |
|----------|-------------------------------|----------|-------------|
| 3 | AS-BUILT | 11/07/10 | DPC |
| 2 | AS-BUILT | 08/10/10 | DPC |
| 1 | ISSUE FOR BIDDING AND PERMITS | 11/09/10 | DPC |
| 0 | RELEASE FOR PRODUCTION | 03/09/10 | JPM |

| DATE | BY | CHKD | APVD | ECN |
|------|----|------|------|-----|
| | | | | |

PROJECT NAME: STANDARD W3T119137 20055552 2 OF 3

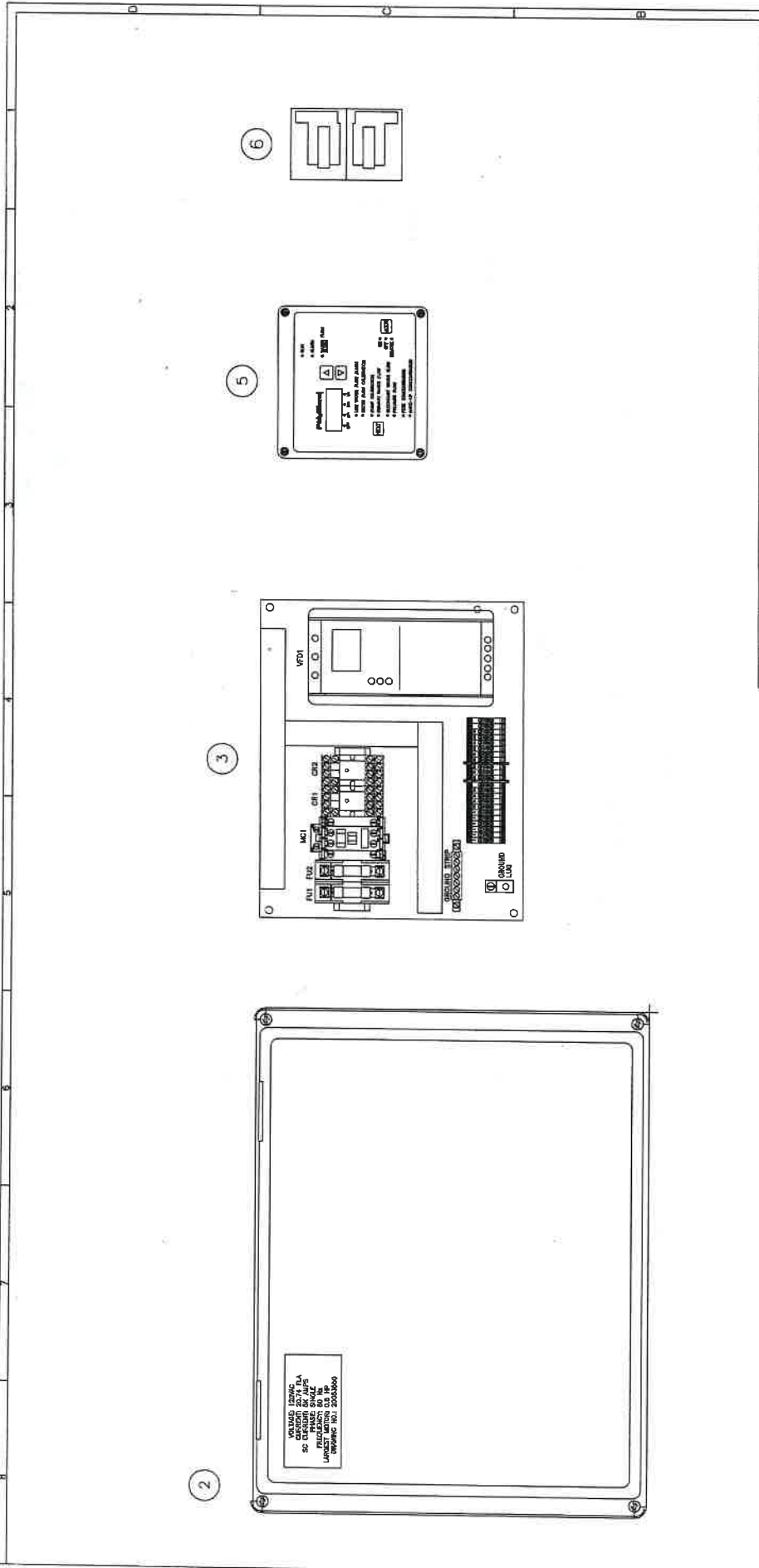
WATER TECHNOLOGIES
 10000 W. 75TH AVENUE
 BLDG 1000
 DENVER, CO 80231 USA
 TEL: 303-772-8011

SIEMENS
 PROJECT: STANDARD W3T119137 20055552 2 OF 3

TITLE: SCHEMATIC ELECTRICAL DRAWINGS M240-1200-PAB

DATE: 11/07/10
 CHECKED: 11/07/10
 DRAWN: 11/07/10
 FILE: 20055552

REV: 3

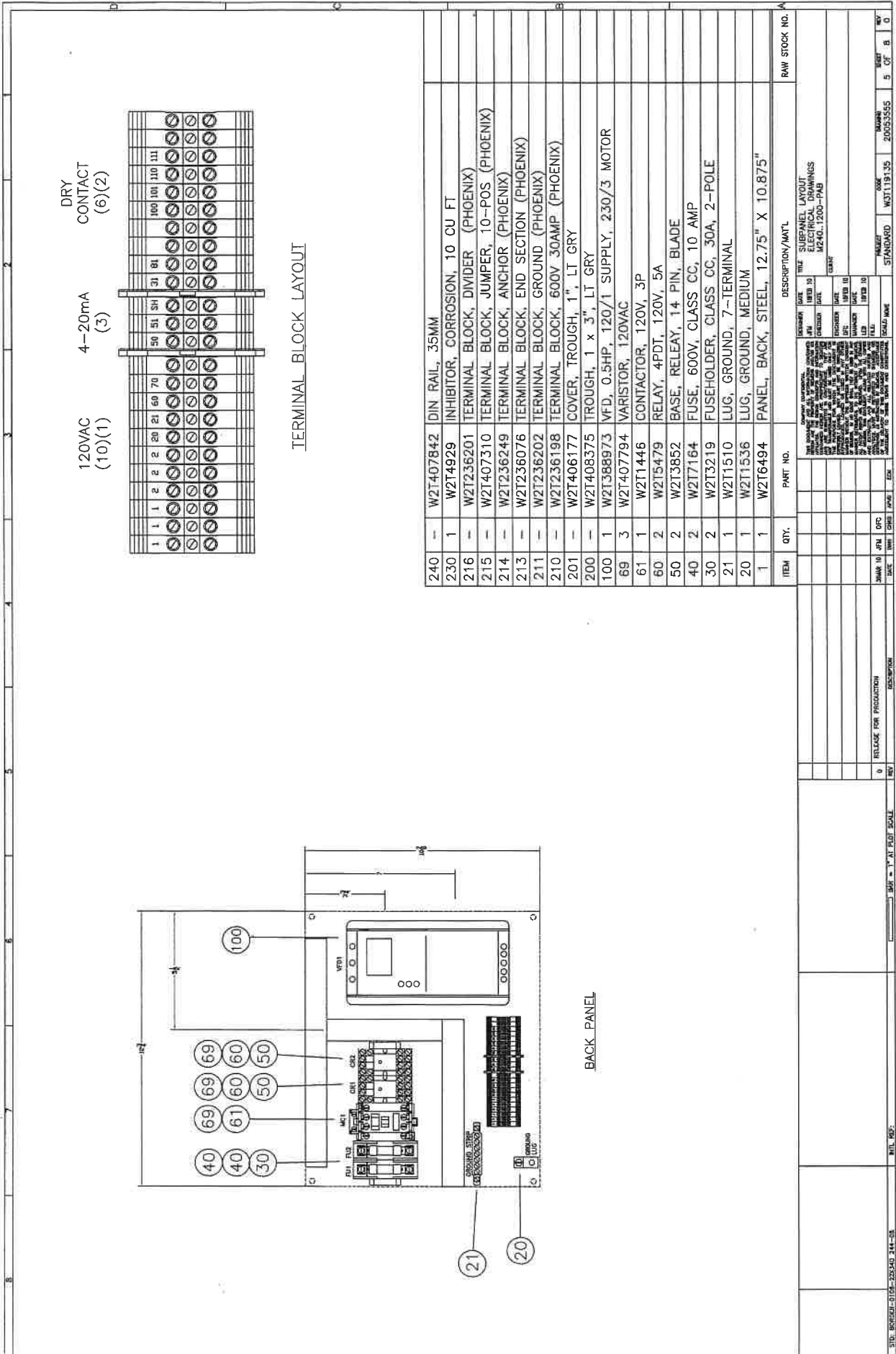


| ITEM | QTY. | PART NO. | DESCRIPTION/MAT'L | RAW STOCK NO. |
|------|------|-----------|------------------------------|---------------|
| 6 | 1 | W3179680 | BOX ASSY. JUNCTION, M-UNIT | |
| 5 | 1 | W2T6468 | B-CONTROLLER | |
| 4 | 1 | W2T43171 | LABEL KIT | |
| 3 | 1 | W3T119135 | SUBPANEL ASSEMBLY | |
| 2 | 1 | W2T6630 | ENCLOSURE 16" X 12" X 8" FRP | |
| 1 | 1 | W3T119137 | SCHEMATIC SET | |

| REVISION | DATE | BY | DESCRIPTION |
|----------|------|----|------------------------------|
| 1 | | | COMPLETE ELECTRICAL ASSEMBLY |
| 2 | | | ELECTRICAL DRAWINGS |
| 3 | | | M240-1200-PAB |
| 4 | | | REVISION |
| 5 | | | REVISION |
| 6 | | | REVISION |

| | | | | | | | | |
|------|----|------|-------|-------|----|------|-------|-------|
| DATE | BY | CHKD | APP'D | SCALE | BY | CHKD | APP'D | SCALE |
| | | | | | | | | |

| | | | | | |
|----------|-----------|----------|---|----|---|
| STANDARD | W3T119135 | 20053554 | 4 | OF | 4 |
| CODE | W3T119135 | 20053554 | 4 | OF | 4 |



TERMINAL BLOCK LAYOUT

| ITEM | QTY. | PART NO. | DESCRIPTION/MATL. | RAW STOCK NO. |
|------|------|-----------|--|---------------|
| 240 | - | W2T407842 | DIN RAIL, 35MM | |
| 230 | 1 | W2T4929 | INHIBITOR, CORROSION, 10 CU FT | |
| 216 | - | W2T236201 | TERMINAL BLOCK, DIVIDER (PHOENIX) | |
| 215 | - | W2T407310 | TERMINAL BLOCK, JUMPER, 10-POS (PHOENIX) | |
| 214 | - | W2T236249 | TERMINAL BLOCK, ANCHOR (PHOENIX) | |
| 213 | - | W2T236076 | TERMINAL BLOCK, END SECTION (PHOENIX) | |
| 211 | - | W2T236202 | TERMINAL BLOCK, GROUND (PHOENIX) | |
| 210 | - | W2T236198 | TERMINAL BLOCK, 600V 30AMP (PHOENIX) | |
| 201 | - | W2T406177 | COVER, TROUGH, 1" x 3", LT GR | |
| 200 | - | W2T408375 | TROUGH, 1 x 3", LT GR | |
| 100 | 1 | W2T388973 | VFD, 0.5HP, 120/1 SUPPLY, 230/3 MOTOR | |
| 69 | 3 | W2T407794 | VARISTOR, 120VAC | |
| 61 | 1 | W2T1446 | CONTACTOR, 120V, 3P | |
| 60 | 2 | W2T5479 | RELAY, 4PDT, 120V, 5A | |
| 50 | 2 | W2T3852 | BASE, RELAY, 14 PIN, BLADE | |
| 40 | 2 | W2T7164 | FUSE, 600V, CLASS CC, 10 AMP | |
| 30 | 2 | W2T3219 | FUSEHOLDER, CLASS CC, 30A, 2-POLE | |
| 21 | 1 | W2T1510 | LUG, GROUND, 7-TERMINAL | |
| 20 | 1 | W2T1536 | LUG, GROUND, MEDIUM | |
| 1 | 1 | W2T6494 | PANEL, BACK, STEEL, 12.75" X 10.875" | |

Globe Valve

PVC Angle and Y-Pattern

150 psi at 73°F water—non-shock

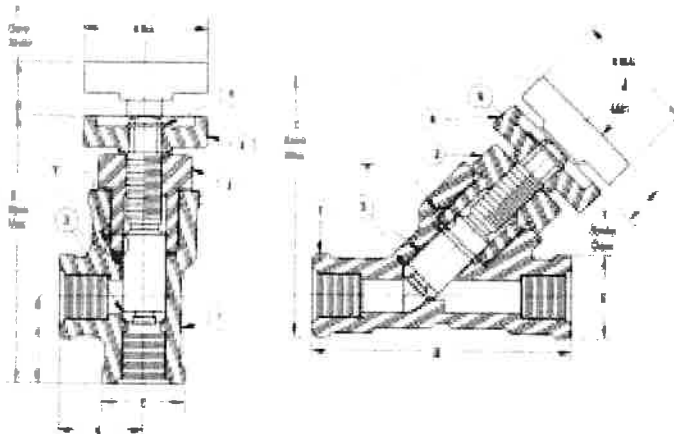


Chemtrol Figure No.
T45AC-V



Chemtrol Figure No.
T45YP-V

Both styles
available with
threaded end
connections only.



Both styles of Chemtrol Globe Valves, the angle and the Y-pattern, utilize interchangeable components within any given valve size. Only the bodies are different. The Y-pattern style has a minimal pressure-drop, even when compared with a conventional upright style globe valve. Therefore, it is an excellent choice for combination on-off and throttling applications.

The Chemtrol Angle Valve is used where a higher pressure-drop is desirable. One of its more common applications is as a pump by-pass control valve.

Features

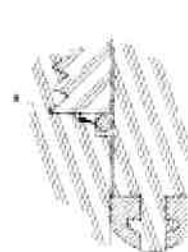
- Malleable glass reinforced PTFE (Teflon) seat disk ensures long-lasting positive sealing.
- Stub acme thread on stem provides rapid open-close operation.
- Liquid or slurry never touches stem threads.
- Can be used for both on-off and throttling control of fluid flow.
- Easy in-line maintenance.
- PVC construction with PTFE seat and FPM seals.

Valve Construction

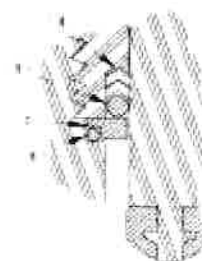
| Part | Material |
|--|------------------------------------|
| 1. Body – Angle | PVC |
| – or Y-Pattern | PVC |
| 2. Bonnet | PVC |
| 3. Stem Assembly | PVC w/ Glass Filled PTFE Seat Disk |
| 4. Handle | PVC |
| 5. Snap Ring Retainer | Zinc Plated Steel |
| 6. O-Ring – Body Seal | FPM ² |
| 7. Energizer Back-Up Washer ¹ | PVC |
| 8. CV Stem Seal (2 required) ¹ | PTFE (Teflon) |
| 9. O-Ring – Stem Seal Energizer ¹ | FPM ² |

¹ Items not required for 1/4" valve.

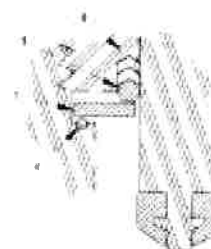
² FPM is also known as FKM. These seals are molded from Viton or Fluorel brands of rubber.



Detail "Y" Enlarged View
1/4" Size Valve



Detail "Y" Enlarged View
1/2" & 3/4" Size Valve



Detail "Y" Enlarged View
1" Size Valve

Notes

For more insight into the selection of materials, refer to *Materials*, page 1. For the specific relationship of pressure vs. temperature, refer to *Engineering Data*, page 33. For *Chemtrol Valve Standards*, see page 35.

Valve Dimensions – Weights – Flow Coefficients

| Valve Size | Common Dimensions | | | Angle Valve ¹ | | | | Y-Pattern Valve ¹ | | | |
|------------|-------------------|----------------|---------------|--------------------------|-------------|--|---------------------|------------------------------|-------------|--|---------------------|
| | Hub Dia. E | Close Stroke F | Handle Dia. H | Center-To-Face A | Open Max. B | Flow Coef. C _v ² | Approx. Weight Lbs. | End-To-End D | Open Max. C | Flow Coef. C _v ² | Approx. Weight Lbs. |
| 1/4 | 0.88 | .44 | 1.32 | 0.88 | 3.56 | 1.1 | 0.11 | 2.75 | 2.75 | 3.1 | 0.12 |
| 1/2 | 1.25 | .75 | 2.19 | 1.31 | 5.38 | 5.4 | 0.28 | 3.50 | 4.63 | 17.7 | 0.30 |
| 3/4 | 1.50 | .94 | 2.19 | 1.41 | 6.50 | 9.9 | 0.47 | 4.25 | 5.56 | 32.5 | 0.53 |
| 1 | 1.75 | 1.19 | 2.19 | 1.88 | 7.88 | 15.8 | 0.69 | 5.00 | 6.31 | 49.3 | 0.73 |

¹ Available with threaded end connections only.

² C_v measured with valves completely open.

Do not use or test the products in this catalog with compressed air or other gases. See Chemtrol Chem-Aire® literature for information about shatter-resistant thermoplastic piping systems specifically designed for compressed air and other gases.

Pressure Gauge



Liquid Filled Gauges

Series P-1550 Low Cost Liquid Filled Utility Gauges

DESCRIPTION

U.S. Gauge P-1550 liquid filled utility gauges are designed for a wide range of rugged service applications on pumps, compressors, hydraulic systems, machine tools, and petrochemical processing equipment. Liquid fill fluid dampens the gauge pointer movement and improves readability, making these instruments ideal for high shock and vibration applications.

Series P-1550 liquid filled gauges are available in psi and bar, kPa, and kg/cm² metric ranges. Rated accuracy is $\pm 3-2-3\%$ of span (Grade B).

Gauges feature a corrosion resistant 300 series stainless steel case and ring, and durable polycarbonate window. Phosphor bronze Bourdon tube, brass movement, and socket connections are standard. Series P-1550 gauges come in 1-1/2" designs with 1/8-27 NPT center back male (CBM) connections (P-1559); 2" and 2-1/2" designs with 1/4-18 NPT low male (LM) (P-1555) and center back male (CBM) (P-1559) connections.

SPECIFICATIONS

CASE: 300 series stainless steel

RING: 300 series stainless steel

WINDOW: Polycarbonate

POINTER: Aluminum, black finish

SEALS: BUNA-N®

DIAL: Aluminum, white background with blue and black markings

SCALE: Dual scale psi/bar (100 x kPa)

MOVEMENT: Brass

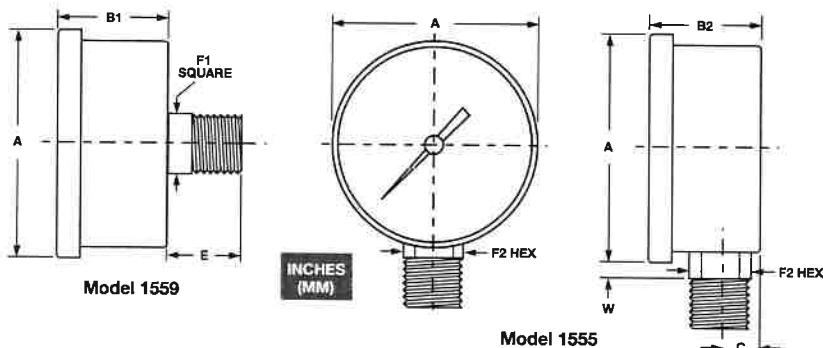
BOURDON TUBE: Phosphor bronze

CONNECTION:

1-1/2": 1/8-27 CBM, NPT

2" and 2-1/2": 1/4-18 NPT LM and CBM

ACCURACY: $\pm 3-2-3\%$ of span (Grade B)



| DIAL SIZE | | A | B1 | B2 | C | E | F1 | F2 | W |
|-----------|--------|------|------|------|------|------|------|------|-----|
| 1-1/2" | Inches | 1.72 | 1.02 | - | - | .75 | .55 | - | - |
| | mm | 43.7 | 25.9 | - | - | 19.1 | 14.0 | - | - |
| 2" | inches | 2.25 | 1.09 | 1.10 | .39 | .74 | .55 | .55 | .35 |
| | mm | 57.2 | 27.7 | 27.9 | 9.9 | 18.8 | 14.0 | 14.0 | 8.9 |
| 2-1/2" | inches | 2.67 | 1.34 | 1.30 | .41 | 1.12 | .55 | .55 | .35 |
| | mm | 67.8 | 34.0 | 33.0 | 10.4 | 28.5 | 14.0 | 14.0 | 8.9 |

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AMETEK®

For Gauges/Thermometers:

U.S. GAUGE
820 Pennsylvania Blvd.
Feasterville, PA 19053 U.S.A.
Tel: (215) 355-6900
Fax: (215) 354-1802
www.ametekusg.com
Customer Service Tel: (863) 534-1504
Customer Service Fax: (863) 533-7465

For Electronic Products:

PMT PRODUCTS
820 Pennsylvania Blvd.
Feasterville, PA 19053 U.S.A.
Tel: (215) 355-6900
Fax: (215) 354-1800
www.ametekusg.com

For Diaphragm Seals:

M&G PRODUCTS
8600 Somerset Drive
Largo, FL 33773 U.S.A.
Tel: (727) 536-7831
Fax: (727) 539-6882
www.ametek.com/tci

ISO 9001 REGISTERED MANUFACTURER



Liquid Filled Gauges

Series P-1550 Low Cost Liquid Filled Utility Gauges

SPEC NUMBER SELECTION CHART

| Series P-1550† | 1-1/2" STEM MOUNTING 1/8-27 NPT CBM CONNECTION | | 2" STEM MOUNTING 1/4-18 NPT LM CONNECTION | | 2-1/2" STEM MOUNTING 1/4-18 NPT LM CONNECTION | |
|----------------|--|-----------------|---|-----------------|---|-----------------|
| | Phosphor Bronze | Phosphor Bronze | Phosphor Bronze | Phosphor Bronze | Phosphor Bronze | Phosphor Bronze |
| Bourdon Tube | Brass | Brass | Brass | Brass | Brass | Brass |
| Connection | 1559 | 1555 | 1559 | 1555 | 1559 | 1555 |
| Model Number | Spec No. | Spec No. | Spec No. | Spec No. | Spec No. | Spec No. |
| Range* | | | | | | |
| 0-30" Hg VAC | - | - | - | - | 171722A | 171733A |
| 30"-0-15 psi | - | - | - | - | 171723A | 171734A |
| 30"-0-30 psi | - | - | - | - | 171724A | 171735A |
| 30"-0-60 psi | - | - | - | - | 171725A | 171736A |
| 30"-0-100 psi | - | - | - | - | 171726A | 171737A |
| 30"-0-150 psi | - | - | - | - | 171727A | 171738A |
| 0-15 psi | - | - | - | - | 171728A | 171739A |
| 0-30 psi | 166664 | 165282 | 165289 | 165296 | 165303 | 165303 |
| 0-60 psi | 166665 | 165283 | 165290 | 165297 | 165304 | 165304 |
| 0-100 psi | 166666 | 165284 | 165291 | 165298 | 165305 | 165305 |
| 0-160 psi | 166667 | 165285 | 165292 | 165299 | 165306 | 165306 |
| 0-200 psi | - | - | - | - | 171729A | 171740A |
| 0-300 psi | 166668 | 165286 | 165293 | 165300 | 165307 | 165307 |
| 0-400 psi | - | - | - | - | 171730A | 171741A |
| 0-600 psi | - | 165287 | 165294 | 165301 | 165308 | 165308 |
| 0-1000 psi | 166669 | 165288 | 165295 | 165302 | 165309 | 165309 |
| 0-1500 psi | - | - | - | - | 171731A | 171742A |
| 0-2000 psi | - | - | - | - | 165377 | 165380 |
| 0-3000 psi | - | - | - | - | 165378 | 165381 |
| 0-5000 psi | - | - | - | - | 171732A | 171743A |

† Stainless steel case and crimped ring
 * All dials have 3 scale dial face (psi/bar/x100=kPA); other scales and ranges are available, please contact Customer Service at (863) 534-1504

- OPTIONS AVAILABLE ON SPECIAL REQUEST** (Consult factory for pricing)
1. Center back mount with U-clamp (fixed on case)
 2. Stainless steel front flange ring (sold separately)
 3. Chrome plated steel clamping ring (sold separately)
 4. High pressure ranges to 4000 psi

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Static Mixer



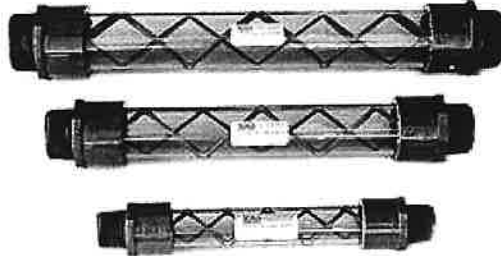
Tomorrow's Technology. Today



Clear PVC Static Mixers

Part # 5850054

Series 308



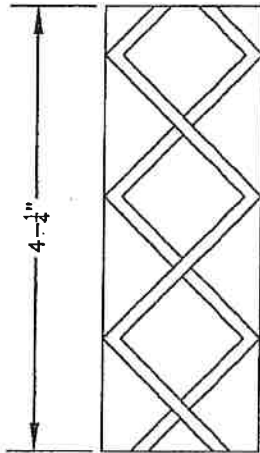
In response to a growing need for high quality PVC static mixers at a lower price, Koflo has developed the Series 308 PVC Static Mixer. This unit is a clear PVC static mixer, which unlike other static mixers, allows for a visual inspection of the mixed product. All Series 308 static mixers are made in standard 6 element and 12 element configurations. Additionally, all static mixers are edge sealed to the inside of the housing. The advantages of edge sealing are twofold. Not only does edge sealing increase mixing efficiency, but this bonding method also increases the structural integrity of the entire mixer. All mixers come standard with male NPT

threads. Sizes 3/8" thru 2" are in stock for immediate delivery.

One of the primary uses of the Series 308 static mixer is in the dilution of polymers and flocculants. Therefore with proper blending, it is quite common to recover the cost of a mixer in a relatively short period of time. This is due to the lower chemical costs associated with better mixing.

Other mixing applications include

- Admixing of water treatment chemicals
- pH control
- Chlorination and ozonation
- Process control sampling



USFILTER/STRANCO PART#5850055
 KOFLO PART# 1-1/2 -400-4-2-1
 SCHEDULE 40 CLEAR PVC
 1-1/2" x 4.25" LONG
 2 ELEMENT, PLAIN ENDS.
 215PSI @ 120°F
 Cv 19.85 (PRESSURE DROP OF 1.015PSI @ 20GPM)

PRESSURE DROP
 0.238PSI @ 10GPM
 1.015PSI @ 20GPM
 4.060PSI @ 40GPM

| REV | DESCRIPTION | DATE | BY | CHKD | APP'D | SCALE | QUANTITY | UNIT | TOTAL | DATE | BY | CHKD | APP'D |
|--|-------------------------------|----------|----|------|-------|-------|----------|------|-------|------|----|------|-------|
| 1 | AS NOTED PRESSURE INFORMATION | 10-18-11 | JG | MD | J/A | N/A | | | | | | | |
| <p>GENERAL INFORMATION</p> <p>DATE: 10-18-11 DRAWN BY: JG CHECKED BY: MD APPROVED BY: J/A</p> <p>REVISIONS</p> <p>NO. DESCRIPTION DATE BY</p> | | | | | | | | | | | | | |
| <p>ITEM INFORMATION</p> <p>ITEM NO: 5850055 QUANTITY: 1 UNIT: OF 1</p> | | | | | | | | | | | | | |
| <p>PROJECT INFORMATION</p> <p>PROJECT NO: 5850055 SHEET NO: 1 OF 1</p> | | | | | | | | | | | | | |

Mixer Motor

BALDOR[®]

BALDOR • RELIANCE

Part Information Packet

TRUE-TECH INDUSTRIES CO

35J306-0762G1

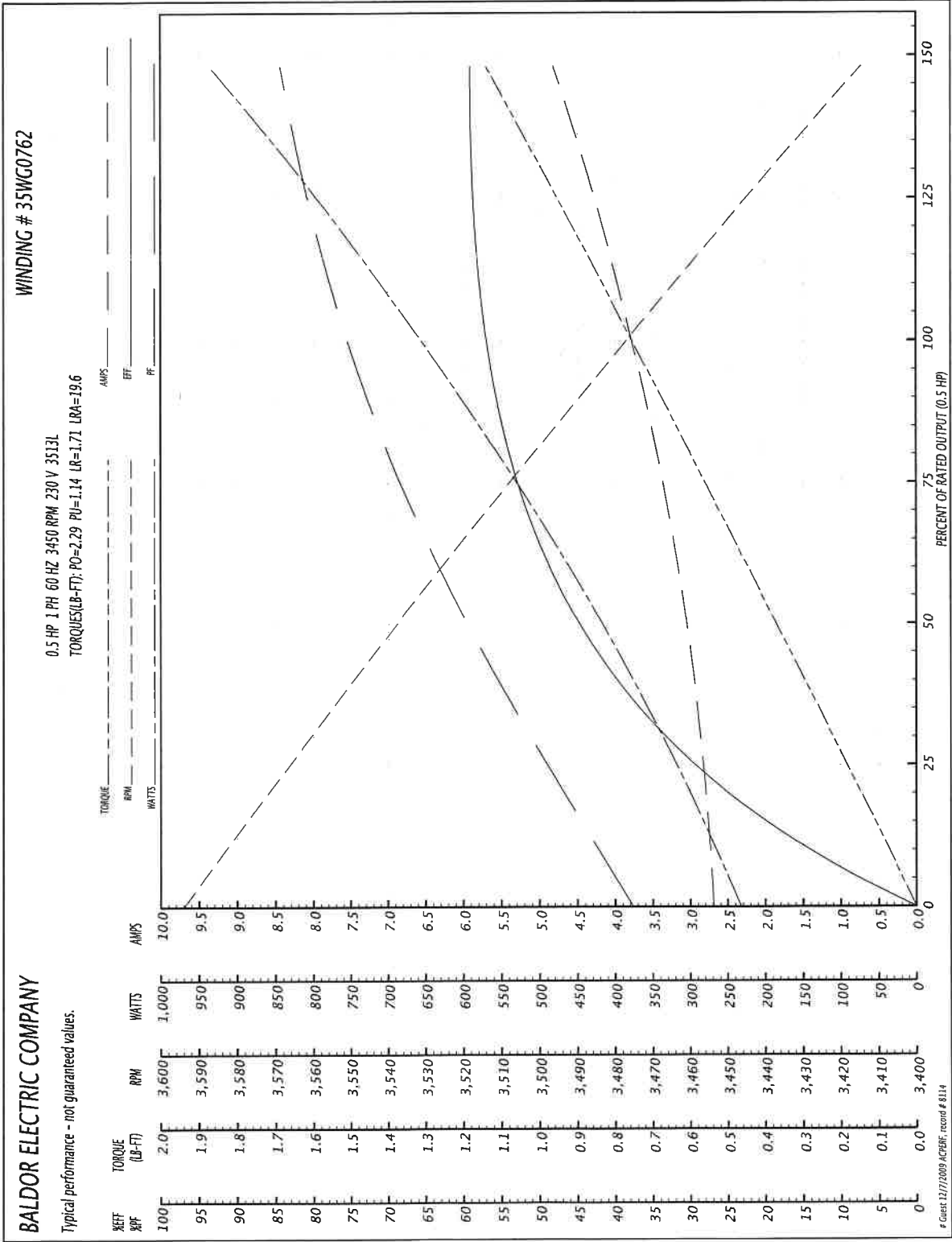
.5HP, 3450RPM, 1PH, 60HZ, 56C, 3513L, TEFC, F1

| Part Detail | | | | | | | | | |
|--------------------------|----------------|-------------|-------|----------------|----------|---------------|------------|--|--|
| Revision: | AL | Status: | PRD/A | Change #: | | Proprietary: | Yes | | |
| Type: | AC | Prod. Type: | 3513L | Elec. Spec: | 35WG0762 | CD Diagram: | CD0008 | | |
| Enclosure: | TEFC | Mfg Plant: | | Mech. Spec: | 35J306 | Layout: | | | |
| Frame: | 56C | Mounting: | F1 | Poles: | 02 | Created Date: | 06-22-2007 | | |
| Base: | RG | Rotation: | R | Insulation: | B | Eff. Date: | 11-23-2009 | | |
| Leads: | 6#18, 1#16 | Literature: | | Elec. Diagram: | | Replaced By: | | | |
| Nameplate NP1402L | | | | | | | | | |
| CAT.NO. | 5902205 | | | | | | | | |
| SPEC. | 35J306-0762G1 | | | | | | | | |
| HP | .5 | | | | | | | | |
| VOLTS | 115/230 | | | | | | | | |
| AMP | 7.8/3.9 | | | | | | | | |
| RPM | 3450 | | | | | | | | |
| FRAME | 56C | | | | | | | | |
| SER.F. | 1.25 | | | | | | | | |
| NEMA-NOM-EFF | 55 | | | | | | | | |
| RATING | 40C AMB-CONT | | | | | | | | |
| CC | USABLE AT 208V | | | | | | | | |
| DE | 6205 | | | | | | | | |
| ENCL | TEFC | | | | | | | | |
| | SFA 8.6/4.3 | | | | | | | | |
| | 60 | | | | | | | | |
| | L | | | | | | | | |
| | 69 | | | | | | | | |
| | PH 1 | | | | | | | | |
| | DES | | | | | | | | |
| | N CL B | | | | | | | | |

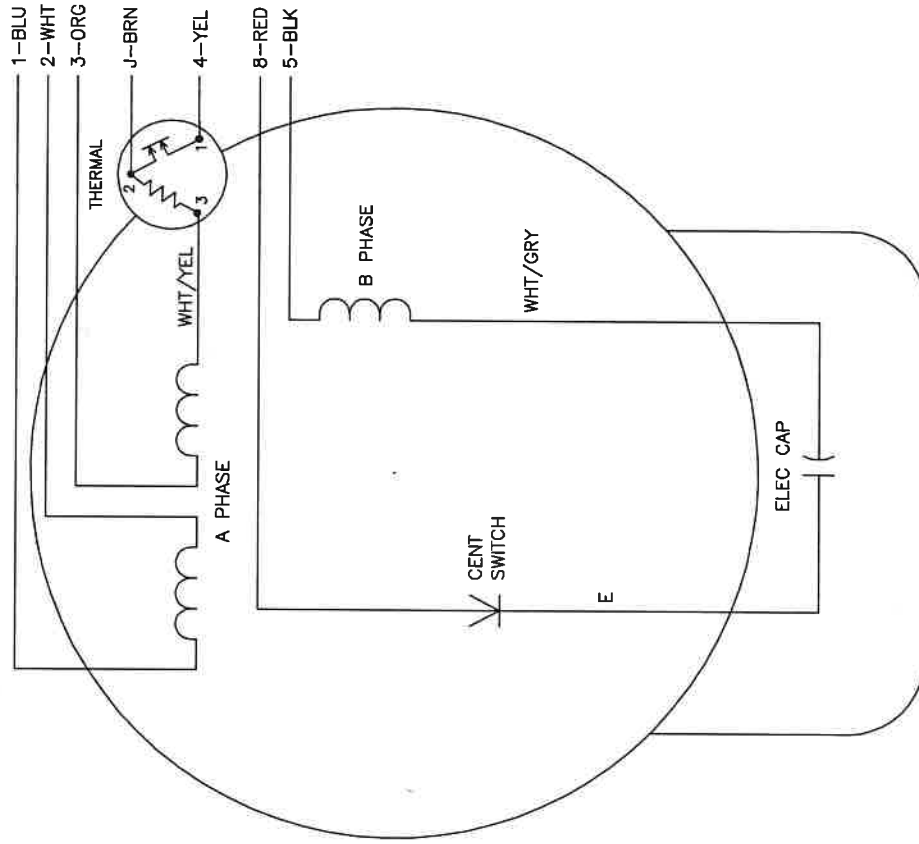
Performance Data at 230V, 60Hz, 0.5HP (Typical performance - Not guaranteed values)

| General Characteristics | | Start Configuration: | | DOL | | | |
|--------------------------|---------------------------------|----------------------|------------|--------|--------|--------|--------|
| Full Load Torque: | 0.754 LB-FT | Break-Down Torque: | 2.29 LB-FT | | | | |
| No-Load Current: | 2.69 Amps | Pull-Up Torque: | 1.14 LB-FT | | | | |
| Line-line Res. @ 25°C.: | 5.14 Ohms A Ph / 3.46 Ohms B Ph | Locked-Rotor Torque: | 1.71 LB-FT | | | | |
| Temp. Rise @ Rated Load: | | Starting Current: | 19.6 Amps | | | | |
| Temp. Rise @ S.F. Load: | | | | | | | |
| Load Characteristics | | | | | | | |
| % of Rated Load | 25 | 50 | 75 | 100 | 125 | 150 | S.F. |
| Power Factor: | 48.0 | 58.0 | 70.0 | 76.0 | 81.0 | 84.0 | 81.0 |
| Efficiency: | 31.0 | 47.8 | 51.4 | 56.5 | 58.5 | 59.4 | 58.5 |
| Speed: | 3556.0 | 3536.0 | 3509.0 | 3481.0 | 3444.0 | 3413.0 | 3444.0 |
| Line Amperes: | 2.87 | 2.98 | 3.43 | 3.78 | 4.3 | 4.81 | 4.3 |

Performance Graph at 230V, 60Hz, 0.5HP Typical performance - Not guaranteed values



CD0008



| | LINE A | LINE B | JOIN | JOIN |
|----------|--------|--------|-------|-------|
| HIGH STD | 1 | 4 | 2,3,8 | J,5 |
| HIGH OPP | 1 | 4 | 2,3,5 | J,8 |
| LOW STD | 1,3,8 | 4 | — | 2,J,5 |
| LOW OPP | 1,3,5 | 4 | — | 2,J,8 |

- NOTES:
1. STANDARD ROTATION IS CCW FACING END OPPOSITE SHAFT EXTENSION.
 2. MULTIPLE CAPACITORS ARE CONNECTED IN PARALLEL UNLESS OTHERWISE SPECIFIED.
 3. LEAD COLORS ARE OPTIONAL. LEADS MUST ALWAYS BE NUMBERED AS SHOWN.

CD0008

BALDOR ELECTRIC Co.

TYPE L, DV, REV, THERMAL, 7 LEADS

REV. DESC: REMOVE 2-TERMINAL THERMAL DETAIL, SEE CD0008A02

REV. LTR: F VERSION: 01 TDR: 000000360649

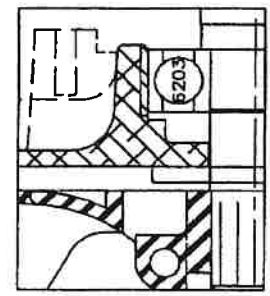
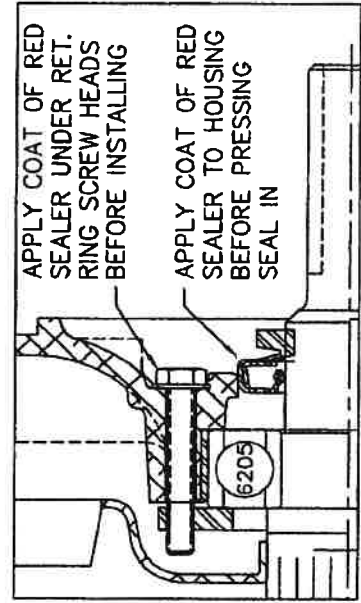
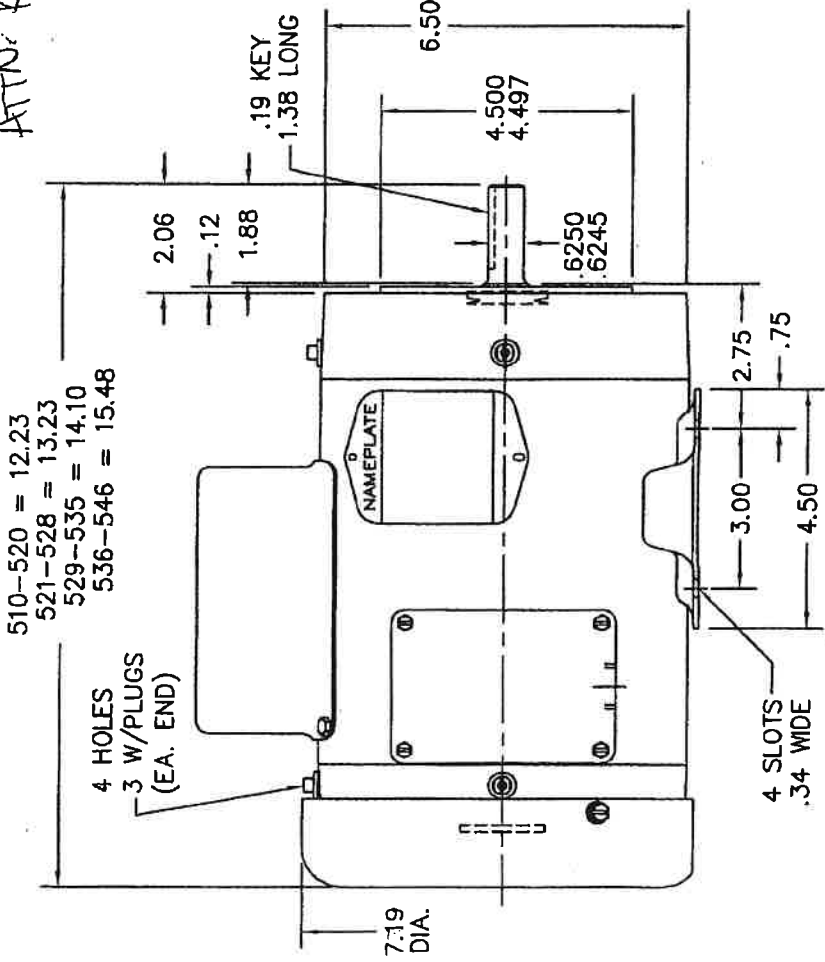
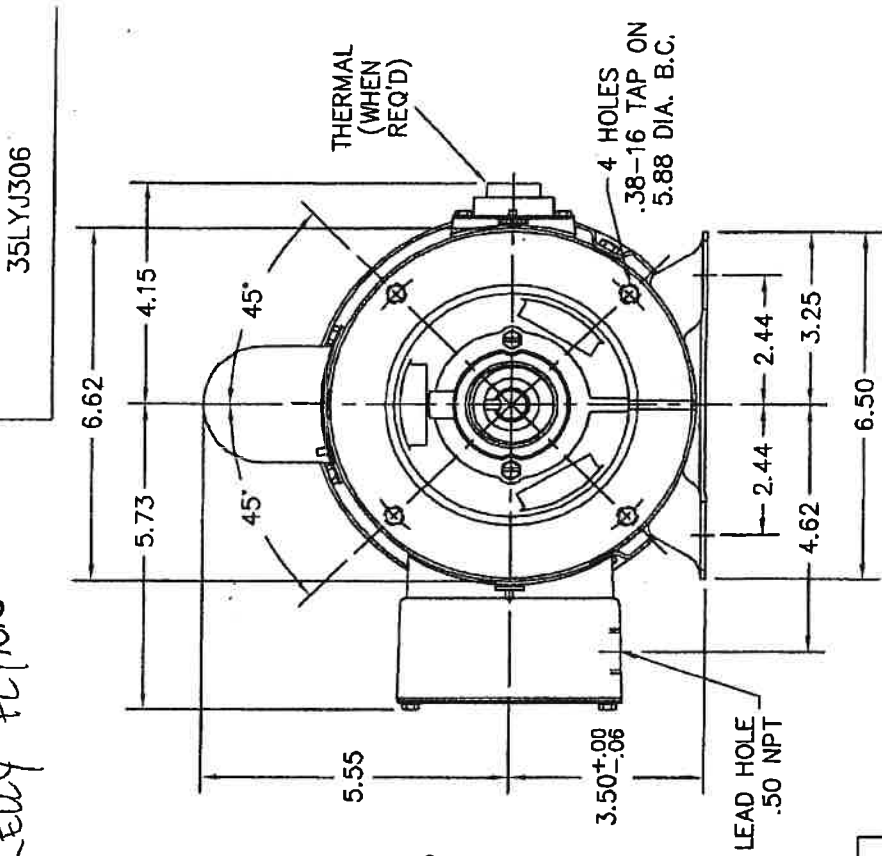
8000DC FILE: \AAA\00007\408 REVISED: 10:56:54 04/18/2005

MTL: — BY: ENJOEPO

ATTN: KELLY FLYNN

35LYJ306

35LYJ306



PULLEY END DETAIL

FRONT END DETAIL

CUSTOMER IS RESPONSIBLE FOR DETERMINING THAT BALDOR'S PRODUCT WILL PERFORM SUITABLY IN THE INTENDED APPLICATION.

REV. DESC: SHOW FACE DRAIN IN PUEP IN THE RIGHT VIEW

REV. LTR: Y VERSION: 04 TDR: 000000712381

FILE: \AAA\00011\467 REVISED: 12:07:47 09/15/2011

MTL: BY: ENTRUVO

BALDOR

STD HORZ 56C TEFC 35L WD (S/P 9)

SH 1 of 1



Solenoid Valve



Products Divisions Literature Where to Buy About Parker

Home Valves 16F24C2164AAF4C05

UGSI Part #: 9571245

Mfg. Part #:

16F24C2164AAF4C05

16F24C2164AAF4C05



| DESCRIPTION | ATTRIBUTE VALUE |
|-----------------------------|----------------------------------|
| PRODUCT TYPE | SOLENOID VALVE 2W PILOT OPERATED |
| CONFIGURATION/TYPE | 2 WAY |
| OPERATION | NORMALLY CLOSED |
| MEDIA | AIR,WATER,LIGHT OIL |
| PIPE/PORT SIZE | 1 INCH |
| CONNECTION | NPT |
| MAX OPERATING PRESSURE DIFF | 150 PSI |
| MIN OPERATING PRESSURE DIFF | 5 PSI |
| VOLTAGE/FREQUENCY RATING | 120/60-110/50 |
| BODY MATERIAL | BRASS |
| SEALS | NBR |
| FLOW COEFFICIENT/RATING | 13 |
| ORIFICE DIAMETER | 1 INCH |
| ENCLOSURE | 1/2 INCH CONDUIT |
| COIL TERMINATIONS | 18 INCH LEADS |
| POWER CONSUMPTION | 6 WATTS |
| COIL INSULATION | CLASS F |
| AMBIENT TEMPERATURE | 32 F - 77 F |
| FLUID TEMPERATURE | 180 F |
| MOPD OIL | 100 PSI |
| MOPD WATER | 150 PSI |
| MOPD STEAM | Not Applicable |
| MOPD AIR/GAS | 150 PSI |

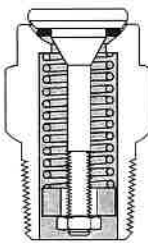
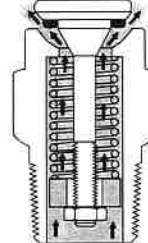
Check Valve

Polymer Injection Check Valve

- Poppet Typed Check Valve
- Viton O-Ring
- 1/2" connections
- -20 to +400 deg/ F
- 20 PSI Cracking Pressure
- Circle Seal Part Number 532T1-4M-20

* The check valve is mounted to the mixing chamber so the emulsion polymer meets the dilution water as close to the mixing energy as possible to avoid plugging. The poppet design allows the polymer to be injected as a thin film into the mixing chamber, increasing the chemical surface area, and aiding in the mixing performance.

How it Works

| | | |
|---|---|---|
|  <p>Closed Resilient seal design prevents leakage. Sealing efficiency increase with increased pressure up to cracking pressure. Metal-to-metal poppet stop supports spring load, prevents sticking.</p> |  <p>Open When system pressure overcomes spring force, poppet opens. As pressure continues to rise, variable orifice between poppet and body increases, allowing greater flow.</p> | <p>Reseating Resilient seal automatically establishes line of contact with spherical seat. Seal provides zero leakage at reseal.</p> |
|---|---|---|

Circle Seal Controls

2301 Wardlow Circle • Corona, CA 92880
Phone (909) 270-6200 Fax (909) 270-6201
www.circle-seal.com

Part# 9572322
Mfg.# 532T1-4M-20
Mfg. Circle Seal

ADJUSTING INFORMATION

Two tools for adjusting cracking pressure range are listed in the chart below; the adjusting tool, 10086 and nut driver, 10087. Use them as follows:

1. Remove Valve from service.
 2. Fit proper size adjusting tool (see chart below) over the spring guide (3-fingered spider) in the inlet end.
 3. Place nut driver (10087) inside the adjusting tool (10086) and loosen lock nut. Remove nut driver leaving adjusting tool engaged with spider nut. Press down on valve housing to compress spring, causing poppet to raise above housing seat. Turn poppet head with your fingers clockwise or counter clockwise to increase or decrease cracking pressure.
 4. On inline models (500-^{*}MP) proceed as in step 3 until it is necessary to turn poppet head. Insert screwdriver into slot in poppet head and turn screwdriver clockwise or counter clockwise to increase or decrease cracking pressure.
- NOTE: Older models, which do not have a slot in the poppet head, require the use of a wood spacer, secured by a pipe plug, to hold poppet while adjusting.
5. Test for desired adjustment.
 6. Hold spring seat spider nut stationary with adjusting tool and cinch lock nut against spider with nut driver after desired setting is obtained.
 7. Retest to be sure adjustment is not changed.

CIRCLE SEAL CONTROLS

RELIEF VALVES 500 SERIES

Popoff, inline .5-150 PSI

ADJUSTMENT TOOLS

| SIZE | 1M/2MP | 2M/3MP | 3M/4MP | 4M/6MP 6M/8MP | 8M/10MP |
|----------------|---------|---------|---------|------------------|---------|
| ADJUSTING TOOL | 10086-1 | 10086-2 | 10086-3 | 10086-4 | 10086-5 |
| NUT DRIVER | 10087-1 | 10087-2 | 10087-3 | 10087-4 | 10087-5 |

Accessories

Pressure Reducing Valve

Pressure Regulating & Reducing Valves

MAXITROL

Gas Pressure Regulators

- Ambient temp. range: -40° to 205°F (Nos. 3UP35 and 4E226 are 32° to 225°F)

Made for natural, manufactured, mixed, LP, or LP gas-air mixtures. Corrosion-resistant aluminum alloy housings. External venting must be in accordance with government and plumbing codes and regulations. NPT connections.

LEVER-ACTING GAS

Reduce intermediate pressure to a level usable by standard low-pressure controls. Nos. 4E224 and 4E225 include automatic vent limiter.

Note: These regulators provide no downstream over-pressure protection in the event of failure. They should not be used if the appliance controls downstream will not safely contain gas when exposed to supply pressure.



Lever-Acting Gas
No. 4E224



Poppet-Type
No. 4E226



Balanced Valve
No. 3UP32



Lever-Acting Line
No. 5JC45

POPPET-TYPE

For burner and pilot load applications where precise control of pilot flows is essential. No. 4E226 includes automatic vent limiting device.

STRAIGHT-THRU-FLOW

For gas-fired appliances and equipment used on low-pressure gas supply. Nos. 4E227 and 3UP36 include automatic vent limiting device. No. 3UP36 is CSA Certified to 1/2 psi.

Note: For main burner-only applications not requiring a lock-up type regulator. Should not be used as a line regulator ahead of low-pressure controls.

| Pipe Size | Max. Load | Capacity | Max. Inlet Pressure (psi) | Venting | Mounting Position | Item No. |
|---------------------------|----------------|------------------|---------------------------------|----------|--------------------|----------|
| Lever-Acting Gas | | | | | | |
| 1/2" | 100,000 Btu/hr | 150,000 Btu/hr | 2 For LP Gas, 5 For Natural Gas | 1/4" NPT | Horizontal Upright | 4E224 |
| 1" | 250,000 Btu/hr | 300,000 Btu/hr | 2 For LP Gas, 5 For Natural Gas | 3/8" NPT | Horizontal Upright | 4E225 ✓ |
| 1 1/2" | 900,000 Btu/hr | 1,250,000 Btu/hr | 10 | 1/2" NPT | Multipoise | 3UP33 ✓ |
| Poppet-Type | | | | | | |
| 1/2" | 40,000 Btu/hr | 125,000 Btu/hr | 1/2" | — | Multipoise | 3UP35 |
| 3/4" | 40,000 Btu/hr | 250,000 Btu/hr | 1/2" | 1/8" NPT | Horizontal Upright | 4E226 |
| Straight-Thru-Flow | | | | | | |
| 3/4" | — | 450,000 Btu/hr | 1/2" | 1/8" NPT | Horizontal Upright | 4E227 |
| 1 1/4" | — | 900,000 Btu/hr | 1/2" | 1/8" NPT | Multipoise | 3UP36 ✓ |
| Balanced Valve | | | | | | |
| 3/4" | — | — | 1/2" | 1/8" NPT | Horizontal Upright | 3UP34 ✓ |
| 1 1/2" | — | — | 10 | 3/8" NPT | Horizontal Upright | 3UP32 ✓ |
| Lever-Acting Line | | | | | | |
| 1/2" | 140,000 Btu/hr | 250,000 Btu/hr | 2 | 1/8" NPT | Horizontal Upright | 5JG86 ✓ |
| 1/2" | 200,000 Btu/hr | 200,000 Btu/hr | 5 | 1/8" NPT | Multipoise | 3MB98 ✓ |
| 3/4" | 320,000 Btu/hr | 320,000 Btu/hr | 5 | 3/8" NPT | Horizontal Upright | 3MB99 ✓ |
| 3/4" | 425,000 Btu/hr | 425,000 Btu/hr | 5 | 3/8" NPT | Horizontal Upright | 3ME10 ✓ |
| 1" | 300,000 Btu/hr | 550,000 Btu/hr | 2 | 3/8" NPT | Horizontal Upright | 5JC45 ✓ |
| 1 1/2" | 900,000 Btu/hr | 1,250,000 Btu/hr | 2 | 1/2" NPT | Multipoise | 5JG88 ✓ |

BALANCED VALVE

Balanced valve design virtually eliminates inlet pressure effect. No. 3UP34 includes automatic vent limiting device.

LEVER-ACTING LINE

For piping systems such as CSST (corrugated stainless steel) or semirigid copper tubing. Nos. 5JG86, 3MB99, 3ME10, and 5JC45 include automatic vent limiter. Nos. 3MB98, 3MB99, and 3ME10 include over-pressure protection device.

Bronze High-Capacity Water Pressure Reducing Valves—U5B Series

WATTS REGULATOR

No. 1KBY2



- Max. pressure: 300 psi

All have stainless steel strainer and built-in thermal expansion bypass with check valve. Factory set at 50 psi. FNPT union x FNPT connections.

Nos. 3AYW6 to 3AYW8 also have a replaceable stainless steel seat module, and reinforced EPDM diaphragm. Meet ANSI 1003 and A112.26.2; IAPMO Listed; Nos. 3AYW6 to 3AYW8 also meet CSA Standard B356, and Southern Plumbing Code.

| Inlet/Outlet | Adjustable Range | |
|--------------|------------------|--------------|
| | 10 to 35 psi | 25 to 75 psi |
| 1/2" | 3AYW6 | 1KBY2 ✓ |
| 3/4" | 3AYW7 | 1KBY3 ✓ |
| 1" | 3AYW8 | 1KBY4 ✓ |

Bronze Pressure Reducing Valves—Series 25 AUB

WATTS REGULATOR

No. 1KBX5



- Max. pressure: 300 psi
- Max. temp.: 160°F

Union inlet connection, with integral stainless steel strainer, and temperature-resistant reinforced EPDM diaphragm for hot water. Factory preset at 50 psi. FNPT x FNPT union connection. Meet ASSE 1003 and ANSI A112.26.2; IAPMO Listed.

| Inlet/Outlet | Pressure Range 25 to 75 psi | | With Gauge, High Pressure Pressure Range 75 to 125 psi | |
|--------------|-----------------------------|----------|--|----------|
| | Item No. | Item No. | Item No. | Item No. |
| 1/2" | 1KBX5 ✓ | 3AYW9 | 3AYX6 | 3AYX7 |
| 3/4" | 1KBX6 ✓ | 3AYX1 | 3AYX2 | 3AYX8 |
| 1" | 3A557 ✓ | 3AYX2 | — | — |
| 1 1/2" | 1KBX8 ✓ | 3AYX3 | — | — |
| 1 1/2" | 1KBX9 ✓ | 3AYX4 | — | — |
| 2" | 1KBY1 ✓ | 3AYX5 | — | — |

Bronze High- and Super-Capacity Water Pressure Reducing Valves

WATTS REGULATOR

'Apollo' Valves

No. 1KBV7



No. 1KBW6



- Adjustable range: 25 to 75 psi

Feature an enlarged diaphragm and orifice and a spring cage to handle high capacities. Factory set at 50 psi. FNPT connections.

HIGH-CAPACITY

- Max. pressure: 300 psi
- Max. temp.: 160°F Meet ASSE 1003, ANSI A112.26.2, IAPMO, and Military Spec. MIL-V-18146B.

SUPER-CAPACITY

- Max. inlet pressure: 400 psi
- Max. temp.: 180°F

With built-in thermal expansion bypass, adjusting screws, nut, cap bolts, and easy access for maintenance/repair. Meet ASSE 1003, ANSI A112.26.2, CSA B356, IAPMO.

| Inlet/Outlet | WATTS High Capacity with Strainer | | WATTS High Capacity without Strainer | | APOLLO Super Capacity without Strainer | |
|--------------|-----------------------------------|----------|--------------------------------------|----------|--|----------|
| | Item No. | Item No. | Item No. | Item No. | Item No. | Item No. |
| 1/2" | 1KBV7 ✓ | 1KBW6 ✓ | 1KBW6 ✓ | 6KJ91 ✓ | — | — |
| 3/4" | 1KBV8 ✓ | 1KBW7 ✓ | 1KBW7 ✓ | 6KJ92 ✓ | — | — |
| 1" | 1KBV9 ✓ | 1KBW8 ✓ | 1KBW8 ✓ | 6KJ93 ✓ | — | — |
| 1 1/4" | 1KBW1 ✓ | 1KBW9 ✓ | 1KBW9 ✓ | 6KJ94 ✓ | — | — |
| 1 1/2" | 1KBW2 ✓ | 1KBX1 ✓ | 1KBX1 ✓ | 6KJ95 ✓ | — | — |
| 2" | 1KBW3 ✓ | 1KBX2 ✓ | 1KBX2 ✓ | 6KJ96 ✓ | — | — |
| 2 1/2" | 1KBW4 ✓ | 1KBX3 ✓ | 1KBX3 ✓ | — | — | — |
| 3" | 1KBW5 ✓ | 1KBX4 ✓ | 1KBX4 ✓ | — | — | — |

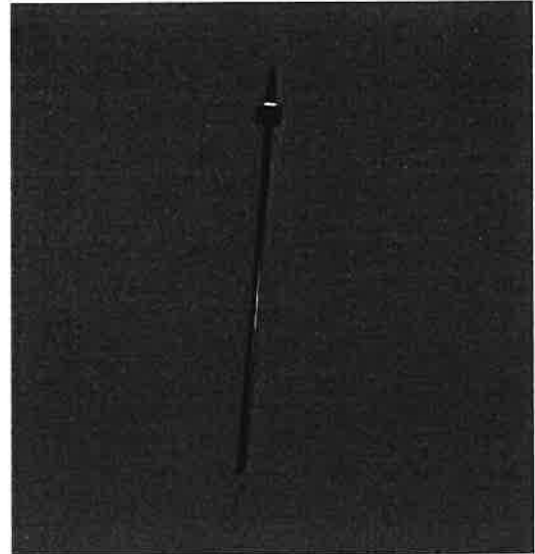
Drum Stick

DrumStik® 55 Gallon Drum Adapter

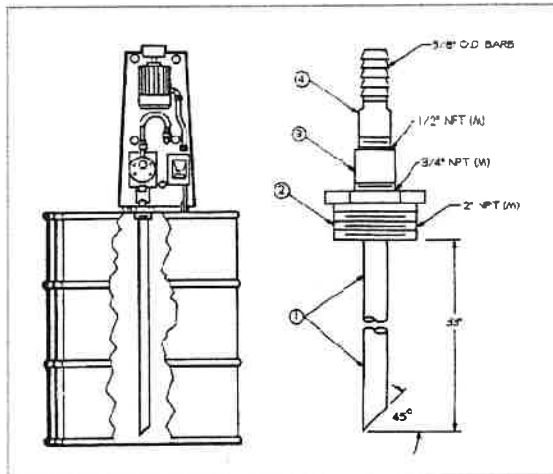
General Description

Designed for quick and easy installation, the DrumStik® adapter greatly simplifies the connection of a new 55-gallon (208.2 L) drum of emulsion polymer to the PolyBlend® unit. This device eliminates the need for hand feeding a length of tubing into the drum and ensures maximum evacuation of the drum's contents. The DrumStik® adapter is designed for either a 2" (50.8mm) NPT bung hole connection or a 3/4" (19.05mm) NPT vent hole connection. Simply remove the 2" (50.8mm) x 3/4" (19.05mm) reducer bushing if installing in the 3/4" (19.05mm) NPT vent hole connection. The DrumStik® adapter is merely inserted in the appropriate drum hole and threaded hand-tight. A barbed connector at the top of the DrumStik® adapter is sized to accept the 5/8" (13.33mm) ID tubing from the PolyBlend® unit's diaphragm pump.

Use of the DrumStik® adapter also virtually eliminates the need for re-priming the pump when changing drums.



General Layout



Part Number Descriptions

| Part No. | Item | Description | Quantity |
|-----------|------|--|----------|
| RM6600061 | 1 | Pipe, 1/2" (12.7mm) x 34" (863.6 lg) | 1 |
| 1930027 | 2 | Bushing, 2" (50.8mm) x 3/4" (19.05mm), T x T | 1 |
| 1048002 | 3 | Adapter, 3/4" (19.05mm) x 1/2" (12.7mm), TxT | 1 |
| 2737205 | 4 | Tube Fitting, 5/8" (13.33mm), OD Bard | 1 |

Drum Dryer

Air Dryer (Drum Dryer)

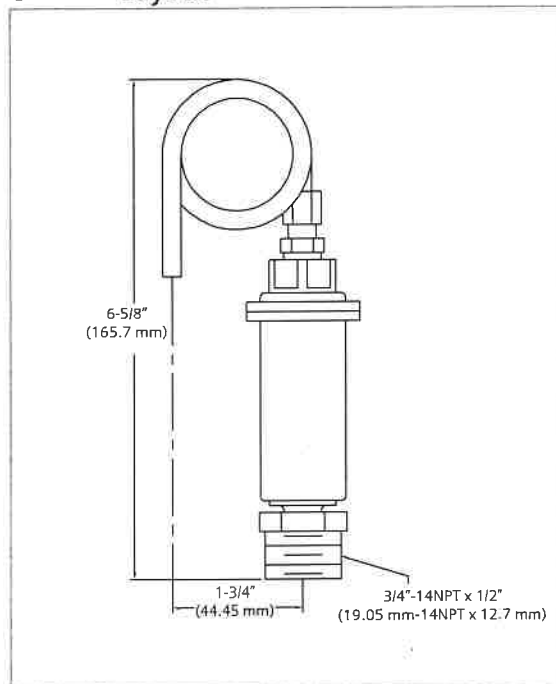
General Description

Air Dryer (Drum Dryer) is a moisture prevention device (desiccator) for use with vertically or horizontally positioned PolyBlend® polymer drums. The desiccator prevents moisture laden air from entering the vent of the polymer drum which can condense at night and contaminate water sensitive polymer.

The "Drum Dryer" consists of a 3/4" (19.05mm) NPT bushing for threading into the drum vent, clear-view desiccator and stainless steel tube coil to prevent water from inadvertently entering the vent. The "Drum Dryer" is shipped preassembled, ready for simple installation. Silica gel in a clear plastic housing changes color when you need to replace the dryer.



General Layout



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Drum Mixer

Drum-Stir Bayonet-Mount Drum Mixer

General Description

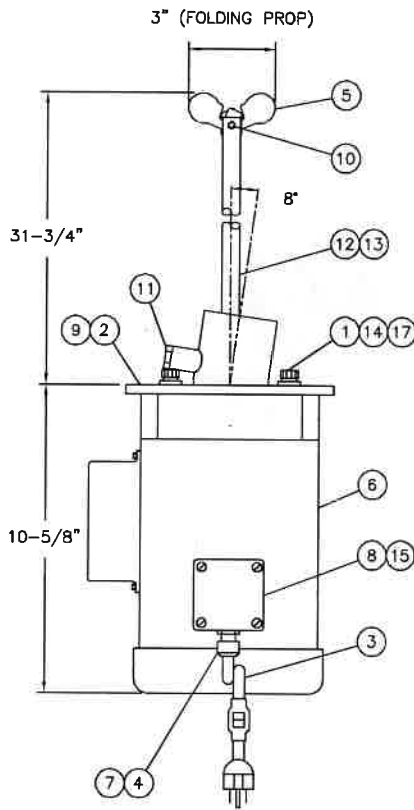
The Drum-Stir is a simple but important improvement over screw-in or clamp-mount drum mixers. The Drum-Stir features a unique mounting system that's easy to install and provides the most thorough mixing. With the mixer, the impeller can be centered in the drum instead of up against one side. The shaft and impeller don't hit the inside wall of the drum during installation. When the top of the drum sags, as they sometimes do, the impeller won't be pushed into the drum wall. See the drawings on reverse. (U.S. Patent No. 4,981,367)

Specifications

| | |
|------------|--|
| Motor | 1.2 H.P TEFC 1725 RPM |
| Shaft | 304 SS, 5/8" (15.9 mm) dia x 28" (711.2mm) |
| Impeller | 304 SS, collapsible, 4" (101.6 mm) dia. (open) |
| Mount | 1/4" (6.35 mm) mild steel plate epoxy powder coated, 2" (50.8 mm) NPT bung mounted |
| Electrical | 120 VAC / 1 pH / 60 Hz / 7.4 amps. Also available - 220 VAC / 1 pH / 50 Hz |
| Cord | 18 AWG-3 (8 ft. long) with grounded plug and on-off switch. UL-CSA approved |
| Weight | 34 lbs. (15.5 kg) |



General Layout



Key Description

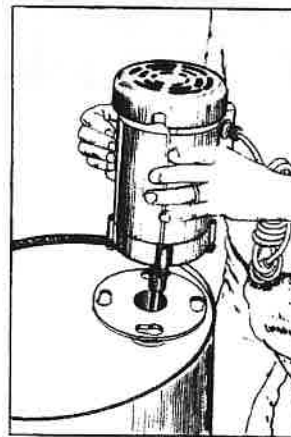
| | |
|----|--|
| 1 | Bolt, Hex, HD., S.S., 3/8" (9.5mm) - 16 (0.63) x 1" L (25.4mm) |
| 2 | Bracket, Bayonet Mounting Plate, Mixer |
| 3 | Cable Assy w/Switch & Plug, 18GA., (3) Conductor |
| 4 | Connector, Electrical, 1/2" (12.7mm) |
| 5 | Fin, Impeller, S.S., Collapsible Blade |
| 6 | Motor, 1/2 HP, 120 VAC, 1725 RPM |
| 7 | Nut, Lock, Conduit, 1/2" (12.7mm) |
| 8 | Nut, Wire Crimpon (Inside) |
| 9 | "O"-Ring, Buna, 4-1/2" (114.3mm) I.D. x 4-7/8" (123.83mm) O.D. x 3/16" (4.8mm) THK |
| 10 | Pin, Tension, Roll, S.S., 1/4" (6.35mm) O.D. x 1" (25.4mm) L |
| 11 | Plug, PVC, 3/4" (19.05mm) (M)NPT |
| 12 | Screw, Set PNT., S.S., 1/4" (6.35mm) -20 (.79) x 1/4" (6.35mm) L |
| 13 | Shaft, Drum Mixer, S.S. |
| 14 | Spacer, S.S., 3/8" (9.53mm) I.D. x 9/16" (14.3mm) O.D. x 15/32" (.5mm) L |
| 15 | Terminal, Forked, #10BOLT |
| 16 | Tool, Allen Wrench, 1/8" (3.175mm), "L" Shaped (See Note #1) |
| 17 | Washer, Flat, S.S., 3/8" (9.53mm) |

Installation Instructions



Step 1

Install mounting flange in 2" (5.1 mm) bung opening. Tighten by hand until flange is firmly seated. Make sure highest edge of flange is pointed away from centerline of drum as shown by arrows in drawing.



Step 2

Mount Motor/Shaft Assembly

- Insert mounting lugs through lane portion of "key holes".
- Turn to right to lock
- Plug mixer into properly grounded electrical service
- Turn mixer on with cord mounted switch

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INSPECTION AND INVENTORY VERIFICATION

- Inspect and inventory the shipment immediately upon receipt.
- Mark any visible damage on the freight bill and notify the carrier immediately.
- You have seven (7) days from the date this shipment was received to report any discrepancies to UGSI ChemFeed.
- After seven (7) days, UGSI ChemFeed will consider the shipment complete and undamaged.
- UGSI ChemFeed takes every precaution to insure safe arrival. However, our responsibility ceased when the shipment was passed over to the carrier. Claims for damages must be made to the carrier.

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SHIPPING, HANDLING AND STORAGE INSTRUCTIONS

Shipping & Handling

1. Follow directions on package.
2. Open packages immediately to check for damage.
3. Handle with care. Fragile components and factory aligned parts are enclosed.
4. Keep all packages in one area. Minimize re-handling.

Storage

1. Store in climate controlled environment. Avoid temperatures below 32°F (0°C) and above 120°F (52°C).
2. Protect from direct weather exposure (sun, rain, high wind, etc.).
3. Consult factory for special situations.

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(b.) Conditions to the Limited Warranties. The Limited Warranties are conditioned on (i) the Product being stored, installed, operated and maintained in accordance with Seller's instructions, (ii) no repairs, modifications or alterations being made to the Product other than by Seller or its authorized representatives, (iii) the Product being used in compliance with any conditions or parameters set forth in specifications that are attached to, or expressly incorporated by reference into, these terms, (iv) use of the Product being discontinued after the Buyer or user has, or should have had, knowledge of any defect in the Product, (v) Buyer providing prompt written notice of any warranty claims within the warranty period described below, (vi) at Seller's discretion, Buyer either removing and shipping the Product or non-conforming part thereof to Seller, at Buyer's expense, or Buyer granting Seller access to the Products at all reasonable times and locations to assess the warranty claims, and (vii) Buyer not being in default of any payment obligation to Seller.

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(d.) Limited Warranty Period. Buyer shall have 12 months from initial operation of the Product or 18 months from shipment, whichever occurs first, to provide Seller with prompt, written notice of any claims of breach of the Limited Warranties. Continued use or possession of the Product after expiration of the warranty period shall be conclusive evidence that the Limited Warranties have been fulfilled to the full satisfaction of Buyer and user, unless Buyer has previously provided Seller with notice of a breach of the Limited Warranties.

(e.) Remedies for Breach of Limited Warranty. Buyer's sole and exclusive remedies for any breach of the Limited Warranties are limited to Seller's choice of repair or replacement of the Product, or non-conforming parts thereof, or refund of all or part of the purchase price for the subject Product or part. The warranty on repaired or replaced Product or parts is limited to the remainder of the original warranty period. Buyer shall be responsible for any labor required to gain access to the Product so that Seller can assess the available remedies and (ii) Buyer shall be responsible for all costs of installation of repaired or replaced Products or parts. All Products or parts replaced under this Limited Warranty will become the property of Seller.

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