City of Rome, NY
Water Resource Recovery Facility Improvements Project
RFB 2024-031

Addendum No. 1

TO: All Bidders of Record **Date Issued:** December 20, 2024

This addendum shall be part of the Contract Documents as provided in the Agreement for the above-referenced project. **Acknowledge the receipt of this addendum on Page 00400-5 of the Bid Documents for the project. Failure to do so may subject the bidder to disqualification.**

CLARIFICATIONS

1. There are no AIS, BABA, or MWBE requirements in the Contract, although participation is encouraged by the City.

QUESTIONS AND ANSWERS

1. What are the engineer's estimates for both contracts?

   Response: $6,200,000 estimated for the General Contract and $1,100,000 for the Electrical Contract.

2. Are there MWBE or BABA requirements?

   Response: While MWBE participation is encouraged by the City, there are no requirements for AIS, MWBE, or BABA under either contract.

3. Would a fusion bonded, factory applied, powder-coat epoxy be accepted as an alternative coating option for the bolted steel tank in this section?

   Response: No, the bolted steel storage tank will need to be glass-coated to match existing tanks on site which serve a similar purpose.

4. For the Plug Valve Specification Section 400562-3.
   a) 2.1 B 2 f. - There are no plug valves that I know of that have an unobstructed flow path when open. Even the round ports you can see the plugs when installed.

   Response: There are valves available from the listed manufactures which have 100% port and meet the other criteria specified, such as the Model 5600F from Val-Matic.

   b) 2.1 8 a. - None of the named plug valve manufacturers make round ported plug valves over 12". Dezurik and Val Matic only make rectangular ports because they offer many benefits in wastewater service.

   Response: Rectangular ports will be accepted for valves larger than 12-inches.

c) 2.1 D 1. b - Is the intent that all plug valves are rubber lined? This is expensive and uncommon. More commonly we provide either epoxy lined, or in the case of extreme service conditions, glass lined. The plug should be completely rubber-lined as detailed in 9 a.

Response: This section has been revised to call for fusion bonded epoxy instead of an elastomer lining.

d) 2.1 D 4 - Plug valve stems are the same material as the plug as it is one casting. 2 piece plug and stems are not desirable.

Response: Valves shall be provided per the specifications.

e) 2.1 D 6 - Seals/packing are usually only PTFE for digester gas. Buna-N or NBR is standard for wastewater. PTFE won't hurt anything but it is a bit more money for no benefit.

Response: This item should change from "PTFE" to "Buna-N."

f) 2.2 - To what valves does this apply as PV2 is not in the valve schedule?

Response: Any plug valves greater than 12-inches will be PV-1; Any plug valves 12-inches and smaller will be PV 2. Section 400562-4 Article 2.2 has been updated to reflect this.

5. For the Check Valves specification Section 400565.23.
   a) 2.1 A. Please name Dezurik/APCO. We make a high-quality product

Response: Alternative manufacturers may be submitted as an equal for approval during shop drawing review per the project specifications.

b) 2.1 B 7 b. Oil Cylinder Cushions can cause problems because oil is not compressible. In order to cushion closure it prevents the shaft from rotating. The valve disk is twisting the shaft in the other direction. The net effect is torsional stress on the shaft when there does not have to be. I would recommend either an air cushion or a bottom-mounted oil buffer for the size check valves you have on this project. This depends on what your transient analysis told you about the propensity for slamming or what they experience currently.

Response: This item should change from "Oil cylinder cushion" to "Air cylinder cushion".

6. For the Valve Schedule on G-1
   a) The first 5 plug valves on the valve schedule require SS body. This is not covered in the valve spec.

Response: Section 400562 Plug Valves has been updated to call for Ductile Iron Body with interior and exterior fusion bonded epoxy in lieu of stainless steel. The valve schedule has been updated to reflect this.

b) The manual actuator spec states 6 in and larger require handwheels. A few of the valves in the schedule say 2" nut. Are they for buried service?

Response: In the Valve Schedule on G-1 the valves listed as "Manual Gear w/ Operating nut" are buried valves. Other exposed valves will either have a manual handwheel, modulating electric with handwheel, or a manual chainwheel.

c) There are 2 x 8" knife gates on your project but I did not see a spec. I have attached one if needed.

Response: The pump manufacturer is to supply the knife gates, shown on the valve schedule on Drawing G-1, as part of their pump package. Section 431329 has been updated to clarify this.

7. In reference to the spec section 004113.16 - Bid Form and spec section 005214.16 - Agreement, there is a discrepancy between the amounts provided for the Liquidated Damages. Please clarify the Liquidated Damages that are required for the Contract No. 1G – General.

   Response: Liquidated damages will be $1,000 per day for each calendar day beyond the Contract Time Limit or Extension thereof that the Work remains incomplete. The bid sheets are updated to reflect this.

8. Drawing M-4, Main Pump Station, Plan View, states "16 inch expansion joint up and downstream of pump (not shown), typ." These will likely have a lay length of 8" to 10", depending on exact unit used. As they are not shown, has it been verified there is adequate room to install these on the suction and discharge sides of the pumps? There appears to be very little extra room on the drawings. With the pump discharge size being specified as 16", and the discharge check valve and piping being shown as 18", an 18" x 16" reducing expansion joint will be required on the discharge side. Such a size unit will limit the make & model type expansion joints available for this application.

   Response: M-4 has been updated to show the expansion joints on each side of the pumps. The valve and fittings immediately downstream of the pumps have been updated from 18" to 16" to match the outlet of the basis of design pump. Ultimately, sizes will depend on the final approved pump.

9. On drawing M-3 for the Main Pump Station, Section 1 states the "Existing sump pump to remain", but specification section 221429-2.2.A and 2.3.A states to replace the Main Pump Station sump pump in kind – please clarify. If it is to be replaced, is any size or performance information available?

   Response: Section 221429 has been updated to remove the requirement to replace the sump pump in the main pump station.

10. Specification section 221429-2.2 identifies the new sump pump at the Pressure Level Indicator Vault on MD-1, but not the one at the Flowmeter Vault on MD-2. Section 221429-2.3.B identifies the sump pump in the Pressure / Level Indicator Vault is to be designed for 5 feet of Total Dynamic Head. Please confirm that is accurate for the service required.

    Response: Section 221429 has been updated to include a reference to the Flowmeter vault sump pump.

11. On MD-1 for the Pressure / Level Indicator Vault, and MD-2 for the Flow Meter Vault, the sump pump detail refers to A / MD-2, but A / MD-2 says "Not Used" – please clarify. Those sump pumps appear to show a float switch, but we do not see float switches identified in the sump pump specification 221429 – please confirm pump mounted float switches are required with the sump pumps.

Response: MD-2 has been revised to add detail A/MD-2 back into the set. Pump mounted float switches are required with the sump pumps. Section 221429 has been updated to make mention of the float switches.

12. The orientation / location of the 4" piping exiting the Leachate (Waste) Transfer Station on M-5 does not appear to match that shown on C-1.

Response: C-1, C-2, and C-3 have been revised to show the correct exit point for the discharge pipe matching M-5.

13. Please identify the objects drawn (but not labeled) immediately adjacent to the flowmeters at the Pressure Level Indicator Vault on MD-1 and the Flowmeter Vault on MD-2. It appears to be some type of removable joint, or expansion joint with tie rods.

Response: The item directly upstream of the flow meter is a dismantling coupling matching the size of the piping and valve for each vault. Sheets MD-1 and MD-2 have been updated to point out this coupling.

14. Check valve specification section 400565.23-2.1.D. states position switches are to be provided with the Check valves. We do not see these identified at the Main Pump Station on the "E" or "I" drawings.

Response: No position switches are required for the check valves at the Main Pump Station. Section 400565.23 has been updated.

15. Are there any original structural drawings of the Existing Main Pump Station available to aide in preparing a bid for the design and installation of pipe supports per 400507?

Response: A historical structural drawing for the Main Pumping Station will be attached to this addendum.

16. Drawing MD-1, section view of the Pressure / Level Indicator Vault, shows the pressure gauge / switch / transmitter upstream of the Pinch valve, which matches Drawing I-3. That section view also has a note for a "Pressure Transmitter" downstream of the mag meter. Please confirm that note is to be removed.

Response: The label for "Pressure Transmitter" downstream of the meter has been removed. The pressure gauge/switch/transmitter is upstream of the pinch valve as shown on MD-1 and I-3.

17. Specification section 400507-2.4.B states to see Section 404213 Process Piping Insulation for process piping insulation requirements. We do not find this section included in the specifications – is any pipe insulation required?

Response: No pipes are to be insulated per the pipe schedule on Drawing G-1. This reference has been removed.

18. The following specs indicate an AIS requirement, which should be removed: Pinch Valves – 400574.23-1.3.I; Combination Air Valves – 400578.29-1.5.G

Response: References to AIS have been removed from these sections.

19. Can you issue a painting schedule that clearly identifies the areas to be painted? The specification describes the various systems to be used but not where.

    Response: The extent for painting is indicated in notes 1 and 2 of sheet M-4. Section 099679 describes the systems required for horizontal/vertical concrete surfaces for the walls and housekeeping pads; and ductile or cast iron for the piping.

20. At the Main Pump Station Lower Level, how high up the walls should be painted?

    Response: Per note 2 on sheet M-4 "all existing concrete walls, floors, and housekeeping pads…".

21. At the Main pump station, does the painting scope include the concrete stairs? If so, to what elevation should the stairs and walls be painted?

    Response: Yes, the entirety of the stairs will be included in the painting scope.

22. Are there any hazardous materials to be abated or encountered in the scope of this project?

    Response: Specification sections 028230 and 028330 have been added to the specification book and allowance A3 has been added to the General Construction Contract to address the testing and removal of suspected lead or asbestos.

23. Specification section 400562 identifies Plug valves as Type 1 per par 2.1 and Type 2 per par 2.2. Is either acceptable ?

    Response: Specification section 400562 has been updated to clarify.

24. Specification section 400562-2.1.D identifies Plug valve bodies to be cast iron with 316 SS hardware. The Valve Schedule on G-1 lists the 5 buried valves as "SS" under "Material" (drawing C-2). The 8" buried Plug valve (drawing C-4) is shown as "DI" in the schedule. Please confirm the "SS" applies to the hardware, not the body.

    Response: Both specification section 400562 and the valve schedule has been updated to clarify the requirements.

25. The Valve Schedule on G-1 does not list the 3 Plug valves in the RAS Manhole per C-1.

    Response: The valve schedule on G-1 has been revised to clarify this.

26. The Gate valve specification section 400561-2.2 (Type GV2), for "Wastewater service", states "Stem: Rising for exposed service and Non rising for buried service". The Valve Schedule on G-1 lists all gate valves as "NRS Handwheel". Please confirm if Gate valves are rising or non-rising stem.

    Response: The valve schedule on G-1 has been revised to eliminate the reference to Non-rising stem (NRS) for exposed valves.

27. The Pipe Schedule on G-1 lists "N" under "Type" for insulation for all pipe lines. Does the "N" mean "None"?

    Response: Correct, "N" represents "None" on this schedule.

28. Specification section 400565.23-2.1.B identifies adjustable weights and oil cushion cylinders are required for the Check valves. The Valve Schedule on G-1 identifies only weight & lever operators. Weight & lever operators are provided either way, we would just like to confirm the oil cushion option is required per the spec.

    Response: Specification section 400565.23 contains more details on the requirements than can fit in the valve schedule. This applies to all other valve specification as well.

29. Refer to section 432513-2.10.A and 3.3.A. - please confirm neither the pump manufacturer or contractor are responsible for the expenses of the engineer to inspect the pumps at the factory, should that occur. Note that 2.10.A states 10 day notice is required, while 3.3.A states 30 day notice is required.

    Response: Contractor is not responsible for the expense if the Engineer or Owner elect to inspect the pumps at the factory and this cost should not be carried in the bid. The purpose of this language is to provide the Owner or Engineer the opportunity with enough advanced notice. 2.10-A has been updated to indicate "30 days" to match 3.3-A

30. Specification section 333113-2.1.C identifies HDPE pipe but does not give an SDR or pressure rating requirement. Specification section 400531-2.3 identifies HDPE pipe as SDR 21 rated for 100 PSI. The pipe schedule on G-1 identifies HDPE pipe as Schedule 80, which seems to be in error, and identifies a pressure test requirement of 150 psi. Please clarify the SDR and pressure rating requirement for HDPE pipe.

    Response: Sections 333113 and 400531 have been updated to agree with SDR 13.5. The pipe schedule on drawing G-1 has also been updated to match.

CHANGES TO SPECIFICATIONS

Section 000110 – Table of Contents

000110-4: Add the following specifications to the list:
028230 Asbestos Abatement
028330 Lead Based Paint Removal

Section 001116 – Invitation to Bid

001116-2: Change the City Clerk's name from "*Jean I. Grande*" to "*Eric Seelig*".

Section 004113.16 – Bid Form – Contract No. 1G General

004113.16-1 paragraph 3: Change *"$2,000*" to "*$1,000*"
004113.16-2: Add the following allowance item to the table:

A3	*Allowance*	*Lead/Asbestos Testing and Removal*	*$50,000*

Section 004113.16 – Bid Form – Contract No. 1E Electrical

004113.16 paragraph 3: Change *"$2,000*" to "*$1,000*"

Section 012100 – Allowances

012100-3 Article 3.3: Add the following:

C. GC Allowance No. A3: Lead/Asbestos Testing and Removal: Include an allowance of $50,000 for all labor, materials, equipment and incidentals required to provide a USEPA and NYSDOL Certified Inspector to perform a lead and asbestos inspection in accordance with Federal and State regulations of samples of the various materials to be disturbed and removal of such materials if found to contain lead and asbestos at levels above acceptable, and all else incidental thereto for which separate payment is not provided. Sampling protocols and removal work, if required, shall be as required by the USEPA, OSHA, and the NYSDOL. The Contractor shall submit a sampling plan to the Engineer for approval prior to sampling activities and a summary report of sampling in accordance with all applicable regulations and requirements.

Add Section 028230 Asbestos Abatement

Add Section 028330 Lead Based Paint Removal

221429 – Sump Pumps

Article 2.2-A: Change "*Pressure Level/Indicator Vault*" to "*Pressure Level/Indicator Vault and Flowmeter Vault*"
Article 2.2-A: Add item 8 as follows:

8. *Controls:*
   - *a. Enclosure: NEMA 250, Type 1.*
   - *b. Switch Type: Pedestal-mounted float switch with float rods and rod buttons.*
   - *c. Float Guides: Pipe or other restraint for floats and rods in basins of depth greater than 60 inches.*
   - *d. High-Water Alarm: Cover-mounted, compression-probe alarm, with electric bell; 120 V ac, with transformer and contacts for remote alarm bell.*

Article 2.3: Replace item A "Main Pump Station Sump Pump: Replace in kind" with the following:

A. Flowmeter Vault:
- *1. Unit Capacity: 90 gpm.*
- *2. Number of Pumps: One.*
- *3. Each Pump:*
  - *a. Capacity: 90 gpm.*
  - *b. Total Dynamic Head: 5 feet.*
  - *c. Speed: 1725.*
  - *d. Discharge Size: 2 inches NPS.*
  - *e. Electrical Characteristics:*
    - *1) Motor Horsepower: 4/10 hp.*
    - *2) Volts: 115 or 230 V ac.*
    - *3) Phases: Single.*

4) Hertz: 60.

Section 330513 – Manholes and Structures

330513-4 Article 2.3: Replace the article and insert the following

2.03 MANHOLE FRAME AND COVERS

A. Manhole frames and covers shall be of good quality, strong, tough, even grained cast iron, smooth, free from scale, lumps, blisters, sand holes and defects of any kind which render them unfit for the service for which they are intended. Manhole covers and frame seats shall be machined to a true surface. Castings shall be thoroughly cleaned and subject to hammer inspection. Cast iron shall conform to ASTM A48, Class 30 as a minimum.

B. All frames and covers shall be suitable for H20 wheel loads.

C. Manhole covers on new sewer and drain manholes shall have a 24-in. clear opening with City of Rome, NY imprint, Model 1310C2 by EJ. Manhole frames shall be 1310Z, by EJ.

Section 333113 – Public Sanitary Utility Sewerage Piping
Article 2.1-C: Add to the end of the item "…, DR13.5 per AWWA C906 and ASTM F714."

Section 400507 – Hangers and Supports for Process Piping
Article 2.4: Delete article *2.4 Insulation* and its contents.

Section 400631 – Thermoplastic Process Pipe
Article 2.3-A-2: Change "*SDR 24.0*" to "*SDR13.5*" and "*100 psig*" to "*160 psig*".

Section 400562 – Plug Valves

400562-2 Article 2.1-B-8-a: Change "*Round*" to "*Round or Rectangular*"
400562-3 Article 2.1-D-1-a: Change "*Cast iron, AWWA C517*" to "*Ductile iron, ASTM A536*".
400562-3 Article 2.1-D-1-b: Replace item with the following: "*Lining: Fusion bonded epoxy, as specified in this section below, under finishes*."
400562-3 Article 2.1-D-6: Change "*Cast iron, AWWA C517*" to "*Ductile iron, ASTM A536, Grade 65-45-12*"
400562-3 Article 2.1-D-6: Change "*PTFE*" to "*Buna-N*"
400562-5 Article 2.1-E: Replace entirely with the following:
E. Finishes
1. As specified in Section 400551 "Common Requirements for Process Valves".
2. Body, Internal and External, Including Bonnet: AWWA C550, Fusion Bonded Epoxy, 12-20 mils minimum thickness.
Article 2.2: Add item C: *C. Any plug valves greater than 12-inches will be PV-1; Any plug valves 12-inches and small will be PV-2.*

Section 400557 – Actuators for Process Valves and Gates

400557-6 Article 2.3-C-1: Break the line before "*Basis of Design*" and make content following a sub item 2.3-C-1-a. Change "*3-inch7 feet5-1/2 feet*" to "3-*inch and larger mounted over 7 feet above the operating floor.*"

Section 400565.23 – Check Valves

400565.23-3 Article 2.1-B-7-b: Change "*Oil cylinder cushion*" to "*Air cylinder cushion*".
Article 2.1-D: Delete article and change item E to item D.

Section 400574.23 – Pinch Valves

400574.23-1 Article 1.3-I: Remove article.

Section 400578.29 – Combination Air Valves for Wastewater Services

400578.29-2 Article 1.5-G-3: Remove article.

Section 431329 – Sanitary Sewerage Pumps

431329 Article 2.2-A: Add new item 14 stating the following:

14. Manufacturer will supply knife gate valves as shown on the valve schedule on the Contract Drawings. Knife gate valves will be compatible with pumped fluid contents, consistent with the pumping system, and will aid in flow control during maintenance of the pumps.

Section 432513 – Submersible Solids Handling Pumps

431329 Article 2.2-A-3: Delete last sentence – "*Substitution must be submitted to design Engineer two weeks before the bid date for pre-approval*."

CHANGES TO DRAWINGS

Sheet G-1: Legend, Abbreviations and Symbols
Updates to the valve schedule to change the item listed under "*Material*" from "*SS*" to "*DI*"; changed "*NRS Handwheel*" to "*Handwheel*"; and the three RAS valves from C-1.
Updates to the pipe schedule to change the SCH./Class for all HDPE pipes from "*80*" to "*DR13.5*"

Sheet C-1: Yard Piping Demolition and new Work Plan
Updated background as described below for C-2.

Sheet C-2: Enlarged Site Plan – Waste Holding Tank

1. Revised alignment of 4" LTI-HDPE between the Waste Holding Tank and the Waste Transfer Station.
2. Revised labels for plug valves installed at the HSW Equalization tank to remove *"…with S.S. Wetted Parts…*" and replaced with *"…with a fusion bonded epoxy coating…".*

Sheet C-3: Profiles
Updated profile B to match changes to Sheets C-1 and C-2.

M-4: Main Pump Station New Work Plan and Sections
Revised plan and section to show expansion joints and 16"x18" reducers.
Changed size of valves, fittings, and piping immediately downstream of the pumps from 18" to 16".
Added notes 3 and 4 for clarification.

MD-1: Mechanical Details I

Updated Detail A, add labels for *4" dismantling joint* directly upstream of the flow meter.

MD-2: Mechanical Details II
Updated Detail F, add labels for *8" dismantling joint* directly upstream of the flow meter.
Added detail A – Sump Pump

ATTACHMENTS

1. Revised Specification Sections including:
    a. Updated Specification Section 000110 – Table of Contents
    b. Updated Specification Section 001116 – Invitation to Bid
    c. Updated Specification Section 004113.16 – Bid Form – Contract No. 1G General
    d. Updated Specification Section 004113.16 – Bid Form – Contract No. 1E Electrical
    e. Updated Specification Section 012100 – Allowances
    f. New Specification Section 028230 – Asbestos Abatement
    g. New Specification Section 028330 – Lead Based Paint Removal
    h. Updated Specification Section 221429 – Sump Pumps
    i. Updated Specification Section 330513 – Manholes and Structures
    j. Updated Specification Section 333113 – Public Sanitary Utility Sewerage Piping
    k. Updated Specification Section 400507 – Hangers and Supports for Process Piping
    l. Updated Specification Section 400631 – Thermoplastic Process Pipe
    m. Updated Specification Section 400557 – Actuators for Process Valves and Gates
    n. Updated Specification Section 400562 – Plug Valves
    o. Updated Specification Section 400565.23 – Check Valves
    p. Updated Specification Section 400574.23 – Pinch Valves
    q. Updated Specification Section 400578.29 – Combination Air Valves for Wastewater Services
    r. Updated Specification Section 431329 – Sanitary Sewerage Pumps
    s. Updated Specification Section 432513 – Submersible Solids Handling Pumps
2. Revised Drawing Sheets including:
    a. G-1: Legend, Abbreviations and Symbols
    b. C-1: Yard Piping Demolition and New Work Plan
    c. C-2: Enlarged Site Plan – Waste Holding Tank
    d. C-3: Profiles
    e. M-4: Main Pump Station New Work - Plan and Sections
    f. MD-1: Mechanical Details I
    g. MD-2: Mechanical Details II
3. Reference – Main Pump Station Historical Structural Drawing

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City of Rome, New York
Water Resource Recovery Facility Improvements Project

INVITATION TO BID
RFB 2024-031

Sealed Bids for construction of the "Water Resource Recovery Facility Improvement Project" will be received by the City of Rome at the City Clerk's office, Rome City Hall, 198 North Washington Street, Rome, New York 13440, until 11:00 AM Eastern Standard Time (EST) on January 9, 2025, and at that time and place bids will be publicly opened and read aloud.

Sealed bids will be received for the following:
RFB 2024-031
Water Resource Recovery Facility Improvement Project

The general contract will generally consist of: replacing four dry pit submersible pumps rated for 6,000 gpm each and the discharge header in the Main Pump Station (MPS), temporary bypass pumping and bypass piping around the MPS, MPS sludge valve and flow meter replacements; Filtrate Pump Station submersible pump and buried forcemain replacement; secondary clarifier plug valve replacements and temporary bypass pumping and piping; buried digested sludge forcemain replacement; new 100,000 glass lined bolted steel leachate storage tank with truck unloading pump station, flow meter and control valve vault and underground piping; instrumentation and control system upgrades and integration.

The electrical contract will generally consist of: replacing the MPS MCC-10 and re-feeding other existing panels during construction, new VFD's and branch circuit wiring to the new pumps in the MPS, MPS lighting upgrades; new underground duct banks to the Filtrate Pump Station and leachate valve vault; modifications to the gravity thickener MCC for the new leachate truck unload pump; instrumentation wire and conduit to control panels from new equipment.

BID MATERIALS
Bids will be advertised electronically at:
- http://www.romenewyork.com/treasurer-purchasing/
- https://www.bidnetdirect.com/new-york/city-of-rome

Digital copies of the contract documents may also be examined at the following locations/sites:
- Dodge Data & Analytics (www.construction.com/projects)
- Mohawk Valley Builders Exchange, 10 Main Street, Suite 202 Whitesboro, NY 13492
- Eastern Contractors Association Inc., 6 Airline Drive, Albany NY 12205
- Syracuse Builders Exchange, 6563 Ridings Road, Syracuse, NY 13206

OFFICIAL PLAN HOLDERS LIST
Bidders who intend to submit a bid must call or email the City of Rome to be placed on the official plan holders list.

All Contractors that obtain contract documents must notify the City of Rome in order to be placed in the official plan holder's list, in order to receive addenda and any other bid correspondence. Bids received from contractors other than those on the official plan holder's list will not be accepted. To be placed on the official plan holders list please contact the Department of Engineer at either (315) 339-7627 or jguiliano@romecitygov.com

PRE-BID CONFERENCE & PROJECT QUESTIONS

There will be a pre-bid conference for this bid on December 5, 2024 10:00am – 12:00pm at Rome City Hall. 198 N. Washington Street, Rome, New York 13440 followed by a site visit to the WRRF, located at 7180 East Dominick Street, Rome, New York 13440.

Questions pertaining to the bid package should be directed to Mr. Kurt Dirr, P.E. at CDM Smith via e-mail (dirrkj@cdmsmith.com).

ADDENDA
The City will not issue Addenda, nor will its Engineer issue addenda nor respond to bidder's questions five (5) days prior to the scheduled bid opening unless stated bid date is postponed.

BID SECURITY
Each Bid shall be submitted in accordance with the Instructions to Bidders and shall be accompanied by a Bid Security in the amount of five (5) percent of the Bid. Bidders may not withdraw their Bids for a period of forty-five (45) calendar days after the actual date of the opening of the Bids.

The Successful Bidder must furnish a 100 percent Performance Bond with a surety company acceptable to the Owner.

ADDITIONAL NOTES
Complete instructions for filing Bids are included in the Instructions to Bidders.

Wage rates for this Project are subject per New York State Prevailing Wage Schedule.

The Owner reserves the right to waive any informality in or to reject any or all Bids if deemed to be in its best interest.

Rome City Clerk,
Eric Seelig
Legal Date: November 19, 2024

DESIGN ENGINEER
Kurt Dirr, P.E.
Project Engineer
CDM Smith
3 Lear Jet Lane, Suite 100N
Latham, NY 12110
Phone: (518) 782-4503
dirrkj@cdmsmith.com

OWNERS CONTACT
Joe Guiliano
Commissioner of Public Works
City of Rome
City Hall
198 N Washington Street
Rome, NY 13440
Phone: (315) 336-6000

SECTION 004113.16 - BID FORM

BID FORM
TO

City of Rome, NY
Water Resource Recovery Facility Improvements
RFB-2024-031

Contract No. 1E - Electrical

The undersigned declares that the only persons or parties interested in this Bid as principals are as stated; that the Bid is made without any collusion with other persons, firms, or corporations; that all the Contract Documents as prepared by CDM Smith, 308 Maltbie St. Suite 101, Syracuse, NY 13204 and dated November 2024 have been carefully examined; that the undersigned is fully informed in regard to all conditions pertaining to the Work and the place where it is to be done, and from them the undersigned makes this Bid. These prices shall cover all expenses incurred in performing the Work required under the Contract Documents, of which this Bid Form is a part.

If a Notice of Award accompanied by at least six unsigned copies of the Agreement and all other applicable Contract Documents is delivered to the undersigned within 45 days, after the actual date of the opening of the Bids, the undersigned will within five days, excluding Saturdays, Sundays, and legal holidays, after the date of receipt of such notification, execute and return all copies of the Agreement and all other applicable Contract Documents to OWNER. The premiums for all Bonds required shall be paid by CONTRACTOR and shall be included in the Contract Price. The undersigned Bidder further agrees that the Bid Security accompanying this Bid shall become the property of OWNER if the Bidder fails to execute the Agreement as stated above.

The undersigned hereby agrees that the Contract Time shall commence 10 days following the Effective Date of the Agreement and to fully complete the Work within 550 Calendar Days and in accordance with the terms as stated in the Agreement. The undersigned further agrees to pay OWNER, as liquidated damages, $1,000 per day for each calendar day beyond the Contract Time Limit or extension thereof that the Work remains incomplete, in accordance with the terms of the Agreement.

The undersigned acknowledges receipt of addenda numbered:

_____

In accordance with the above understanding, the undersigned proposes to perform the Work, furnish all materials and complete the Work in its entirety in the manner and under the conditions required at the prices listed as follows:

Item No	Estimated Quantity	Brief Description of Work	Amount in Figures
1	Lump Sum	General Requirements, not to exceed 5% of the total contract price	$_____
2	Lump Sum	All work related to the Main Pump Station as shown on the Drawings as described under Section 011200.	$_____
3	Lump Sum	All work related to the Filtrate Pump Station and flow meter vault as shown on the Drawings and as described under Section 011200.	$_____
4	Lump Sum	All work related to the Waste Holding Tank, pressure level/indicator vault, Waste Transfer Station as shown on the Drawings and as described under Section 011200.	$_____
A1	Allowance	Contingency Allowance	$50,000

TOTAL CONTRACT BID SUMMARY

TOTAL CONTRACT BID PRICE $_____

TOTAL CONTRACT BID PRICE IN WORDS

_____

The undersigned agrees that extra work, if any, will be performed and will be paid for in accordance with Article 11 of the Conditions of the Contract.

Amounts shall be shown in both words and figures, where indicated. In case of discrepancy, the amount shown in words will govern.

The above prices shall include all labor, materials, bailing, shoring, removal, overhead, profit, insurance and incidentals required to complete the Work.

The names and residences of all persons and parties interested in the foregoing Bid as principals are as follows:

(Give first and last names in full. In the case of a corporation, see Article 8.3 of the Instructions to Bidders, in the case of a limited liability company [LLC], see Article 8.4 of the Instructions to Bidders, in the case of a partnership, see Article 8.5 of the Instructions to Bidders.)

_____

_____

_____

The undersigned hereby certifies that he/she is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the work.

The undersigned hereby certifies under the penalties of perjury that this bid is in all respects bona fide, fair and made without collusion or fraud with any other person. As used in this section, the word "person" shall mean any natural person, joint venture, partnership, corporation, or other business or legal entity.

_____ _____

Social Security Number or Federal Identification Number

Signature of Individual or Corporate Name

By: _____
Corporate Officer
(if applicable)

Notice of acceptance should be mailed, faxed, or delivered to the following:

_____
(Name)

By: _____
(Title)

_____
(Business Address)

_____
(City and State)

Date _____

If the Bidder is a corporation, indicate State of incorporation under signature, and affix corporate seal; if a partnership, give full names and residential addresses, if different from business address.

END OF SECTION 004113

SECTION 004113.16 - BID FORM

BID FORM
TO

City of Rome, NY
Water Resource Recovery Facility Improvements
RFB-2024-031

Contract No. 1G - General

The undersigned declares that the only persons or parties interested in this Bid as principals are as stated; that the Bid is made without any collusion with other persons, firms, or corporations; that all the Contract Documents as prepared by CDM Smith, 308 Maltbie St. Suite 101, Syracuse, NY 13204 and dated November 2024 have been carefully examined; that the undersigned is fully informed in regard to all conditions pertaining to the Work and the place where it is to be done, and from them the undersigned makes this Bid. These prices shall cover all expenses incurred in performing the Work required under the Contract Documents, of which this Bid Form is a part.

If a Notice of Award accompanied by at least six unsigned copies of the Agreement and all other applicable Contract Documents is delivered to the undersigned within 45 days, after the actual date of the opening of the Bids, the undersigned will within 15 days, excluding Saturdays, Sundays, and legal holidays, after the date of receipt of such notification, execute and return all copies of the Agreement and all other applicable Contract Documents to OWNER. The premiums for all Bonds required shall be paid by CONTRACTOR and shall be included in the Contract Price. The undersigned Bidder further agrees that the Bid Security accompanying this Bid shall become the property of OWNER if the Bidder fails to execute the Agreement as stated above.

The undersigned hereby agrees that the Contract Time shall commence 10 days following the Effective Date of the Agreement and to fully complete the Work within 550 Calendar Days and in accordance with the terms as stated in the Agreement. The undersigned further agrees to pay OWNER, as liquidated damages, $1,000 per day for each calendar day beyond the Contract Time Limit or extension thereof that the Work remains incomplete, in accordance with the terms of the Agreement.

The undersigned acknowledges receipt of addenda numbered:

_____

In accordance with the above understanding, the undersigned proposes to perform the Work, furnish all materials and complete the Work in its entirety in the manner and under the conditions required at the prices listed as follows:

Item No	Estimated Quantity	Brief Description of Work	Amount in Figures
1	Lump Sum	General Requirements, not to exceed 5% of the total contract price	$_____
2	Lump Sum	All work related to the Main Pump Station as shown on the Drawings and as described under Section 011200, except as included under other Base Bid items.	$_____
3	Lump Sum	All work related to the Filtrate Pump Station and flow meter vault as shown on the Drawings and as described under Section 011200, except as included under other Base Bid items.	$_____
4	Lump Sum	All work related to the Waste Holding Tank, pressure level/indicator vault, and Waste Transfer Station as shown on the Drawings and as described under Section 011200, except as included under other Base Bid items.	$_____
5	Lump Sum	All work related to the Digester No. 2 Control Building as shown on the Drawings and as described under Section 011200, except as included under other Base Bid items.	$_____
6	Lump Sum	RAS manhole valve replacements with new manhole top with access hatch.	$_____
7	Lump Sum	Power wash and clean wet well, provide scaffolding and review repair quantities with Engineer.	$_____
8	60 SF	Repair Type A – deep spall concrete repair. $_____ (per square foot).	$_____ (total cost)
9	450 SF	Repair Type B – low depth spall concrete repair. $_____ (per square foot).	$_____ (total cost)
10	110 LF	Repair Type C – crack repair with chemical grout injection. $_____ (per linear foot).	$_____ (total cost)
A1	Allowance	Contingency Allowance	$100,000
A2	Allowance	SCADA Allowance	$60,000
A3	Allowance	Lead/Asbestos Testing and Removal	$50,000

TOTAL CONTRACT BID SUMMARY

TOTAL CONTRACT BID PRICE $_____

TOTAL CONTRACT BID PRICE IN WORDS

_____

The undersigned agrees that extra work, if any, will be performed and will be paid for in accordance with Article 11 of the Conditions of the Contract.

Amounts shall be shown in both words and figures, where indicated. In case of discrepancy, the amount shown in words will govern.

The above prices shall include all labor, materials, bailing, shoring, removal, overhead, profit, insurance and incidentals required to complete the Work.

The names and residences of all persons and parties interested in the foregoing Bid as principals are as follows:

(Give first and last names in full. In the case of a corporation, see Article 8.3 of the Instructions to Bidders, in the case of a limited liability company [LLC], see Article 8.4 of the Instructions to Bidders, in the case of a partnership, see Article 8.5 of the Instructions to Bidders.)

_____

_____

_____

The undersigned hereby certifies that he/she is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the work.

The undersigned hereby certifies under the penalties of perjury that this bid is in all respects bona fide, fair and made without collusion or fraud with any other person. As used in this section, the word "person" shall mean any natural person, joint venture, partnership, corporation, or other business or legal entity.

_____ _____

Social Security Number or Federal Identification Number

Signature of Individual or Corporate Name

By: _____
Corporate Officer
(if applicable)

Notice of acceptance should be mailed, faxed, or delivered to the following:

_____
(Name)

By: _____
(Title)

_____
(Business Address)

_____
(City and State)

Date _____

If the Bidder is a corporation, indicate State of incorporation under signature, and affix corporate seal; if a partnership, give full names and residential addresses, if different from business address.

END OF SECTION 004113

SECTION 012100 - ALLOWANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements governing allowances.

B. Types of allowances include the following:

1. Contingency allowances.

C. Related Requirements:

1. Section 012600 “Contract Modification Procedures” for procedures for submitting and handling Change Orders.
2. Section 014000 "Quality Requirements" for procedures governing the use of allowances for field testing by an independent testing agency.

1.3 DEFINITIONS

A. Allowance: A quantity of work or dollar amount included in the Contract, established in lieu of additional requirements, used to defer selection of actual materials and equipment to a later date when direction will be provided to Contractor. If necessary, additional requirements will be issued by Change Order.

1.4 ACTION SUBMITTALS

A. Submit proposals for purchase of products or systems included in allowances in the form specified for Change Orders.

1.5 INFORMATIONAL SUBMITTALS

A. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance when requested by the Engineer.

B. Submit time sheets and other documentation to show labor time and cost for installation of allowance items that include installation as part of the allowance when requested by the Engineer.

C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.6 CONTINGENCY ALLOWANCES

A. Use the contingency allowance only as directed by Engineer for Owner's purposes and only by Change Orders that indicate amounts to be charged to the allowance.

B. Contractor's overhead, profit, and related costs for products and equipment ordered by Owner under the contingency allowance are included in the allowance and are not part of the Contract Sum. These costs include delivery, installation, taxes, insurance, equipment rental, and similar costs.

C. Change Orders authorizing use of funds from the contingency allowance will include Contractor's related costs and reasonable overhead and profit.

D. At Project closeout, credit unused amounts remaining in the contingency allowance to Owner by Change Order.

1.7 ADJUSTMENT OF ALLOWANCES

A. Allowance Adjustment: To adjust allowance amounts, prepare a Change Order proposal based on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place where applicable. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, required maintenance materials, and similar margins.

1. Include installation costs in purchase amount only where indicated as part of the allowance.
2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other markups.
3. Submit substantiation of a change in scope of Work, if any, claimed in Change Orders related to unit-cost allowances.
4. Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.

B. Submit claims for increased costs due to a change in the scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or Contractor's handling, labor, installation, overhead, and profit.

1. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of Work has changed from what could have been foreseen from information in the Contract Documents.
2. No change to Contractor's indirect expense is permitted for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.2 PREPARATION

A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

3.3 SCHEDULE OF ALLOWANCES – GENERAL CONTRACT

A. GC Allowance No. A1: Contingency Allowance: Include a contingency allowance of $100,000 for Owner's purposes, only as directed by the Engineer.

B. GC Allowance No. A2: SCADA Allowance: Include an allowance of $60,000 for the work performed by the City's SCADA integrator as shown on the Drawings, as specified in Divisions 01 through 46, and as detailed in Appendix B.

C. GC Allowance No. A3: Lead/Asbestos Testing and Removal: Include an allowance of $50,000 for all labor, materials, equipment and incidentals required to provide a USEPA and NYSDOL Certified Inspector to perform a lead and asbestos inspection in accordance with Federal and State regulations of samples of the various materials to be disturbed and removal of such materials if found to contain lead and asbestos at levels above acceptable, and all else incidental thereto for which separate payment is not provided. Sampling protocols and removal work, if required, shall be as required by the USEPA, OSHA, and the NYSDOL. The Contractor shall submit a sampling plan to the Engineer for approval prior to sampling activities and a summary report of sampling in accordance with all applicable regulations and requirements.

3.4 SCHEDULE OF ALLOWANCES – ELECTRICAL CONTRACT

A. EC Allowance No. A1: Contingency Allowance: Include a contingency allowance of $50,000 for Owner's purposes, only as directed by the Engineer.

END OF SECTION 012100

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SECTION 02823

ASBESTOS ABATEMENT

PART I GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Contractor shall provide an accredited asbestos inspector to conduct a Limited Hazardous Materials Survey of all areas of the project where asbestos may exist.

B. Remove ACM from all areas of the project where it exists. Closely coordinate the work of this Section with the work of other contractors. Provide security as required to protect facilities. Remove ACM each day to prevent vandalism of containers.

C. Related Requirements:

1. Section 028330 – Lead Based Paint Removal

2. Section 024119 – Selective Demolition

1.03 SUBMITTALS

A. Section 013300 “Submittal Procedures”: Requirements for submittals.

B. Prior to Commencement of Work, submit the documents described in this sub-section to the Owner. Submittals must be bound together in one labeled, indexed submittal. See also general submittal requirements.

C. Copies of the asbestos survey must be provided by the Contractor to the demo permitting entity and to the local Department of Labor office, and a copy of the survey must also be kept at the construction site.

D. The ARC is responsible for informing all employers at the worksite about the nature of their work, as well as presumed ACM (PACM), ACM and asbestos material (known or assumed) at the site. Asbestos Abatement Contractor is responsible for informing all non-asbestos contractors regarding prohibition of disturbance to PACM, ACM, and asbestos material at the site.

E. Begin no work until the following documents have been reviewed and accepted:

1. A copy of a valid asbestos handling license or other proof of the issuance of a valid asbestos handling license deemed suitable by the NYS Commissioner of Health.

2. Identification of all variances to be used (identify specific locations or areas, as applicable).
3. An Asbestos Abatement Plan (AA Plan) that presents a detailed approach to completing asbestos abatement activities in accordance with all applicable federal, state, and local regulations, standards, and codes. The AA Plan shall include a contingency plan for removing any ACM (including ACM not identified in the Asbestos Survey) encountered by the Contractor during removal activities. The AA Plan must also provide waste transporter and waste disposal facility information, as well as copies of their valid permits.

4. Copies of all written notifications to the EPA regional office with jurisdiction over the project area, and the New York Department of Labor, in accordance with Title 40 CFR Part 61, Subparts A & M, National Emission Standards for Hazardous Air Pollutants, U.S. EPA.

5. Proof that all required permits, disposal site locations, and arrangements for transportation and disposal of ACM, supplies and the like have been obtained. See Part 3 of this Section for waste manifest requirements. *As part of this submittal, provide both a Part 364 Form and a cover sheet specifically identifying the intended disposal location.*

6. Valid, legible photocopies of Asbestos Handling Certificate cards for all of the ARC's employees to be engaged in this abatement project, in compliance with Code Rule Part 56, Title 12 of the New York State Department of Labor. All employees engaged in this work must be 18 years of age or older.

7. Copy of monitoring laboratory's certification by the New York State Department of Health to conduct such analysis and proof that all sampling technicians are also certified.

F. During the abatement work, submit the following:

1. Copies of daily asbestos worker in/out logs from the abatement site.

2. Copies of all asbestos air monitoring results, as soon as they are provided by the monitoring laboratory. Provide separate correspondence to explain any non-conforming results and detailing modifications made to correct the non- conformance.

F. At the end of the abatement work but at least five (5) days prior to application for final payment, provide records showing final disposition of all ACM removed from the project site (see also Part 3 of this Section for waste manifest requirements).

1.04 REGULATIONS

A. Comply with applicable federal, state, municipal, and local regulations including, but not limited to, the following:

1. U.S. Environmental Protection Agency (EPA), including Title 40, Code of Federal Regulations, Part 61, Subparts A and M, National Emission Standards for Hazardous Air Pollutants, (EPA).

2. Occupational Safety and Health Administration (OSHA), including Title 29, Code of Federal Regulations, and 1926.58, OSHA, U.S. Department of Labor.

3. State of New York Rules and Regulations, including Code Rule Part 56, Title 12, New York State Department of Labor (NYSDOL) (hereinafter referred to as "Code Rule 56").

4. Recommendations of the National Institute of Occupational Safety and Health (NIOSH).

5. Applicable federal, state, and local government regulations.

B. Disposal sites which accept ACM for disposal shall be permitted by the New York State Department of Environmental Conservation (NYSDEC) to accept such material.

C. Whenever there is a conflict or overlap of the above references, the most stringent provision is applicable.

D. In the event that any requirement of this specification contradicts any such requirement, immediately notify the Owner of such conflict or contradiction. In such cases, the regulation or law shall apply.

E. Post all applicable regulations in a conspicuous place at the jobsite. Assure that the regulations are not altered, defaced or covered by other materials.

1.05 LICENSING AND CERTIFICATION REQUIREMENTS

A. The Asbestos Removal Contractor (ARC) must hold a current valid asbestos handling license issued by the Commissioner of Labor.

B. Conspicuously display a copy of the valid Asbestos Handling License proximate to but outside the work area for the duration of the project.

C. Permit only those persons who hold a valid asbestos handling certificate to engage in the work of this Section.

1.06 NOTICE AND RECORDKEEPING

A. Maintain, for at least thirty (30) years, a record of each asbestos project in which the Contractor engages as required by all Federal and State rules, laws, regulations, and requirements.

B. Provide an entire copy of all records required by Code Rule 56, Paragraph 56-3.4, to the Owner at the conclusion of the project for the files of the Owner.

1.09 RESPONSIBILITY FOR AIR MONITORING DURING ASBESTOS WORK

A. The air monitoring subcontractor shall be an independent firm, contracted separately by the Contractor, and not associated with the abatement contractor firm.

1.10 PROJECT MONITOR

A. The Owner may, at his discretion, authorize a suitably-certified site representative or Project Monitor to act on his behalf to access all asbestos work areas and to assist in interpretation of the contract documents or governing law pertaining to the control of ACM.

B. Provide all access, assistance, and documentation to the Project Monitor as may be required to verify conformance with these Contract Documents.

C. The authorized representative may stop work if an instance of substantial non-conformance with the Contract Documents and/or a situation presenting a health hazard or other danger to workers or real property is observed during the course of their review of the project. Work shall not resume until corrective measures have been carried out.

C. The ARC is solely responsible to comply with all applicable health and safety regulations promulgated by the Federal, State of Local Governments. No activity on the part of the Owner represents the Contractor's compliance with the applicable health and safety regulations.

1.11 PROTECTION OF CONTRACTOR'S PERSONNEL

A. The ARC is solely responsible for the protection of his work force. Worker Protection shall comply with OSHA 29 CFR 1926.58(h) (respiratory Protection), as applicable. In addition, protection from other hazards inherent in demolition projects shall be provided, including temporary shoring and support for building structural elements.

B. Because there is no known safe level of exposure to asbestos, it is prudent to reduce worker's exposure to be as low a level as possible. Proper respiratory protection and clothing is critical in minimizing exposure. However, protective clothing shall not be worn in lieu of street clothing outside the work area.

1.12 DISPOSAL ACTIVITIES

A. It is the responsibility of the ARC to comply with current federal, state and local regulations concerning the waste handling, transportation, and disposal of ACM.

B. The ARC shall provide a certified letter at the conclusion of work stating that all ACM removed from the project site was disposed of properly, and with attachments to that letter providing proof of actual disposal of the waste at the designated landfill.

1.13 VARIANCES

A. The ARC may obtain project specific variances (at the Contractor's own cost, risk, and discretion) from the applicable regulating authorities. Any such variance shall be submitted in its entirety to the Owner prior to submission to the NYSDOL and as soon as it is approved in order that the Owner may review the conditions stated therein. Any variance which may allow on-site burial or disposal of ACM will not be permitted to be used on this project. The Owner reserves the right to disallow any variance which increases the risk or expense to the Owner on this project at any time.

PART 2 MATERIALS AND EQUIPMENT

2.01 MATERIALS

A. Sealable drums of 30 or 50-gallon capacity shall be of fiber or metal with tightly fitting lids. The drums and bags shall be labeled in accordance with OSHA or USEPA requirements and shall be air and water tight.

B. Wetting agent shall generally be non-toxic and non-carcinogenic.

C. Encapsulant materials shall be EPA approved bridging and penetration type which are not solvent-based or utilize hydrocarbons in the liquid in which the solid parts of the encapsulant are suspended. Encapsulant shall not be flammable or form any hazard to employees.

2.02 TOOLS AND EQUIPMENT

A. Provide sufficient number of high efficiency particulate absolute (HEPA)-filtered vacuum cleaners equipped with wet pick-up adapters, steel floor wands, and crevice tools as needed to complete the work in accordance with the regulations.

B. Provide airless sprayers capable of spraying amended water in sufficient number to allow continuous wetting of work.

D. Use power tools only as necessary and as permitted by applicable regulations. Equip power tools used to drill, cut, saw or otherwise disturb ACM with HEPA-filtered local exhaust ventilation.

E. Scaffolds, platforms, and ladders shall comply with all applicable codes. Seal scaffold or platform joints and ends with tape to prevent incursion of ACM. Make available to authorized visitors, ladders, platforms, and/or scaffolds of sufficient dimension and quantity and so that all work surfaces can be easily and safely reached.

PART 3 EXECUTION

3.01 WORK BARRIERS

A. Where methods which do not require isolation barriers are used (such as glove-bag operations or other operations allowed by approved variances), the methods approved in the variance or other regulation permitting such activity shall be strictly observed.

3.02 CONTINUOUS CLEANING

A. Clean ACM and contaminated water from the work area as soon as it is identified using wet methods and HEPA vacuuming equipment. Place asbestos debris and water in bags. Seal bags and remove from the facility.

3.03 FINAL CLEAN UP

A. Removal of waste: All containerized waste shall be removed from the site immediately after finishing the ACM removal and encapsulation work.

B. Removal of Tools and Equipment: Remove all tools and equipment from the work area immediately after work is complete. Place in sealed airtight hardwall container and decontaminate within the Contractor’s own off-site facilities.

C. Perform a complete visual inspection of the work area under adequate lighting to ensure the work area is free of visible ACM, debris, and dust prior to the start of any demolition of non-abatement activities.

3.04 HANDLING AND DISPOSAL OF ASBESTOS-CONTAMINATED WASTE

A. Handling of Contaminated Water and Wastewater

1. Collect and dispose of all water potentially-contaminated by abatement activities off-site, in accordance with regulations.

B. Transportation of Waste

1. Transport waste in sealed drums. Sealed bags may be removed from the drums and deposited at the burial site. If bags are broken or damaged, leave them in the drums and the sealed drums shall be buried. Uncontaminated drums may be recycled.

C. Waste Manifest System

1. Establish a manifest system that accounts for all ACM. Describe the manifest system in writing for review and acceptance by the Owner. Demonstrate custody over all ACM from the time it is removed from the work area until it is deposited at the landfill.

2. Provide final manifest and documents to the Owner within three (3) working days of the removal of ACM from the site by the waste hauler.

END OF SECTION

SECTION 02833

LEAD BASED PAINT REMOVAL

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. The scope of work for this project covers providing all labor, tools, materials, equipment, services and appurtenances to accomplish the work included in this Section. The work shall be performed to the complete satisfaction of the Engineer and the Owner's representative, in accordance with the current EPA and OSHA regulations, State Labor and Industry and Department of Environmental Resources regulations (if applicable) and any other applicable state and local government regulations.

B. Work under this project includes, but is not limited to, the following:

1. The Contractor shall provide accredited sampling and testing services for lead based paint of all areas of the project where it may exist.

2. The Contractor will be responsible for the removal, storage, transportation and disposal of all lead-based paint and hazardous materials generated by this work. Closely coordinate the work of this Section with the work of other contractors.

C. Related Requirements:

1. Section 028330 – Lead Based Paint Removal

2. Section 024119 – Selective Demolition

1.03 SUBMITTALS

A. Section 013300 "Submittal Procedures": Requirements for submittals.

1.03 CONTROL OF WORK

A. All work which does not conform to the requirements of this Section will be considered unacceptable.

B. Unacceptable work, whether the result of poor workmanship, use of defective materials, damage through carelessness, or any other cause found to exist prior to the final acceptance of the work, shall be removed immediately and replaced in an acceptable manner.

C. If the Engineer finds the materials furnished or the work performed has resulted in an unacceptable finished product the affected work or material shall be removed and replaced or otherwise corrected by and at the expense of the Contractor.

1.04 STIPULATIONS

A. The procedures specified in this section are guidelines for minimum performance. The Contractor is responsible for his own methods of operations and conformance to regulatory codes, rules and guidelines. The Contractor is required to obtain all permits, licenses and approvals (if required) to perform the work, including any rights to use patented systems. The procedures specified in this section are to be followed only if the Contractor intends to cut steel structures during the demolition process with an acetylene or other type of torch. If the Contractor is using methods which do not require heat or grinding (such as a large hydraulic cutter, for example), then other means of lead removal may be employed. Before work commences, coordinate with the Engineer and/or Owner's Representative to determine if hazardous atmospheric conditions may exist in the removal area that would impact the removal method being utilized.

1.05 QUALITY ASSURANCE

A. Owners' Representative

1. Contractor shall perform all elements of this Section to the satisfaction of the Owner's on-site representative and/or the Engineer.

B. Compliance with Standards and Regulations

1. The Contractor is responsible for compliance with all Federal, State, and Local laws and regulations and all Industry Standard practices associated with the abatement, storage, transport, and disposal of Hazardous Wastes, as well as all general conditions, special conditions, and all other sections within the contract document.

2. Contractor shall demonstrate to the satisfaction of the Owners' representative that the project was completed in accordance with this Section and any applicable EPA and NYSDEC standards and regulations.

C. Worker Requirements

1. The Contractor shall furnish proof that each employee has had previous instruction on the hazards of lead exposure, on use and fitting of respirators, on protective dress, on use of decontamination procedures, on entry and exit from work areas, and on all aspects of work procedures and protective measures and all other requirements.

2. Submit verification, signed by an occupational health physician, that each employee has been recently examined as required by OSHA regulations. Medical examination will be required prior to entering the work area.

3. Submit names and training certificates of the superintendent and foreman who will be performing work related to this project.

4. Provide verification that the Contractor has provided the following information to the examining physician:

    a. A copy of OSHA Standard (29 CFR 1910.1025)
    b. A description of the affected employee's duties as they relate to the employee's exposure.
    c. The employee's current or anticipated exposure level.
    d. A description of any personal protective and respiratory equipment to be used.
    e. Prior lead determination and information from previous medical examinations of the affected employee that is not otherwise available to the examining physician.

1.06 PLACEMENT OF WARNING SIGNS

A. Post warning signs in and around the work area. Locate signs at such a distance that personnel may read the sign and take necessary protective steps required before entering the work area.

B. Inform other employers on-site of the nature of the Contractor's work and requirements pertaining to regulated areas in order to comply with OSHA regulation 29 CFR 1910.120. Such notification shall be coordinated with, and approved by the Owner.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 LEAD ABATEMENT

A. The Contractor shall be responsible for the removal, storage, transportation, and disposal of all lead-based paint from surfaces in the affected areas to the degree where such surfaces can be cut for demolition without generation of significant amounts of lead dust.

1. Rope off area using caution tape. Place plastic drop cloth under work area.

2. Strip to bare metal all areas within 12-in of anticipated cuts using chemical methods or a needlegun with a HEPA vacuum recovery system to avoid the necessity of building a containment around the affected areas.

3.02 REMOVAL

A. Removal work shall not commence until:

1. Arrangements have been made for disposal of waste at an acceptable site.

2. Work areas and parts of the building required to remain in use are effectively segregated.

3. Tools, equipment, and material waste receptors are on hand.

4. Arrangements have been made for building security.

5. All preparatory steps have been taken and applicable notices posted, and permits obtained (if required).

3.03 DAMAGES

A. The Contractor shall protect adjacent areas from contamination.

3.04 DAILY CLEANUP

A. A thorough cleanup of the entire area under active abatement shall occur daily during the entire abatement process.

3.05 STORAGE OF LIQUID AND SOLID WASTE

A. The Contractor must make provisions for the safe storage of waste on-site prior to disposal. For safety reasons, waste storage areas must be treated as abatement areas and access restricted.

3.06 CONTROLLING OFFSITE DISPERSAL

A. Basic control measures to minimize the dispersal of lead dust and debris from the work area are:

1. Control and limit access to the abatement work areas.

2. Limit tracking of dust and debris.

3. Implement a program of ongoing cleanup.

3.07 CLEANUP AND CLEARANCE TESTING

A. The Contractor shall perform air, wipe, water, and/or Toxicity Characteristics Leaching Procedure (TCLP) sample collection during the abatement under the supervision of the Owner’s representative or the Engineer.

B. Final cleanup shall proceed as follows:

1. The entire abatement area shall be washed down with a Tri-Sodium Phosphate (TSP) solution. To avoid recontaminating the cleaned area, this solution should be changed according to the manufacturer's recommendations. The dirty water from this operation is considered hazardous and shall be disposed of in watertight containers.

C. After this phase of the final cleanup is complete, a visual inspection will be performed by the Owners’ representative and/or the Engineer to ensure that all visible dust and debris have been removed from the work surfaces and the work area. Any unsatisfactory results will cause the Contractor to reclean the affected surfaces until the inspector is satisfied with the results.

D. Clearance testing may now take place by taking wipe samples of the abated area. Clearance criteria is 200 micrograms per square foot.

E. Any areas which do not meet these criteria shall be recleaned and retested until the standards are met.

3.08 DISPOSAL OF LEAD WASTE

A. The lead paint chips, all wastewater from cleaning operations, any chemical stripper used, all plastic used for containment (both indoors and out), and all rags, cloths or sponges used for cleaning shall be disposed of as hazardous waste. These materials shall be removed in sealed,

labeled containers at an authorized disposal site in accordance with all applicable hazardous waste regulations.

B. A waste manifest shall be forwarded to the Owner after the disposal.

END OF SECTION

SECTION 221429 - SUMP PUMPS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Submersible sump pumps.

B. Related Requirements:

1. Section 221329 "Sanitary Sewerage Pumps" for effluent and sewage pumps.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings:

1. Include plans, elevations, sections, and attachment details.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.
4. Include diagrams for power, signal, and control wiring.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For pumps and controls, to include in operation and maintenance manuals.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Retain shipping flange protective covers and protective coatings during storage.

B. Protect bearings and couplings against damage.

C. Comply with manufacturer's written instructions for handling.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

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

B. UL Compliance: Comply with UL 778 for motor-operated water pumps.

2.2 SUBMERSIBLE SUMP PUMPS

A. Submersible, Fixed-Position, Single-Seal Sump Pumps - Pressure Level/Indicator Vault and Flow Meter Vault:

1. Description: Factory-assembled and -tested sump-pump unit.
2. Pump Type: Submersible, end-suction, single-stage, close-coupled, overhung-impeller, centrifugal sump pump as defined in HI 1.1-1.2 and HI 1.3.
3. Pump Casing: Cast iron, with strainer inlet, legs that elevate pump to permit flow into impeller, and vertical discharge for piping connection.
4. Impeller: Statically and dynamically balanced, ASTM A 48/A 48M, Class No. 25 A cast iron, semiopen design for clear wastewater handling, and keyed and secured to shaft.
5. Pump and Motor Shaft: Stainless steel, with factory-sealed, grease-lubricated ball bearings.
6. Seal: Mechanical.
7. Motor: Hermetically sealed, capacitor-start type; with built-in overload protection; lifting eye or lug; and three-conductor, waterproof power cable of length required and with grounding plug and cable-sealing assembly for connection at pump.

    a. Motor Housing Fluid: Oil.

8. Controls:

    a. Enclosure: NEMA 250, Type 1.
    b. Switch Type: Pedestal-mounted float switch with float rods and rod buttons.
    c. Float Guides: Pipe or other restraint for floats and rods in basins of depth greater than 60 inches.
    d. High-Water Alarm: Cover-mounted, compression-probe alarm, with electric bell; 120 V ac, with transformer and contacts for remote alarm bell.

2.3 SUMP-PUMP CAPACITIES AND CHARACTERISTICS

A. Flowmeter Vault:

1. Unit Capacity: 90 gpm.
2. Number of Pumps: One.
3. Each Pump:

a. Capacity: 90 gpm.
b. Total Dynamic Head: 5 feet.
c. Speed: 1725.
d. Discharge Size: 2 inches NPS.
e. Electrical Characteristics:

1) Motor Horsepower: 4/10 hp.
2) Volts: 115 or 230 V ac.
3) Phases: Single.
4) Hertz: 60.

B. Pressure Level/Indicator Vault

1. Unit Capacity: 90 gpm.
2. Number of Pumps: One.
3. Each Pump:

a. Capacity: 90 gpm.
b. Total Dynamic Head: 5 feet.
c. Speed: 1725.
d. Discharge Size: 2 inches NPS.
e. Electrical Characteristics:

1) Motor Horsepower: 4/10 hp.
2) Volts: 115 or 230 V ac.
3) Phases: Single.
4) Hertz: 60.

2.4 MOTORS

A. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Section 220513 "Common Motor Requirements for Plumbing Equipment."

1. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.

B. Motors for submersible pumps shall be hermetically sealed.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in for plumbing piping to verify actual locations of storm drainage piping connections before sump pump installation.

3.2 INSTALLATION

A. Pump Installation Standards: Comply with HI 1.4 for installation of sump pumps.

3.3 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Where installing piping adjacent to equipment, allow space for service and maintenance.

3.4 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to test, inspect, and adjust components, assemblies, and equipment installations, including connections.

B. Perform the following tests and inspections:

1. Perform each visual and mechanical inspection.
2. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
3. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

C. Pumps and controls will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

3.5 STARTUP SERVICE

A. Perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.

3.6 ADJUSTING

A. Adjust pumps to function smoothly and lubricate as recommended by manufacturer.

B. Adjust control set points.

3.7 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain controls and pumps.

END OF SECTION 221429

SECTION 330513 - MANHOLES AND STRUCTURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Monolithic concrete manholes and structures with concrete transition to cover frame, covers, anchorage, and accessories.
2. Modular precast concrete manhole and structures with tongue-and-groove joints with concrete transition to cover frame, covers, anchorage, and accessories.
3. Bedding and cover materials.

B. Related Requirements:

1. Section 033000 “Cast-in-Place Concrete” for forming and installation of reinforcing steel.
2. Section 310515 “Soils and Aggregates for Earthwork” for soil and aggregates for backfill in trenches.
3. Section 312000 “Earthwork” for excavating for manholes and structures.

1.3 ACTION SUBMITTALS

A. Product Data: Submit cover and frame construction, features, configuration, dimensions.

B. Shop Drawings: Indicate manhole and structure locations, elevations, piping, conduit, sizes and elevations of penetrations.

1.4 INFORMATIONAL SUBMITTALS

A. Manufacturer's Certificate: Products meet or exceed specified requirements.

B. Manufacturer Instructions: Detailed instructions on installation requirements, including storage and handling procedures.

C. Field Quality-Control Submittals: Results of Contractor-furnished tests and inspections.

D. Qualifications Statements: Qualifications for manufacturer.

1.5 QUALITY ASSURANCE

A. Perform Work according to State of New York Department of Transportation standards.

B. Maintain a copy of each standard affecting Work of this Section on Site.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Unload, store, and handle precast manholes and structures according to manufacturer instructions.

B. Storage: Store precast concrete manholes and structures as to prevent damage to Owner's property or other public or private property.

1. Repair property damaged from materials storage.

1.8 AMBIENT CONDITIONS

A. Cold Weather Requirements: According to ACI 530/530.1.

PART 2 - PRODUCTS

2.1 PERFORMANCE AND DESIGN CRITERIA

A. Equivalent strength: Based on structural design of reinforced concrete as outlined in ACI 318 .

B. Design of Lifting Devices for Precast Components: According to ASTM C913.

C. Design of Joints for Precast Components:

1. According to ASTM C913.
2. Maximum Leakage: 0.025 gal. per hour per foot of joint at 3 feet of head.

D. Shape: Rectangular.

E. Clear Inside Dimensions: As indicated on Drawings.

F. Design Depth: As indicated on Drawings.

G. Clear Cover Opening: As indicated on Drawings.

H. Pipe and Conduit Entry: Furnish openings as indicated on Drawings.

2.2 MANHOLES AND STRUCTURES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Fort Miller Co., Schuylerville, NY
2. Oldcastle Infrastructure Inc, Littleton, CO

B. Manhole and Structure Sections: Reinforced precast concrete according to ASTM C478Pipe Connection Gaskets: According to ASTM C923.
2. Joint Sealant: Preformed flexible joint sealant conforming to ASTM C990

C. Reinforcement: ASTM A615 Grade 60.

2.3 MANHOLE FRAMES AND COVERS

A. Manhole frames and covers shall be of good quality, strong, tough, even grained cast iron, smooth, free from scale, lumps, blisters, sand holes and defects of any kind which render them unfit for the service for which they are intended. Manhole covers and frame seats shall be machined to a true surface. Castings shall be thoroughly cleaned and subject to hammer inspection. Cast iron shall conform to ASTM A48, Class 30 as a minimum.

B. All frames and covers shall be suitable for H20 wheel loads.

C. Manhole covers on new sewer and drain manholes shall have a 24-in. clear opening with City of Rome, NY imprint, Model 1310C2 by EJ. Manhole frames shall be 1310Z, by EJ.

2.4 FINISHES

A. Steel Galvanizing: ASTM A123. Hot dip galvanize after fabrication.

2.5 ACCESSORIES

A. Manhole and Structure Steps:

1. Formed Steel Reinforced Polypropylene rungs.
2. Formed integral with manhole and structure sections.
3. Diameter: 3/4 inch.
4. Width: 12 inch.
5. Spacing: 16 inch o.c. vertically, set into manhole and structure wall.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that items provided by other Sections of Work are properly sized and located.

B. Verify that built-in items are in proper location and ready for roughing into Work.

C. Verify correct size of manhole and structure excavation.

3.2 PREPARATION

A. Mark each precast structure by indentation or waterproof paint showing date of manufacture, manufacturer, and identifying symbols and numbers as indicated on Drawings to indicate its intended use.

B. Coordinate placement of inlet and outlet pipe or duct sleeves required by other Sections.

C. Do not install structures where Site conditions induce loads exceeding structural capacity of structures.

D. Inspect precast concrete structures immediately prior to placement in excavation to verify structures are internally clean and free from damage; remove and replace damaged units.

3.3 INSTALLATION

A. Excavation and Backfill:

1. Excavate manholes and structures as specified in Section 312000 “Earthwork” in location and to indicated depth.
2. Provide clearance around sidewalls of structure for construction operations.
3. When groundwater is encountered, prevent accumulation of water in excavations; place manholes and structures in dry trench.
4. Where possibility exists of watertight structure becoming buoyant in flooded excavation, anchor structure to avoid flotation as approved by Engineer.

B. Place manhole and structure sections plumb and level, trim to correct elevations, and anchor to base pad.

C. Backfill excavations for manholes and structures as specified in Section 312000 “Earthwork.”

D. Form and place manhole and structures cylinder plumb and level and to correct dimensions and elevations.

E. Cut and fit for pipe and sleeves.

F. Set cover frames and covers level without tipping and to correct elevations.

G. Coordinate with other Sections of Work to provide correct size, shape, and location.

H. Precast Concrete Manholes and Structures:

1. Lift precast components at lifting points designated by manufacturer.
2. When lowering manholes and structures into excavations and joining pipe to units, take precautions to ensure that interior of pipeline and structure remains clean.
3. Set precast structures bearing firmly and fully on crushed stone bedding, compacted as specified in Section 312000 “Earthwork” or on other support system as indicated on Drawings.
4. Assemble multi-section structures by lowering each section into excavation; set level and firmly position base section before placing additional sections.
5. Remove foreign materials from joint surfaces and verify sealing materials are placed properly.
6. Maintain alignment between sections by using guide devices affixed to lower section.
7. Joint sealing materials may be installed on Site or at manufacturer's plant.
8. Verify that installed manholes and structures meet required alignment and grade.
9. Remove knockouts or cut structure to receive piping without creating openings larger than required to receive pipe; fill annular spaces with mortar.
10. Cut pipe flush with interior of structure.

3.4 FIELD QUALITY CONTROL

A. Test concrete manhole and structure sections according to ASTM C497.

B. Leakage Tests:

1. Performed on every manhole with Engineer observing.
2. Preparation:

    a. Prior to placing the shelf and invert, and pointing the horizontal joints, fill all lifting holes within 6 feet of ground surface with approved non-shrinking mortar.
    b. Lower groundwater table as required.
    c. Plug all pipes and other openings into manhole.

3. Test:

    a. Fill water to top of cone section.
    b. Observe for visible water in the excavated area.
    c. If area around structure is backfilled or the test is unsatisfactory, repeat the test allowing for suitable time for absorption of water in the excavated area.
    d. At the end of the absorption period, refill manhole and wait 8 hours.
    e. Refill the cone at the end of 8 hours, measuring the amount required to refill.
    f. Extrapolate to determine 24-rate of leakage. Do not allow leakage to exceed 1 gallon per vertical foot in a 24-hour period.
    g. Engineer will perform visual inspection along with the Contractor.

4. Repair:

    a. If leakage is less than 3 gallons per vertical foot per 24 hours, make approved repairs to the structure and retest, if it is determined the leakage is due to defects in the joints or sections.

b. If leakage is 3 gallons or more, then replace the entire structure, including all joints and sections without additional compensation. Retest the new structure as described above.

C. A vacuum test may be substituted for a leakage test as follows:

1. The filling and pointing of exterior joints are not required where the excavation has not been backfilled.
2. Inflate to affect a seal between the vacuum base and the top of the manhole.
3. Connect the vacuum pump to the outlet port with the valve open and a vacuum of 10" Hg (20" of Hg absolute) drawn.
4. Close the valve.
5. The following test criteria shall apply to 4-ft and 5-ft diameter manholes:

    a. Allowable drops in pressure:

        1) Manholes 0 – 10 ft. deep:

            a) Drop of 1" Hg over 2 minutes.

        2) Manholes 10 -15 ft. deep:

            a) Drop of 1” Hg over 2-1/2 minutes.

        3) Manholes 15 - 30 feet:

            a) Drop of 1” Hg over 3 minutes.

6. If the pressure drop exceeds the acceptable limits, make necessary repairs as approved by the Engineer, and:

    a. Re-test the structure.
    b. If the structure fails to meet the minimum requirements of the vacuum test retest using the leakage test.

7. Upon completion of a successful vacuum test, the interior and exterior joints shall be filled and pointed.

3.5 CLEANING

A. Clean all new manholes to be free of silt, debris and foreign matter of any kind, prior to final inspection.

END OF SECTION 330513

SECTION 333113 - PUBLIC SANITARY UTILITY SEWERAGE PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Sanitary sewerage gravity pipe and fittings.
2. Pipe markers.
3. Connection to manholes.
4. Wye branches and tees.
5. Bedding and cover materials.

B. Related Requirements:

1. Section 032000, “Concrete Reinforcing” for requirements for concrete reinforcement.
2. Section 033000, “Cast-In-Place Concrete” for concrete type for manhole base pad construction.
3. Section 310515 “Soils and Aggregates for Earthwork” for soils and aggregate for backfill in trenches.
4. Section 312316, “Rock Removal” for product and execution requirements for excavation and backfill required by this Section.
5. Section 312333, “Trenching and Backfilling” for execution requirements for trenching required by this Section.
6. Section 400531, “Thermoplastic Process Pipe” for requirements for piping.
7. Section 460553, “Identification for Water and Wastewater Equipment” for pipe markers.

1.3 COORDINATION

A. Coordinate Work of this Section with municipal sewerage authority having jurisdiction.

B. Notify affected utility companies at least 72 hours prior to construction.

1.4 PREINSTALLATION MEETINGS

A. Convene minimum one week prior to commencing Work of this Section. At the pre-installation meeting, discuss at a minimum, construction schedule, coordination with others, known deviations

from the specifications, communication protocols and quality control / testing procedures and system start-up procedures.

B. Attendance Roster: Include affected utility companies and appropriate county officials.

1.5 ACTION SUBMITTALS

A. Section 013300, “Submittal Procedures” for submittals requirements.

B. Product Data: Submit manufacturer catalog cuts and other information indicating proposed materials to be used, accessories, details,, and construction information.

C. Shop Drawings:

1. Drawings showing layout and details of pipe, reinforcement, joints, gaskets, special fittings and the name of the pipe manufacturer.

D. Permits: Submit one copy of State construction permit,.

1.6 INFORMATIONAL SUBMITTALS

A. Manufacturer's Certificate: Products meet or exceed specified requirements.

B. Test and Evaluation Reports: Documenting field tests made and results obtained.

C. Manufacturer Instructions: Procedures required to install specified products.

D. Field Quality-Control Submittals: Results of Contractor-furnished tests and inspections.

E. Qualifications Statements:
1. Qualifications for manufacturer and installer.
2. Manufacturer's approval of installer.

1.7 CLOSEOUT SUBMITTALS

A. Section 017700 “Closeout Procedures” for submittals requirements.

B. Project Record Documents: Record invert elevations and actual locations of pipe runs, connections, manholes, and cleanouts.

C. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.8 QUALITY ASSURANCE

A. Perform Work according to State of New York Department of Transportation standards.

B. Maintain a copy] of each standard affecting Work of this Section on Site.

1.9 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.

B. Installer: Company specializing in performing Work of this Section with minimum three years' documented experience and approved by manufacturer.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Section 016000, “Product Requirements” for transporting, handling, storing, and protecting products requirements. Refer to specific pipe material specifications for additional information.

B. Inspection: Accept materials on Site in manufacturer’s original packaging and inspect for damage.

C. Storage: Store materials according to manufacturer instructions.

D. Protection:

1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
2. Block individual and stockpiled pipe lengths to prevent moving.
3. Provide additional protection according to manufacturer instructions.
4. Protect materials from weather and UV exposure.

1.11 EXISTING CONDITIONS

A. Field Measurements:

1. Verify field measurements prior to fabrication.
2. Field verify fit-up to existing infrastructure prior to fabrication.
3. Indicate field measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 SANITARY SEWERAGE PIPE AND FITTINGS

A. Ductile-Iron Pipe: Per AWWA C151.

1. Minimum Pressure Class: 150.
2. Minimum Special Thickness Class: 53.
3. End Connections: Bell and spigot.
4. Outside Coating Type: Asphaltic coating, minimum 1 mil uniform thickness. Per AWWA C151.
5. Lining: ASTM C150 Type 2 X Thickness cement mortar lining and asphaltic seal coat in accordance with AWWA C104.
6. Fittings: Ductile iron, Class 53 or greater. Per AWWA C153 or AWWA C110.

B. Plastic Pipe: Polyvinyl chloride (PVC), Schedule 80 per ASTM D1785.

1. Inside Nominal Diameter: As noted on drawings.
2. End Connections: Bell and spigot style, with solvent-sealed ends.
3. Fittings: PVC per ASTM D2466.
4. Joints: Solvent welded with solvent cement per ASTM D2564. Comply with ASTM D2855.

C. Thermoplastic Pipe: High-density polyethylene (HDPE), DR13.5 per AWWA C906 and ASTM F714.

1. Inside Nominal Diameter: As noted on drawings.
2. End Connections: Bell and spigot style, with solvent-sealed ends.
3. Fittings: HDPE in compliance with AWWA C901 and ASTM D3261 or fabricated to comply with ASTM F2206.
4. Joints: Butt fusion.

2.2 FLEXIBLE COUPLINGS

A. Manufacturers:

1. Substitutions: Section 016000, “Product Requirements.”
2. Furnish materials according to State of New York Department of Transportation standards.

B. Description: Resilient chemical-resistant elastomeric polyvinyl chloride (PVC) coupling.

1. Attachment: Two Series 300 stainless-steel clamps, screws, and housings.

2.3 FLEXIBLE PIPE BOOT FOR MANHOLE PIPE ENTRANCES

A. Manufacturers:

1. Substitutions: Section 016000, “Product Requirements.”
2. Furnish materials according to State of New York Department of Transportation standards.

B. Description: Ethylene propylene rubber (EPDM) per ASTM C923.

1. Attachment: Series 300 stainless-steel clamp and hardware.

2.4 MATERIALS

A. Bedding and Cover:

1. Bedding: Coarse aggregate – screened gravel as specified in Section 310515 “Soils and Aggregates for Earthwork”
2. Cover: Coarse aggregate – screened gravel as specified in Section 310515 “Soils and Aggregates for Earthwork”
3. Soil Backfill from Above Pipe to Finish Grade:

a. Select common fill as specified in Section 310515 “Soils and Aggregates for Earthwork”.
b. Subsoil with no rocks over 6 inches in diameter, frozen earth, or foreign matter.

2.5 FINISHES

A. Galvanizing: Hot-dip galvanize after fabrication per ASTM A123.

2.6 ACCESSORIES

A. Pipe Supports: Metal for pipe support brackets: Galvanized structural steel, thoroughly coated with bituminous paint.

B. Pipe Markers: As specified in Section 460553, “Identification for Water and Wastewater Equipment.”

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 017300 “Execution” for installation examination requirements.

B. Verify that trench cut is ready to receive Work.

C. Verify that excavations, dimensions, and elevations are as indicated on Drawings.

3.2 PREPARATION

A. Section 017300 “Execution” for installation preparation requirements.

B. Correct over-excavation with coarse aggregate.

C. Remove large stones or other hard materials that could damage pipe or impede consistent backfilling or compaction.

D. Protect and support existing sewer lines, utilities, and appurtenances.

E. Utilities:

1. Maintain profiles of utilities.
2. Coordinate with other utilities to eliminate interference.
3. Notify Engineer if crossing conflicts occur.

3.3 INSTALLATION

A. Bedding:

1. Excavate pipe trench as specified in Section 312000, “Earthwork.”
2. Excavate to lines and grades as indicated on as required to accommodate installation.
3. Dewater excavations to maintain dry conditions and to preserve final grades at bottom of excavation.
4. Provide sheeting and shoring as specified in Section 312000, “Earthwork.”
5. Placement: Place bedding material at trench bottom.

    a. Level materials in continuous layer not exceeding 6 inches compacted depth.
    b. Compact to 95 percent of maximum density.

B. Piping:
1. Install pipe, fittings, and accessories according to ASTM D2321, and seal joints watertight.
2. Lay pipe to slope gradients as indicated on Drawings.
3. Maximum Variation from Indicated Slope: 1/8 inch in 10 feet.
4. Begin at downstream end and progress upstream.
5. Assemble and handle pipe according to manufacturer’s instructions, except as may be modified on Drawings or by Engineer.
6. Keep pipe and fittings clean until Work has been completed and accepted by Engineer.
7. Cap open ends during periods of Work stoppage.
8. Lay bell and spigot pipe with bells upstream.
9. Backfill and compact as specified in Section 310515, “Soils and Aggregates for Earthwork.”
10. Do not displace or damage pipe when compacting.
11. Connect pipe to existing sewer system or at existing manhole.
12. Pipe Markers: As specified in Section 460553, “Identification for Water and Wastewater Equipment.”

C. Connection to Existing Manholes:

1. Drilling: Core drill existing manhole to clean opening.

    a. Use of pneumatic hammers, chipping guns, and sledge hammers are not permitted.

2. Install watertight neoprene gasket and seal with non-shrink concrete grout.
3. Encasement: Concrete encase new sewer pipe minimum of 24 inch to nearest pipe joint. Use epoxy binder between new and existing concrete.
4. Prevent construction debris from entering existing sewer line when making connection.

D. Wye Branches and Tees:

1. Concurrent with pipe-laying operations, install wye branches and pipe tees at locations indicated on Drawings.
2. Use standard fittings of same material and joint type as sewer main.
3. Maintain minimum 5 feet separation distance between wye connection and manhole.
4. Use saddle wye or tee with stainless-steel clamps for taps into existing piping.
5. Mount saddles with solvent cement or gasket and secure with metal bands.
6. Lay out holes with template and cut holes with mechanical cutter.

E. Backfilling: Maintain optimum moisture content of bedding material as required to attain specified compaction density

1. Backfill around sides and to top of pipe as specified in Section 310515, “Soils and Aggregates for Earthwork.”

3.4 FIELD QUALITY CONTROL

A. Section 014000, “Quality Requirements” for inspecting and testing requirements.

B. Request inspection by Engineer prior to and immediately after placing bedding.

C. Testing of Gravity Sewer Piping:

1. Low Pressure Air Testing:

a. Test each reach of gravity sewer piping between manholes.
b. Introduce air pressure slowly to approximately 4 psig.

1) Determine ground water elevation above spring line of piping.
2) For every foot of ground water above spring line of piping, increase starting air test pressure by 0.43 psi.
3) Do not increase pressure above 10 psig.

c. Allow pressure to stabilize for at least five minutes.
d. Adjust pressure to 3.5 psig or to increased test pressure as determined above when ground water is present.
e. Testing: Determine test duration for reach of sewer with single pipe size from following table; do not make allowance for laterals.

NOMINAL PIPE SIZE, **INCHES**	MINIMUM TESTING TIME, MINUTES/ **100 FEET**
3	0.2
4	0.3
6	0.7
8	1.2
10	1.5
12	1.8
15	2.1
18	2.4
21	3.0
24	3.6
27	4.2
30	4.8
33	5.4
36	6.0

1) Record drop in pressure during testing period.
2) Test Acceptance: If 1.0 psi air pressure drop has not occurred during testing period, piping is acceptable; discontinue testing.

3) Test Failure: If air pressure drops more than 1.0 psi during testing period, piping has failed.

a) If piping fails, test reach of piping in incremental stages until leaks are isolated, repair leaks, and retest entire reach between manholes.

2. Exfiltration Testing of Pipes Larger than 36 inches in Diameter:

a. Maximum Allowable Exfiltration: 100 gal/inch of pipe diameter for each mile per day for each reach of piping undergoing testing.
b. Perform testing with minimum positive head of 2 feet.

3. Infiltration Testing:

a. Maximum Allowable Infiltration: 100 gal/in of pipe diameter for each mile per day for reach of piping undergoing testing.
b. Include allowances for leakage from manholes.
c. Perform testing with minimum positive head of 2 feet.

4. Deflection Testing of Plastic Sewer Piping:

a. Vertical Ring Deflection Testing: On PVC and acrylonitrile butadiene styrene sewer piping after backfilling has been in place for 30 days but not longer than 12 months.
b. Allowable Maximum Deflection: For installed plastic sewer pipe; not greater than 5 percent of original vertical internal diameter.
c. Deflection Testing: Using properly sized rigid ball or "go, no go" mandrel.

1) Furnish rigid ball or mandrel with diameter not less than 95 percent of base or average inside diameter of pipe, as determined by ASTM standard to which pipe is manufactured.
2) Measure pipe diameter in compliance with ASTM D2122.

d. Perform testing without mechanical pulling devices.
e. Locate, excavate, replace, and retest piping that exceeds allowable deflection.

5. Compaction Testing:
a. Comply with ASTM D1557.
b. Testing Frequency: Every 50 linear feet test each lift.

3.5 PROTECTION

A. Section 017300 “Execution” for protecting finished Work requirements.

B. Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.

END OF SECTION 333113

SECTION 400507 - HANGERS AND SUPPORTS FOR PROCESS PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes:

1. Hangers and supports for piping.
2. Delegated design.

B. Related Requirements:

1. Section 031000 “Concrete Forming and Accessories” for placement of sleeves in concrete forms required by this Section.
2. Section 033000 “Cast-in-Place Concrete” for placement of concrete housekeeping pads required by this Section.
3. Section 400506 “Couplings, Adapters, and Specials for Process Piping”.
4. Section 400519 “Ductile Iron Process Pipe”

1.3 DEFINITIONS

A. Ferrous Metal: Iron, steel, stainless steel, and alloys with iron as principal component.

B. Wetted or submerged: Submerged, less than 1-foot above liquid surface, below top of channel or tank wall, under cover or slab of channel or tank, or in other damp locations.

C. “Pipe” or “Piping”: Piping, piping system(s), hose, tube, fittings, joints, valves, and similar appurtenances.

D. Supports: Wherever the word “supports” or “pipe supports” are used, pipe supports, hangers, structural connections, concrete inserts (if allowed), anchors, guides, bolts, expansion units, restraints and all restraint, hanging, supporting, allowing controlled expansion, or other means of attaching piping along with the necessary appurtenances.

1.4 COORDINATION

A. Coordinate Work of this Section with piping and equipment connections specified in other Sections and indicated on Drawings.

1.5 PREINSTALLATION MEETINGS

A. Convene minimum one week prior to commencing Work of this Section.

1.6 ACTION SUBMITTALS

A. Product Data: Submit manufacturer's catalog data including load capacity.

B. Shop Drawings: Submit scaled piping layouts for each system. Indicate flow stream, pipe size(s) material(s), schedule(s), lining(s), critical dimensions between pipes, equipment and building features. Indicate by schedule pipe hanger/support type and locations. Provide detail of each type of hangers, supports, anchors, and guides.

1.7 DELEGATED DESIGN SUBMITTALS

A. Delegated-Design Submittal: For hangers and supports for piping; Section 014000 “Quality Requirements” for additional delegated design requirements.

1. Where the Drawings show support types and/or locations, analyze them for adequacy to support loads and stresses, modify if required, install generally where shown, and integrate with the pipe support system design.
2. Engage the services of an independent registered professional engineer licensed in the State of New York ordinarily engaged in the business of pipe support systems analysis and design, to analyze system piping and service conditions, and to develop a detailed support system design, specific to the piping material, pipe joints, valves, and piping appurtenances proposed for use.

    a. Support system engineering groups include the following:

        1) SAC Incorporated https://www.sacincorporated.com/contact-us/
        2) Fenny Engineering http://www.fennyengineering.com/contact/
        3) Piping Solutions and Energy Associates https://www.pseassoc.com/request-for-service/
        4) Newman Associates https://newmanassoc.com/

3. The support system design shall include:

    a. Criteria by piping system.
    b. Summary of Contractor-selected related components including joints, class, valves, appurtenances, etc., and commercial supports and especially including pipe materials.
    c. Dead weight and dynamic analysis, including system thermal effects and pressure thrusts. Computer-based software system equivalent to Bentley Systems AutoPIPE or SST Systems CAEPIPE.

        1) Present each system in an isometric graphic and show the resolved and resultant force and moment systems, as well as all recommended hangers, supports, anchors, restraints, and expansion/flexible joints.

d. Submit support system design to the Engineer for review. The submittal needs to be stamped by a professional engineer registered in New York.
e. All aspects of the analysis and design to comply with the provisions of ANSI B31.9 and the referenced standards.

4. Coordinate support arrangements to eliminate interference with similar systems to be installed under HVAC, Plumbing, and Electrical, to account for structural expansion joints and to maintain access for both personnel and for the removal of equipment.

B. Manufacturers' Instructions: Submit special procedures and assembly of components.

C. Qualifications Statement: Submit qualifications for licensed professional.

1.8 INFORMATIONAL SUBMITTALS

A. Manufacturer’s Certificate: Certify that products meet or exceed specified requirements.

B. Welders' Certificate: Submit welders' certification of compliance with ASME Section IX, verifying qualification within previous 12 months.

C. Qualifications Statements:
1. Submit qualifications for manufacturer, fabricator, installer, and licensed professional.
2. Submit manufacturer's approval of installer.

1.9 DELIVERY, STORAGE AND HANDLING

A. All supports and hangers shall be crated, delivered and uncrated so as to protect against any damage.

B. All parts shall be properly protected so that no damage or deterioration shall occur during a prolonged delay from the time of shipment until installation is completed.

C. Finished metal surfaces not galvanized, that are not of stainless-steel construction, or that are not coated, shall be grease coated, to prevent rust and corrosion.

1.10 QUALITY ASSURANCE

A. Perform Work according to applicable authority for welding hanger and support attachments to building structure.

B. Perform Work according to City of Rome standards.

C. Maintain a copy of each standard affecting the Work of this Section on-Site.

1.11 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this Section with minimum three years' documented experience.

B. Fabricator: Company specializing in fabricating products specified in this Section with minimum three years' documented experience.

C. Installer: Company specializing in performing Work of this Section with minimum three years' documented experience.

D. Licensed Professional: Professional engineer experienced in design of specified Work and licensed in State of New York.

1. Have at least 5 years of experience in the analysis and design of similar systems, including the use of commercial and custom pipe supports and in the use of commercial pipe stress software programs.

1.12 DELIVERY, STORAGE, AND HANDLING

A. Inspection: Accept materials on-Site in original factory packaging, labeled with manufacturer's identification.

B. Protect products from weather and construction traffic, dirt, water, chemical, and damage by storing in original packaging.

1.13 EXISTING CONDITIONS

A. Field Measurements: Verify field measurements prior to fabrication. Indicate field measurements on Shop Drawings.

1.14 WARRANTY

A. Furnish five-year manufacturer's warranty for pipe hangers and supports.

PART 2 - PRODUCTS

2.1 GENERAL

A. Support pipe and appurtenances connected to equipment to prevent any strain being imposed on the equipment. Comply with manufacturer’s requirements regarding piping loads being or not being transmitted to their equipment. Submit certification stating that such requirements have been met.

B. Support and secure all pipe and tubing in the intended position and alignment to prevent significant stresses in the pipe or tubing material, valves, fittings, and other pipe appurtenances. Design all supports to adequately secure the pipe against excessive dislocation due to thermal expansion and contraction, internal flow forces, and all probable external forces such as equipment, pipe, and personnel contact. Any structural steel members required to brace any piping from excessive dislocation shall conform to the applicable requirements of Section 055000 “Metal Fabrications” and shall be furnished and installed under this Section.

C. Contractor may propose minor adjustments to the piping arrangements in order to simplify the supports, or in order to resolve minor conflicts in the work. Such an adjustment might involve minor change to a pipe centerline elevation so that a single trapeze support may be used.

D. Where flexible sleeve, split ring, vibration, or other couplings are required at equipment, tanks, etc., the end opposite to the piece of equipment, tank, etc., shall be rigidly supported to prevent transfer of force systems to the equipment. Do not install fixed or restraining supports between a flexible coupling and the piece of equipment.

E. Pipe Supports:

1. Shall not induce point loadings but shall distribute pipe loads evenly along the pipe circumference.
2. Provide supports at changes in direction and elsewhere as shown in the Drawings or as specified herein.
3. No piping shall be supported from other piping or from metal stairs, ladders, and walkways, unless specifically directed or authorized by the Engineer.
4. Provide pipe supports to minimize lateral forces through valves, both sides of flexible split ring type couplings and sleeve type couplings, and to minimize all pipe forces on pump housings. Pump housings shall not be utilized to support connecting pipes.
5. Effects of thermal expansion and contraction of the pipe to be accounted for in the pipe support selection and installation.

F. Insofar as is possible, floor supports shall be given preference. Where specifically indicated, concrete supports, as shown on the Drawings, may be used. Base elbow and base tees shall be supported on concrete pedestals.

G. Restraints, flexible connections, expansion items, and related items as included in other specifications (especially Section 400506 SFL - Couplings, Adapters, and Specials for Process Piping and other individual pipe sections) and shown on the Drawings.

2.2 PERFORMANCE REQUIREMENTS/DESIGN CRITERIA

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design hangers and supports for piping.

B. All supports and appurtenances shall be standard products from approved manufacturers wherever possible and shall be adequate to maintain the supported load in proper position under all operating conditions. Any reference to a specific figure number of a specific manufacturer is for the purpose of establishing a type and quality of product and shall not be considered as proprietary. Note that different materials required, as specified in Part 2 MATERIALS, may require different figures or model numbers than those shown.

1. The minimum working factor of safety for all items, with the exception of springs, shall be five times the ultimate tensile strength of the material, assuming 10 feet of water-filled pipe being supported and normal test pressures.
2. Design for all loads using a safety factor of 5.

C. Piping schedule is included in the contract drawings.

D. All items shall be designed with strength and stiffness to support, restrain, and allow expansion of the respective pipes under the maximum combination of peak loading conditions to include pipe weight, liquid weight, liquid movement and pressure forces, thermal expansion and contraction, vibrations, and all probable externally applied forces.

E. Support spacing shall be per ASME 31.9

F. Complete design details of the pipe system components shall be submitted for review and approval as specified in Part 1. No support shall be installed without approved support system Drawings.

G. The pipe support system shall not impose loads on the supporting structures in excess of the loads for which the supporting structure is designed.

2.3 MATERIALS

A. Metallic Pipe Support:

1. Submerged, buried, or within outdoor structures (vaults, etc.): Type 316 stainless steel (SS).
2. Within chemical areas: Vinyl ester fiberglass reinforced plastic (FRP) for pipe size up to 2 inch, epoxy coated steel for 2-1/2 inches size and larger.
3. Other locations: steel with galvanizing where noted, or if not otherwise noted, coating as required in Division 09 Finished Painting.
4. Additional requirements (including dielectric insulation) in ACCESSORIES Article.

B. Non-Metallic Pipe Support:

1. Submerged, buried, or within vaults: Type 316 stainless steel or FRP.
2. Within chemical areas: vinyl ester FRP.
3. Other locations: steel with galvanizing where noted, or if not otherwise noted, coating as required in Division 09 Finished Painting; all with local stress protection shields.
4. Additional requirements (including stress protection shields) in ACCESSORIES Article.

C. Wherever stainless steel is noted, it shall be Type 316 unless noted otherwise.

2.4 SUPPORT AND RESTRAINT SYSTEMS

A. Steel or Ductile Iron Piping:

1. Cast iron and ductile iron, steel, and stainless-steel piping shall be supported at a maximum support spacing of 10 feet with a minimum of one support per pipe section at the joints.
2. Support spacing for ductile iron, steel, and stainless-steel piping 2-inch and smaller diameter shall not exceed 5 feet.

B. Copper Piping:

1. Supports for copper pipe shall be copper plated or shall have a 1/16-inch plastic coating.

2. Support spacing for copper piping and tubing 2-inch and smaller diameter shall not exceed 5 feet and greater than 2 inch diameter shall not exceed 8 feet.
3. Where pipe supports come in contact with copper piping, provide protection from galvanic corrosion by: wrapping pipe with 1/16 inch thick neoprene sheet material and galvanized protection shield; isolators similar to Cooper B-Line B3195CT; or copper-plated or PVC-coated hangers and supports.

C. Non-Metallic Piping:

1. All uninsulated non-metallic piping such as PVC, CPVC, HDPE, PVDF, etc., shall be protected from local stress concentrations at each support point. Protection shall be provided by non-metallic protection shields or other method as approved by the Engineer.

    a. Where pipes are bottom supported 180 degrees, arc shields shall be furnished. Where 360-degree arc support is required, such as U-bolts, protection shields shall be provided for the entire pipe circumference. All U-bolts or clamps for non-metallic pipes shall be plastic coated.
    b. Protection shields shall have an 18-gauge minimum thickness, not be less than 12 inches in length and be securely fastened to pipe with Type 316 stainless steel straps not less than 1/2 inch wide.

2. Individually supported PVC pipes shall be supported as recommended by the pipe manufacturer except that support-spacing shall be manufacturers recommendation minus 2-ft. down to 5 ft spacing recommendation, then spacing shall be 3 feet.
3. Supports for horizontal multiple PVC plastic piping:

    a. Shall be continuous wherever possible.
    b. Multiple, suspended, horizontal plastic PVC pipe runs, where possible, shall be supported by ladder type cable trays such as: Husky Ladder Flange Out by MPHusky; or equal.
    c. Rung spacing shall be 12 inches. Tray width shall be approximately 6 inch for single runs and 12 inchesfor double runs.
    d. Ladder type cable trays shall be furnished complete with all hanger rods, rod couplings, concrete inserts, hanger clips, etc., required for a complete support system. Individual plastic pipes shall be secured to the rungs of the cable tray by strap clamps or fasteners similar to: Globe, Series 600; Unistrut Pipe/Conduit Clamps and Hangers; or equal.
    e. Spacing between clamps shall not exceed 9 feet. The cable trays shall provide continuous support along the length of the pipe. Individual clamps, hangers, and supports in contact with plastic PVC pipe shall provide firm support but not so firm as to prevent longitudinal movement due to thermal expansion and contraction.

D. Framing Support System:

1. See Part 2 MATERIALS for materials of construction.
2. Beams: Size such that beam stress does not exceed 25,000 psi and maximum deflection does not exceed 1/240 of span.
3. Column Members: Size in accordance with manufacturer's recommended method.
4. Support Loads: Calculate using weight of pipes filled with water.
5. Maximum Spans:

a. Steel and ductile iron pipe 3-inch diameter and larger: 10 feetcenters, unless otherwise shown.
b. Other pipelines and special situations: Same as noted in previous paragraphs. Supplementary hangers and supports may be required.

E. All vertical pipes shall be supported at each floor or at intervals of not more than 12 feet by approved pipe collars, clamps, brackets, or wall rests and at all points necessary to ensure rigid construction. All vertical pipes passing through pipe sleeves shall be secured using a pipe collar.

2.5 ANCHOR BOLTS/SYSTEMS

A. Anchoring Devices: Design, size, and space support anchoring devices, including anchor bolts, inserts, and other devices used to anchor support, to withstand shear, and pullout loads imposed by loading and spacing on each particular support. DO NOTE USE ADHESIVE ANCHOR BOLTS ON ANY PIPE SUPPORT HUNG FROM A ROOF OR CEILING, unless specifically noted otherwise.

B. All post-installed anchors in concrete shall have current published ICC-ES Evaluation Report indicating the anchor is approved for installation in cracked concrete.

C. The latest edition of the following specification and recommended practices shall become part of this specification as if written herein. Wherever requirements conflict, the more stringent shall govern.

1. ACI 318, Appendix D.
2. ACI 355.2, Mechanical Anchors “Qualification of Post-Installed Mechanical Anchors in Concrete”
3. Anchor manufacturer’s published installation requirements.

D. Expansion Anchors:

1. The length of expansion bolts shall be sufficient to place the wedge portion of the bolt a minimum of 1 inch behind the steel reinforcement.
2. Manufacturers:

a. Power-Stud+ SD4 and Power-Stud+ SD6 by Powers Fasteners, Brewster, NY.
b. Kwik Bolt as manufactured by Hilti USA, Tulsa, Oklahoma.
c. Wej-it by Wej-it Expansion Products, Inc., Broomfield, Colorado.

E. Unless otherwise noted: use Type 304 stainless steel anchoring parts/bolts and hardware for non-submerged supports, Type 316 stainless steel for submerged anchors.

F. Size of anchor bolts as designed by manufacturer, 1/2 inch minimum diameter, or as shown on the Drawings.

G. Anchors to concrete in chemical areas shall be epoxy secured vinyl ester FRP all thread, insertion depth and size as required by the manufacturer for the design loads. Nuts, bolts and hardware shall all be vinyl ester FRP construction.

2.6 HANGER RODS

A. Where use of steel is allowed, hanger rods shall be hot-rolled steel, machine-threaded, and, except for stainless steel, galvanized after fabrication. The strength of the rod shall be based on its root diameter.

1. Hanger rods shall be attached to concrete structures using single or continuous concrete inserts by the named support manufacturers above. Where use of steel is allowed, inserts shall be malleable iron or steel with galvanized finish.
2. Beam-clamps, C-clamps, or welded-beam attachments shall be used for attaching hanger rods to structural steel members.

B. Minimum rod size for metallic rod hangers: (* For pipe diameters less than 14 inch, if using pipe roller, use 2 hanger rods with minimum diameter noted below for pipe's diameter).

	Nominal Pipe / Tube Diameter	Minimum Hanger Rod Diameter
1	Less than 2-1/2 inch	1/4 inch*
2	3 to 8 inches	1/2 inch
3	10 to 14 inches	3/4 inch*
4	16 to 20 inches	2 at 1 inch
5	24 inches	2 at 1-1/4 inch
6	30 inches	2 at 1-1/2 inch

2.7 SINGLE PIPE HANGERS

A. Unless otherwise indicated, pipe hangers and supports shall be standard catalogued components, conforming to the requirements of MSS-41, 58, or 69 and shall be of the following type:

1. Anvil International.
2. Equal models by: Carpenter & Patterson, Inc., Wobum, MA.
3. Cooper B-Line.
4. Gulf State Manufacturing.
5. Unistrut Northeast, Cambridge, Massachusetts.
6. CADDY; nVent.
7. Carpenter & Paterson, Inc.
8. Empire Industries, Inc.
9. Globe Pipe Hanger Products Incorporated.
10. Haydon Corporation.
11. Hilti, Inc.
12. NIBCO INC.
13. PHD Manufacturing, Inc.
14. PHS Industries, Inc.
15. Unitron Product, Inc. / US-Strut.

B. Single pipes shall be supported by hangers suspended by hanger rods from structural steel members, concrete ceilings, bottom of trapeze hangers, and wall-mounted steel angle brackets.

C. Where pipes are near walls, beams, columns, etc., and located an excessive distance from ceilings or underside of beams, welded steel wall brackets similar to Carpenter and Patterson, Figure Nos. 68, 79, 84, or 139 shall be used for hanging pipe. Where single pipes rest on top of bracket pipe supports, attachments shall meet requirements as specified under multiple pipe hangers.

2.8 MULTIPLE PIPE HANGERS

A. Suspended multiple pipes, running parallel in the same horizontal plane that are adjacent to each other, shall be suspended by trapeze type hangers or wall brackets. Where use of steel is allowed, trapeze hangers shall consist of galvanized structural steel channel supported from galvanized threaded rod or attached to concrete walls, columns, or structural steel support members. See previous paragraphs about multiple PVC pipe supports.

B. Except as otherwise specified herein, pipe anchors used for attaching pipe to trapeze or multiple pipe wall brackets shall be anchor or pipe chairs similar to:

1. Anvil Fig. 175.
2. Cooper B-Line B3147A or B3147B.
3. Where use of steel is allowed, material of construction shall be galvanized steel. Chair U bolts shall be tightened to allow freedom of movement for normal expansion and contraction except where pipe must be anchored to control direction of movement or act as a thrust anchor.

2.9 SINGLE PIPE SUPPORTS FROM BELOW

A. Single pipes located in a horizontal plane close to the floor shall be Pedestal type: Schedule 40 pipe stanchion, saddle, and anchoring flange.

1. Nonadjustable Saddle: MSS SP 58, Type 37 with U-Bolt.

   a. Anvil, Figure 259.
   b. Cooper B-Line, Figure B3090.

2. Adjustable Saddle: MSS SP 58, Type 38 without clamp.

   a. Anvil, Figure 264.
   b. Cooper B-Line, Figure B3093.

B. Pipes less than 3 inch in diameter:

1. Hold in position by supports fabricated from steel C channel, welded post base similar to Unistrut, Figure P2072A, where use of steel is allowed; and pipe clamps similar to Unistrut, Figures P1109 through 26.

2. Where required to assure adequate support, fabricate supports using two vertical members and post bases connected by horizontal member of sufficient load capacity to support pipe.
3. Fasten supports to nearby walls or other structural member to provide horizontal rigidity.
4. More than one pipe may be supported from a common fabricated support.

C. Pipes 3 inch in diameter and larger:

1. Support by adjustable stanchions.
2. Provide at least 4-inch adjustment.
3. Flange mount to floor.

D. Use yoked saddles for piping whose centerline elevation is 18 inch or greater above the floor and for all exterior installations.

E. Pipe roller type supports shall be used where required to accommodate thermal movement in conjunction with axial supports.

2.10 WALL SUPPORTED SINGLE AND MULTIPLE PIPES

A. Single or multiple pipes located adjacent to walls, columns, or other structural members shall be supported using welded steel wall brackets, where use of steel is allowed, as manufactured by Carpenter and Patterson, Figure No. 69, 84, or 139.

B. Where noted, multiple pipes may be supported on C-channel with steel brackets similar to Unistrut pipe clamps; with pipe anchor chairs; or equal.

C. Individual pipes, up to 8-in diameter, where noted, may use MSS Type 8 pipe clamps as noted on the Drawings.

D. Securely fasten all members to wall, column, etc., using double-expansion shields or other method as approved by the Engineer. Provide additional wall bearing plates as required.

2.11 BASE ANCHOR SUPPORT

A. Bend Support: Where pipes change direction from horizontal to vertical via a bend, install a welded or cast base bend support to carry the load. Fasten to the floor, pipe stanchion, or concrete pedestal using expansion anchors or other method as approved by the Engineer.

B. Concrete Supports: Where indicated, securely fasten pipe bends to concrete supports with suitable metal bands as required and approved by the Engineer. Isolate piping from poured concrete with a neoprene insert.

2.12 VERTICAL PIPE SUPPORTS

A. Where vertical pipes are not supported by a Unistrut type system as specified, they shall be supported in one of the following methods.

1. For pipes 1/4 to 2 inch in diameter:

a. Provide extension hanger ring with an extension rod and hanger flange.
b. The rod diameter shall be as recommended by the manufacturer for the type of pipe to be supported.
c. Where use of steel is allowed, the hanger ring shall be steel- or PVC-clad depending on the supported pipe material of construction. The hanger ring shall be equal to Carpenter & Patterson, Figure Nos. 81.
d. Where use of steel is allowed, the anchor flange shall be galvanized malleable iron similar to Carpenter and Patterson, Figure No. 85.

2. For pipes equal to or greater than 2 inchin diameter:

a. Extended pipe clamps similar to Carpenter & Patterson, Figure No. 267 may be used.
b. Attach hanger to concrete structures using double expansion shields,
c. Attach hanger to metal support members using welding lugs similar to Carpenter & Patterson, Figure No. 114.

B. Pipe supports shall be provided for closely spaced vertical piping systems required to provide a rigid installation. The interval of vertical support spacing shall be as specified, but in no case shall vertical interval exceed 12 feet. The support system shall consist of a framework suitably anchored to floors, ceilings, or roofs.

C. Unless otherwise specified, shown, or specifically approved by the Engineer, vertical runs exceeding 12 feetshall be supported by base elbows/tees, clamps, brackets, wall rests, and pipe collars, all located as required to ensure a rigid installation.

D. Pipe riser clamps, per MSS SP58, shall be used to support all vertical pipes extending through floor slabs. Where use of steel is allowed, riser clamps shall be galvanized steel manufactured by:

1. Carpenter & Patterson, Figure No. 128.
2. Anvil, Figure 261.
3. Cooper B-Line, Figure B3373.
4. Or equal.

E. Copper-clad or PVC-coated clamps shall be used on copper pipes. Insulation shall be removed from insulated pipes prior to installing riser clamps. Insulation shall not be damaged by clamp installation.

2.13 SPECIAL SUPPORTS

A. Frame Work Supports:

1. Vertical and horizontal supporting members shall be U-shaped channels similar to Unistrut, Series P1000. Vertical piping shall be secured to the horizontal members by pipe clamps or pipe straps. See pipe clamp and strap requirements.
2. For piping 3 inch and smaller, framework shall be as manufactured by:

a. Unistrut Corporation.
b. Power-Strut (or Ackinstrut where fiberglass systems are specified).

c. Multi-Strut by Carpenter-Paterson.
d. Or equal.

3. For piping larger than 3 inch, the support frame shall be fabricated from structural stainless steel or steel shapes, depending upon the support location, and secured through the use of drop in, adhesive or expansion anchors.
4. The assemblies shall be furnished complete with all nuts, bolts, and fittings required for a complete assembly including end caps for all Unistrut members.
5. Electrical Conduit Support: Under Division 26.
6. The design of each individual framing system shall be the responsibility of the Contractor. Submit shop drawings, and show all details of the installation, including dimensions and types of supports. In all instances the completed frame shall be adequately braced to provide a complete rigid structure when all the piping has been attached. See also Article SUPPORT AND RESTRAINT.

B. Supports not otherwise described in this Section shall be fabricated or constructed from standard structural stainless steel or steel shapes in accordance with applicable provisions of Section 055000 “Metal Fabrications,” or Unistrut-type frame; have anchor hardware similar to items previously specified herein; shall meet the minimum requirements listed below; and be subject to the approval of the Engineer.

C. Additional Pipe Support Situations:

1. Supporting Multiple Chemical and Related Piping:

a. Location: indicated on Drawings or otherwise required, especially adjacent to chemical pumps.
b. Use: framework support.
c. Materials: FRP, with proper local stress protection.

2.14 SHOP FACTORY FINISHING

A. Prepare and prime metallic (except stainless steel) supports in accordance with Division 09.

2.15 ACCESSORIES

A. Insulation Shield: Install on insulated non-steel piping. Oversize the rollers and supports, as required. Manufacturers:

1. Anvil, Figure 167.
2. Cooper B-Line, Series B3151.

B. Welding Insulation Saddle: Install on insulated metal pipe. Oversize the rollers and supports, as required. Manufacturers:

1. Anvil, Figure 160.
2. Cooper B-Line, Series B3160.

C. Vibration Isolation Pad: Install under base flange of pedestal type pipe supports adjacent to equipment, and where required to isolate vibration.

1. Isolation pads to be neoprene, waffle type.
2. Manufacturers:

a. Mason Industries, Type W.
b. Korfund.

D. Dielectric Barrier:

1. Install between carbon steel members and copper or stainless-steel pipe.
2. Install between stainless steel supports and non-stainless steel ferrous metal piping.
3. All stainless-steel piping shall be isolated from all ferrous materials, including galvanized steel by use of neoprene sheet material and protection shields.

E. Electrical Isolation: Install 1/4 by 3 inch neoprene rubber wrap between submerged metal pipe and oversized clamps.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify field dimensions as indicated on Drawings.

3.2 INSTALLATION

A. Obtain permission from Engineer before using powder-actuated anchors.

B. Obtain permission from Engineer before drilling or cutting structural members.

C. Inserts:

1. Install inserts for placement in concrete forms. Before setting inserts, all drawings and figures shall be checked that have a direct bearing on the pipe location. Responsibility for the proper location of pipe supports is included under this Section.
2. Install inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe 4 in and larger.
4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut above slab.

D. Pipe Hangers and Supports:
1. Install according to: MSS SP 58.
2. Support horizontal piping as indicated on Drawings, depending upon pipe size.
3. Install hangers with minimum 1/2 in space between finished covering and adjacent Work.
4. Place hangers within 12 in of each horizontal elbow.

5. Use hangers with 1-1/2 in minimum vertical adjustment.
6. Support horizontal cast iron pipe adjacent to each hub, with 5 ft maximum spacing between hangers.
7. Support vertical piping at every floor. Support vertical cast iron pipe at each floor at hub.
8. Where piping is installed in parallel and at same elevation, provide multiple pipe or trapeze hangers.
9. Support riser piping independently of connected horizontal piping.
10. Provide sheet lead packing between hanger or support and piping.
11. Design hangers for pipe movement without disengagement of supported pipe.
12. Support piping independently so that equipment is not stressed by piping weight or expansion in piping system.
13. Support large or heavy valves, fittings, and appurtenances independently of connected piping.
14. Provide welded steel brackets where piping is to be run adjacent to building walls or columns.
15. Use beam clamps where piping is to be suspended from building steel.
16. Insulated Piping: Provide two bolted clamps designed to accommodate insulated piping.
17. Use offset clamps where pipes are indicated as offset from wall surfaces.
18. Proceed with installation of piping and supports only after any building structural work has been completed and new concrete has reached its 28-day compressive strength.
19. The installation of pipe support systems shall not interfere with the operation of any overhead bridge cranes, monorails, access hatches, etc. No piping shall be supported from stairs, other pipes, ladders, and walkways unless authorized by the Engineer.
20. Repair mounting surfaces to original condition after attachments are made.
21. Brace horizontal pipe movements by both longitudinal and lateral sway bracing.
22. Where supports are required in areas to receive chemical resistant seamless flooring, install supports prior to application of flooring system.

E. Insulation:

1. Provide clearance in hangers and from structure and other equipment for installation of insulation.

F. Equipment Bases and Supports:

1. Provide housekeeping pads of concrete, minimum 3-1/2 in thick and extending 6 in beyond supported equipment. Comply with Section 033000 - Cast-in-Place Concrete.
2. Provide housekeeping pads as detailed on Drawings.
3. Using templates furnished with equipment, install anchor bolts and accessories for mounting and anchoring equipment.
4. Construct supports of formed steel channel. Brace and fasten with flanges bolted to structure.
5. Provide rigid anchors for pipes after vibration isolation components are installed. Comply with Section 400513 - Common Work Results for Process Piping.

G. Prime Coat:

1. Prime coat exposed steel hangers and supports.

2. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

3.3 FIELD QUALITY CONTROL

A. All pipe support systems shall be tested after installation in conjunction with the respective piping pressure tests. If any part of the pipe support system proves to be defective or inadequate, it shall be repaired, augmented or replaced to the satisfaction of the Engineer.

B. After the work is installed, but before it is filled for start-up and testing, the Support System Design Engineer shall inspect the work and shall certify its complete adequacy. Each system shall be inspected and certified in the same way.

C. Submit a report, including all field modifications and including all certificates.

1. Insert state where project is located.
2. The report shall bear the stamp of a professional engineer registered in New York and shall be subject to the review of the Engineer.

3.4 ATTACHMENT SCHEDULE

A. Pipe Hanger Spacing:

1. Pipe Material: ABS.

   a. Maximum Hanger Spacing: 4 feet
   b. 3/8 inch

2. Pipe Material: Aluminum.

   a. Maximum Hanger Spacing: 10 feet
   b. 1/2 inch

3. Pipe Material: Cast iron.

   a. Maximum Hanger Spacing: 5 feet
   b. 5/8 inch

4. Pipe Material: Cast Iron, with 10-foot length of pipe.

   a. Maximum Hanger Spacing: 10 feet
   b. 5/8 inch

5. Pipe Material: CPVC.

   a. Size: 1 inch and smaller.
   b. Maximum Hanger Spacing: 3 feet
   c. 1/2 inch

6. Pipe Material: CPVC.

   a. Size: 1-1/4 inches and larger.
   b. Maximum Hanger Spacing: 4 feet

c. 1/2 inch

7. Pipe Material: Copper tube.

   a. Size: 1-1/4 inches and smaller.
   b. Maximum Hanger Spacing: 6 feet
   c. 1/2 inch

8. Pipe Material: Copper tube.

   a. Size: 1-1/2 inches and larger.
   b. Maximum Hanger Spacing: 10 feet
   c. 1/2 inch

9. Pipe Material: Fiberglass:

   a. Maximum Hanger Spacing: 4 feet
   b. 1/2 inch

10. Pipe Material: Glass.

    a. Maximum Hanger Spacing: 8 feet
    b. 1/2 inch

11. Pipe Material: Polybutylene.

    a. Maximum Hanger Spacing: 2.7 feet
    b. 3/8 inch

12. Pipe Material: Polypropylene.

    a. Maximum Hanger Spacing: 4 feet
    b. 3/8 inch

13. Pipe Material: PVC.

    a. Maximum Hanger Spacing: 4 feet
    b. 3/8 inch

14. Pipe Material: Steel.

    a. Size: 3 inches and smaller.
    b. Maximum Hanger Spacing: 12 feet
    c. 1/2 inch

15. Pipe Material: Steel.

    a. Size: 4 inches and larger.
    b. Maximum Hanger Spacing: 12 feet

c. 5/8 inch

END OF SECTION 400507

SECTION 400531 - THERMOPLASTIC PROCESS PIPE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. PVC pipe.
2. PVC tube.
3. CPVC pipe.
4. Polyvinylidene fluoride (PVDF) pipe and tube.
5. Acrylonitrile-butadiene-styrene (ABS) pipe.
6. Polyethylene (PE) pipe and tube.
7. Fittings.
8. Accessories for plastic piping.

B. Related Requirements:

1. Section 400506 “Couplings, Adapters, and Specials for Process Piping”: Pipe penetrations, restrained joints, flexible connections, expansion joints and loops, and sleeve-type couplings.
2. Section 400507 “Hangers and Supports for Process Piping”: Hangers, anchors, sleeves, and sealing of piping to adjacent structures.
3. Section 400551 “Common Requirements for Process Valves”: Common product requirements for valves for placement by this Section.

1.3 COORDINATION

A. Section 013100 “Project Management and Coordination”: Requirements for coordination.

B. Coordinate Work of this Section with piping and equipment connections specified in other Sections and indicated on Drawings.

1.4 PREINSTALLATION MEETINGS

A. Section 013100 “Project Management and Coordination”: Requirements for preinstallation meeting.

B. Convene minimum one week prior to commencing Work of this Section.

1.5 SUBMITTALS

A. Section 013300 “Submittal Procedures”: Requirements for submittals.

B. Product Data: Submit manufacturer's catalog information regarding pipe and fittings.

C. Shop Drawings: Indicate layout of piping systems, including equipment, critical dimensions, sizes, materials lists, location of all fittings, valves, and in-line accessories.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

E. Manufacturer’s recommended butt fusion welding procedures identifying all quality control checks during the fusion procedure including the minimum and maximum allowable bead formation during the heat soak process and the final weld roll back process for the various size pipes.

F. Manufacturer to provide a sample joint for each size pipe to be supplied that is 12-in long and has two heat fusion welds that identifies the manufacturer’s minimum and maximum allowable bead thicknesses. Provide documentation that the sample was pressure tested to 150 psi or the specified pressure.

G. Delegated Design Submittals: Submit signed and sealed Shop Drawings with design calculations and assumptions for pipe sizes and sizing methods.

H. Source Quality-Control Submittals: Indicate results of factory tests and inspections.

I. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

J. Qualifications Statements:

1. Submit qualifications for manufacturer, installer, and licensed professional.
2. Submit manufacturer's approval of installer.

1.6 SUSTAINABLE DESIGN SUBMITTALS

A. Section 018113 “Sustainable Design Requirements”: Requirements for sustainable design submittals.

B. Manufacturer's Certificate:

1. Certify that products meet or exceed specified sustainable design requirements.
2. Materials Resources Certificates:

a. Certify source and origin for salvaged and reused products.
b. Certify recycled material content for recycled content products.
c. Certify source for regional materials and distance from Project Site.

C. Product Cost Data:

1. Submit cost of products to verify compliance with Project sustainable design requirements.

2. Exclude cost of labor and equipment to install products.
3. Provide cost data for following products:

    a. Salvaged, refurbished, and reused products.
    b. Products with recycled material content.
    c. Regional products.

1.7 CLOSEOUT SUBMITTALS

A. Section 017700 “Closeout Procedures”: Requirements for submittals.

B. Project Record Documents: Record actual locations of piping, valves and other appurtenances, connections, and invert elevations.

C. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.8 QUALITY ASSURANCE

A. Permanently mark each length of pipe with manufacturer's name or trademark and indicate conformance to standards.

B. Perform Work according to AWWA standards.

C. Maintain a copy of each standard affecting Work of this Section on Site.

1.9 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.

B. Installer: Company specializing in performing Work of this Section with minimum three years' documented experience.

C. Licensed Professional: Professional engineer experienced in design of specified Work and licensed in State of New York.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Section 016000 “Product Requirements”: Requirements for transporting, handling, storing, and protecting products.

B. Inspection:

1. Accept materials on Site in manufacturer's original packaging and inspect for damage.
2. Manufacturer's Packaging: Comply with ASTM D3892.

C. Storage: Store materials according to manufacturer instructions.

D. Protection:

1. Protect materials from puncture, abrasion, moisture, dust, and UV by storing in clean, dry location remote from construction operations areas.
2. Protect piping and appurtenances by storing off ground.
3. Provide additional protection according to manufacturer instructions.

1.11 AMBIENT CONDITIONS

A. Section 015000 “Temporary Facilities and Controls”: Requirements for ambient condition control facilities for product storage and installation.

B. Minimum and Maximum Temperatures: Do not install pipe when temperature is below 40 degrees F (4.4 degrees C) or above 90 degrees F (32.2 degrees C) if pipe is exposed to direct sunlight.

C. UV Protection: Provide pipe installed above ground or outside with UV protection.

1.12 EXISTING CONDITIONS

A. Field Measurements:

1. Verify field measurements prior to fabrication.
2. Indicate field measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 GENERAL

A. Van Stone flanges shall not be used with pinch valves, industrial butterfly valves; elastomer bellows style expansion joints or other piping system components having an elastomer liner (rubber seat) that is used as a gasket.

2.2 PVC PIPE, TUBE, AND FITTINGS

A. PVC Pipe and Fittings:

1. Pipe:

a. Comply with AWWA C900.
b. Class 12454-B Schedule 80.

2. Fittings:

a. Material: Molded PVC.
b. Type: Push-on, comply with AWWA C907.
c. Gaskets: Comply with AWWA C111.

3. Joints:

    a. Type: Compression gasket ring.
    b. Comply with ASTM D3139.

4. Materials:

    a. Comply with ASTM D1784.
    b. Minimum Cell Classification: 12454-B.

2.3 PE PIPE, TUBE, AND FITTINGS

A. HDPE Pipe and Fittings:

1. Pipe: ASTM F714 / AWWA C906 for sizes 4” and greater
2. SDR: SDR 13.5, rated for a maximum 160 psig working pressure
3. Fittings:

    a. Comply with AWWA C901.
    b. Type: Molded to comply with ASTM D3261or fabricated to comply with ASTM F2206.
    c. Minimum pressure rating equal to or greater than the pipe to which they are joined.

4. Joints: Butt fusion.
5. Materials:

    a. PE 4710 high density polyethylene resin.
    b. Comply with ASTM D3350.
    c. Minimum Cell Classification: 445574-C-C.

2.4 FINISHES

A. Coat machined faces of metallic flanges with temporary rust-inhibitive coating.

2.5 ACCESSORIES

A. PVC Piping:

1. Flange Bolting:

    a. Hex-Head Bolts: Stainless steel; ASTM F593 Grade 316.
    b. Hex-Head Nuts: Stainless steel; ASTM F594 Grade 316.

2. Flange Gaskets:

    a. Type: Full faced.
    b. Material: EPDM.
    c. Comply with ASME B16.21.

3. Push-On Joint Seals:

    a. Material: EPDM.
    b. Comply with ASTM F477.

4. Solvent Cement:

    a. Comply with ASTM D2564.
    b. Formulated for use with sodium hypochlorite and other caustic solutions.
    c. Primers: Comply with ASTM F656.

B. PE Piping:

1. Insert Fittings: Comply with ASTM D2609.
2. Couplings: Comply with ASTM F1055.
3. Flange Bolting:

    a. Hex-Head Bolts: Stainless steel; ASTM A193/ (A193M;).
    b. Hex-Head Nuts: Stainless steel; ASTM A194/ (A194M;).

4. Flange Gaskets:

    a. Type: Full faced.
    b. Material: EPDM.
    c. Comply with ASME B16.21.

2.6 SOURCE QUALITY CONTROL

A. Section 014000 “Quality Requirements”: Requirements for testing, inspection, and analysis.

B. Provide shop inspection and testing of completed pipe sections.

C. Owner Inspection:

1. Notify Owner at least seven days before inspection is allowed.

D. Owner Witnessing:

1. Notify Owner at least seven days before inspections and tests are scheduled.

E. Certificate of Compliance:

1. If manufacturer is approved by authorities having jurisdiction, submit certificate of compliance indicating Work performed at manufacturer's facility conforms to Contract Documents.
2. Specified shop tests are not required for Work performed by approved manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 017300 “Execution”: Requirements for installation examination.

B. Verify that field dimensions are as indicated on Drawings.

C. Inspect existing flanges for nonstandard bolt hole configurations or design and verify that new pipe and flange mate properly.

3.2 PREPARATION

A. Section 017300 “Execution”: Requirements for installation preparation.

B. Ream pipe ends, remove burrs, and bevel plain-end pipe.

C. Thoroughly clean pipe and fittings before installation.

D. Cleaning: Clean surfaces to remove foreign substances.

3.3 INSTALLATION

A. Comply with ASME B31.3 and B31.9.

B. Run piping straight along alignment as indicated on Drawings, with minimum number of joints.

C. Fittings:

1. According to manufacturer instructions.
2. Gaskets:

    a. Clean seats thoroughly.
    b. Wipe gaskets clean prior to installation.

3. Tighten bolts progressively, drawing up bolts on opposite sides until bolts are uniformly tight; use torque wrench to tighten bolts to manufacturer instructions.

D. Provide required upstream and downstream clearances from devices as indicated.

E. Install piping with sufficient slopes for venting or drainage of liquids and condensate to low points.

F. Support exposed piping as specified in Section 400507 “Hangers and Supports for Process Piping”.

G. Provide expansion joints as specified in Section 400506 “Couplings, Adapters, and Specials for Process Piping”, and provide pipe guides as specified in Section 400507 “Hangers and Supports for Process Piping”, to compensate for pipe expansion due to temperature differences.

H. Field Cuts: According to pipe manufacturer instructions.

I. Joining:

1. Heat Joining: Comply with ASTM D2657.

a. Butt-fusion joints to be done by a factory-qualified joining technician as designated by the pipe manufacturer.
b. Field Samples: join two sample welds on each size of pipe to be installed using the same fusion welding equipment that will be used for completion of the entire work. These sample welds will be compared to the manufacturer's sample previously submitted in accordance with Part 1.
c. Pipe joints with beads in excess of 3/16-in will not be approved by the Engineer.

2. Electrofusion: Comply with ASTM F1290.
3. Primers and Cleaners: Comply with ASTM F402.
4. PVC Solvent-Cemented Joints: Comply with ASTM D2855.

J. Insulation: As indicated on Drawings.

K. Underground Piping: As specified in Section 331116 "Site Water Utility Distribution Piping".

3.4 TOLERANCES

A. Section 014000 "Quality Requirements": Requirements for tolerances.

B. Laying Tolerances: As specified in Section 331116 "Site Water Utility Distribution Piping".

3.5 FIELD QUALITY CONTROL

A. Section 014000 "Quality Requirements": Requirements for inspecting and testing.

B. Inspection:

1. Inspect for piping defects that may be detrimental as determined by the Engineer.
2. Repair damaged piping, or provide new, undamaged pipe.
3. After installation, inspect for proper supports and interferences.

C. Pressure Testing:

1. Test Pressure: Not less than 150 psig (1034 kPa) or 1.5 times the system's working pressure, whichever is greater.
2. Conduct hydrostatic test for minimum two hours.
3. Filling:

a. Fill section to be tested with water slowly and expel air from piping at high points.
b. Install corporation cocks at high points.
c. Close air vents and corporation cocks after air is expelled.
d. Raise pressure to specified test pressure.

4. Observe joints, fittings, and valves under test.
5. Remove and renew cracked pipe, joints, fittings, and valves showing visible leakage and retest.
6. Leakage:

    a. Correct visible deficiencies and continue testing at same test pressure for additional two hours to determine leakage rate.
    b. Maintain pressure within plus or minus 5 psi (34.4 kPa) of test pressure.
    c. Leakage is defined as quantity of water supplied to piping necessary to maintain test pressure during period of test.
    d. Correct visible leaks and repeat test to verify no leaks at the required test pressures.

3.6 CLEANING

A. Sections 017300 “Execution” and 017700 “Closeout Procedures”: Requirements for cleaning.

B. Keep pipe interior clean as installation progresses.

C. Clean pipe interior of soil, grit, shavings, and other debris after pipe installation.

END OF SECTION 400531

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SECTION 400557 - ACTUATORS FOR PROCESS VALVES AND GATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes: Following types of actuators for linear, multi-turn, and quarter turn valves and gates:

1. Manual actuators.
2. Pneumatic actuators.

    a. Rotary vane.
    b. Rack and pinion.
    c. Pneumatic cylinder.
    d. Diaphragm.

3. Electric motor actuators.

B. Related Requirements:
1. Section 055000 “Metal Fabrications” for miscellaneous metalwork and fasteners as required.
2. Section 400507 “Hangers and Supports for Process Piping” for hangers, anchors, sleeves, and sealing of piping to adjacent structures.
3. Section 400551 “Common Requirements for Process Valves” for common product requirements for valves for placement by this Section.

1.3 DEFINITION

A. Where the term “valve” alone is used in this Section, it applies to both valves and gates as the corresponding text context dictates.

1.4 COORDINATION

A. Section 400551 “Common Requirements for Process Valves” for valve schedule requirements.

B. Coordinate Work of this Section with installation of valves, gates, and accessories.

1.5 PREINSTALLATION MEETINGS

A. Convene minimum one week prior to commencing Work of this Section.

1.6 SUBMITTALS

A. Product Data: Manufacturer information for actuator with model number and size indicated.

B. Shop Drawings:

1. Parts list, materials, sizes, position indicators, limit switches, control system, actuator mounting, wiring diagrams, control system schematics with external interfaces on assembly drawings.
2. Actuator Shop Drawings with respective valve submittal.

C. Manufacturer's Certificate: Products meet or exceed specified requirements.

D. Manufacturer Instructions: Special procedures and placement requirements.

E. Source Quality-Control Submittals: Results of factory tests and inspections and provide required certifications.

F. Field Quality-Control Submittals: Results of Contractor-furnished tests and inspections.

G. Qualifications Statements:
1. Qualifications for manufacturer and installer.
2. Manufacturer's approval of installer.

1.7 CLOSEOUT SUBMITTALS

A. Project Record Documents: Documentation of actual locations and types of actuators.

1.8 QUALITY ASSURANCE

A. Valve Actuators in NEC Class 1, , Division 1 or 2, Group C & D, Hazardous Locations: Comply with NFPA 70.

B. Minimum NEMA Enclosure Classification:

1. Non-submergence Installations: NEMA 4X.
2. Submergence Installations: NEMA 6P/IP68.

C. Perform Work according to Municipality of Rome, New York Department of Public Works standards.

D. Maintain a copy of each standard affecting Work of this Section on Site.

E. Single Source Requirements:

1. Furnish electric motor actuators in the scope of the project by the same manufacturer. Coordinate this requirement with actuated valves and gates included in scope of vender furnished equipment.
2. Furnish actuators, floor stands, stem guides, stems, extensions, and accessories for slide gate assemblies by slide gate manufacturer.

F. Mate actuators to equipment at equipment manufacturers or integrators facility.

1. Test assembled product. Certify ready for installation prior to shipment to job site.
2. For extremely large assemblies requiring disassembly for installation, the actuator may be disassembled for shipment and remounted in the field.

1.9 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum five years' documented experience.

B. Installer: Company specializing in performing Work of this Section with minimum five years' documented experience.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.

B. Store materials according to manufacturer instructions.

C. Protection:

1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
2. Furnish temporary end caps and closures on piping and fittings and maintain in place until installation.
3. Provide additional protection according to manufacturer instructions.

1.11 EXISTING CONDITIONS

A. Field Measurements:

1. Verify field measurements prior to fabrication.
2. Indicate field measurements on Shop Drawings.

1.12 WARRANTY

A. Manufacturer’s Special Warranty: Submit standard written warranty against manufacturing defects for actuators.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GENERAL

A. Refer to valve and gate schedule for actuator type, accessories, and sizing information.

B. Provide clockwise closed actuation unless otherwise noted on the valve and gate schedule.

C. Supply chain actuators for manual valves located 7 feet or higher above finished floor.

2.2 ACCESSORIES

A. Floor Stands:

1. Materials:

a. Stand: fabricated steel**.**
b. Stem Bushing: Sintered bronze.
c. Position Indicator: Bronze.

2. Height to input shaft or handwheel: 36 inch.
3. Base Mounting Requirements:

a. Concrete Floor Mounting: Type 316 stainless-steel anchor bolts.
b. Face of Basin or Offset Mounting: Heavily reinforced, adjustable wall bracket with required anchor hardware using Type 316 stainless steel.

4. Actuator Mounting Requirements:

a. Manual Actuator: Cast iron handwheel on top of floor stand with dual ball type thrust bearings, grease fitting on bearing bowl, hardened machined alloy bronze lift nut (for rising stem). Where manual effort is greater than 40 lb rim pull with 2 feet diameter wheel, provide geared actuator with a handwheel or crank.

1) Handwheel casting to include the word “OPEN” and an arrow indicating the direction of operation.

b. Gearbox or Direct Powered Actuator: Through bolt holes matched to actuator or gearbox bolting pattern.

5. Non-rising stem position indicator: Mechanical indicator connected to and driven by stem extension and cast position marks on floor stand with the word “OPEN” cast at the top of the travel, and a field mounted aluminum “CLOSED” tag supplied with drive rivets, installed based on number of valve turns.
6. Rising Stem Position Indicator: Permanent markings on transparent stem covers.

B. Stem Covers: Fracture-resistant clear polycarbonate stem covers for rising stems. Closed top with position indicator markings.

C. Extension Stems and Stem Guides:

1. Extension stems and couplings to actuate recessed, buried, below slab valves and gates via operating nut or floor stand mounted actuator.
2. Stem Extensions and Stem Couplings: Alloy steel, hardware of Type 316 stainless steel unless specified otherwise in the respective slide gate specification.
3. Stem and Stem Couplings: Rated for five times the maximum input torque capacity of the actuator.
4. Adjustable, Cast Iron Wall Bracket Type Stem Guides: Include bronze bushing.
5. Spacing: 10 feet spacing or at spacing calculated by manufacturer to prevent buckling with a safety factor of 2 based on design thrust, shaft material and shaft size.

D. Torque Tubes:

1. Supply where shown on the Drawings or Valve and Gate Schedule.
2. Supported by/mated to valve bonnet/yoke.
3. Sized by supplier for the required actuator torque.
4. Drilled specifically for valve and actuator bolt pattern.
5. Internal extension keyed or shaped specifically to mate to valve shaft and fabricated of Type 316 stainless steel.
6. Internal extension designed for axial adjustment for mating purposes.

2.3 MANUAL ACTUATORS

A. Operating Nuts:

1. 2-inch cast iron AWWA design.

    a. Painted Carbon Steel Tee Handle Operator: 2-inch AWWA nut socket end extension length for nut actuated valves where nuts are recessed in valve boxes.
    b. Tee Extension Length: Determine based on nut height as shown on Drawings with handle height approximately 3 feet above operating surface.

2. Operating Nuts Recessed on Concrete: Cast iron floor box with cover and tee handle operator with 2-inch AWWA nut socket end.
3. Nut Operated Non-Rising Stem Buried Valves: Cast iron bonnet skirts, extension pipes valve box and cover. Stem extensions with AWWA nut end to elevation shown on the Drawings or scheduled.
4. Two tee handles for every ten buried or encased non-rising stem application with 2-inch AWWA operating nut.

B. Gear-Assisted Manual Valve Actuators:

1. Provide:

    a. For manually actuated valves and gates larger than 8 inch nominal diameter and for ball and plug valves 6 inch and larger.
    b. With power actuators where torque requirements dictate.

2. Comply with AWWA C504.
3. Handwheel Diameter: 8-inch
4. Maximum Handwheel Pull: 40 lbs maximum.

5. Housings: Cast or ductile iron.
6. Worm or helical gear type.
7. Gears: Hardened steel, machine cut and mated.
8. Bearings: Permanently lubricated bronze.
9. Input and Output Shafts: Sealed with greased, waterproof machine shaft seals.
10. Filled with waterproof grease and designed for submerged service where scheduled.
11. Handwheel: Removable.

    a. Diameter: 8-inch up to 12-inch valve size.
    b. Diameter: 12-inch diameter up to 16-inch valve size.
    c. Diameter: 18-inch diameter for larger than 16-inch valve size.
    d. Maximum Diameter: 24-inch diameter.

12. Include mechanical top mounted valve position indication, opening direction, and adjustable stops.

C. Chain Wheels:

1. Supply for manual valves 3-inchand larger mounted over 7 feet feet above the operating floor.
    a. Basis-of-Design: Trumbull, Model ‘Chain Up’ as manufactured by Trumbull Manufacturing. Inc., or equal.

6. Chain Wall Hooks: Include where feasible to prevent chain from impeding personnel egress.

D. Direct Manual Slide Gate Actuators:

1. Small Gates not Requiring Gear Reduction to Achieve Rim Pull Requirements: Yoke or floor stand mounted handwheel with dual ball type thrust bearings, grease fitting on bearing bowl, hardened machined alloy bronze lift nut.

E. Gear-Assisted Manual Slide Gate Actuators:

1. Provide manually actuated slide gates where direct mount actuators cannot meet rim pull requirements and design safety factors.
2. Include power actuators where torque requirements dictate.
3. Comply with AWWA C504.
4. Yoke mount for self-contained gates and floor stand mount for non-self-contained gates.
5. Accessories specified hereinabove where pertinent to the application.
6. Handwheel or crank style operator with maximum rim or crank pull of 40 lbs

    a. Crank operators of cast iron construction with revolving brass grip.
    b. Handwheel casting to include the word “OPEN” and an arrow indicating the direction of operation.

7. Gear Boxes:

    a. Bevel or parallel shaft as required by installation geometry.
    b. Fully enclosed cast or ductile iron housings.
    c. Suitable for pedestal or yoke (bench) mounting.

d. Mechanical seals on input shafting.
e. Shafting fully supported with anti-friction ball or roller bearings throughout.
f. Precision machined high strength bronze lift nuts.
g. Precision cut steel gears.
h. Input Shafts: Type 316 stainless steel.
i. AWWA drive nut for removable crank, wheel or portable power operator to be 2 inches
j. Single or compound reduction as required to achieve rim pull requirements.
k. No damage to gearbox components with 100 lbs rim pull.
l. Coordinate with gate stem design such that catastrophic failure occurs at stem nut prior to stem buckling.

8. Tandem gear drives where indicated on Gate Schedule. Tandem drives include parallel gear boxes, Type 316 stainless-steel interconnecting shafting, and flexible couplings furnished by the manufacturer.

2.4 ELECTRIC MOTOR ACTUATORS

A. General:

1. Where specified on the Valve and Gate Schedule.
2. Comply with AWWA C542.
3. Actuators for Valves 3 inches and Smaller: 120 Volt, 1 Phase, 60 Hertz power supply.

a. Actuators for Valves Larger than 3 inches and for slide gates and weir gates: 480 Volt, 3 Phase, 60 Hz power supply.

B. 120 Volt Power Actuators:

1. Actuators to have reversing motor, reduction gearing, local position indicator, position limit switches, provision for manual override, 100 to 1000 in-lbs torque range and motor thermal and electronic control protection.
2. Enclosure:

a. Cast aluminum or steel alloy.
b. Powder coated or fusion bonded epoxy finish.
c. NEMA 4X.

3. Power Train:

a. Self-locking planetary epicyclical gear design.
b. Hardened steel gears with bronze bearings.
c. Housing Penetrations: Seal with mechanical seals.
d. Housing: Equip with space heaters.
e. Mounting System: ISO 5211.

4. Actuator for Open/Close/Jog Reversing Service: Proportional/modulating service where required in the equipment specifications or Instrumentation Drawings.
5. Motors:

a. Design for valve actuation service.
b. Insulation: Class F.
c. Split phase capacitor protection.
d. Duty Cycle: 40 percent at 100 degrees F for open/close duty, and 100 percent for modulating duty.
e. 90-Degree Travel Time: 10 to 20 seconds depending on actuator size.
f. Actuator Switches: Have two SPDT 15 Amp rated switches for remote open/close valve position indication.

6. Products: Subject to compliance with requirements, provide one of the following or equal:

a. Series 92 as manufactured by Asahi/America.
b. EPM-6 by Hayward.
c. P Series as manufactured by Promation Engineering, Inc.
d. Or equal.

C. 480 Volt Power Actuators:

1. General: 2 phase 60 hz supply rated, self-contained, totally enclosed with motor, integral reversing starters, local controls, reduction gearing, limit switch gearing, limit switches, control power transformer, torque switches, bored and keyed drive sleeve for non-rising stems, declutch lever, auxiliary handwheel, and local position indication.
2. Separately seal motor and control compartments with space heaters in limit switch, motor, and control compartments.
3. Suitable for indoor and outdoor use, fully functional in ambient temperature range from 40 to 140 degrees F at 100 percent relative humidity.
4. Size to guarantee full travel, seating and unseating torque or thrust as specified by the valve or gate manufacturer.
5. Size to provide torque required to operate valve or gate at 90 percent of nominal voltage.
6. Design Travel Rate:

a. As indicated on valve and gate schedule, and if not so indicated:

1) Gate Valves and Slide Gates: 12 inches per minute.
2) Globe Valves: 4 inches per minute.
3) Quarter Turn Valves: 30 seconds per 1 foot of throat diameter.

7. Enclosure:

a. Cast iron construction.
b. NEMA 4X for watertightness from pressure hose.
c. NEMA 6 for submergence up to 6 feet for 30 minutes.
d. NEMA 6P for submergence up to 15 feet for 72 hours.
e. IP 68-8 for submergence up to 26 feet for 96 hours per EN 60529.
f. NEMA 7 for Class 1, Division 1 & 2, Groups C & D hazardous environment.
g. Operate successfully a minimum of 10 full cycles under submersion.
h. External Fasteners: Type 316 stainless steel.
i. Include anti-condensation heater, suitable for continuous operation with alarm output to indicate heater failure.

8. Motors:

    a. High-starting torque; low stall torque, low inertia, designed and built by actuator manufacturer.
    b. Embed thermistor in each motor winding for thermal protection.
    c. Insulation: Class F, with a duty rating of at least 15 minutes at 40 degrees F ambient temperature.
    d. Electrical disconnection by means of plug and socket. Allow motor removal without loss of lubricant.
    e. Hardware to ensure motor runs with correct rotation for required direction of valve travel regardless of power supply connection sequence.

9. Motor Protection:

    a. De-energize without damage in the event of a stall condition when attempting to move a jammed valve.
    b. De-energize in the event of an over-torque condition.
    c. Imbed a minimum of three thermal devices in motor windings to de-energize the motor in case of overheating.
    d. Lost phase protection algorithm.

10. Gear Train:

    a. Grease filled, O-ring sealed in cast or ductile iron gear case.
    b. Suitable for operation in any orientation.
    c. Hardened, machine cut steel gears, and precision machined alloy bronze worm gear.
    d. Reduction gearboxes as specified in Paragraph “Gear-Assisted Manual Valve Actuators.”

11. Manual Operation:

    a. Handwheel which does not rotate during motor operation.
    b. Output contact with declutch mechanism to indicate manual operation.
    c. Utilize actuator worm shaft/worm wheel to maintain self-locking gearing and to facilitate changeover from motor to manual operation when the actuator is under load. Do not use designs that bypass actuator worm gear or break valve load at worm gear.
    d. Automatic return from manual to motor operation upon starting motor.
    e. Manual operation capable with seized motor.

12. Position and Torque Calibration:

    a. Sensing by absolute encoder using hall effect sensors. Incremental encoders requiring batteries to retain settings upon loss of power are not acceptable. Settings stored in permanent non-volatile memory.
    b. Torque and travel adjustment parameters:

        1) Position Setting Range: 1 to 500 or 10 to 5,000 turns depending on the size of the valve, with resolution of 2.81 degrees and accuracy to 5.0 degrees of actuator output.

2) Torque Setting: 40 to 100 percent of rated torque.

c. Torque switch bypass for the torque sensing system to inhibit torque switch trip during unseating or during starting in mid-travel against high inertia loads.

13. Wiring and Terminals:

a. Tropical grade insulated stranded cable of appropriate size for the control and 3-phase power.
b. Include a removable plug and socket head for termination of all external wiring. Include actuators without plug and socket terminal connections having power and control disconnect switches for ease of maintenance and safety.

14. Controls:

a. Microprocessor: Based with mechanically and electronically interlocked reversing contactors for Open/Close duty and solid-state contactors for modulating duty.
b. Local/Off /Remote Selector Switch and Open/Stop/Close Pushbuttons: Mount on actuator face with red and green indication lights for open/close and amber for fault.
c. Remote On/Off Service: Actuator to accept one remote signal to open and a second remote signal to close.
d. Modulating Service: When in remote mode, actuator to accept a 4 to 20 mA DC position control signal and position valve 0 to 100 percent of travel in proportion to control signal.
e. Monitoring Relays: Remotely indicate fault signal for indication of power failure, phase failure, thermal switch tripped, torque switch tripped between travel stops, and Local-Off-Remote selector switch position.
f. Gear Actuated Position Transmitter: On modulating duty actuator that is a two-wire device, produce 4 to 20 mA DC signal proportional to 0 to 100 percent travel.
g. Transmitter: Have easily accessible zero and span adjustment potentiometers.
h. DC Power Supply: Integral with operator and powered from 110-volt AC internal transformer. Positioner board to provide repeatable accuracy to 0.25 percent of span and have separate trim pots for zero, span, and dead band adjustment.

15. Where noted in valve and gate schedules, actuators to have a digital control module to allow valves or gates to be positioned remotely via a 2-wire non-proprietary field bus protocol. Equip digital control module with serial communication ports to allow actuation by the Plant’s SCADA system linked by a 2-wire local area network utilizing Modbus function code (report by exception). Arrange in a self-healing ring configuration with multi-drop taps to each actuator.
16. Position Indication: Continuous mechanical dial indication of valve and gate position in step with the actuator at all times in both the hand wheel and motor operation. For modulating applications, graduations on mechanical dial position indicator to be 0 to 100 percent scale.
17. Limit Switches:

a. Adjustable type to trip at any point between fully opened and fully closed.
b. Mid-travel Switches: Provide as noted in valve and gate schedule.
c. Do not allow set position to be lost if over travel occurs in either manual or electric modes of operation.

d. Two independent and fully adjustable rotary type position limit switches each with 15 Amp DPDT contacts for remote open/close position indication.

18. Torque Switches: Actuator with adjustable torque switches and be responsive to load encountered in either direction of travel.
19. Terminal Compartment:

a. Separate from the inner electrical components of actuator with a watertight seal.
b. Three threaded cable entries.
c. Stud-type Terminals: Embed in a terminal block of high tracking-resistance compound.
d. Three-phase Power Terminals: Shroud from control terminals by means of an insulating cover.

20. Remote Control Stations:

a. For actuators located below the operating floor or located more than 7 feet above the operating floor, provide a UL Listed remote control station at the operating floor level with the same enclosure rating as the actuator.
b. Include a Local/Off/Remote selector switch, Open/Stop/Close pushbuttons and Open/Close indicating lights.

1) Local/Off/Remote selector to include padlock mount for the Off position.

c. Include auxiliary contacts for remote indication of switch position.

21. Manufacturers: Provide products by one of the following or equal.

a. IQ/IQM as manufactured by Rotork, Plc.

2.5 SOURCE QUALITY CONTROL

A. Factory Testing:

1. Shop inspect and test completed assemblies.
2. Factory performance test each actuator and supply individual test certificates. Submit test certificates prior to shipment of valve actuators. Test equipment to simulate a typical valve and gate load, and record the following parameters:

a. No load current.
b. Current at maximum torque setting.
c. Stall current.
d. Torque at maximum torque setting.
e. Stall torque.
f. Test voltage and frequency.
g. Flash test voltage.
h. Actuator output speed.

B. Owner Inspection:

1. Make completed valve and gate and actuator assembly available for inspection at manufacturer's factory prior to packaging for shipment.
2. Notify Owner at least seven days before inspection is allowed..

C. Certificate of Compliance:

1. If manufacturer is approved by authorities having jurisdiction, submit certificate of compliance indicating Work performed at manufacturer's facility conforms to Contract Documents.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify field dimensions are as indicated on Drawings.

3.2 INSTALLATION

A. Install products plumb, square, and true according to manufacturer’s published installation instructions.

B. Securely mount actuators using brackets or hardware specifically designed for attachment to valves/gates.

C. Extend chain actuators to 5-1/2 feet above operating floor level.

3.3 FIELD QUALITY CONTROL

A. After installation, inspect for proper supports and interferences according to manufacturer’s requirements and Section 400551 “Common Requirements for Process Valves”.

B. Repair damaged coatings with material equal to original coating as specified in Section 099676.56 “Wastewater Transmission System Coatings”.

3.4 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Perform adjustments during normal occupancy hours.

3.5 DEMONSTRATIONS

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain actuators.

1. Time Duration: Allow four hours during a single day.

END OF SECTION 400557

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SECTION 400562 - PLUG VALVES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes: Eccentric plug valves.

B. Related Requirements:

1. Section 400551 “Common Requirements for Process Valves”: Basic materials and methods related to valves commonly used for process systems.

1.3 SUBMITTALS

A. As specified in Section 400551 “Common Requirements for Process Valves”: Submittal requirements for compliance with this Section.

1.4 QUALITY ASSURANCE

A. Test valves in accordance with AWWA C517

B. Provide Installation Inspection and Operator Training per Section 400551.

C. Provide testing and inspection certificates.

PART 2 - PRODUCTS

2.1 ECCENTRIC PLUG VALVES – Tag Type PV1

A. Manufacturers:

1. DeZurik.
2. M&H Valve
3. Clow Valve Company; a subsidiary of McWane, Inc.
4. Henry Pratt Company; a Mueller brand.
5. Kennedy Valve Company; a division of McWane, Inc.
6. Val-Matic Valve & Manufacturing Corp..

B. Description:

1. As specified in Section 400551 “Common Requirements for Process Valves.
2. Type”:

    a. Offset disc type
    b. Non-lubricated
    c. Serviceable (able to be repacked) under full line pressure
    d. Eccentric.
    e. Capable of sealing in both directions at the rated pressure
    f. unobstructed flow path when open
    g. Drop tight shut-off to the full valve rating with pressure on either side of the plug.

3. Body:

    a. 30,000-psi tensile strength
    b. Top entry, bolted bonnet
    c. Body shall be cast with integral piping connections

4. Plug:

    a. To be removable without removing the valve from the line.
    b. To have an integral upper and lower shaft:

        1) seals on the upper and lower journals to prevent entrance of solids into the journals.

    c. one piece for all valves.

5. Bearings:

    a. Permanently lubricated

6. Minimum Working Pressure: Per valve schedule.

    a. At the above rated minimum working pressures, certified by the manufacturer as permitting zero leakage for a 5-minute duration with full pressure applied in either direction.

7. Maximum Process Fluid Temperature: 100 deg. F.
8. Ports:

    a. Configuration: Round or Rectangular.
    b. Minimum Port Area: 80 percent of nominal pipe area for valves 20 inches (500 mm) and smaller; 70 percent for valves larger than 20 inches (500 mm).

9. Seats:

    a. Full 360 degree seating by contact of a resilient seating material on the plug mating with welded-in seating surface in the body.
    b. Screw in body seats not acceptable.

c. Resilient and of the continuous interface type having consistent opening and closing torques.
d. Non-jamming in the closed position.

10. Stem Bearings: Self-lubricating.
11. Stem Seals:

a. Type: V-ring.
b. Externally adjustable and repackable without removing the bonnet from the valve, or self adjusting.

12. Packing and Gland: Accessible and externally adjustable.
13. End Connections:

a. Mechanical Joint: Comply with ANSI/AWWA C111/A21.11
b. Flanged: Comply with ASME B16.1 and B16.42.

C. Operation:

1. As specified in Section 400551 “Common Requirements for Process Valves”.

2. A suitably sized steel actuator mounting bracket shall be provided to provide an air gap between the actuator and the valve stem seal. Under no circumstance shall the gear box be mounted directly to the top body flange such that leakage could directly enter the gear box.
3. Provide adjustable limit stops for both opening and closing and a clearly marked position indicator.
4. 4 Inches (75 mm) and Smaller: Manual, provided with its own securely attached lever.
5. Greater Than 4 Inches (75 mm): Worm gear manual operators with handwheel.
6. Furnish chain wheel operators for valves mounted over 7 feet (2.3 m) above operating floor.

D. Materials:

1. Body:

a. Ductile iron, ASTM A536.
b. Lining: Fusion bonded epoxy, as specified in this section below, under finishes.

2. Plug:

a. Ductile iron, ASTM A536, Grade 65-45-12.
b. Lining: Buna-N

3. Seats: Nickel.
4. Stem: Type 316 stainless steel.
5. Stem Bearings: Stainless steel.
6. Seals: Buna-N.
7. Connecting Hardware: Type 316 stainless steel

E. Finishes:

1. As specified in Section 400551 “Common Requirements for Process Valves”.
2. Body, Internal and External, Including Bonnet: AWWA C550, Fusion Bonded Epoxy, 12-20 mils minimum thickness.

2.2 ROUND, FULL PORT PLUG VALVES – Tag Type PV2

A. Manufacturers:

1. VAG/GA ECO Centric.
2. Pratt Ballcentric.
3. Milliken.
4. Mueller.
5. Val-Matic Valve & Manufacturing Corp.

B. Round full port plug valves shall be equal in all respects as Tag Type PV1 except plug shape shall provide for a round, 100% open area viewing the open valve from the end.

C. Any plug valves greater than 12-inches will be PV-1; Any plug valves 12-inches and small will be PV-2.

2.3 SOURCE QUALITY CONTROL

A. As specified in Section 400551 “Common Requirements for Process Valves”.

B. Testing: Hydrostatic Test Per ANSI B16.1 and B16.5 .

C. Submit an affidavit of compliance stating that the valves have been manufactured and tested in accordance with AWWA C504-00, Section 5.2.4 and specifically list all exceptions.

PART 3 - EXECUTION

3.1 INSTALLATION

A. According to AWWA C517.

B. Horizontal Piping: Stem horizontal, Plug opening to crown of body.

C. Vertical Piping: Plug at top when closed.

D. Plugs: On top when open and on pressure side when closed.

END OF SECTION 400562

SECTION 400565.23 - CHECK VALVES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes: Check valves 3 inches (75 mm) and larger.

B. Related Requirements:

1. Section 400551 “Common Requirements for Process Valves”: Basic materials and methods related to valves commonly used for process systems.

1.3 COORDINATION

A. Section 400551 “Common Requirements for Process Valves”: valve schedule

B. Coordinate Work of this Section with piping and equipment connections as specified in other Sections and as indicated on Drawings.

1.4 SUBMITTALS

A. Comply with Section 400551 “Common Requirements for Process Valves”.

B. Product Data: Submit manufacturer's catalog information, indicating materials of construction and compliance with indicated standards.

C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

D. Source Quality-Control Submittals: Indicate results of factory tests and inspections and provide required certifications.

E. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

F. Qualifications Statement:

1.5 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of piping, valves and other appurtenances, connections, and invert elevations.

1.6 QUALITY ASSURANCE

A. Materials in Contact with Potable Water: Certified according to NSF 61 and NSF 372.

B. Perform Work according to City of Rome, New York standards.

C. Maintain a copy of each standard affecting Work of this Section on Site.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum five years' documented experience.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Comply with Section 400551 “Common Requirements for Process Valves”.

B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.

C. Store materials according to manufacturer instructions.

D. Protection:

1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
2. Protect valves and appurtenances by storing off ground.
3. Protect valve ends from entry of foreign materials by providing temporary covers and plugs.
4. Provide additional protection according to manufacturer instructions.

1.9 WARRANTY

A. Furnish five-year manufacturer's warranty for check valves.

PART 2 - PRODUCTS

2.1 IRON BODY SWING CHECK VALVES 4-INCH AND LARGER - Tag Type SCV1

A. Manufacturers:

1. Kennedy Valve,
2. GA Industries,
3. Valve and Gate Group,
4. Pratt, Mueller Co.,
5. Val-Matic
6. or approved equal.

B. Description:

1. Comply with AWWA C508.
2. Size: 4 inches (76 mm) and larger.
3. Type: Swing, metal disc, with hinge shaft extended from body, sealed with stuffing box, packing and gland. Furnish outside lever and control specified below or in valve schedule.
4. Seat: Resilient**.**
5. Minimum Working Pressure: 175 psig 4 to 12-inch diameter, 150 psig 14 to 30-inch diameter at _70 deg. F .
6. Maximum Fluid Temperature: 100 deg. F (38 deg. C).
7. Disc Controller:

    a. Adjustable weight.
    b. Air cylinder cushion..

8. Mounting: Horizontal or vertical.
9. End Connections: Flanged, ASME B16.42..

C. Materials:

1. Body and Cover: Ductile iron, ASTM A536.
2. Disc: Ductile iron, ASTM A536.
3. Seat: Field replaceable, Type 304 stainless steel.
4. Cover hardware: 316 stainless steel.
5. Chamber and Plunger: Bronze, ASTM B62.
6. Hinge Shaft and Key: Stainless steel.
7. Hinge Shaft Gland: A582 Type 416 Stainless Steel**.**
8. Packing and O-Ring: Reinforced Teflon .
9. Grease Fittings: 316 stainless steel.
10. Rubber Components: Viton.
11. Connecting Hardware: Type 304 stainless steel.

D. Finishes: As specified in Section 400551 “Common Requirements for Process Valves”.

2.2 SWING CHECK VALVES 3-INCH AND SMALLER: Tag Type SCV3

A. Manufacturer:

1. Solder or thread end Hammond 1B-940, or Jenkins Figure 996.
2. Flanged end Hammond 1R-1124 or Jenkins Figure 587J.

B. Description:

1. Comply with MSS SP-71, 80.

C. Finishes: As specified in Section 400551 “- Common Requirements for Process Valves”.

2.3 DUCK BILL CHECK VALVES 4-INCH AND SMALLER: Tag Type DBCV

A. Manufacturers:
1. Red Valve Company, Inc.
2. Or approved equal.

B. Description
1. Type: Duck bill
2. Minimum Working Pressure: 35 psi.
3. Maximum Fluid Temperature: 90 deg. F.
4. Mounting: Horizontal.
5. End Connections: Flanged, ASME B16.5.

C. Materials:
1. Body: EPDM
2. Retaining Rings: 316 stainless steel.
3. Flange: Elastomer

2.4 SOURCE QUALITY CONTROL

A. Section 400551 “Common Requirements for Process Valves”.

B. Testing:

1. Hydrostatically test check valves at twice rated pressure according to AWWA C508.
2. Permitted Leakage at Indicated Working Pressure: None.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that field dimensions are as indicated on Drawings.

B. Inspect existing flanges for nonstandard bolt-hole configurations or design and verify that new valve and flange mate properly.

3.2 PREPARATION

A. Thoroughly clean valves before installation.

B. Surface Preparation:

1. Touch up shop-primed surfaces with primer as specified in Section 099676.53 “Wastewater Transmission System Coatings”.
2. Solvent-clean surfaces that are not shop primed.

3. Clean surfaces to remove loose rust, mill scale, and other foreign substances by power wire brushing.
4. Prime surfaces as specified in Section 099676.53 “Wastewater Transmission System Coatings”.

3.3 INSTALLATION

A. According to AWWA C508 and manufacturer instructions.

B. Dielectric Fittings: Provide between dissimilar metals.

3.4 FIELD QUALITY CONTROL

A. Inspection:

1. Inspect for damage to valve lining or coating and for other defects that may be detrimental as determined by Architect/Engineer.
2. Repair damaged valve or provide new, undamaged valve.
3. After installation, inspect for proper supports and interferences.

B. Pressure test valves with piping.

3.5 CLEANING

A. Keep valve interior clean as installation progresses.

B. After installation, clean valve interior of soil, grit, loose mortar, and other debris.

END OF SECTION 400565.23

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SECTION 400574.23 - PINCH VALVES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes: Pinch valves.

B. Related Requirements:

1. Section 400551 “Common Requirements for Process Valves”: Basic materials and methods related to valves commonly used for process systems.

1.3 SUBMITTALS

A. As specified in Section 400551 “Common Requirements for Process Valves”: Submittal requirements for compliance with this Section.

B. Section 013300 “Submittal Procedures”: Requirements for submittals.

C. Product Data: Submit manufacturer information, indicating materials of construction and compliance with indicated standards.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

E. Manufacturer Instructions: Submit detailed instructions on installation requirements, including storage and handling procedures.

F. Source Quality-Control Submittals: Indicate results of factory tests and inspections.

G. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

H. Qualifications Statement:

1. Submit qualifications for manufacturer and installer.
2. Submit manufacturer’s approval of installer.

1.4 QUALITY ASSURANCE

A. Perform Work according to AWWA C110 standards.

B. Provide Installation Inspection and Operator Training per Section 400551.

C. Provide testing and inspection certificates.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum five years' documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Section 016000 “Product Requirements”: Requirements for transporting, handling, storing, and protecting products.

B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.

C. Store materials according to manufacturer instructions.

D. Protection:

1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
2. Provide additional protection according to manufacturer instructions.

1.7 EXISTING CONDITIONS

A. Field Measurements:

1. Verify field measurements prior to fabrication.
2. Indicate field measurements on Shop Drawings.

1.8 WARRANTY

A. Section 017700 “Closeout Procedures”: Requirements for warranties.

B. Furnish five-year manufacturer's warranty for pinch valves.

PART 2 - PRODUCTS

2.1 PINCH VALVES

A. Manufacturers:

1. Red Valve Company, Inc, Carnegie, PA;
2. Onyx Valve Company, Cinnaminson, NJ;

3. General Rubber FlexValve, South Hackensack, NJ;
4. Flowrox Oy, Finland

B. Description:

1. Service: Modulating
2. Type: Mechanically pinched
3. Design Capacity: 800 gpm
4. Type of Housing: Closed frame
5. Working Pressure: As indicated in valve schedule.
6. Maximum Pressure Drop: 14.3 PSID
7. Maximum Fluid Temperature: As indicated in valve schedule.
8. Sleeves: Cone with Positive Pull Tabs
9. Fluid Characteristics: Linear to quick-opening.
10. Rangeability: 10:1.
11. Leakage: ANSI V
12. Upper Pinch Bar Actuation: Manual and Electric. Actuation:
13. Stem: non-rising
14. Furnish electric actuators with handwheel.
15. Size: As indicated in valve schedule.
16. End Connections:

    a. Flanged.
    b. Comply with ASME B16.1 and B16.5

C. Materials:

1. Body: Cast Ductile iron, ASTM A536.
2. Sleeve: Viton lined

2.2 SOURCE QUALITY CONTROL

A. Section 014000 “Quality Requirements”: Requirements for testing, inspection, and analysis.

B. Provide shop inspection and testing of completed assembly.

C. Owner Inspection:

1. Make completed pinch valves available for inspection at manufacturer's factory prior to packaging for shipment.
2. Notify Owner at least seven days before inspection is allowed.
3. Upon request, manufacturer will provide sizing calculations showing cavitation range.

D. Owner Witnessing:

1. Allow witnessing of factory inspections and test at manufacturer's test facility.
2. Notify Owner at least seven days before inspections and tests are scheduled.

E. Certificate of Compliance:

1. If manufacturer is approved by authorities having jurisdiction, submit certificate of compliance indicating Work performed at manufacturer's facility conforms to Contract Documents.
2. Specified shop tests are not required for Work performed by approved manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. As specified in Section 400551 “Common Requirements for Process Valves”.

3.2 INSTALLATION

A. As specified in Section 400551 “Common Requirements for Process Valves”.

3.3 FIELD QUALITY CONTROL

A. As specified in Section 400551 “Common Requirements for Process Valves”.

END OF SECTION 400574.23

SECTION 400578.29 - COMBINATION AIR VALVES FOR WASTEWATER SERVICE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes: Combination air valves for wastewater treatment facilities.

B. Related Requirements:
1. Section 099679 Atmospheric Protection and Plant Service Areas Coatings : Preparing, priming, and painting surfaces, including field-applied and equipment finishing.
2. Section 400507 “Hangers and Supports for Process Piping”: Anchors and supports.
3. Section 400551 “Common Requirements for Process Valves”: Typical product and installation requirements for valves specified in this Section.
4. Section 404213 “Process Piping Insulation”: Insulation applied to process piping systems.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordination

1. Section 013100 “Project Management and Coordination”: Requirements for coordination.
2. Coordinate Work of this Section with installation of process piping.

B. PREINSTALLATION MEETINGS

1. Section 013100 “Project Management and Coordination”: Requirements for preinstallation meeting.
2. Section 400551 ”Common Requirements for Process Valves”.

1.4 ACTION SUBMITTALS

A. Section 013300 “Submittal Procedures”: Requirements for submittals.

B. Shop Drawings: Indicate materials, dimensions, weights, and end connections on assembly drawings.

1.5 INFORMATIONAL SUBMITTALS

A. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

B. Product Data: Submit manufacturer catalog information.

C. Manufacturer Instructions: Submit special procedures and setting dimensions.

D. Source Quality-Control Submittals: Indicate results of tests and inspections.

E. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections and provide required certifications.

F. Manufacturer Reports: Certify that equipment has been installed according to manufacturer instructions.

G. Qualifications Statements:
1. Submit qualifications for manufacturer and installer.
2. Submit manufacturer's approval of installer.

1.6 CLOSEOUT SUBMITTALS

A. Section 017700 “Closeout Procedures”: Requirements for submittals.

B. Project Record Documents: Record actual locations of combination air valves.

1.7 QUALITY ASSURANCE

A. Manufacturer Quality Management System: Certified to ISO 9001.

1.8 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum five years' documented experience.

B. Installer: Company specializing in performing Work of this Section with minimum five years' documented experience.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Section 016000 “Product Requirements”: Requirements for transporting, handling, storing, and protecting products.

B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.

C. Store materials according to manufacturer instructions.

D. Protection:

1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.

2. Furnish temporary end caps and closures on piping and fittings and maintain in place until installation.
3. Provide additional protection according to manufacturer instructions.

1.10 FIELD CONDITIONS

A. Field Measurements:

1. Verify field measurements prior to fabrication.
2. Indicate field measurements on Shop Drawings.

1.11 WARRANTY

A. Section 017700 “Closeout Procedures”: Requirements for warranties.

PART 2 - PRODUCTS

2.1 COMBINATION AIR VALVES FOR WASTEWATER SERVICE – Tag Type ASC

A. Manufacturers:

1. DeZURIK
2. Val-Matic Valve & Manufacturing Corp.

B. Description:

1. Type:

a. Fully automatic, float operated.
b. Body: Single.

2. Comply with AWWA C512.
3. Size: As indicated on Drawings.
4. Suitable for sewage service.
5. Provide with flushing capabilities.
6. Pressure Rating: 150 psig.
7. Combination air valves:
   a. perform the functions of an air/vacuum valve (exhaust large quantities of air on start-up, admits air on shut-down) and air release valves (release air continuously during operation) to maintain system efficiency and prevent pipeline surges.

C. Materials:

1. Body and Cover: Stainless steel, ASTM A351.
2. Float: Type 316 stainless steel.
3. Seats: Buna-N.
4. Seals: Buna-N.
5. Trim:

6. Hardware: Stainless steel

D. End Connections - Single Body:

1. Size 4 Inches and Smaller:

a. Threaded, NPT.
b. 1-Inch Valves: Furnish 2-inch inlet.

2. Backwash Accessories: Furnish three additional NPT connections.

E. Valve Body Connections:

1. Threaded, NPT.
2. Cleanout: 2 inches.
3. Drain: 1 inch.

F. Accessories:

1. Backwash accessories, including inlet shutoff valve, blowoff valve, rubber supply hose, and quick-disconnect couplings.

2.2 FINISHES

A. Prepare piping appurtenances for field finishes as specified in Section 099679 Atmospheric Protection and Plant Service Areas.

2.3 SOURCE QUALITY CONTROL

A. Section 014000 “Quality Requirements”: Requirements for testing, inspection, and analysis.

B. Provide shop inspection and testing of completed assembly.

C. Owner Inspection:

1. Make completed air release valve assembly available for inspection at manufacturer's factory prior to packaging for shipment.
2. Notify Owner at least seven days before inspection is allowed.

D. Owner Witnessing:

1. Allow witnessing of factory inspections and test at manufacturer's test facility.
2. Notify Owner at least seven days before inspections and tests are scheduled.

E. Certificate of Compliance:

1. If fabricator is approved by authorities having jurisdiction, submit certificate of compliance indicating Work performed at fabricator's facility conforms to Contract Documents.
2. Specified shop tests are not required for Work performed by approved fabricator.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 017300 “Execution”: Requirements for installation examination.

B. Verify that field dimensions are as indicated on Shop Drawings.

C. Inspect existing flanges for nonstandard bolt hole configurations or design and verify that new pipe and flanges mate properly.

3.2 PREPARATION

A. Section 017300 “Execution”: Requirements for installation preparation.

B. Thoroughly clean end connections before installation.

C. Close pipe and equipment openings with caps or plugs during installation.

D. Cleaning: Clean surfaces to remove foreign substances.

3.3 INSTALLATION

A. According to manufacturer instructions.

B. Provide access for operation, removal, and maintenance, and to avoid discharge to occupied areas or other equipment.

C. Vent the valve properly and pipe outlet to nearest drain or as directed by the Engineer.

3.4 FIELD QUALITY CONTROL

A. Section 014000 “Quality Requirements”: Requirements for inspecting and testing.

B. Inspect for interferences and proper supports.

C. Testing:

1. As specified in Section 400551 “Common Requirements for Process Valves”.
2. Demonstrate operation without undue noise or vibration.

D. Manufacturer Services: Furnish services of manufacturer's representative experienced in installation of products furnished under this Section for not less than 8 hours on Site for installation, inspection, startup, field testing, and instructing Owner's personnel in operation and maintenance of equipment.

E. Equipment Acceptance:

1. Adjust, repair, modify, or replace components failing to perform as specified and rerun tests.
2. Make final adjustments to equipment under direction of manufacturer's representative.
3. Repair damaged coatings with material equal to original coating.

F. Furnish installation certificate from equipment manufacturer's representative attesting that equipment has been properly installed and is ready for startup and testing.

3.5 CLEANING

A. Sections 017300 “Execution” and 017700 “Closeout Procedures”: Requirements for cleaning.

B. Keep interior of air release valves clean as installation progresses.

3.6 DEMONSTRATION

A. Section 017900 “Demonstration and Training”: Requirements for demonstration and training.

B. Demonstrate equipment startup, shutdown, routine maintenance, and emergency repair procedures to Owner's personnel.

END OF SECTION 400578.29

SECTION 431329 - SANITARY SEWERAGE PUMPS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Waste Transfer Pumps - Packaged, Direct In-Line, Wastewater-Pump Units.

B. Related Requirements:

1. Section 400519 “Ductile Iron Process Pipe” for piping and connections.
2. Section 400531 "Thermoplastic Process Pipe" for piping and connections.
3. Section 406717 “Industrial Enclosures”
4. Section 406733 “Panel Wiring”
5. Section 407816 “Indicating Lights”
6. Section 407819 “Switches and Push Buttons”
7. Section 407853 “Relays”
8. Section 407856 “Isolators, Intrinsically Safety Barriers and Surge Suppressors”

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings:

1. Include plans, elevations, sections, and mounting details.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.
4. Include diagrams for power, signal, and control wiring.
5. Include control panel layout drawn to scale for exterior and interior components and control panel wiring diagrams.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For pumps and controls, to include in operation and maintenance manuals.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Retain shipping flange protective covers and protective coatings during storage.

B. Protect bearings and couplings against damage.

C. Comply with manufacturer's written instructions for handling.

1.6 COORDINATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

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

B. UL Compliance: Comply with UL 778 for motor-operated water pumps.

2.2 PACKAGED WASTEWATER PUMP UNITS

A. Waste Transfer Pumps - Packaged, Direct In-Line, Wastewater-Pump Units:

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

a. Industrial Flow Solutions; Overwatch Model OW 151BC/6VV.
b. Or approved equal.

2. Description: Duplex direct in-line pumping system, factory-assembled and -tested, manual-operation, floor-mounted.
3. Pump Type:

a. Pumps shall be designed to accommodate design flows with one pump with redundant pump in back up.
b. The direct in-line pump shall have a 100% reserve peak pumping capacity (dual pumps). Pump operations shall be set to achieve maximum efficiency as determined by the actual flow rate.
c. The power source, voltage, and phasing shall be verified with the engineer and manufacturer prior to construction.

d. Pumps shall be furnished complete with motor mounting assembly and valves required for installation and operation.
e. Direct inline pumps shall be installed in such a way that solids are fed in an upward flow direction to the impeller.
f. The pump and controls shall be tested in the factory prior to shipping.

4. Pump Body:

a. 304L stainless steel body and cover.
b. Stone trap with clean out access integral to unit to collect large solids which cannot be passed through the unit.
c. All wetted fasteners shall be made of 304L stainless steel.

5. Impeller:

a. Conical vortex impellers shall be constructed with a detachable pumping face secured to the impeller hub by fasteners to allow for replacement of the hydraulics without removal of the mechanical seal from the shaft.
b. Capable of pumping liquids with up to 10% air/gas entrained without air binding.
c. Impeller hubs shall be keyed and bolted to the motor shaft with an O-ring for sealing.

6. Motor:

a. Motor and housing shall be designed to be TEFC. Motors shall be sealed, IP67 immersible type. The motors shall be sized so that they will not be overloaded at their rated capacity at any point on the pump performance curve.
b. Motors shall be squirrel cage induction type housed in cast iron body. Motors shall be NEMA B-design, insulation shall be minimum Class F for continuous duty in 40 degree C ambient temperature, C-Face, round body, and inverter ready.
c. Motor shall have two heavy duty ball bearings to support pump impeller and take radial and thrust loads.
d. Pump motor cables shall be shielded and suitable for VFD applications. Cable sizing shall conform to NEC requirements for the full load currents of the motors.

7. Seal: Mechanical.

a. Single mechanical seal lubricated by the pumped liquid.
b. The seal shall be independent of the direction of rotation and require no routine maintenance.
c. Seal faces shall be Tungsten carbide/Tungsten Carbide or Tungsten Carbide/Silicon Carbide.

8. Power Cord: Three-conductor, waterproof cable of length required, but not less than 72 inches and with grounding plug and cable-sealing assembly for connection at pump.
9. Instruments:

a. All controls and accessories shall be of the pump manufacturer’s model and type specified and shall be included by the manufacturer in accordance with the following requirements:

10. Waste Transfer Control Panel (LCP-1010):

    a. Control panel enclosure equipment and requirements are specified in Sections noted in paragraph 1.2.B., “Related Requirements”. Control panel to be built in accordance with all of these requirements and spare parts provided as noted.

    b. Control panel to meet the following general electrical requirements:

        1) Comply with NEMA 250: Enclosures for Electrical Equipment (1000 Volts Maximum)
        2) Comply with NEMA ICS 6: Industrial Control and Systems: Enclosures.
        3) Comply with NFPA 70.
        4) Comply with UL 508A.
        5) Control panel shall be equipped with individual motor lock out tag out disconnect switches. Comply with UL 98.
        6) Control panel shall operate on a power supply of 480 volts, 3-phase, 60 hertz.
        7) Surface-mounted cabinet rated NEMA 4X, Type 316 stainless steel, minimum 14 gauge certified industrial control panel.
        8) Control panel shall have a minimum overall short-circuit current rating (SCCR) of 65kA.
        9) Control panel shall be equipped with a UL 98, inner door interlocked fused main disconnect switch.
        10) Control panel consists of a main circuit breaker, motor circuit protector (MCP) and motor controller for each motor, and a control power transformer 120V secondary (fused on primary and secondary) along with other devices specified. Mount all control components in one common enclosure. Starter control panel sized to match voltage and horsepower of the motor to be controlled.

            a) Main Breaker: Thermal-magnetic air circuit breaker, Schneider Electric/Square D PowerPact Type or approved equal. Ratings for Continuous and Short Circuit Current: Matching upstream protective device.
            b) MCP: Molded case motor circuit protector with adjustable magnetic trip only, Schneider Electric/Square D “Mag-Gard” or equal.
            c) Motor Controller: Full Voltage Motor Starting. Open frame, across-the-line, NEMA-rated magnetic motor starter, Schneider Electric/Square D Class 8536 or equal. Solid state overloads with Class 10/20 selectable tripping. Submersible motors shall use Class 10 trip curve.

        11) SPD: The control panel shall be provided with a surge protective device (SPD) rated for 100kA per mode for the incoming power. SPD shall be mounted within the control panel enclosure. Lead lengths shall not be longer than 12 inches from the main circuit breaker.
        12) A duplex GFCI utility receptacle (circuit breaker protected) providing 120 volts, 60 Hertz, single phase current shall be mounted on the side of the enclosure.

c. Provide the following on the front of the control panel

1) Pump On-Off selector switches
2) Status indicating pilot lights for each pump for pump running, pump fault, pump motor high temperature and high waste storage tank level.
3) Alarm horn: weatherproof rated with gasket (Federal Signal Corporation, Cat. #350 or equal) for NEMA 4X applications. Horn shall activate on high tank level only.
4) Alarm beacon: Red lens and solid-state flasher (Ingam Products Inc. LRX-40 or equal) for NEMA 4X applications. Beacon shall activate on high tank level only.
5) Silence and reset pushbuttons shall also be furnished. A common failure/alarm reset pushbutton shall be provided to reset any alarm condition (reset shall occur only if fault condition has been cleared).

d. The system shall communicate with plant SCADA system by providing interposing relays for the following digital signals as shown on drawing I-3:

1) Pump "Running" status for each pump
2) Pump "Fault" (common alarm for any pump fault condition) for each pump.
3) Waste Storage Tank High Level

e. Interlocks:

1) A Waste Storage Tank High Level signal will be wired to this control panel for use as an interlock. If the tank level remains high for more than 10 seconds (operator adjustable between 0-2 minutes), the transfer pumps will shutdown and horn and beacon are activated.
2) The transfer pumps will not be able to be restarted until all active alarm conditions are cleared and alarm reset pushbutton is pressed.

11. Pump Discharge Piping: Factory or field fabricated, ASTM F714, Schedule 80, HDPE pipe with ASTM D3261 or F2206 fittings.
12. Capacities and Characteristics:

a. Service: Landfill leachate/wastewater
b. Pump Operation: Constant Speed.
c. Maximum Anticipated Pumped Fluid Temperature: 90 degrees F.
d. Intermediate (Design) Point Flow Rate: 450 gpm.
e. Minimum Total Dynamic Head at Intermediate (Design) point Flow Rate: 17.49 feet.
f. Maximum Total Dynamic Head at Intermediate (Design) point Flow Rate: 47.49 feet.
g. Minimum Overall Efficiency at Intermediate (Design) point Flow Rate: 35%
h. Best Efficiency Point (BEP) Flow Rate Acceptable Range (minimum/maximum): 780/840 gpm.
i. Minium Overall Efficiency at BEP: 42.5%
j. BEP location Relative to Intermediate Design Point: Right
k. Inlet Pipe Size: 12 inches.
l. Discharge Pipe Size: 8 inches.
m. Speed: 1800 rpm.

n. Motor Horsepower: 20 hp.
o. Electrical Characteristics:

1) Volts: 480 V ac.
2) Phases: 3.
3) Hertz: 60.

13. Warranty: The manufacturer shall warrant the pump unit against defects in workmanship and material for a period of one year from delivery under normal use, operation and service; or 18 months from shipment, whichever occurs first.

14. Manufacturer will supply knife gate valves as shown on the valve schedule on the Contract Drawings. Knife gate valves will be compatible with pumped fluid contents, consistent with the pumping system, and will aid in flow control during maintenance of the pumps.

2.3 MOTORS

A. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Section 220513 "Common Motor Requirements for Plumbing Equipment."

1. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.

B. Motors for submersible pumps shall be hermetically sealed.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in for plumbing piping to verify actual locations of sanitary drainage and vent piping connections before sewage pump installation.

3.2 INSTALLATION

A. Pump Installation Standards:

1. Comply with HI 1.4 for installation of centrifugal pumps.
2. Comply with HI 3.1-3.5 for installation of progressing-cavity sewage pumps.

B. Wiring Method: Comply with requirements in Division 26.

C. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.

3.3 CONNECTIONS

A. Comply with requirements for piping specified in Section 400519 “Ductile Iron Process Pipe” and 400531 "Thermoplastic Process Piping." Drawings indicate general arrangement of piping, fittings, and specialties.

B. Where installing piping adjacent to equipment, allow space for service and maintenance.

3.4 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to test, inspect, and adjust components, assemblies, and equipment installations, including connections.

B. Perform the following tests and inspections:

1. Perform each visual and mechanical inspection.
2. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
3. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
5. Test all signals connected to plant control system to ensure they are functioning properly and perform test with control system programmer.

C. Pumps and controls will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

3.5 STARTUP SERVICE

A. Perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.

3.6 ADJUSTING

A. Adjust pumps to function smoothly, and lubricate as recommended by manufacturer.

B. Adjust control set points.

3.7 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain controls and pumps.

END OF SECTION 431329

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SECTION 432513 - SUBMERSIBLE SOLIDS HANDLING PUMPS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Submersible Solids Handling Pumps: Including their respective motors.

    a. Main Pump Station Mounting Configuration: Dry pit.
    b. Filtrate Pump Station Mounting Configuration: Wet Pit

2. Pump manufacturer shall have unit responsibility for the pumping system. Manufacturer Supervisory and Support Services shall be provided during installation and field testing of each unit and instruction of the regular operating personnel in the proper care, operation and maintenance of the equipment.

B. Related Requirements:

1. Section 033000 “Cast-in-place Concrete”: Concrete Work, except anchor bolts which are as recommended by (pump) Manufacturer furnished by the Contractor.
2. Section 055000 “Metal Fabrications” for fasteners, brackets, and other miscellaneous metal fabrications as required by this Section.
3. Section 099679 “Atmospheric Protection and Plant Service Areas Coatings” for priming in shop fabrication and field painting.
4. Division 26: Electrical Work.
5. Section 260519 “Low-Voltage Electrical Power Conductors and Cables” for connections and terminations.
6. Section 262923 “Variable Frequency Motor Controller”: Manufacturer to coordinate their design with the supplier of the variable frequency drives.
7. Division 40: Valves, mechanical piping and appurtenances and pipe hangers and supports related to process mechanical work.
8. Section 406717 “Industrial Enclosures”
9. Section 406733 “Panel Wiring”
10. Section 407276 “Level Switches” (Float Switches)
11. Section 407816 “Indicating Lights”
12. Section 407819 “Switches and Push Buttons”
13. Section 407853 “Relays”
14. Section 407856 “Isolators, Intrinsically Safety Barriers and Surge Suppressors”

1.3 COORDINATION

A. Section 013100 “Project Management and Coordination”.

B. Coordinate installation and startup of Work of this Section with Owner’s operations.

1.4 ACTION SUBMITTALS

A. Section 013300 “Submittal Procedures”: Requirements for submittals.

B. Product Data:

1. Total Weight of Equipment: Include weight of single largest item.
2. Materials List: A complete materials table for all equipment establishing compliance with these specifications..
3. Bill of Materials: complete total bill of materials of all equipment.
4. Manufacturer's Recommended Spare Parts List:

    a. Manufacturer's current price for each item.
    b. Include gaskets, seals, etc.
    c. List bearings by bearing manufacturer's numbers only.

C. Shop Drawings:

1. Certified dimensional drawings showing details of pump construction and auxiliary apparatus.
2. Wiring Diagrams and Schematics: Power and control systems. Wiring requirements between system components, motors, sensors, control panels, and related systems.
3. Motor Data: Including, but not limited to the following.

    a. Type of enclosure design.
    b. Rated horsepower.
    c. Rated voltage.
    d. FLA.
    e. Starting current.
    f. LRA.
    g. LR KVA.
    h. NEMA starting code letter and insulation code letter.
    i. RPM.
    j. Input power in kW at nameplate rating.
    k. Starting calculations.
    l. Cable size.
    m. Efficiency: At 50, 75, and 100 percent load.
    n. Power Factor: At 50, 75, and 100 percent load.
    o. Winding temperature rise.
    p. Vibration design limits.
    q. Speed torque curves.
    r. Trip and Alarm Settings: For temperature protective devices.
    s. Power and control cable size.
    t. Materials of construction.

u. Cable sealing method.
v. Description of motor thermal protection and insulation system.
w. Service factor.

4. Include control panel layout drawn to scale for exterior and interior components and control panel wiring diagrams.

D. Manufacturer's Certificate:

1. Motor Manufacturer Certification: minimum of 8 evenly spaced starts per hour and continuous operation on furnished motor starter or VFD power supply without affecting bearings and windings design life.
2. Manufacturer's Installation Certification: Installation is per Manufacturer's installation, operation and maintenance manuals; a specified in PART 3.
3. Manufacturer's Field Report: As specified in PART 3.

1.5 DELEGATED DESIGN SUBMITTALS

A. Pump Supports: Design details, anchor bolt locations, sizing information, and installation requirements. Anchorage design and engineering calculations for pump components signed and sealed by a structural engineer licensed in the State of New York

1.6 INFORMATIONAL SUBMITTALS

A. Test and Evaluation Reports:

1. Proposed Pump Factory Test Plan: Description. Include procedures and equipment.
2. Proposed Field Test Plan: Description. Include procedures and equipment.
3. Factory and Field Performance Test Data: For Approval. As specified in PART 2 and 3.
4. Milestone Schedule: Factory inspection, testing, shipping, and job site delivery.

B. Manufacturer's Instructions: Detailed instructions on installation, requirements, storage and handling procedures.

C. Field Quality-Control Submittals: Identify the entity and qualified individual who will inspect the installation in accordance with "Inspection and Testing" Article in Part 3.

D. Qualifications Statement: Submit qualifications for Manufacturer.

E. Complete description of surface preparation and shop painting for pumps and motors.

F. Critical Speed Analyses Report: Include Campbell diagrams, backup documentation, and Statement of Guarantee.

1. Statement of Guarantee: Critical speed analyses as required in the "Quality Assurance" Article of this Specification has been completed and the specified limitations/separation margins are met.

G. Design Data, Characteristics and Performance:

1. Guaranteed performance curves per ANSI/HI 11.6.

    a. Grade 1U for specified (intermediate) design point.
    b. Grade 1E for other specified points.
    c. Actual factory tests results of similar units, showing they met specified requirements for total head (TH), flow rate, overall efficiency, guaranteed maximum net positive suction head required (NPSH3), submergence, and horsepower.

2. Submit curves on 8-1/2 by 11 inch sheets, as large a scale as practical. Plot from zero flow at shut-off head to pump flow rate at minimum specified total head (TH).
3. The POR and AOR per ANSI/HI 9.6.3 shall be clearly shown on the curves.
4. Catalog sheets showing a family of curves are not acceptable.

H. Warranty Information: Demonstrate conformance to “Warranty Article.”

1. Authorized Warranty Center: Within a 3-day shipping radius of job site; fully staffed with factory trained mechanics and equipped with stock of strategic spare parts for each pump model furnished for Project. Document warranty center location prior to delivery of equipment.

1.7 CLOSEOUT SUBMITTALS

A. Section 017000, “Execution and Closeout Requirements” for closeout procedures requirements.

B. Project Record Documents: Document actual locations and final orientation of equipment and accessories.

C. Operation and Maintenance Data Manual: As specified in Section 017823.

1. Prepare for this project installation. Include cuts, drawings, equipment lists, descriptions, etc. required to instruct operating and maintenance personnel unfamiliar with equipment.
2. Include trouble shooting data, full preventative maintenance schedules, and complete spare parts lists with ordering information.

1.8 MAINTENANCE MATERIAL SUBMITTALS

A. Manufacturer to Furnish the Following:

1. Special tools and test equipment required for proper servicing of equipment as specified. Furnish in a steel tool chest with lock and duplicate keys.
2. List of recommended spare parts, gaskets, lubricants, and sealants necessary for the first five years operation of each pumping system.
3. Furnish manufacturer’s recommended spare parts for each size pump:

    a. Include gaskets, packing, and related materials.
    b. List all bearings by the bearing manufacturer's numbers only.
    c. Include Manufacturer's current price for each item; pricing to remain in effect for not less than one year after Substantial Completion.

4. Furnish one shelf spare Filtrate Pump Station wet pit submersible pump.

1.9 QUALITY ASSURANCE

A. Manufacturer:

1. Coordination Responsibilities: Pumps, motors, VFDs, guide rails, and other auxiliary equipment.
2. Equipment Furnished: New, unused, and standard. Furnished with accessories required and meeting specified requirements.
3. Service Record: Successful five-year record servicing equipment and systems similar to that specified.
4. Certified to ISO 9001 Standard: For design and manufacture of submersible solids handling pumps.

B. Both Contractor and Manufacturer: Share responsibility for satisfactory installation and operation of entire pumping systems including pumps, motors, VFDs, and accessories.

C. Equipment Specified in this Section:

1. To be standard pumping equipment of proven ability.
2. Manufactured by companies experienced in production of equipment used in system applications as stated in the “System Description,” Article in Part 2.

    a. Manufacture per Hydraulic Institute Standards, unless otherwise specified.

3. Furnish from single manufacturer.
4. Must operate satisfactorily when installed as shown on Drawings, as specified, and as approved by Engineer.

D. Prior to Manufacture: Forward submittal to Engineer indicating the required vibration analyses outlined herein has been performed and specified limitations are met.

1. Dynamic Vibration Analysis:

    a. Minimum and maximum operating speeds: As specified in “Conditions of Operation” Article.
2. Maximum Vibration Velocity: Inches per Section RMS: Conform to ANSI/HI 11.6 requirements through pump operating range. Include displacement vibration results.

1.10 DELIVERY, STORAGE AND HANDLING

A. Section 016000, “Product Requirements” for transporting, handling, storing, and protecting products requirements.

B. Protect equipment and parts against damage during shipment.

C. Store equipment per Manufacturer's recommendations.

D. Long Term Storage: Protect and store parts so no damage or deterioration occurs during prolonged delays from time of fabrication to installation; per Manufacturer’s requirements.

1. On-Site Long-Term Storage: Follow Manufacturer's detailed long term storage requirements.

E. Factory Assembled Parts and Components: Do not dismantle for shipment without written permission from Engineer.

F. Finished Surfaces; Exposed Pump Openings: Protect with blank flanges of rigid wooden or equivalent material. Secure with bolts or other manufacturer approved means.

G. Unpainted Finished Iron or Steel Surfaces: Protect to prevent rust and corrosion.

H. After Hydrostatic or Other Tests: Drain entrapped water prior to shipment. Protect to prevent entrance of water and moisture during shipment, storage and handling.

I. Box or Package Markings: Contents and net weight.

J. Engineer’s Approval: Do not ship until given written approval by Engineer.

1.11 EXISTING CONDITIONS

A. Special Requirements:

1. Contractor required to make or verify field measurements prior to start of work.

B. Field Measurements: Verify prior to fabrication. Document on Shop Drawings.

1.12 WARRANTY

A. Section 017000, “Execution and Closeout” for warranties requirements.

B. Manufacturer Warranty: Pump and motor for period of five years. Prorated after initial 1.5 years.

1. Warranty Duration: Includes specified warranty period and as outlined in Divisions 01 and 00.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Main Pump Station: Pump raw wastewater from Wet Well to Aeration Tanks Distribution Chamber using dry pit submersible pumps in the Dry Pit.

1. Equipment Specified in this Section: Includes four dry pit submersible wastewater pumps, motors, and accessories.

2. Existing control panels and systems are to be reconnected as shown on the drawings.
3. Contractor to coordinate and be responsible for proper operation and compatibility between items in this scope of work and items in Division 40 scope.
4. VFDs are provided in Division 26 by Electrical Contractor.

B. Filtrate Pump Station: Pump raw wastewater from within Wet Pit to primary screen and grit chamber.

1. Equipment Specified in this Section: Includes one submersible wastewater pump, motor, guide rails, control panels and control systems, and accessories.
2. Contractor to coordinate and be responsible for proper operation and compatibility between items in this scope of work and items in Division 40 scope.

C. Pump Motors, Cables, and Appurtenances: Rated for operation in a damp/corrosive environment.

D. Pumping Units: Totally submersible, solids handling, rotodynamic with submersible close coupled inverter duty motors. Each unit to be aligned and balanced. Designed to pump raw wastewater. All parts shall be so designed and proportioned as to have liberal strength, stability, and stiffness and to be especially adapted for the work to be done. Ample room shall be provided for inspection, repairs, and adjustments.

1. Wet Pit Applications: Pumping units to be automatically connected to discharge piping when lowered into place on discharge connection, providing a water tight seal.

a. Pumps: Easily removable from discharge connections and wet well for inspection or service. Lifting pumps from discharge connections and wet well is not to require removal of fasteners or fastenings or require personnel to enter the pump well.

2. Components: Proportioned to have liberal strength, stability, and stiffness and especially adapted to meet specified requirements.
3. Provide ample room for inspection, repairs, and adjustments.

E. Baseplates or Base Elbows for Pumps: Rigidly and accurately anchored in position.

1. Anchor Bolts, Plates, Nuts and Washers: Furnished as specified.

F. Nameplates: Stainless steel. Permanently attached to each pump and/or motor.

1. Give name of manufacturer, rated flow rate, head, speed, and other pertinent data.
2. Wet Pit Applications: Contractor to install additional stainless steel nameplates on other above grade locations as instructed by Engineer. Orient and locate so pumps do not need to be moved to gather information.

2.2 CONDITIONS OF OPERATION

A. Manufacturers and Products: Provide pump units from one of the following:

1. Main Pump Station Dry Pit: Model XFP 405M-CB2, by Sulzer.
2. Filtrate Pump Station Wet Pit: Model NP 3085 MT 3~Adaptive 462, by Flygt.

3. Or equal substitution product meeting detailed requirements of this specification.
4. Pumps Within Each Service Type: Identical in every respect. All parts interchangeable.

B. Pumps: Designed for conditions of service tabulated as follows and operate within the system head curve envelope as appended.

1. Specific Speed Less Than 4,500 (US units): Continuously rising head performance curve, from runout toward shutoff. For stable pump operation from minimum head operating point to shut-off head.
2. Specific Speed Greater Than or Equal to 4,500: The intersection of pump head and system head curves to be used to demonstrate stable operation.
3. Pumps Operation Throughout Operating Range: Within vibration limitations specified in "Dynamic Vibration Analysis" Paragraph in the "Quality Assurance" Article in Part 1.
4. Pumping Units and Driving Equipment: To withstand maximum turbine run-away speed due to back flow through the pump.

C. Each pump is to be designed for the conditions of operation tabulated as follows.

Conditions of Operation – Main Pump Station Dry Pit	
Item Description	**Design Conditions**
Service	Screened Wastewater
Number of Pumps (operating/standby)	4 (3/1)
Maximum Motor Full Load Speed (FLS) (rpm)	890
Maximum Allowable Motor Horsepower (non-overloading throughout operating range) (HP)	85
Drive Type	VFD
Motor Design Voltage/Phase/Frequency	480/3/60
Maximum Anticipated Pumped Fluid Temperature (degrees F.)	90
Minimum Pump Discharge Size (inches)	16
Minimum Pump Suction Size (inches)	16
Minimum Pump Shut-Off Head at Motor FLS Acceptable Range (minimum/maximum) (feet)	15/54
Flow Rate at Secondary Operation Point (gpm)	6000
Minimum TH at Secondary Operation Point (feet)	37.5
Minimum Overall Efficiency at Secondary Operation Point (%)*	80.67
Maximum NPSH Required at Secondary Operation Point (feet)	17.5
Intermediate (Design) Point Flow Rate (gpm)	6806
Minimum TH at Intermediate (Design) Point Flow Rate (feet)	34.7
Minimum Overall Efficiency at Intermediate (Design) Point Flow Rate (%)*	80.50
Maximum NPSH Required at Intermediate (Design) Point Flow (feet)	19.0
Best Efficiency Point (BEP) Flow Rate Acceptable Range (minimum/maximum) (gpm)	6800/7200
Minimum Overall Efficiency at BEP (%)*	81
Primary Operation Point TH (feet)	34.7
Minimum Flow Rate at Primary Operation Point (gpm)	6682
Minimum Overall Efficiency at Primary Operation Point (%)*	80.28
Maximum NPSH Required at Primary Operation Point (feet)	18.5
Minimum Size Solids Passing (inches)	3

Conditions of Operation – Main Pump Station Dry Pit	
Item Description	**Design Conditions**

* Note that minimum overall efficiencies listed are "wire-to-water" in accordance with ANSI/HI 11.6 – latest edition.

Conditions of Operation – Filtrate Pump Station Wet Pit	
Item Description	**Design Conditions**
Service	Screened Wastewater
Number of Pumps (operating/standby)	1 (1/0)
Maximum Motor Full Load Speed (FLS) (rpm)	1700
Maximum Allowable Motor Horsepower (non-overloading throughout operating range) (HP)	3
Drive Type	Constant Speed
Motor Design Voltage/Phase/Frequency	460/3/60
Maximum Anticipated Pumped Fluid Temperature (degrees F.)	90
Minimum Pump Discharge Size (inches)	3
Minimum Base Elbow Discharge Size (inches)	4
Minimum Pump Shut-Off Head at Motor FLS Acceptable Range (minimum/maximum) (feet)	9/36.5
Intermediate (Design) Point Flow Rate (gpm)	445
Minimum TH at Intermediate (Design) Point Flow Rate (feet)	15.1
Minimum Overall Efficiency at Intermediate (Design) Point Flow Rate (%)*	60.6
Maximum NPSH Required at Intermediate (Design) Point Flow (feet)	12.5
Minimum Size Solids Passing (inches)	3
Minimum Water Level (inches)	12-3/16

* Note that minimum overall efficiencies listed are "wire-to-water" in accordance with ANSI/HI 11.6 – latest edition.

2.3 PUMP CONSTRUCTION

A. Overall Pump Design: Combine high efficiency and low required NPSH3.

1. Wastewater Applications: Handle high solids concentrations effectively. Impellers/Casings: Must have passage surfaces to which solid or fibrous materials cannot adhere. Capable of passing fibrous and nonwoven materials found in domestic wastewater. Permit low liquid velocities, gradual acceleration, and change of flow direction of pumped media.

B. External Pump and Motor Parts:

1. Dry-Pit Application: Water-tight close grained cast iron, ASTM A48 Class 35B construction, with all parts in contact with wastewater protected by corrosion resistant coatings.
2. Wet-Pit Application: Close grained cast iron, ASTM A48 Class 35B construction, with all parts in contact with wastewater protected by corrosion resistant coatings.
3. External Bolts and Nuts: Type 304 or 316 stainless steel.

C. Impellers:

1. Construction:

a. Dry-Pit Application: ASTM A48 Class 30 minimum gray cast iron. Dynamically balance impellers as specified below.
b. Wet-Pit Application: ASTM A48 Class 30 minimum gray cast iron. Dynamically balance impellers as specified below.

2. Rotodynamic: Two-plane dynamically balanced per ISO 1940-1 quality grade G2.5 standard to provide smooth, vibration free operation.

a. Wastewater Applications with Flushable Fibrous and Non-Woven Material:

1) Semi-open, solids handling type.
2) Capable of passing 3-inch minimum diameter solids due to internal clearances or other features facilitating solids processing including a wear plate with groove.
3) Wear Plate to Impeller Clearance: Easily adjustable without pump disassembly or the need to add or remove shims.
4) Impeller may include pump out vanes on upper shroud reducing axial thrust and minimize clogging due to debris accumulation around the mechanical seal.

b. Relatively Clean Wastewater:

1) Enclosed, solids handling type.
2) Capable of passing fibrous material, 4 inch minimum diameter solids.
3) Wear Ring: Type 316 stainless steel, fitted to impeller front shroud.

3. Enclosed or Semi Open Impeller Designs: Stationary wear ring or wear plate to have minimum 50 points Brinnell hardness greater than rotating wear ring or semi-open impeller vane tip hardness.
4. Alternative Materials and Design Approaches: Approved by Engineer.

D. Balanced Tandem Mechanical Shaft Seal System.

1. Upper (Inner) Tandem Seal Set:

a. Operate in seal lubricant chamber located just below the stator housing.
b. One Stationary Ring: Silicon carbide.
c. One Positively Driven Rotating Ring: Tungsten carbide or silicon carbide.
d. Function: Independent secondary barrier between pumped liquid and stator housing.

2. Lower (Outer) Tandem Seal Set:

a. One Stationary Ring: Tungsten carbide or silicon carbide.
b. One Positively Driven Rotating Ring: Tungsten carbide or silicon carbide.
c. Function: Primary barrier between pumped liquid and stator housing.
d. Each Interface: Held in contact by its own Hastelloy-C® or Elgiloy® spring system.

e. Seal Body: Type 316 stainless steel.
f. O-Rings: FKM (Viton).
g. Must require no maintenance and adjustment, but be easily inspected and replaced.
h. Provide pressure applied to outside diameter of face.
i. Not Acceptable: Conventional double mechanical shaft seals containing either a common single or double spring, acting between the upper and lower units.

E. Minimum Pump Discharge Size:

1. Wet-Pit Application: Minimum allowable nominal diameter of discharge connection provided for attachment to discharge piping, as shown on Drawings, except as allowed otherwise by this specification.
2. Dry-Pit Application: Minimum allowable nominal diameter of discharge piping, as shown on Drawings, except as allowed otherwise by this specification.
3. Unless Otherwise Noted: Diameter of opening at connection between pump and discharge to be the same as the minimum specified discharge size.

F. Pump Seal Against Discharge Connection:

1. Wet-Pit applications: Pump must tightly seal against discharge connection. Accomplish with simple linear downward motion of pumping unit guided by two guide rails No portion of the pump is to bear directly on the wet well floor.

a. Sliding Guide Bracket: An integral part of or bolted to the pumping unit.
b. Pump Casing Machined Connection System: For attachment of the ASTM A48, Class 35, cast iron discharge connection.
c. Sealing System: Positive leak proof system providing easy pump removal. Two machined metal-to-metal flanges or flanges with a replaceable rubber seal, form fitted to the machined discharge coupling.
d. Discharge Connection:

1) Rigidly and accurately anchored to floor of wet well.
2) Precisely leveled and aligned.
3) Completed Installation: Free from stress or distortion with type 316 stainless steel expansion anchor bolts, monel nuts and accessories.
4) Must receive the pump connection without need of any bolts or nuts.

2. Dry-Pit Applications:

a. Pump Casing Flange Connection: To attach to discharge piping. Machined per ASTM B16.1, 125 lb.
b. Pump Baseplate and Split Sole Plates: Rigidly and accurately located and anchored to concrete support base piers of dry pit arrangement as shown on Drawings and as specified.
c. Precision level and align. Installation to be free from stress or distortion.
d. Anchor Bolts: Type 316 stainless steel expansion, monel nuts and accessories.

1) Configuration and Installation: Per API RP 686 and ACI 318-08 where not in conflict with specifications.
2) Threads: Use Anti-seize compound of molybdenum disulfide base; Molycoat G or approved equal.

3) The use of shims or leveling nuts on anchor bolts is specifically prohibited.

e. Baseplate and Associated Accessories:

1) Size to support pump/motor assemblies and loads, including dynamic analysis results.
2) Pump Unit Handling: Lifting lugs or eye bolts, special slings, strongbacks, or other devices for loading, unloading, erection, installation, and subsequent disassembly and assembly.
3) Sole Plates: Under each pump baseplate.
4) Jacking Bolts: For leveling pump baseplate sole plate assembly.
5) Jacking Bolt Bearing Disks: A 1- inch diameter by 1/4 inch thick stainless steel disk, Disk edges in contact with epoxy grout must be radiused to a 1/2 inch radius to prevent stress risers in epoxy grout.
6) Plastic Vent Tubes: Sized recommended by manufacturer.
7) Anchor Bolt Layout: To aid in placement of anchor bolts.
8) Grout: Five Star DP Epoxy Grout; an expansive, non-shrink, low exothermic epoxy system, or approved equal. For use under sole plates supported by jack bolts.

G. Lifting Cable for Wet-Pit Applications:

1. Lifting Cable and Chain: Type 316 stainless steel cable and short piece of suitably sized Type 316 stainless steel chain between bail and cable.

a. Rating: Five times pump weight; minimum.
b. Combined Length: Equal to wet well depth; top slab finished grade to wet well bottom, plus six feet to permit raising pump for inspection and removal.

2. Attach lifting cable to a lifting bail on the pump.
3. Eyebolts are not an acceptable alternate to a lifting bail.

2.4 SUBMERSIBLE MOTORS

A. Pump Motors: housed in an air filled, water-tight casing.

1. Insulated Windings: Class F or better, non-hygroscopic and moisture resistant.
2. Motors Greater than 15 HP: Oil filled motor housings are not acceptable.
3. Motors 15 HP or Smaller: Oil filled motor housing is acceptable in dry pit applications.
4. Suitable for use with solid-state starters.
5. Motor Stator: Dipped and baked three times in VPI process and heat shrunk fitted into stator housing.

a. Alternative: Trickle impregnation method may be used for motor stator windings.
b. No penetrations of stator housing, such as bolts, pins or other fastening devices.

6. NEMA Design B;

a. Service Factor: 1.3, acceptable when VFD driven (non-sinusoidal power supply).

7. Insulation System: Rated at 155 degrees C or better.
8. Capable of continuous operation at ambient 40 degrees C with Class A temperature rise.
9. NEMA Starting Code G or H, or better.
10. Non-overloading. Capable of ten evenly spaced starts per hour.
11. Minimum Power Factor at Full Load: 0.80.

    a. Power Factor Correction Capacitors: By manufacturer if motor is below minimum power factor value for constant speed applications.

12. Motor Efficiency: As noted at the design point in part 2.2 above at full load to meet wire-to-water efficiency specified in "Conditions of Operation".

    a. The Main Pump Station Pumps shall have inverter duty rated motors and suitable for use with a VFD.

B. Pump Motor Cooling Characteristics:

1. Permit continuous operation in totally submerged condition.
2. Three overheat, self-resetting sensing devices: One in each motor winding. Trip at 140 degrees C**.** Wire devices into controls. If a device activates, pump must shut down.

C. Closed Loop Cooling Circuit:

1. Integrated Cooling Pump: Rated for continuous duty in completely dry mode and fully submerged condition without damage.
2. Cooling Jacket: Cast iron ASTM A48 class 30 or steel.
3. Coolant Pump Impeller: Mounted on motor shaft between tandem mechanical seals to circulate coolant fluid into top inter-space between cooling jacket and motor housing and over motor surface, through ducts in bearing housing and into a casing heat exchanger.
4. Heat Losses From Motor: Transfer to fluid pumped in casing heat exchanger, which forms a structural unit together with pump discharge cover. After passing through volute-casing heat exchanger, coolant returns to suction side of internal coolant pump (impeller).
5. Coolant: Environmentally safe glycol or food grade oil rated for use at temperatures of minus 20 degrees C .
6. Auxiliary Cooling Systems such as Fans or Blowers external of pump motor enclosure is not acceptable.

D. Non-overloading within range of operation between shutoff and low head run-out conditions shown on pump conditions of operation data table above.

1. Where specific speed is 4,500 or greater, the range from the pump head and system head curves intersection point and low-head run out conditions shall be used to demonstrate non-overloading over the range of operating conditions.
2. Wet Pit Applications: Capable of running continuously in totally dry condition under full load without damage for a cleaning cycle; 15 minutes maximum.

E. Pump/motor shaft: Type 420 or 431 stainless steel.

1. Operating at Pump Design Point:

    a. Shaft Deflection at Lower Seal Face: 0.2 mm maximum

b. Shaft Deflection at Wear Ring Area: 0.45 mm maximum.

2. Permanently lubricated ball bearings sized to withstand axial and radial forces.
3. Bearing Life: ABMA Minimum L-10: 100,000 hours rated at pump BEP.

F. Pump motor, its Appurtenances, and Cable: Capable of continuous submergence underwater without loss of watertight integrity to depth of 65feet. Mating surfaces: Machined, fitted with O-rings for watertight sealing.

G. Power and Control Cable Entry System: Design precluding specific torque requirements ensuring a water tight and submersible seal.

1. Certified by UL or FM to have passed pull-testing requirements.
2. Chamber and motor: Separated by a stator lead, sealing gland or terminal board, which isolates the motor interior from foreign material gaining access to pump motor top.
3. Field serviceable.
4. Entry Into Lead Connection Chamber: Epoxy encapsulated for positive moisture sealing. Cable Grommet: BUNA-N, in addition to epoxy sealed leads.

H. Power Cables, Conduits and Accessories:

1. Supply pumps with power and sensor conductors.
2. Pump motor cables: Sized to meet applicable NEC requirements.
3. Cables: Exceed industry standards for oil, gas and sewage resistance.

a. Type SPC or SEOW insulated cables with double jacketed protection system.

1) Outside: Neoprene or chlorinated polyethylene.
2) Inside: Synthetic rubber.

b. Individual conductors: Type RUW.
c. Sufficient length so cables are continuous between pump and disconnect. No splices allowed.
d. If more than one cable is provided per pump: Contractor must furnish and provide for installation of additional conduits, etc. as required for each additional cable.
e. One cable per conduit allowed at pump station.
f. Conduit: Sized per manufacturers recommendations. Not smaller than 3/4-inch.

4. Contractor: Furnish required stainless steel conduit hardware and fittings.
5. Water tight connectors equal to Crouse-Hinds Type "CGB", with neoprene lands to be furnished and installed in control panel enclosure or disconnect to terminate each conduit and seal each cable entry.
6. Conduit Seals: Equal to Crouse-Hinds Type "EYS".
7. Coordinate the installation of the above materials with the Manufacturer.

2.5 VARIABLE FREQUENCY DRIVES

A. Speed Control for Variable Speed Pumps: Variable Frequency Drives, as specified in Section 262923.25, suitable for installation as shown on the Drawings.

2.6 PUMP/MOTOR PROTECTION SYSTEM

A. Pump/Motor Protection System: To monitor machine temperature, and moisture.

1. Warning and shutdown protection.
2. UL listed.
3. Protective and Monitoring Sensors: Connected to electronic module which provides a signal from the pump/motor sensors to devices located in pump/motor protection equipment.
4. Modules: Manufactured by Benshaw, Sulzer, or equal.

B. Detailed Operational Data: Accessible via computers using common web browsers. No special software required.

1. Alternatively: Data may be transferred to a higher level distributed control system such as a Supervisory Control and Data Acquisition (SCADA) system.

C. Pump/Motor Protection System: Monitor each pump/motor's temperature and moisture (leakage).

D. Protection and Monitoring Sensors:

1. Over Heating Protection:

a. Motor Winding Bi-Metallic Thermal Switches or Thermistors: Quantity of three.

1) One installed in each motor stator phase winding. Connect in series to monitor and protect winding from over temperature operation.
2) Upon a High Temperature Event: Thermal switches shall open, activating an alarm and stopping the motor.

2. Temperature Probes: PT-100; Platinum, 100 ohm, 2 or 3-wire.

a. Accurate Temperature Monitoring of Bearings:

1) One installed in bearing housing holding the main bearing.

b. Direct Stator Temperature Read-Out of Winding:

1) One installed on a motor stator phase winding.

3. Water Intrusion Detection:

a. Motor Stator Chamber: Float-type moisture leakage sensor (stator FLS). If activated, FLS to activate an alarm.
b. Motor Electrical Connection (Cable Junction) Chamber: Float-type moisture leakage sensor (electrical connection FLS). If activated, FLS to activate an alarm.
c. Mechanical Seal Lubrication Chamber; Between Inner and Outer Mechanical Seals: Water-in-oil or water-in-air capacitive type moisture sensor. If activated, to activate an alarm.

4. Relays Associated with Monitoring and Protective Devices: Furnished by Manufacturer.

2.7 FILTRATE PUMP STATION CONTROL SYSTEM

A. Level Monitoring System – Float Switches (LSL.LSM & LSH-1040)

1. Provide three float switches, mounting/support hardware and termination box as specified in Section 407276 and as shown on drawing I-3 and I-4. Floats are to be mounted at elevations shown on drawing M-6.
2. A NEMA 4X, 316SS Intrinsic Safety Barrier (ISB) Panel is required for each of the three float switches. ISB's are specified in Section 407856.

B. Local Control Panel (LCP-1040)

a. Control panel enclosure equipment and requirements are specified in Sections noted in paragraph 1.2.B., "Related Requirements". Control panel to be built in accordance with all of these requirements and spare parts provided as noted.

1) Control panel to meet the general electrical requirements: Comply with NEMA 250: Enclosures for Electrical Equipment (1000 Volts Maximum)
2) Comply with NEMA ICS 6: Industrial Control and Systems: Enclosures.
3) Comply with NFPA 70.
4) Comply with UL 508A.
5) Control panel shall be equipped with individual motor lock out tag out disconnect switches. Comply with UL 98.
6) Control panel shall operate on a power supply of 480 volts, 3-phase, 60 hertz.
7) Surface-mounted, cabinet rated NEMA 4X, Type 316 stainless steel, minimum 14 gauge certified industrial control panel.
8) Control panel shall have a minimum overall short-circuit current rating (SCCR) of 65kA.
9) Control panel shall be equipped with a UL 98, inner door interlocked fused main disconnect switch.
10) Control panel consists of a main circuit breaker, motor circuit protector (MCP) and motor controller for each motor, and a control power transformer 120V secondary (fused on primary and secondary) along with other devices specified. Mount all control components in one common enclosure. Starter control panel sized to match voltage and horsepower of the motor to be controlled.

a) Main Breaker: Thermal-magnetic air circuit breaker, Schneider Electric/Square D PowerPact Type or approved equal. Ratings for Continuous and Short Circuit Current: Matching upstream protective device.
b) MCP: Molded case motor circuit protector with adjustable magnetic trip only, Schneider Electric/Square D "Mag-Gard" or equal.
c) Motor Controller: Full Voltage Motor Starting. Open frame, across-the-line, NEMA-rated magnetic motor starter, Schneider Electric/Square D Class 8536 or equal. Solid state overloads with Class 10/20 selectable tripping. Submersible motors shall use Class 10 trip curve.

11) SPD: The control panel shall be provided with a surge protective device (SPD) rated for 100kA per mode for the incoming power. SPD shall be mounted within the control panel enclosure. Lead lengths shall not be longer than 12 inches from the main circuit breaker.

b. Adhere to requirements for surge protection for all incoming signals entering this panel in accordance with specification Section 407856.

c. Provide Hand-Off-Auto selector switch, status indicating pilot lights for running motor fault, motor protection panel and high level alarm, an hour meter, alarm reset pushbutton. All of these items to be located on concealed door behind "dead front" door.

d. The system shall communicate with plant SCADA system by providing interposing relays for the following digital signals as shown on drawing I-3:

1) Filtrate Pump "Running" status
2) Filtrate Pump Fault (common alarm for any fault condition in panel including alarms from motor protection panel).
3) Filtrate Pump Station High Level Alarm
4) Filtrate Pump Station Low Level

e. Interlocks: When HOA selector switch is in Auto, the filtrate pump will automatically start and stop based on float LSM-1040 (On) and LSL-1040 (off) A high level float (LSH-1040) will trigger a high level alarm if float stays energized for more than 5 seconds (operator adjustable between 0-60 seconds). When HOA selector switch is in Hand, the sump pump will run. The filtrate pump will not be able to be restarted until all active alarm conditions are cleared and corresponding alarm reset pushbutton is pressed (either for Motor Protection alarms or general control panel alarm reset for fault and high level alarm).

2.8 GUIDE RAILS AND PUMP LIFTING DEVICE

A. Pumping Station: Furnish with necessary, stainless steel upper guide holder and level sensor cable holder.

B. Lower Guide Holders: Integral with discharge connection.

1. Dual guide rails: Schedule 40, welded 3 inch minimum diameter, Type 316 stainless steel pipe of length as required by Drawings.
2. Single guide rails and guide cables are not acceptable.

C. Intermediate Guide Brackets: Furnished and installed.

1. Unsupported Guide Rails: No longer than 20 feet, Type 316 stainless steel.

D. Cable Holders Including Cable Hooks: Fabricated from Type 316 stainless steel plate.

1. No sharp corners or edges that would abrade or cut electrical cable insulation.
2. Cable Holders: Sufficient length and strength to support each separate cable.

3. Pump power and lift cables may use the same hook position, provided cables do not foul one another and lift cable is easily accessed from hatch opening.

E. Chain and Latch Device: To facilitate pump removal from wet well without a series of incremental lifts. Design device to be lowered along guide rails and remotely latch to pump lifting bail without requiring wet well entry.

2.9 SHOP PAINTING

A. Pump and Associated Equipment: Shop-primed and finished-coated per Manufacturer's standard practice prior to shipment. Color: Manufacturer’s standard.

1. Touch-Up Paint: Supplied by Manufacturer.

B. Interior and Exterior Pump Surfaces, Motor Enclosure and Exterior and Interior of Cooling Jacket: Supplied with Manufacturer’s standard epoxy coatings. Cleaned, dry, free of rust, mill scale, grease, dirt, and other foreign matter.

C. Nameplates: Protect during painting.

2.10 SOURCE QUALITY CONTROL

A. General:

1. The Engineer has the right to inspect any equipment furnished under this Section prior to shipment from place of manufacture.
2. Notify Engineer in writing 30 days prior to initial shipment, so arrangements can be made for inspection by the Engineer.

B. Factory Pump Testing: Performed by Manufacturer.

1. Test pumps as described in ANSI/HI 11.6, American National Standard for Rotodynamic Submersible Pumps for Hydraulic Performance Acceptance Tests, as specified.

a. Submit for approval by Engineer the proposed pump factory test plan. Engineer to review in writing prior to testing. Include milestone schedule; factory inspection, testing, shipping, and job site delivery.

2. Perform hydrostatic test on pressure-containing components per ANSI/HI 11.6 on pumps prior to shipment.
3. Examine cast surfaces of components by visual inspection per MSS SP-55.
4. Factory pump tests are the basis of acceptance of hydraulic performance of pumps.

a. Factory test pumps prior to shipment per Hydraulic Institute standards.
b. Test and Record: Flow rate, total head, overall efficiency and input KW for at least five points on pump performance curve.

1) Include the points specified in “Conditions of Operation” Article in Part 2.

c. Pumps failing to meet specification requirements are required to be modified to meet specification requirements. If reasonable attempts to correct inefficiencies are unsuccessful, replace pumps with units meeting specified requirements.

5. Certified Pump Performance Curves: Submit test data to Engineer for approval prior to shipment. Include total head, flow rate, overall efficiency and total brake horsepower for each pump supplied.
6. If Manufacturer does not have historical test records for NPSH3 at specified design pump speed, test one pump to demonstrate NPSH3 versus flow rate. Any alternative testing shall be submitted to Engineer for review.
7. Meters, Gauges, and Other Test Instruments: Calibrated within manufacturer's established time period prior to scheduled test.

    a. Provide calibration certification data.
    b. If Manufacturer has no ISO standard calibration period, Hydraulic Institute Standards governs.

8. Test pumps at 100 percent of design speed. Determine reduced speed curves using affinity laws.
9. Test pumps through specified range of flow, and head/flow rate/ efficiency curves plotted at maximum output speed.

    a. During each test, run pumps at each head condition for sufficient time to accurately determine flow rate, head, power input, and efficiency.
    b. Determine the overall efficiency at each test point.
    c. Modify pumps under test until specified conditions are met or replace with pumps meeting specified conditions.

C. Dynamic Vibration Analysis

1. The dynamic vibration analysis required by the following paragraphs shall be performed by:

    a. Mechanical Solutions Inc. (MSI) of Whippany, NJ.
    b. DynaTech Engineering, Inc. of Auburn, CA.
    c. Engineering Dynamics Inc. (EDI) of San Antonio, TX.
    d. Or equal approved by the Engineer

2. Minimum and maximum operating speeds: As specified in “Conditions of Operation” Article.
3. Wet-pit Mounting: Conduct factory testing to demonstrate compliance with specified vibration characteristics when the wet pit mounted pumping system includes variable speed operation with motors at or above 90 HP or constant speed motors at or above 134 HP (100 kW).

    a. Equip each pump with a vibration sensor and data processor to measure and record the vibration velocity (inches per second RMS) and displacement (mils peak to peak).
    b. If operating speed range includes operation below 600 rpm over the full range of operating conditions specified. Test with setup that matches actual installation as closely as practicable and in accordance with ANSI/HI 11.6.

c. Submit specific test procedure for approval by Engineer a minimum of six weeks prior to the testing.

4. Dry-pit Mounting: Conduct factory testing to demonstrate compliance with specified vibration characteristics when variable speed operation with motors at or above 90 HP or constant speed motors at or above 134 HP (100 kW)

   a. Prior to manufacture, submit required vibration analyses outlined herein verifying that the specified requirements will be met.
   b. Minimum and maximum operating speeds will be in accordance with the operating speeds required to satisfy the conditions of operation.

5. Dry-pit Mounting: For VFD speed-controlled pumps below 90 HP.

   a. Prior to manufacture, submit a statement certifying that no torsional or lateral critical speeds are in or near the operating speed range based upon historical analysis results for the specified pump model.
   b. Match to proposed pump/motor confirming that the first torsional and lateral critical speeds are at least 20 percent above the maximum pump speed and blade pass frequency or 20 percent below the minimum pump speed, assumed to be 50 percent of the full load speed.

6. Factory test each pump, including the cables suspended as designed, to demonstrate that no harmful resonance of the system occurs under the following conditions:

   a. 1 times full speed.
   b. 2 times full speed.
   c. Number of vanes times running speed.
   d. Any bending mode natural frequencies within the operating range insert range for speed controlled pumps plus 20 percent separation margin above and below.
   e. Submit detailed test report with findings.

7. Structural Dynamic Analysis: The combined pump, motor, nearby foundation, and piping out to the first pipe restraint or expansion joint.

   a. Do not assume foundation is rigid.
   b. Incorporate foundation design shown on Drawings.
   c. Verify no first or second bending mode frequencies exist within a pump speed and vane pass frequency range from 20 percent below minimum operating speed recommended by manufacturer to 20 percent above maximum operating speed.

8. Lateral Rotodynamic Analysis:

   a. Identify and predict that first lateral critical speed is 20 percent above the maximum pump speed and vane pass frequency or 20 percent below the minimum pump speed.
   b. Any Pump Component Excited Resonant Frequency: No closer than plus or minus 20 percent of natural frequency of any part of installed assembled pumping unit.

      1) Any lateral rotordynamic frequencies not satisfying the plus or minus 20 percent margins must not result in a forced damped response allowing contact between shaft and journal bearings.

9. Campbell Diagrams: Submit documenting the following:

    a. Structural lateral.
    b. Rotating component lateral.
    c. Torsional analysis results.
    d. Graphically demonstrate the separation margins specified above.

10. Maximum Vibration Velocity, Inches per Section RMS: Conform to ANSI/HI 11.6 requirements through pump operating range. Include displacement vibration results.

PART 3 - EXECUTION

3.1 PREPARATION

A. Take necessary field measurements. Determine exact dimensions for Work and required sizes of equipment under this Contract. Verify all pertinent data and dimensions.

3.2 INSTALLATION

A. Install equipment per Manufacturer's instructions and recommendations in locations shown on the Drawings.

B. General: Unless instructed otherwise by Manufacturer's instructions.

1. Oil and Grease for Initial Operation: Supplied by Contractor.
2. Baseplates or Base Elbows for Pumps: Installed by Contractor conforming to Manufacturer recommendations and instructions.
3. Anchor Bolts: Set per Manufacturer's recommendations.
4. Pump Seal Against Discharge Connection:

    a. Baseplate and Associated Accessories: Installation requirements.

        1) Sole Plates: Install, level and grout per API RP 686, Chapter 5 – Mounting Plate Grouting.
        2) Jacking Bolts: Back off after grouting so they do not support any of the load.
        3) Jacking Bolt Bearing Disks: Placed under each jack bolt.
        4) Plastic Vent Tubes: Spaced as recommended by manufacturer.
        5) Grout: Mix and apply according to manufacturer's directions.
        6) Manufacturer Representative Presence: Is mandatory during pouring of epoxy grout as well as use of rigid non-absorbing formwork and a head box.
        7) Surface of formwork in contact with epoxy grout must be covered with a layer of paste wax to facilitate removal.
        8) Clearance between the concrete surface and bottom surfaces of sole plates to be per Manufacturer's recommendation.
        9) Concrete surface in contact with epoxy grout:

            a) Chipped to present a slightly rough surface and remove the laitance.
            b) The surface must then be cleaned of all dust, moisture and oil.

c) Place thin layer of leveling grout under jacking bolt bearing discs.
d) Place Plastic Vent Tubes: Sized and spaced per manufacturer's recommendation, under sole plates to vent air during grouting and prevent voids in epoxy grout.

10) Annular Space Between Anchor Bolts and Anchor Bolt Sleeve: Filled with expanding urethane foam.

a) Threads of anchor and jack bolts in contact with grout to be covered with paste wax and a layer of duct tape.
b) After alignment tolerances are met: Tighten anchor bolts snug to prevent movement during the pour.
c) Epoxy grout is not to extend above the top edge of the sole plates.
d) After the epoxy grout has fully cured, within 24 to 48 hours after pouring, remove jack bolts and tighten anchor bolts tightened to torque levels recommended by Manufacturer.

11) Threaded Jack Bolt Holes: Coat with grease. Clean jack bolts of paste wax and duct tape then reinsert and secure in position with a lock nut to within 1/4 inch of bottom of hole.
12) After grouting, chip and patch edges to present a smooth finish.

C. Upon Completion of Each Pump Application: Manufacturer shall inspect installation.

1. Satisfactory Inspection: Submit certificate stating equipment installation is satisfactory and meets Manufacturer’s installation, operation and maintenance manuals. State equipment is ready for operation, and operating personnel have been suitably instructed in operation, lubrication and maintenance of each unit.

D. Ensure Proper Installation: If Contractor does not provide qualified installation staff during installations, the Engineer may require Contractor to provide services of Manufacturer's factory representative to give necessary instruction and supervision.

3.3 INSPECTION AND TESTING

A. General:

1. Prior to Shipment from Place of Manufacture: Engineer reserves right to inspect furnished equipment meeting this Section’s specified requirements.

a. Manufacturer to notify Engineer in writing 30 business days prior to initial shipment, so arrangements may be made for inspection by Engineer.

2. Field Tests: Not be conducted until pumping system, including controls, is complete and ready for testing.

B. Field Pump Test:

1. Manufacturer to furnish services of a representative having complete knowledge of proper operation and maintenance to inspect final installation and supervise test run of equipment.

    a. Pump Pricing: Include minimum eight hours of representative's time for field pump testing.

2. Written Test Procedures: Submit to Engineer for approval 30 days prior to testing.
3. Contractor to furnish water, power, facilities, labor, materials, supplies and test instruments required to conduct field testing.
4. Final Acceptance Tests: Demonstrate these Specification requirements have been met by equipment as installed.

    a. Contractor to, at a minimum, verify the following:

        1) Pumping units are properly installed and in correct alignment.
        2) Correct lubrication per manufacturer's instructions.
        3) Correct direction of rotation of motors and reverse connections, if necessary.
        4) Pump units operate without overheating or overloading and without objectionable vibration.
        5) No mechanical defects in any of the parts.
        6) Pump units deliver specified total head and flow rate to demonstrate units generally meet requirements specified. Factory performance test is basis of pump acceptance.
        7) Sensors and controls perform satisfactorily as to sequence control, correct start and stop elevations, and proper level alarm functions.
        8) Signals connected to plant control system are functioning properly and tested with control system programmer.

5. If pump unit performance does not meet specifications, take corrective measures or remove and replace with pumps which satisfy conditions specified.
6. Continuous Operating Period: A five-day period of pump units’ operation is required before acceptance. Pump units failing during this period shall be repaired or replaced. Continuous operating period shall then be restarted; resetting run time to zero.

C. Field Vibration Testing: In presence of Engineer.

1. Small or Constant Speed Pump Units: Test per ANSI/HI 11.6 at full speed operation, by a minimum level III qualified vibration technician as defined by Vibration Institute or equivalent.

    a. Verify the Following:

        1) Compliance with specified limitations
        2) There are no field installed resonant conditions due to misalignment, the foundation, or connecting piping and its supports, when operating at any speed within the specified operating range.

2. Pumping Systems Variable Frequency Drives or Motors 100 HP or Larger: After installation, and as soon as conditions permit full speed operation.

a. Contractor to retain services of fully qualified independent mechanical vibration testing and analysis firm.

1) Acceptable Firms:

a) Mechanical Solutions Inc. (MSI) Whippany, NJ
b) Engineering Dynamics Inc. (EDI) San Antonio, TX
c) Other organization pre-approved by Engineer.

b. Perform detailed vibration signature analysis of units per ANSI/HI 11.6, including "Bump Tests" and X-Y vibration profiles.

1) Verify the following:

a) Compliance with the specified vibration limitations and
b) There are no field installed resonant conditions due to misalignment, the foundation, or the connecting piping and its supports, when operating at any speed within the specified operating range.

c. Testing Speeds:

1) Design full speed.
2) Design minimum speed.
3) A maximum of 3 Hz increments between minimum and full speed.

d. Written Report: Submit. Include detailed schematic drawings of pump units.

1) Indicating on schematics where and in which direction vibration readings were taken and recorded. Document the following on schematics.

a) Peak-to-peak displacement, in mils.
b) Frequency spectrum
c) Peak velocity level, in inches per second,
d) Velocity level, in inches per second RMS.

2) Report must contain a complete analysis of findings. Describe any problem encountered; probable cause, and specific recommendations for required corrective action.

e. When System is Furnished with Vibration and Temperature Monitoring System:

1) Motor vibration sensor may be used for acceptance testing.

2) Temporary surface mounted sensors mounted in vicinity of installed sensor is preferred to establish accuracy of permanently installed system.

f. Take Corrective Action if Required: Retest units to ensure full compliance with this Specification.
g. Costs for Field Testing and Required Corrective Actions: Borne by Contractor.
h. Follow Up Testing: Repeat vibration testing and analysis specified, six months after initial vibration signature testing.

1) Prepare report comparing six month and signature test results.
2) Significant worsening of vibration, as determined by Engineer, during six month tests shall require corrective action and retesting.

3. Take corrective action if required. Have units retested to ensure full compliance with the specified requirements. All costs associated with field tests or any required corrective action to be borne by the Contractor.

3.4 MANUFACTURER SERVICES INCLUDING OPERATING INSTRUCTIONS

A. Installation Inspection and Startup:

1. Contractor to include in bid price, providing services of Manufacturer's factory representative having complete knowledge of proper operation and maintenance.

a. Representative to instruct Owner representatives and Engineer on operation and maintenance.
b. Instruction may be conducted in conjunction with inspection, installation and start-up of pump units.
c. If there are difficulties in equipment operation due to design or fabrication, additional service to be provided until performance is as specified.
d. Listed Service Requirements: To be exclusive of travel time, and will not limit or relieve Contractor of obligation to provide sufficient service necessary to place equipment in satisfactory and functioning condition.

2. Installation Inspection: Complete review of installation per Section 014000 Quality Requirements.

a. Written Installation Certification: Installation is complete and operable in all respects, per Manufacturer's information and instructions and no conditions exist which may affect warranty.
b. Qualified supervisory services, including Manufacturers' Factory representatives, to be provided to ensure installation is done in a manner approved by Manufacturer.
c. Manufacturer's factory representative to supervise and approve**:**

1) Installation and alignment of pumps with motors.
2) Grouting.
3) Alignment of connecting piping and installation of field installed packing or mechanical seal.

d. Start-Up or Operation Difficulties due to Manufacturer's Design or Fabrication:

1) Manufacturer to provide additional service until performance is as specified.

e. Services of Manufacturer's factory representative and training to be provided when first pump unit is started, with follow-up visits upon start-up of each subsequent pump unit.
f. Minimum Time On-Site: One 8 hour day per pump.

3. Start-Up:

    a. Written Field Report. Summarize test procedures and results. Include tested and measured variables. Show installation meets performance requirements of this specification and project.
    b. Tested and Measured Variables: Including but not limited to the following.

        1) Flow rates.
        2) Total heads.
        3) Shaft-speed.
        4) Vibration measurements.

    c. Minimum Time On-Site: One 8 hour day per pump.

B. Training:

1. Field and classroom instruction on operation and maintenance of the equipment.

    a. Include start-up, shut-down troubleshooting, lubrication, maintenance, and safety.

2. Manufacturer to provide detailed manuals to supplement training courses.

    a. Include specific details of equipment supplied and operations specific to project.
    b. If required, make use of teaching aids, slide/video presentations, etc.

3. After Completing Training Services: Deliver training materials used by Manufacturer to Owner.
4. Minimum Time On-Site: One 8 hour day.

C. Contractor is solely responsible for the following:

1. Requesting inspection and training services
2. Coordinating requests with other relevant trades.
3. Ensuring effectiveness of Manufacturers' service.
4. If lack of coordination by Contractor results in need to recall Manufacturer’s factory representative, time lost will not be counted against above days.

END OF SECTION 432513

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ACTUATORS

SYMBOL	FEATURE
S	SOLENOID OPERATOR
	HAND WHEEL
M	MOTOR OPERATOR

FITTINGS

SYMBOL	FEATURE
	QUICK CONNECT COUPLING
	CONCENTRIC REDUCER
	ECCENTRIC REDUCER
	DRESSER TYPE CPLG
	UNION
	FLEXIBLE HOSE COUPLE
HC	HOSE COUPLING

VALVES & APPURTENCES

SYMBOL	FEATURE
	GATE VALVE
	PLUG VALVE
	SWING CHECK VALVE
	BALL VALVE
K	KNIFE GATE VALVE
S	SOLENOID VALVE
	RPZ ASSEMBLY
KCW	KNIFE GATE VALVE WITH CHAIN WHEEL OPERATOR
FM	FLOW METER

ABBREVIATIONS

A.O.B.E.	AS ORDERED BY ENGINEER	FT	FEET	RUB	RUBBER
ASTM	AMERICAN SOCIETY FOR TESTING MATERIALS	G	GAS	SST	STAINLESS STEEL TUBE
AT	AERATION TANK	GL	GLASS LINED	STA	STATION
BFP	BELT FILTER PRESS	HC	HOSE CONNECTION	ST	STEEL
BGS	BELOW GROUND SURFACE	HDPE	HIGH DENSITY POLYETHYLENE	TMP	THICKENED GREASE MIXING PUMP
CL	CENTERLINE	HMA	HOT MIX ASPHALT	TOT	TOP OF TIER
CMP	CORRUGATED METAL PIPE	HP	HIGH POINT	TOW	TOP OF WALL
CONC	CONCENTRIC	HYD	HYDRANT	TYP	TYPICAL
CPP	CORRUGATED PLASTIC PIPE	ID	INTERIOR DIAMETER	VERT	VERTICAL
CS	CARBON STEEL	IN	INCH	VF	VENDOR FURNISHED
CU	COPPER	LP	LOW POINT	W/	WITH
CW	CHAIN WHEEL	MAG	MAGNETIC	WV	WATER VALVE
DAFT	DISSOLVED AIR FLOTATION THICKENER	MAX	MAXIMUM		
DCD	DECIDUOUS	MH	MANHOLE		
DG	DIGESTER GAS	MIN	MINIMUM		
DI	DUCTILE IRON	NO	NUMBER		
DIA	DIAMETER	NTS	NOT TO SCALE		
ECC	ECCENTRIC	NYSDOT	NEW YORK STATE DEPARTMENT OF TRANSPORTATION		
E.W.	EACH WAY	O.C.	ON CENTER		
EXIST.	EXISTING	O.D.	OUTER DIAMETER		
FCA	FLANGED COUPLING ADAPTER	PE	POLYVINYL CHLORIDE		
FCV	FLOW CONTROL VALVE	PVC	POLYETHYLENE		
FF	FINISHED FLOOR	SS	STAINLESS STEEL		
FOT	FLAT SIDE ON TOP	RC	REINFORCED CONCRETE		
FRP	FIBERGLASS REINFORCED PIPE	RCCP	REINFORCED CONCRETE CYLINDER PIPE		
FST	FINAL SETTLING TANK	RED	REDUCER		
		REQD	REQUIRED		

PROCESS FLOW STREAMS & ABBREVIATIONS

D	DRAIN	PS	PLANT SEWER
DG	DIGESTED GAS	PSD	PLANT SEWER DRAIN
DS	DIGESTED SLUDGE	PSR	PLANT SEWER RETURN
EDW	EFFLUENT DISCHARGE WATER	PSL	PRIMARY SLUDGE
FE	FINAL EFFLUENT	RAS	RETURN ACTIVATED SLUDGE
FIL	FILTRATE	RS	RESIDUAL CHLORINE SAMPLE
FPS	FILTRATE PUMP STATION EFFLUENT	RT	RESIDUAL CHLORINE SAMPLE
GTO	GRAVITY THICKENER OVERFLOW	SB	SODIUM BISULFITE
HSOW	HIGH STRENGTH ORGSNIC WASTE	SC	SCUM
HSW	HIGH STRENGTH WASTE	SD	STORM DRAIN
HWR	HOT WATER RETURN	SHC	SODIUM HYPOCHLORITE
INF	INFLUENT	SS	SANITARY SEWER
LTE	LEACHATE TRANSFER EFFLUENT	SSL	SECONDARY SLUDGE
LTI	LEACHATE TRANSFER INFLUENT	THW	TEPID HOT WATER
NPW	NEW PLANT WATER	TS	THICKENED SLUDGE
OPW	OLD PLANT WATER	UE	UNDERGROUND ELECTRIC
OVF	OVERFLOW	W	POTABLE WATER
PEF	PRIMARY EFFLUENT	WAS	WASTE ACTIVATED SLUDGE
PIN	PRIMARY INFLUENT	WSH	WASH WATER

DETAIL CALL OUT SYMBOLS

DETAIL LETTER

E M-15 | A A-12

SHEET WHERE DETAIL

LEADER LINE

WHERE A NOTE IS REQUIRED FOR CLARITY, USE A/M-12 FORMAT IN THE NOTE INSTEAD OF BUBBLE. IF MULTIPLE DETAILS REFER TO THE SAME AREA OF THE DRAWING, THE BUBBLES SHOULD BE STACKED SIDE BY SIDE.

TIE POINT SYMBOL

TP 1 — TIE POINT

SECTION CUT SYMBOLS

1 A-12 — SECTION LINE — 1 A-12 — SECTION NUMBER

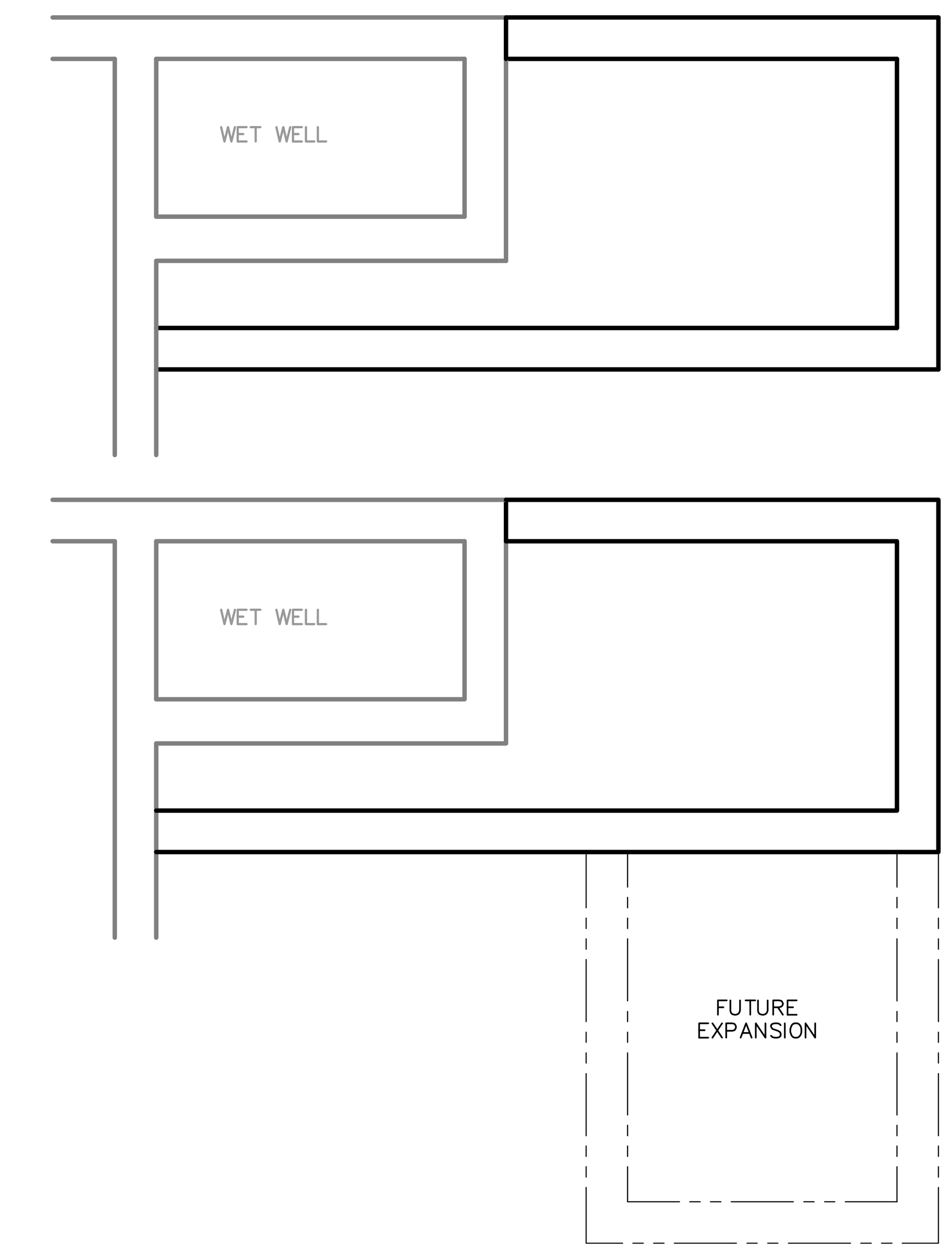
THIS SYMBOLOGY TO BE USED FOR SHORT SECTION CUTS ONLY

SHEET WHERE SECTION IS LOCATED IF THE SECTION IS SHOWN ON THE SAME SHEET IT IS CUT, THE SHEET NUMBER SHOULD BE REPLACED WITH A DASH.

CIVIL SYMBOLS LEGEND

LIGHT POLE	INDEX CONTOUR (1105)
UTILITY POLE	INTERMEDIATE CONTOUR (1106)
HYDRANT	DEMOLITION
VALVE	DUCT BANK
TEST PIT	MAPLE TREE
LIGHT POLE	OTHER FENCE
ELECTRIC MANHOLE	UNDERGROUND ELECTRIC
ELECTRIC RISER	UNDERGROUND GAS
GAS RISER	WATER LINE
SANITARY SEWER MANHOLE	NON POTABLE WATER LINE
CATCH BASIN	OVERHEAD WIRE
ROUND CATCH BASIN	CHLORINE LINE
STORM SEWER MANHOLE	
TRAFFIC HAND HOLE	
HYDRANT	
WATER SERVICE	
WATER SERVICE	

EXISTING OR FUTURE CONDITION DESIGNATION



DRAWING, SECTION AND DETAIL TITLES

SUBTITLE OR DESCRIPTION (AS REQ'D)

PLAN
1/4" = 1'-0"

SUBTITLE OR DESCRIPTION (AS REQ'D)

ELEVATION
1/4" = 1'-0"

SECTION 3/4" = 1'-0" — 1 S-6 — SECTION NUMBER; SHEET WHERE SECTION CUT IS TAKEN *

DETAIL 3/4" = 1'-0" — A A-3 — DETAIL LETTER; SHEET WHERE DETAIL IS TAKEN *

SCHEMATIC 3/4" = 1'-0" — 1 M-6 — SCHEMATIC NUMBER; SHEET WHERE SCHEMATIC IS TAKEN *

DIAGRAM 3/4" = 1'-0" — 1 I-6 — DIAGRAM NUMBER; SHEET WHERE DIAGRAM IS TAKEN *

* IF SECTION, DETAIL, SCHEMATIC OR DIAGRAM IS DRAWN ON THE SAME SHEET THAT IT IS TAKEN FROM, REPLACE THE SHEET NUMBER WITH A HYPHEN. IF THE SECTION IS REFERENCED ON MULTIPLE SHEETS, THE SHEET NUMBER SHOWN SHOULD INDICATE THE FIRST SHEET THE SECTION IS TAKEN FROM.

Page	Valve Number	Valve Type	Valve Type Description	Size	Service	Material	Joint Type	Operator	Power	Control
C-1	--	PV	PLUG VALVE	12"	RAS	DI	CLASS 125	MANUAL, HANDWHEEL	--	--
C-1	--	PV	PLUG VALVE	10"	RAS	DI	CLASS 125	MANUAL, HANDWHEEL	--	--
C-1	--	PV	PLUG VALVE	10"	RAS	DI	CLASS 125	MANUAL, HANDWHEEL	--	--
C-2	PV-1020-1	PV	PLUG VALVE	4"	WASTEWATER/LEACHATE	DI	CLASS 125	MANUAL GEAR W/OPERATING NUT	--	--
C-2	PV-1020-2	PV	PLUG VALVE	4"	WASTEWATER/LEACHATE	DI	CLASS 125	MANUAL GEAR W/OPERATING NUT	--	--
C-2	--	PV	PLUG VALVE	4"	HSW	DI	CLASS 125	MANUAL GEAR W/OPERATING NUT	--	--
C-2	--	PV	PLUG VALVE	6"	HSW	DI	CLASS 125	MANUAL GEAR W/OPERATING NUT	--	--
C-2	--	PV	PLUG VALVE	6"	HSW	DI	CLASS 125	MANUAL GEAR W/OPERATING NUT	--	--
C-4	--	PV	PLUG VALVE	8"	DIGESTED SLUDGE	DI	CLASS 125	MANUAL GEAR W/OPERATING NUT	--	--
M-4	--	GV	GATE VALVE	20"	PRIMARY EFFLUENT	DI	CLASS 125	MANUAL, HANDWHEEL	--	--
M-4	--	GV	GATE VALVE	20"	PRIMARY EFFLUENT	DI	CLASS 125	MANUAL, HANDWHEEL	--	--
M-4	--	GV	GATE VALVE	20"	PRIMARY EFFLUENT	DI	CLASS 125	MANUAL, HANDWHEEL	--	--
M-4	--	GV	GATE VALVE	20"	PRIMARY EFFLUENT	DI	CLASS 125	MANUAL, HANDWHEEL	--	--
M-4	--	PV	PLUG VALVE	16"	PRIMARY EFFLUENT	DI	CLASS 125	MODULATING ELECTRIC W/HANDWHEEL	480 VAC/3 PH/60 HZ	24VDC
M-4	--	PV	PLUG VALVE	16"	PRIMARY EFFLUENT	DI	CLASS 125	MODULATING ELECTRIC W/HANDWHEEL	480 VAC/3 PH/60 HZ	24VDC
M-4	--	SCV	SWING CHECK VALVE	18"	PRIMARY EFFLUENT	DI	CLASS 125	WEIGHT & LEVER RIGHT SIDE (LOOKING AT INLET)	--	--
M-4	--	SCV	SWING CHECK VALVE	18"	PRIMARY EFFLUENT	DI	CLASS 125	WEIGHT & LEVER RIGHT SIDE (LOOKING AT INLET)	--	--
M-4	--	SCV	SWING CHECK VALVE	18"	PRIMARY EFFLUENT	DI	CLASS 125	WEIGHT & LEVER RIGHT SIDE (LOOKING AT INLET)	--	--
M-4	--	SCV	SWING CHECK VALVE	18"	PRIMARY EFFLUENT	DI	CLASS 125	WEIGHT & LEVER RIGHT SIDE (LOOKING AT INLET)	--	--
M-4	--	GV	GATE VALVE	18"	PRIMARY EFFLUENT	DI	CLASS 125	MANUAL, HANDWHEEL	--	--
M-4	--	GV	GATE VALVE	18"	PRIMARY EFFLUENT	DI	CLASS 125	MANUAL, HANDWHEEL	--	--
M-4	--	GV	GATE VALVE	18"	PRIMARY EFFLUENT	DI	CLASS 125	MANUAL, HANDWHEEL	--	--
M-4	--	GV	GATE VALVE	18"	PRIMARY EFFLUENT	DI	CLASS 125	MANUAL, HANDWHEEL	--	--
M-4	--	PV	PLUG VALVE	18"	PRIMARY EFFLUENT	DI	CLASS 125	MANUAL GEAR W/CHAINWHEEL	--	--
M-4	--	PV	PLUG VALVE	18"	PRIMARY EFFLUENT	DI	CLASS 125	MANUAL GEAR W/CHAINWHEEL	--	--
M-5	PV-1010	PV	PLUG VALVE	4"	WASTEWATER/LEACHATE	DI	CLASS 125	MANUAL GEAR W/HANDWHEEL	--	--
M-5	CV-1010	SCV	SWING CHECK VALVE	4"	WASTEWATER/LEACHATE	DI	CLASS 125	WEIGHT & LEVER RIGHT SIDE (LOOKING AT INLET)	--	--
M-5	KNV-1010-1	KNV	KNIFE VALVE	8"	WASTEWATER/LEACHATE	DI	CLASS 125	MANUAL, HANDWHEEL	--	--
M-5	KNV-1010-2	KNV	KNIFE VALVE	8"	WASTEWATER/LEACHATE	DI	CLASS 125	MANUAL, HANDWHEEL	--	--
M-5	CAV-1010	ARV	AIR RELEASE VALVE	2"	WASTEWATER/LEACHATE	--	--	--	--	--
M-7	--	PV	PLUG VALVE	8"	DIGESTED SLUDGE	DI	CLASS 125	MANUAL GEAR W/CHAINWHEEL	--	--

VALVE SCHEDULE

	System Design Conditions					Piping						Insulation		Test Requirements		
Page	SYSTEM	TEMP. (°F)		WORKING PRESSURE (PSI)		MATERIAL	DIAMETER (IN)	SCH./CLASS	LINING	COATING	JOINT TYPE	TYPE	THICKNESS (IN)	TEST PRESSURE (PSI)	MEDIUM	TEST DURATION (MIN.)
Page #		OPER	MAX	OPER	MAX											
C-1	FPS	80	120	10	20	HDPE	8	DR13.5	--	--	MJ	N	--	150	WATER	120
C-2	LTI	80	120	20	40	HDPE	4	DR13.5	--	--	MJ	N	--	150	WATER	120
C-2	LTE	80	120	20	20	HDPE	4	DR13.5	--	--	MJ	N	--	150	WATER	120
C-4	DS	80	120	UNKNOWN	UNKNOWN	DI	8	53	CEMENT MORTAR	ASPHALT	MJ	N	--	200	WATER	120
M-4	PE	80	120	20	40	DI	18	53	CEMENT MORTAR	ASPHALT	FLG	N	--	200	WATER	120
M-4	PE	80	120	20	40	DI	24	53	CEMENT MORTAR	ASPHALT	FLG	N	--	200	WATER	120
M-4	PE	80	120	20	40	DI	30	53	CEMENT MORTAR	ASPHALT	FLG	N	--	200	WATER	120
M-5	LTI	80	120	20	40	DI	4	53	CEMENT MORTAR	ASPHALT	FLG	N	--	200	WATER	120
M-5	LTI	80	120	20	40	HDPE	4	DR13.5	--	--	MJ	N	--	150	WATER	120
M-5	LTI	80	120	20	40	DI	6	53	CEMENT MORTAR	ASPHALT	FLG	N	--	200	WATER	120
M-6	LTI	80	120	20	40	DI	6	53	CEMENT MORTAR	ASPHALT	FLG	N	--	200	WATER	120
M-6	FPS	80	120	10	20	HDPE	8	DR13.5	--	--	MJ	N	--	150	WATER	120
M-6	FPS	80	120	10	20	DI	4	53	CEMENT MORTAR	ASPHALT	FLG	N	--	200	WATER	120
M-7	DS	80	120	UNKNOWN	UNKNOWN	DI	8	53	CEMENT MORTAR	ASPHALT	FLG	N	--	200	WATER	120

PIPE SCHEDULE

STATE OF NEW YORK · GREG BOLD · 077651 · LICENSED PROFESSIONAL ENGINEER

WARNING
IT IS A VIOLATION OF SECTION 7209, SUB-DIVISION 2 OF THE NEW YORK STATE EDUCATION LAW FOR ANY PERSON UNLESS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER OR LAND SURVEYOR TO ALTER IN ANY WAY PLANS, SPECIFICATIONS, PLATES OR REPORTS TO WHICH THE SEAL OF A PROFESSIONAL ENGINEER OR LAND SURVEYOR HAS BEEN ATTACHED.

REV. NO.	DATE	DRWN	CHKD	REMARKS
1	12/24	KJD	–	ADDENDUM NO. 1

DESIGNED BY: P. DUFFANY
DRAWN BY: R. HAINES
SHEET CHK'D BY: K. DIRR
CROSS CHK'D BY: M. MCCOSKEY
APPROVED BY: G. BOLD
DATE: NOVEMBER 2024

CDM Smith
308 Maltbie Street, Suite 101
Syracuse, New York 13204
Tel: (315) 434-3247

CITY OF ROME
ONEIDA COUNTY, NEW YORK
WATER RESOURCE RECOVERY FACILITY IMPROVEMENTS

LEGEND, ABBREVIATIONS AND SYMBOLS

PROJECT NO. 21984-276880
FILE NAME: GSY00001
SHEET NO. G-1

BID SET - FOR CONSTRUCTION

XREFs: [CDMS_2234] Images: []
Last saved by: HAINESRW Time: 12/18/2024 10:51:26 AM
pw:\\cdmsmith-oz02-pw.bentley.com:pw_ext\21984\276880\04 Design Services NM_10%\01 General\10 CADD\GSY00001.dwg

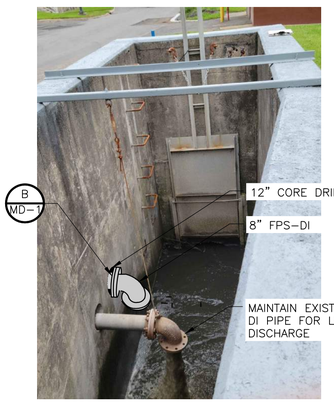
PLAN
1" = 40'
20 0 40

NOTES:

1. CONTRACTOR TO INSTALL NEW 8"–FPS–HDPE IN TRENCH PARALLEL TO EXISTING 4"–FPS–HDPE MAINTAINING 4' SEPARATION. MAKE TIE IN TO PUMP DISCHARGE IN SINGLE 8 HR SHIFT.
2. CONTRACTOR SHALL REMOVE OLD FILTRATE EFFLUENT FORCE MAIN PIPING AND SEAL PENETRATION INTO FLUME.
3. EXISTING RAS VALVE MANHOLE TOP SLAB IS APPROXIMATELY 9'–8" IN DIAMETER AND ABOUT 10" THICK.
4. RAS VALVES WILL BE REPLACED ONE AT A TIME, EACH IN A SINGLE 8–10 HOUR SHIFT, DEPENDING ON WEATHER CONDITIONS. IN BETWEEN VALVE REPLACEMENTS, THE OWNER WILL RUN TO WASTE OVERNIGHT BEFORE THE NEXT VALVE CAN BE INSTALLED.

RAS VALVE MANHOLE
DETAIL A / –
NTS

FILTRATE PUMP STATION
DETAIL B / –
NTS



PARSHALL FLUME NO. 1
DETAIL C / –
NTS

WARNING
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REV. NO.	DATE	DRWN	CHKD	REMARKS
1	12/24	RWH	KJD	ADDENDUM 1 UPDATES

DESIGNED BY: K. DIRR
DRAWN BY: R. HAINES
SHEET CHK'D BY: K. DIRR
CROSS CHK'D BY: M. MCCOSKEY
APPROVED BY: G.BOLD
DATE: NOVEMBER 2024

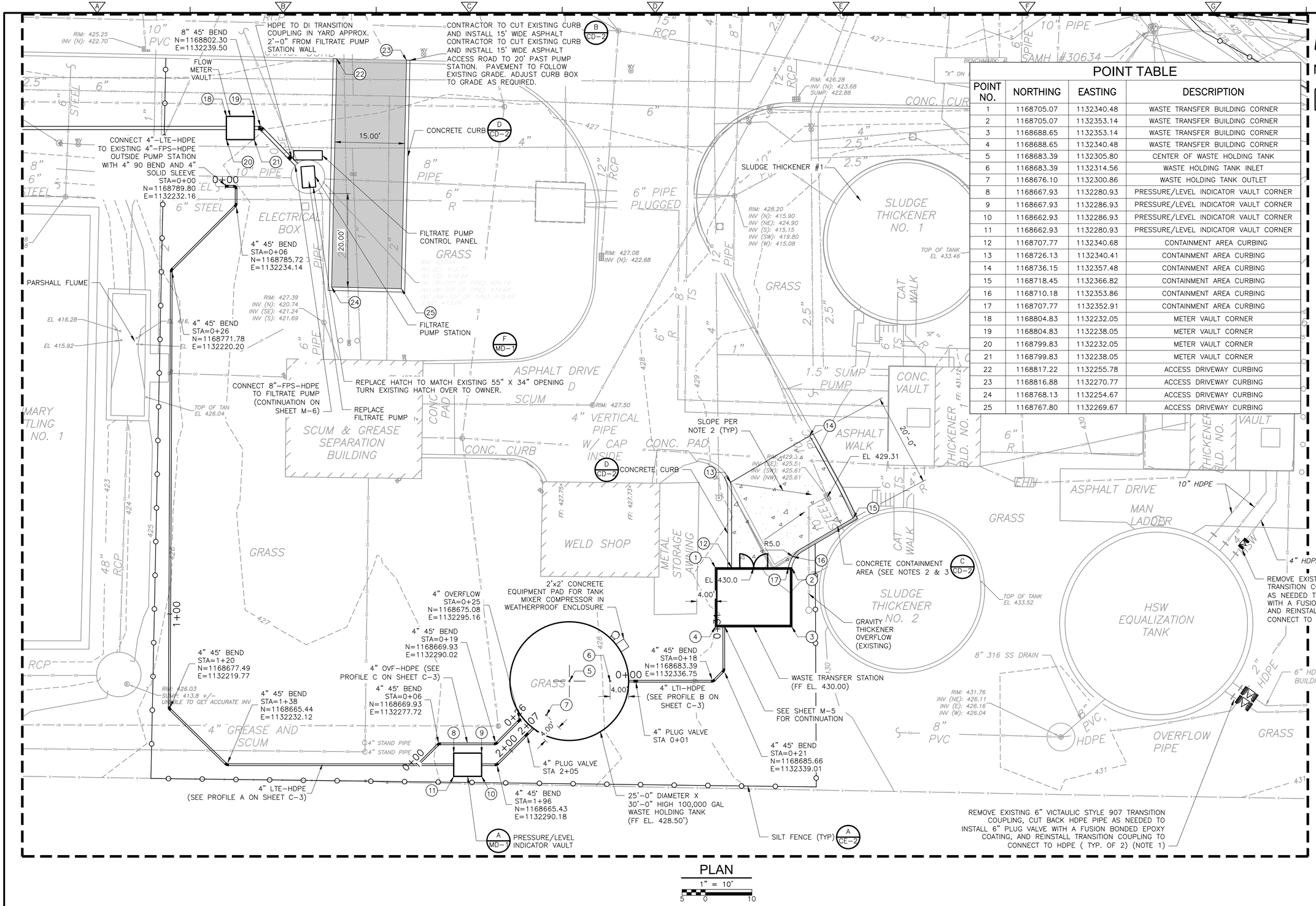
CDM Smith
308 Maltbie Street, Suite 101
Syracuse, New York 13204
Tel: (315) 434-3247

CITY OF ROME
ONEIDA COUNTY, NEW YORK
WATER RESOURCE RECOVERY FACILITY IMPROVEMENTS

YARD PIPING DEMOLITION AND NEW WORK PLAN

PROJECT NO. 21984–276880
FILE NAME: CSTPL001.DWG
SHEET NO. C-1

BID SET - FOR CONSTRUCTION



POINT TABLE

POINT NO.	NORTHING	EASTING	DESCRIPTION
1	1168705.07	1132340.48	WASTE TRANSFER BUILDING CORNER
2	1168705.07	1132353.14	WASTE TRANSFER BUILDING CORNER
3	1168688.65	1132353.14	WASTE TRANSFER BUILDING CORNER
4	1168688.65	1132340.48	WASTE TRANSFER BUILDING CORNER
5	1168683.39	1132305.80	CENTER OF WASTE HOLDING TANK
6	1168683.39	1132314.56	WASTE HOLDING TANK INLET
7	1168676.10	1132300.86	WASTE HOLDING TANK OUTLET
8	1168667.93	1132280.93	PRESSURE/LEVEL INDICATOR VAULT CORNER
9	1168667.93	1132286.93	PRESSURE/LEVEL INDICATOR VAULT CORNER
10	1168662.93	1132286.93	PRESSURE/LEVEL INDICATOR VAULT CORNER
11	1168662.93	1132280.93	PRESSURE/LEVEL INDICATOR VAULT CORNER
12	1168707.77	1132340.68	CONTAINMENT AREA CURBING
13	1168726.13	1132340.41	CONTAINMENT AREA CURBING
14	1168736.15	1132357.48	CONTAINMENT AREA CURBING
15	1168718.45	1132366.82	CONTAINMENT AREA CURBING
16	1168710.18	1132353.86	CONTAINMENT AREA CURBING
17	1168707.77	1132352.91	CONTAINMENT AREA CURBING
18	1168804.83	1132232.05	METER VAULT CORNER
19	1168804.83	1132238.05	METER VAULT CORNER
20	1168799.83	1132232.05	METER VAULT CORNER
21	1168799.83	1132238.05	METER VAULT CORNER
22	1168817.22	1132255.78	ACCESS DRIVEWAY CURBING
23	1168816.88	1132270.77	ACCESS DRIVEWAY CURBING
24	1168768.13	1132254.67	ACCESS DRIVEWAY CURBING
25	1168767.80	1132269.67	ACCESS DRIVEWAY CURBING

NOTES:

1. CONTRACTOR SHALL PROTECT AND REINSTALL TRACER WIRES ON HDPE PIPE.
2. CONTRACTOR TO REPLACE EXISTING CONCRETE SLAB AND CURB. SLOPE SLAB FROM EDGE OF ASPHALT PAVEMENT TO CATCH BASIN RIM LIKE EXISTING. SLOPE SLAB FROM CATCH BASIN RIM UP TO PUMP ENCLOSURE SLAB AT EL 430.0. PROVIDE CONCRETE CURB AROUND PERIMETER OF SLAB.
3. CONTRACTOR TO COORDINATE SLAB REPLACEMENT TIMING WITH WRRF STAFF TO MINIMIZE DISRUPTION TO HAULERS THAT DISCHARGE LEACHATE TO THICKENER 2 AT EXISTING SLAB UNLOADING AREA.

PLAN
1" = 10'
5 0 10

REV. NO.	DATE	DRWN	CHKD	REMARKS
1	12/24	RWH	KJD	ADDENDUM 1 UPDATES

DESIGNED BY: K. DIRR
DRAWN BY: R. HAINES
SHEET CHK'D BY: K.DIRR
CROSS CHK'D BY: M. MCCOSKEY
APPROVED BY: G. BOLD
DATE: NOVEMBER 2024

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CITY OF ROME
ONEIDA COUNTY, NEW YORK
WATER RESOURCE RECOVERY FACILITY IMPROVEMENTS

ENLARGED SITE PLAN - WASTE HOLDING TANK

PROJECT NO. 21984-276880
FILE NAME: CSTPL002.DWG
SHEET NO. C-2

STATE OF NEW YORK · GREG BOLD · 077651 · LICENSED PROFESSIONAL ENGINEER

WARNING
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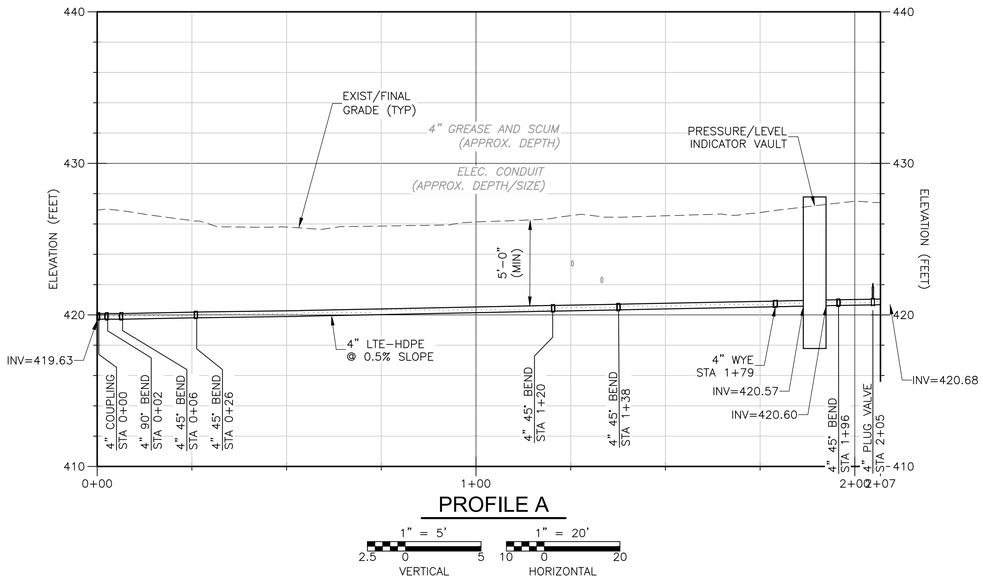
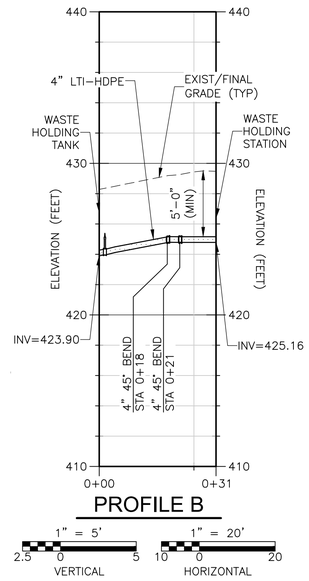
BID SET - FOR CONSTRUCTION



PROFILE A

1" = 5'
2.5 0 5
VERTICAL

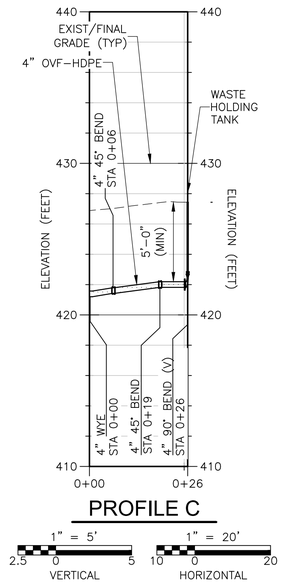
1" = 20'
10 0 20
HORIZONTAL



PROFILE B

1" = 5'
2.5 0 5
VERTICAL

1" = 20'
10 0 20
HORIZONTAL



PROFILE C

1" = 5'
2.5 0 5
VERTICAL

1" = 20'
10 0 20
HORIZONTAL

REV. NO.	DATE	DRWN	CHKD	REMARKS
1	12/24	RWH	KJD	ADDENDUM 1 UPDATES

DESIGNED BY: K. DIRR
DRAWN BY: R. HAINES
SHEET CHK'D BY: K.DIRR
CROSS CHK'D BY: M. MCCOSKEY
APPROVED BY: G. BOLD
DATE: NOVEMBER 2024

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CITY OF ROME
ONEIDA COUNTY, NEW YORK
WATER RESOURCE RECOVERY FACILITY IMPROVEMENTS

PROFILES

PROJECT NO. 21984-276880
FILE NAME: CSTPL003.DWG
SHEET NO.
C-3

STATE OF NEW YORK
GREG BOLD
077651
LICENSED PROFESSIONAL ENGINEER

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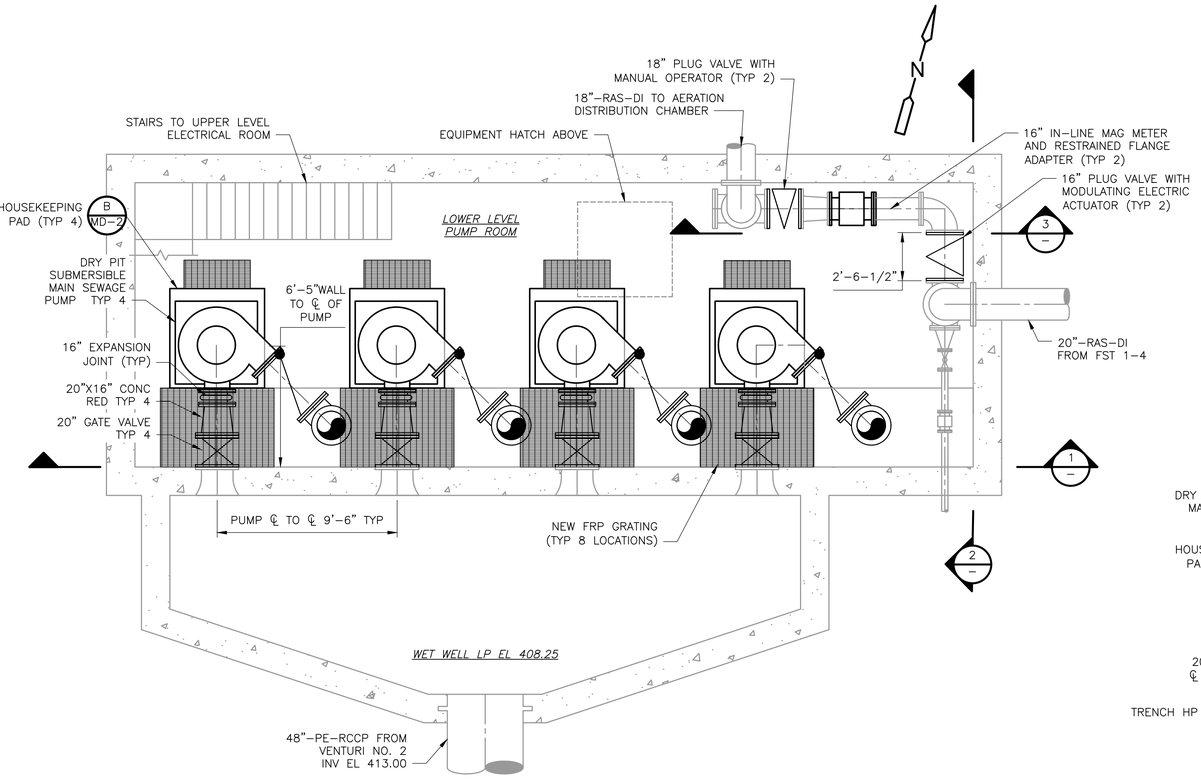
BID SET - FOR CONSTRUCTION

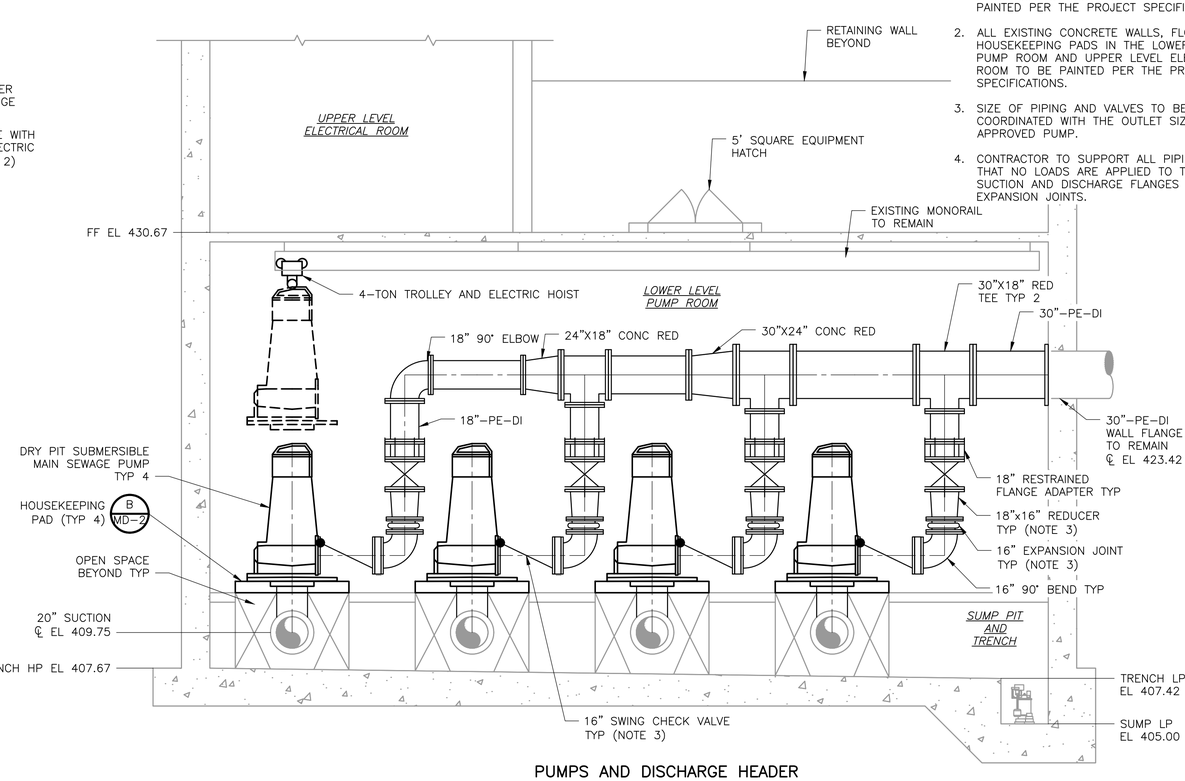


MAIN PUMP STATION LOWER LEVEL

PLAN

1/4" = 1'- 0"

2 1 0 2 4



PUMPS AND DISCHARGE HEADER

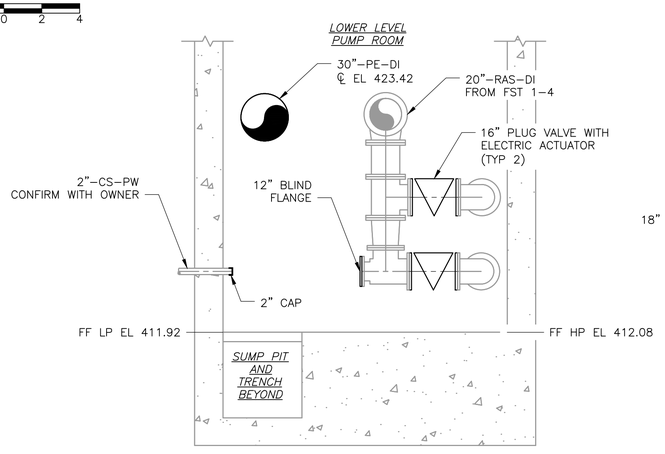
SECTION 1

1/4" = 1'- 0"

2 1 0 2 4

NOTES:

1. ALL EXISTING AND PROPOSED PIPING IN THE MAIN PUMP STATION LOWER LEVEL SHALL BE PAINTED PER THE PROJECT SPECIFICATIONS.
2. ALL EXISTING CONCRETE WALLS, FLOORS, AND HOUSEKEEPING PADS IN THE LOWER LEVEL PUMP ROOM AND UPPER LEVEL ELECTRICAL ROOM TO BE PAINTED PER THE PROJECT SPECIFICATIONS.
3. SIZE OF PIPING AND VALVES TO BE COORDINATED WITH THE OUTLET SIZE OF THE APPROVED PUMP.
4. CONTRACTOR TO SUPPORT ALL PIPING SUCH THAT NO LOADS ARE APPLIED TO THE PUMP SUCTION AND DISCHARGE FLANGES OR THE EXPANSION JOINTS.

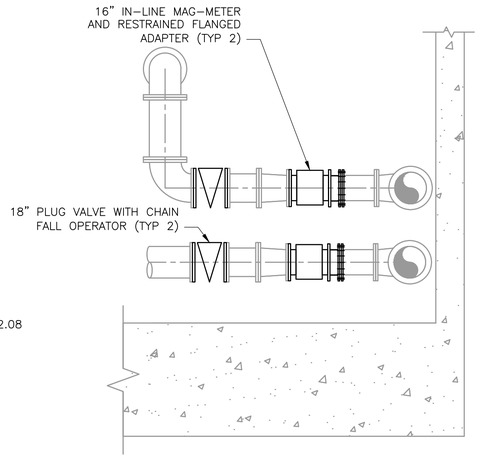


ELECTRICALLY ACTUATED RAS VALVES

SECTION 2

1/4" = 1'- 0"

2 1 0 2 4



SECTION 3

1/4" = 1'- 0"

2 1 0 2 4

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REV. NO.	DATE	DRWN	CHKD	REMARKS
1	12/24	RWH	KJD	ADDENDUM 1 UPDATES

DESIGNED BY: P. DUFFANY
DRAWN BY: R. HAINES
SHEET CHK'D BY: K. DIRR
CROSS CHK'D BY: M. MCCOSKEY
APPROVED BY: G. BOLD
DATE: NOVEMBER 2024

CDM Smith
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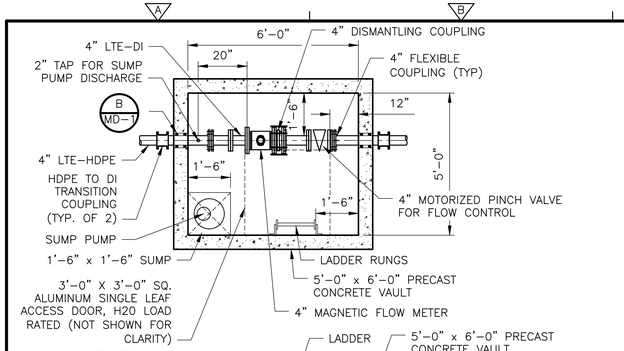
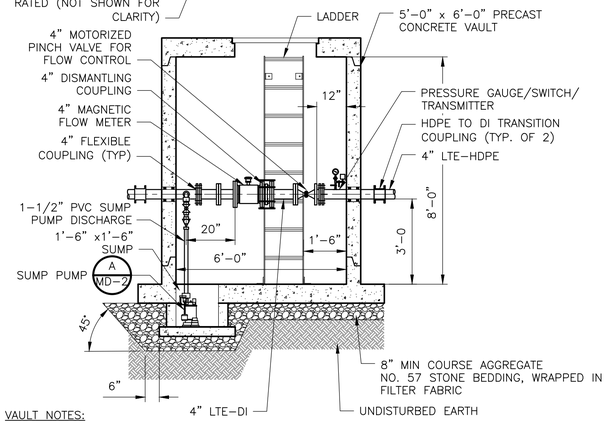
CITY OF ROME
ONEIDA COUNTY, NEW YORK
WATER RESOURCE RECOVERY FACILITY IMPROVEMENTS

MAIN PUMP STATION NEW WORK
PLAN AND SECTIONS

PROJECT NO. 21984-276880
FILE NAME: M004PFPL.DWG
SHEET NO.
M-4

BID SET - FOR CONSTRUCTION





VAULT NOTES:

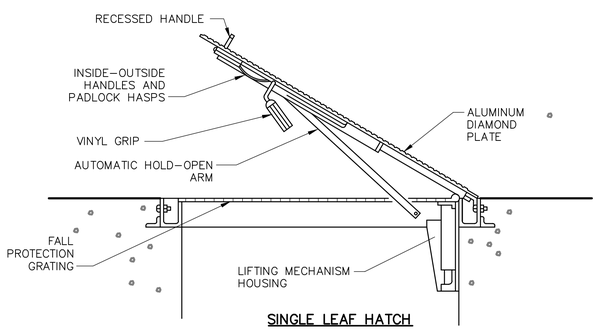
1. FLOW METERS ARE TO HAVE A MINIMUM OF FIVE PIPE DIAMETERS UPSTREAM AND THREE PIPE DIAMETERS DOWNSTREAM FREE OF OBSTRUCTIONS.
2. EXCAVATION FOR THE VAULT MUST BE WITNESSED BY THE ENGINEER'S GEOTECHNICAL ENGINEER TO ASSESS AND CONFIRM EXISTING SOIL CONDITIONS. IF FILL IS ENCOUNTERED ALL EXISTING FILL MUST BE REMOVED FROM WITHIN THE VAULT FOOTPRINT. IF ROCK IS ENCOUNTERED ABOVE PLANNED FOOTING EXCAVATION BOTTOMS THE ROCK MUST BE REMOVED AND RESTORED WITH A MINIMUM OF 12–INCH CRUSHED STONE. PARTIAL ROCK SUPPORTED FOUNDATION IS NOT ALLOWED.
3. PIPE SUPPORT SHOWN FOR INFORMATIONAL PURPOSES ONLY. PIPE SUPPORT SYSTEM SHALL BE DESIGNED BY CONTRACTOR.

PRESSURE LEVEL/INDICATOR VAULT

DETAIL A

3/8" = 1'– 0"

2 0 2 4

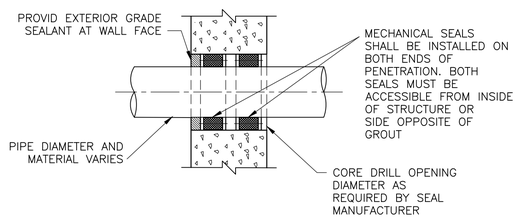


SINGLE LEAF HATCH

ACCESS HATCH

DETAIL F

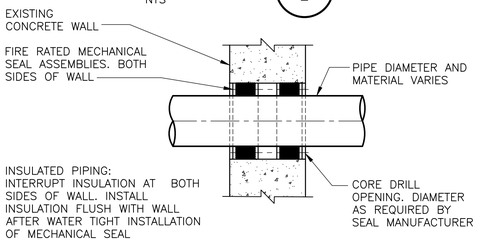
NTS



WALL SLEEVE WITH MECHANICAL SEAL FOR BRICK, CMU, OR CAVITY WALLS

DETAIL B

NTS



NOTE:
IF WALL THICKNESS IS INSUFFICIENT FOR DUAL WALL SEALS, A SINGLE WALL SEAL ON THE EXTERIOR OF THE WALL SHALL BE SUFFICIENT.

CORE DRILLED OR CAST OPENING AND DUAL FIRE RATED MECHANICAL SEALS PENETRATION THROUGH EXISTING CONCRETE

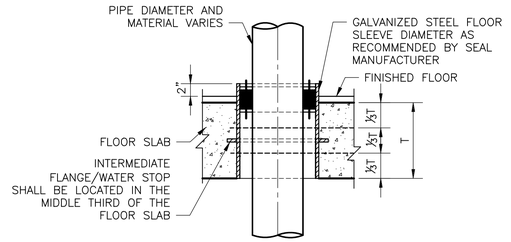
DETAIL C

NTS

HATCH NOTES:

1. ALUMINUM HATCHES TO BE SUPPLIED WITH STAINLESS STEEL HARDWARE.
2. ALL HATCHES TO BE SUPPLIED WITH SAFETY CHAINS. CORNER POST WITH FLOOR INSERTS MUST ALSO BE PROVIDED FOR SINGLE LEAF HATCHES.
3. ALL HATCHES TO BE SUPPLIED WITH HIGH SECURITY DETENTION LOCKS.
4. HINGE PINS SHALL NOT BE ACCESSIBLE WHEN THE HATCH IS IN THE CLOSED POSITION.
5. ALL HATCHES TO HAVE REMOVABLE FALL PROTECTION GRATING WITH 4" X 4" OPENINGS IN GRATES. CROSSBARS ON GRATES TO RUN FLUSH WITH TOP OF GRATE, EXCEPT TO ACCOMPDATE HANDLE SO THAT PULL HANDLE IS FLUSH WITH THE TOP OF GRATE. GRATE CENTER BARS TO BE STRAIGHT WITH NO BAND AT ENDS.
6. ALL HATCHES TO HAVE EXTENDABLE SAFETY POST FOR LADDER ACCESS BY GLOBAL INDUSTRIAL OR APPROVED EQUAL. SAFETY POST TO BE YELLOW POWDER COATED STEEL.
7. SINGLE LEAF HATCHES TO BE MODEL CHS1 HEAVY DUTY H–20 RATED SAFE HATCH BY EJ GROUP, INC.
8. REFER TO SECTION 330516.13 FOR ADDITIONAL HATCH REQUIREMENTS.

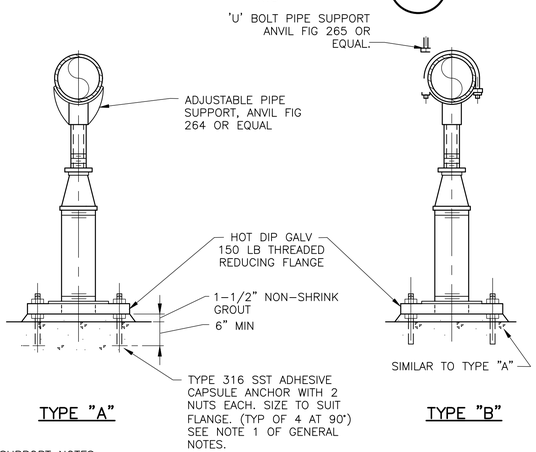
TIE ROD SCHEDULE FOR HARNESSED JOINTS		
PIPE DIAMETER (IN)	TIE ROD DIAMETER (D) (IN)	NUMBER OF TIE RODS
6	5/8	2
8	5/8	2
10	5/8	2
12	3/4	2
14	3/4	2
16	7/8	2
18	1	2
20	1	2
24	1–1/8	4
30	1–1/8	4
36	1–1/4	4
42	1–1/2	4
48	1–5/8	4



FLOOR SLEEVE WITH SINGLE MECHANICAL SEAL

DETAIL D

NTS



TYPE "A" TYPE "B"

PIPE SUPPORT NOTES:

1. UNDER VALVES, METERS OR OTHER SPECIAL APPURTENANCES, A FABRICATED SUPPORT PIECE MAY BE UTILIZED AS ACCEPTABLE TO ENGINEER.
2. PROVIDE HOT DIP GALVANIZED SUPPORTS AND ANCHORS FOR INTERIOR APPLICATIONS AND TYPE 316 STAINLESS STEEL IN VAULTS AND OUTDOOR APPLICATIONS.
3. PROVIDE CONCRETE BASE BENEATH PIPE SUPPORT WHERE SHOWN IN DRAWINGS. CONCRETE BASE SUPPORT SHALL BE DIMENSION 'C' PLUS 4" SQ.
4. REFER TO SECTION 400507 FOR SPECIAL PIPE SUPPORT REQUIREMENTS.

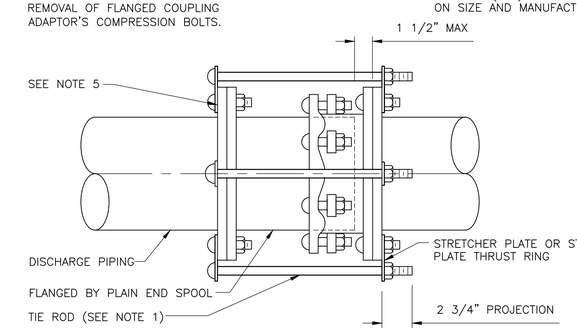
ADJUSTABLE PIPE SUPPORT

DETAIL G

NTS

LENGTH SHALL BE SUFFICIENT TO ALLOW INSTALLATION AND REMOVAL OF FLANGED COUPLING ADAPTOR'S COMPRESSION BOLTS.

LENGTH OF FLANGED COUPLING ADAPTOR (FCA) IS DEPENDANT ON SIZE AND MANUFACTURER



NOTES:

1. PROVIDE NUMBER OF TIE RODS PER SCHEDULE. EVENLY SPACE INSTALLATION OF THE TIE RODS. LENGTH OF TIE RODS TO BE DETERMINED BY CONTRACTOR BASED ON SIZE AND FLANGED COUPLING ADAPTOR AND FINAL LENGTH OF SPOOL PIECE.
2. TIE ROD SCHEDULE IS VALID FOR PRESSURES UP TO 150 PSI. FOR PRESSURES OVER 150 PSI SEE AWWA MANUAL 11.
3. PROVIDE STRETCHER PLATE OR STEEL PLATE THRUST RING FOR ATTACHMENT OF TIE RODS. FOR SIZE SEE TABLE.
4. MATERIALS – HARNESS RODS: ASTM A–307 HOT DIP GALVANIZED.
   STRETCHER PLATE: ASTM A36 STEEL HOT DIP GALVANIZED.
   FLEXIBLE COUPLING: PER SPECIFICATIONS
5. WELD TO DEVELOP MIN. THE STRENGTH OF PIPE. REPAIR COATINGS AS REQUIRED.
6. WRAP ALL COUPLING BURIED BELOW GRADE IN PROTECTIVE TAPE.

FLANGED COUPLING ADAPTOR

DETAIL E

NTS

ADJUSTABLE PIPE SUPPORT APPROX. DIMENSIONS IN INCHES					
PIPE SIZE	A	B	C	D MIN	D MAX
2–1/2	2–1/2	1–1/2	9	8	11–1/2
3	2–1/2	1–1/2	9	8–1/4	11–3/4
3–/12	2–1/2	1–1/2	9	8–1/2	12
4	3	2–1/2	9	10–1/4	14
6	3	2–1/2	9	11–5/8	15–1/4
8	3	2–1/2	9	13–5/8	16–1/2
10	3	2–1/2	9	14–5/8	18–1/4
12	3	2–1/2	9	15–5/8	19–3/4
14	4	3	11	18–7/8	20–3/4
16	4	3	11	19–7/8	22–1/4
18	6	3–1/2	13–1/2	21–1/4	24
20	6	3–1/2	13–1/2	23–1/4	25–1/2
24	6	4	13–1/2	26–1/2	28–1/4
30	6	4	13–1/2	29–5/8	31–1/2
32	6	4	13–1/2	30–5/8	32–3/4
36	6	4	13–1/2	32–5/8	34–3/4

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REV. NO.	DATE	DRWN	CHKD	REMARKS
1	12/24	RWH	KJD	ADDENDUM 1 UPDATES

DESIGNED BY: K. DIRR
DRAWN BY: R. HAINES
SHEET CHK'D BY: K. DIRR
CROSS CHK'D BY: M.MCCOSKEY
APPROVED BY: G. BOLD
DATE: NOVEMBER 2024

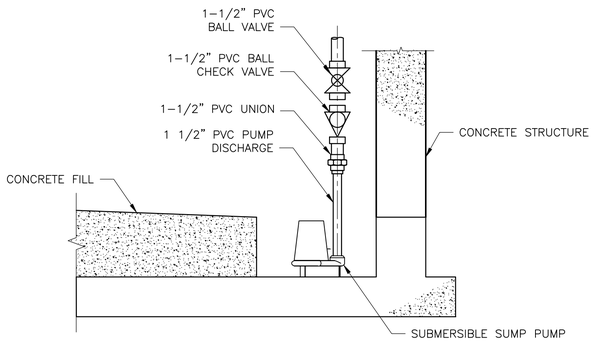
CDM Smith
308 Maltbie Street, Suite 101
Syracuse, New York 13204
Tel: (315) 434-3247

CITY OF ROME
ONEIDA COUNTY, NEW YORK
WATER RESOURCE RECOVERY FACILITY IMPROVEMENTS

MECHANICAL DETAILS I

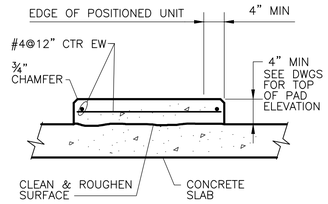
PROJECT NO. 21984–276880
FILE NAME: MD01NFDT.DWG
SHEET NO.
MD-1

BID SET - FOR CONSTRUCTION



SUMP PUMP

DETAIL A
NTS

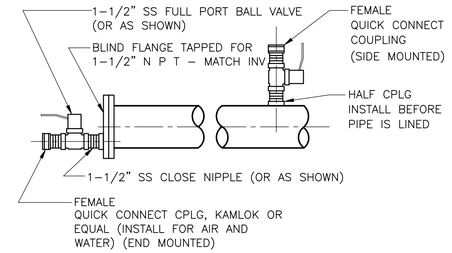


HOUSEKEEPING PAD

DETAIL B
NTS

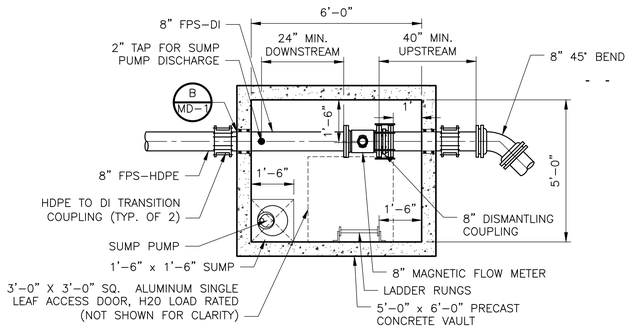
NOT USED

DETAIL C
NTS



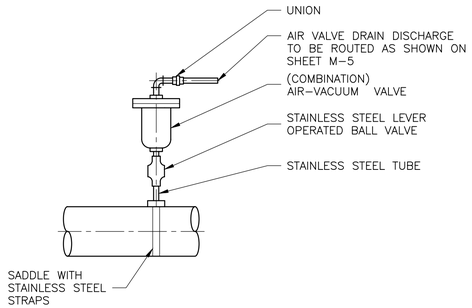
FLUSHING COCK

DETAIL D
NTS



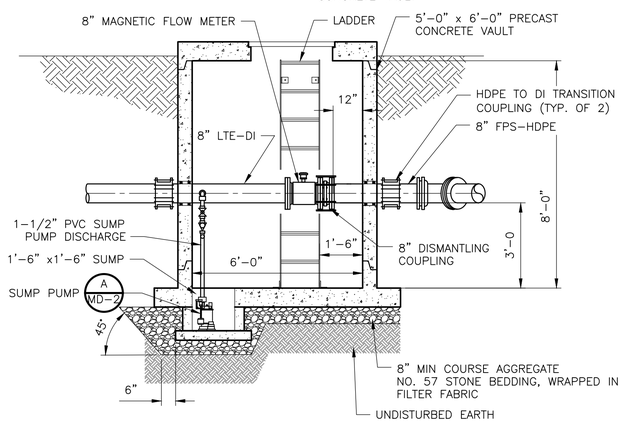
VAULT NOTES:

1. FLOW METERS ARE TO HAVE A MINIMUM OF FIVE PIPE DIAMETERS UPSTREAM AND THREE PIPE DIAMETERS DOWNSTREAM FREE OF OBSTRUCTIONS.
2. EXCAVATION FOR THE VAULT MUST BE WITNESSED BY THE ENGINEER'S GEOTECHNICAL ENGINEER TO ASSESS AND CONFIRM EXISTING SOIL CONDITIONS. IF FILL IS ENCOUNTERED ALL EXISTING FILL MUST BE REMOVED FROM WITHIN THE VAULT FOOTPRINT. IF ROCK IS ENCOUNTERED ABOVE PLANNED FOOTING EXCAVATION BOTTOMS THE ROCK MUST BE REMOVED AND RESTORED WITH A MINIMUM OF 12–INCH CRUSHED STONE. PARTIAL ROCK SUPPORTED FOUNDATION IS NOT ALLOWED.
3. PIPE SUPPORT SHOWN FOR INFORMATIONAL PURPOSES ONLY. PIPE SUPPORT SYSTEM SHALL BE DESIGNED BY CONTRACTOR.



COMBINATION AIR VALVE

DETAIL E
NTS



FLOW METER VAULT

DETAIL F
3/8" = 1'– 0"
2 0 2 4

REV. NO.	DATE	DRWN	CHKD	REMARKS
1	12/24	RWH	KJD	ADDENDUM 1

DESIGNED BY: K. DIRR
DRAWN BY: R. HAINES
SHEET CHK'D BY: K. DIRR
CROSS CHK'D BY: M. MCCOSKEY
APPROVED BY: G. BOLD
DATE: NOVEMBER 2024

CDM Smith
308 Maltbie Street, Suite 101
Syracuse, New York 13204
Tel: (315) 434-3247

CITY OF ROME
ONEIDA COUNTY, NEW YORK
WATER RESOURCE RECOVERY FACILITY IMPROVEMENTS

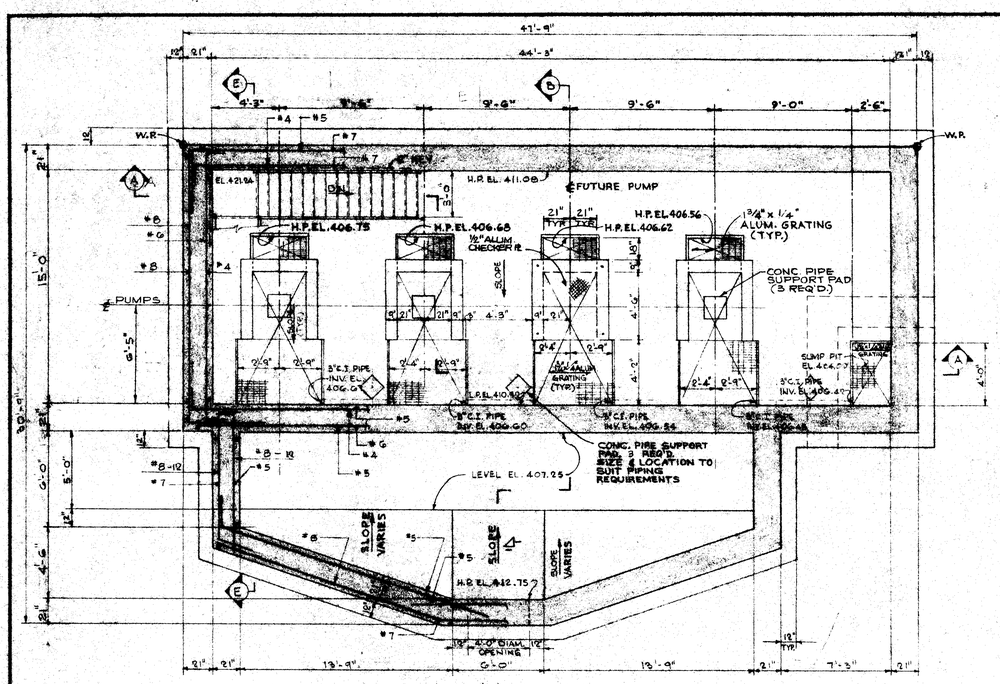
MECHANICAL DETAILS II

PROJECT NO. 21984–276880
FILE NAME: MD02NFDT.DWG
SHEET NO.
MD-2

STATE OF NEW YORK · GREG BOLD · 077651 · LICENSED PROFESSIONAL ENGINEER

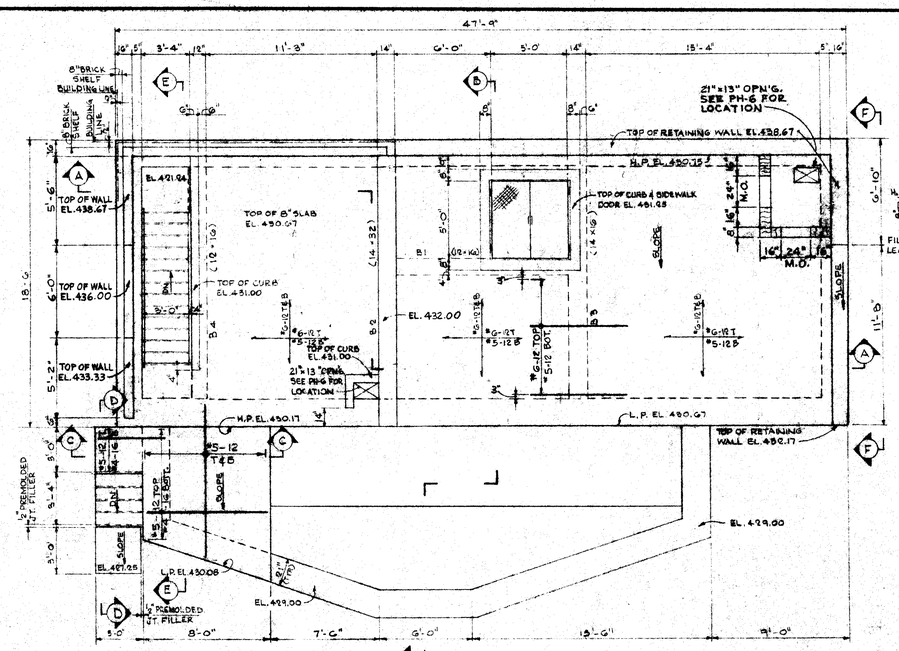
WARNING
IT IS A VIOLATION OF SECTION 7209, SUB–DIVISION 2 OF THE NEW YORK STATE EDUCATION LAW FOR ANY PERSON UNLESS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER OR LAND SURVEYOR TO ALTER IN ANY WAY PLANS, SPECIFICATIONS, PLATES OR REPORTS TO WHICH THE SEAL OF A PROFESSIONAL ENGINEER OR LAND SURVEYOR HAS BEEN ATTACHED.

BID SET - FOR CONSTRUCTION

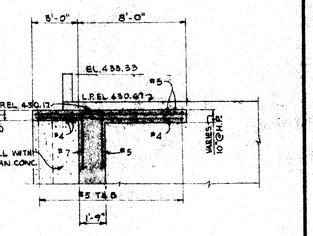


SECTIONAL PLAN

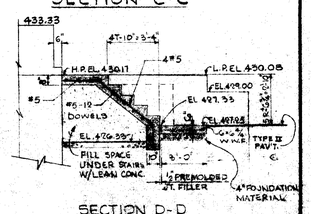
6" FOUNDATION MATERIAL UNDER THE ENTIRE FOUNDATION, AND AS SHOWN OR NOTED.



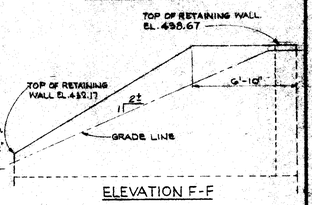
PLAN VIEW



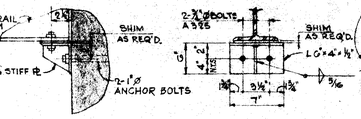
SECTION C-C



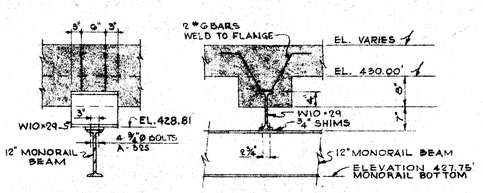
SECTION D-D



ELEVATION F-F

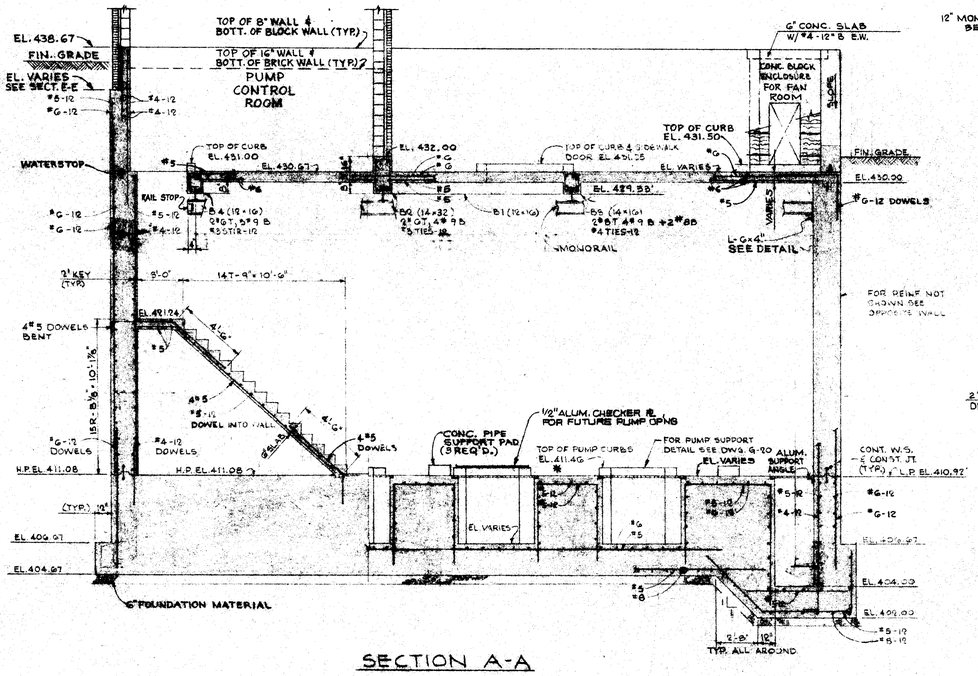


MONCRAIL END SUPPORT DETAILS

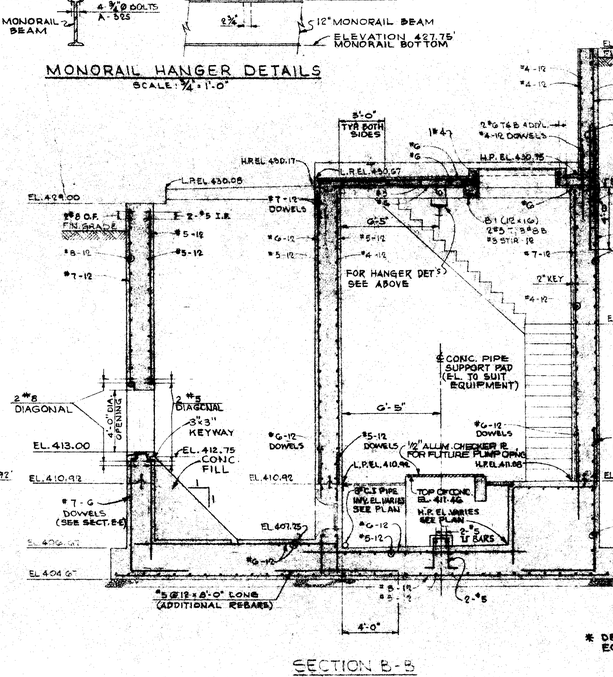


MONORAIL HANGER DETAILS

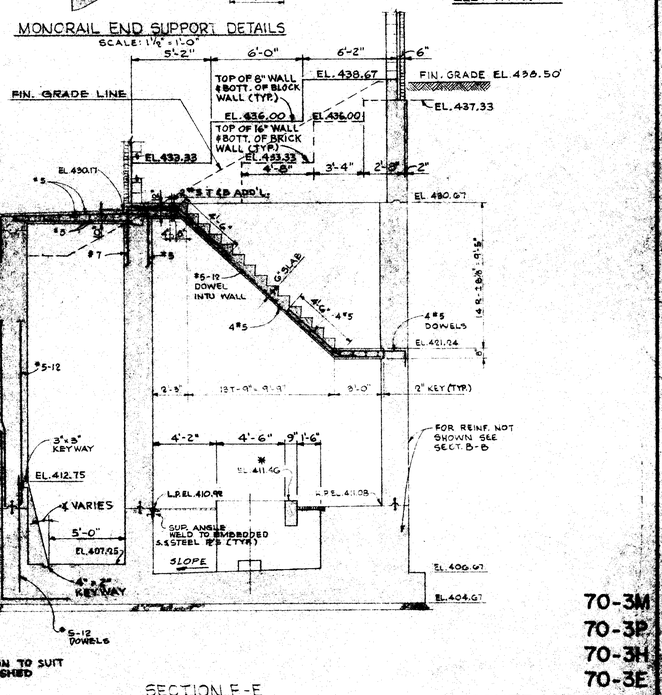
SCALE: ¾" = 1'-0"



SECTION A-A



SECTION B-B



SECTION E-E

(FOR REINFORCING NOT SHOWN SEE SECTION B-B)

* DENOTES DIMENSION TO SUIT EQUIPMENT FURNISHED

70-3M
70-3P
70-3H
70-3E
CONTRACT 70-3G
DRAWING No. S-1

MANGANARO, MARTIN AND LINCOLN CONSULTING ENGINEERS NEW YORK, N. Y.	APPROVED BY DATE NOV. 1971	STATE OF NEW YORK REGISTERED PROFESSIONAL ENGINEER	DESIGNED JXB. DRAWN JB & GRS. CHECKED JXB J.E.	SCALE: ½"=1'-0" & AS NOTED	CITY OF ROME, N.Y. BOARD OF ESTIMATE AND CONTRACT	IMPROVEMENTS TO SEWAGE TREATMENT PLANT	MAIN PUMPING STATION PLANS AND SECTIONS