

**WATER TREATMENT PLANT IMPROVEMENTS
TOWN OF SMITHFIELD
JOHNSTON COUNTY, NORTH CAROLINA**

SUBJECT: ADDENDUM NO. 1

NOVEMBER 6, 2020

To the Plans and Specifications for:
Water Treatment Plant Improvements
Smithfield, N.C.

To: PROSPECTIVE BIDDERS AND OTHER CONCERNED PARTIES

This ADDENDUM forms a part of the Contract Documents and modifies the original Bidding Documents as noted below. Bidders shall acknowledge receipt of the ADDENDUM in the space provided on the Bid Form. Failure to do so may subject the Bidder to Disqualification.

A. General

1. Minutes and Attendance Sheet for the Pre-Bid Conference held October 27, 2020 are attached herein.
2. The Town of Smithfield will not charge for water utilized for construction testing.
3. The existing Buffalo Creek Greenway Trail which runs through the existing Water Treatment Plant site will be closed throughout the construction period.
4. Bidders shall contact the Johnston County Permitting Office for all building, electrical and trades permits required for construction of the project. Contact information is as follows: Mr. Ed Lewis, Code Enforcement Officer, 919-989-5060, ed.lewis@johnstonnc.com.
5. Clarification – Bidders should consider the Matchline -See Sheet C106 shown on Sheet C105 of the plans as the LOD limit for the Alternate No. 3 bid. Thus, all work **south** of this Matchline should be included in the Alternate No. 3 work.
6. Water Treatment Plant staff anticipates the following areas where plant operations will be impacted for construction of the new work at the plant. These items are not provided in order of sequence, but are intended to give the Contractor reference information for use in schedule planning and shall be considered as a guide only. This list is not comprehensive and may need to be adjusted depending on field conditions or the Town's need to operate facilities as required by system demand at a given time. The following items have been identified: 1) 36" Clearwell pipe tie-in (treated water line from plant to clearwell), 2) 36" Clearwell pipe tie-in (finished water line from clearwell to high service pumps) 3) Sedimentation Basin No. 4 influent tie-in, 4) Sedimentation Basin No. 4 effluent tie-in, 5) Sludge collection system tie-ins to the existing waste line (TBD by Plant Staff), 6) Settled water isolation valve replacement at the raw water pump station and PAC mixing vault/valve installation, and 7) Filter No. 4 effluent flume tie-in. Items 1 and 2 should be considered as distinct and individual tie-ins requiring a separate plant shut-down time for each to occur. It is anticipated that items 3-7 could be planned concurrently to the extent possible such that several tie-ins can occur during the same shut-down period thus minimizing the number of plant shut-downs. For planning purposes, the Contractor should anticipate up to 24 hours availability for a given shut-down period. Again, this is a guide and may be subject to change dependent on system demand at the time. Contractor shall coordinate and give the Town a minimum of 7 days notice prior to a given shut-down occurring.
7. The Town shall be responsible to drain and flush all chemical lines prior to demolition and tie-ins.

8. All piping indicated to be abandoned in place shall be completely filled with concrete flowable fill.
- B. Bidding Requirements
1. Section 00100, Advertisement For Bids
 - a. The Bid Opening Date and Time has been changed to **Tuesday, November 17, 2020 at 3 pm**. Bid opening location remains the same as identified in the Advertisement for Bids.
 2. Section 00410, Bid Form
 - a. Article 7.01: Change Paragraph B to read as follows:
 - B. In accordance with the NC Division of Water Infrastructure MBE/WBE (DBE) Compliance Supplement, Bidders shall submit the following with their Bid to be considered responsive:
 1. Good Faith Efforts Form.
 2. Table A (Summary of firms on job).
 - b. Article 7.03: Change Paragraph A to read as **"Table B (per item being subbed)."**
 - c. Article 7.03: Delete Paragraph B in its entirety.
 3. Section 00410a, Bidder's Checklist
 - a. Change item B1 to read as **"Good Faith Efforts Form"**.
 - b. Change item B2 to read as **"Table A (Summary of firms on job)."**
- C. Contracting Requirements
1. Section 00520, Agreement
 - a. Article 4.02: Change Paragraph A to read as follows: **"The Work will be substantially completed within 570 days after the date when the Contract Times commence to run as provided in Paragraph 2.03 of the General Conditions, and completed and ready for final payment in accordance with Paragraph 14.07 of the General Conditions within 600 days after the date when the Contract Times commence to run."**
- D. Technical Specification Requirements
1. Section 02082, Specialty Valves and Gates
 - a. Paragraph 2.01: Add the following Item B:
 - B. Flap Gates: Flap gates shall be of the rectangular port design with dual offset single pivot hinges. The gate shall consist of frame, hinge pins, pivot lugs, studs and stud nuts, flap gate, hinge links, and associated connectors. The flap gate shall meet the following requirements.
 1. The flap gate and body shall be cast iron conforming to ASTM A126 Class B. The gate end shall be flanged unless indicated otherwise on the Drawings. A lifting eye shall be cast as part of the cover.
 2. A minimum 2 1/2" seating angle and double pivoted links to assure positive seating.
 3. Hinge brackets shall be field adjustable to allow the gate to be set for a sensitive opening under low unseating pressure.
 4. Gate shall include bronze hinge bushings, stainless steel hinge pins, studs and nuts with brass retainer washers and stainless steel spring pins.
 5. Gate seating shall be bronze to bronze. Both gate and seat ring faces shall be machined to a smooth finish.
 6. Gates shall be manufactured by Clow Valve Co., M&H Valve Co., Waterman Industries, or equal.

2. Section 02510, Water Distribution System
 - a. Paragraph 2.02: Delete Item E in its entirety.
3. Section 05050, Miscellaneous Metals
 - a. Paragraph 2.01.B: Add the following item, **"14. Concrete anchors shall be stainless steel type 303 or 304 wedge anchors and shall be furnished by the handrail manufacturer. The anchor design shall include the appropriate reduction factors for spacing and edge distances in accordance with the manufacturers published data."**
 - b. Paragraph 2.01: Change item C to read as follows, **"C. Rail system shall be of component construction. Samples of all components, bases, toeboard and pipe must be submitted for approval at the request of the engineer. Components that are pop-riveted or glued at the joints will not be acceptable. All components must be mechanically fastened with stainless steel hardware."**
 - c. Paragraph 2.01: Delete item D in its entirety.
4. Section 08572, Fiberglass Double-Hung Windows
 - a. Change **"Double Hung"** to **"Sliding"** in all instances.
 - b. Change **"Lower"** to **"Inner"** in all instances.
 - c. Change **"Upper"** to **"Outer"** in all instances.
5. Section 11100, Quarterturn Electric Motor Actuator
 - a. Part 2.A.4: Add the following sentences **"The existing actuators are AUMA SA (open/close) and SAR (modulating) with GS gearbox and AM controls for both open/close and modulating. No microprocessor-based controls are acceptable."**
6. Section 11223, Wafer Style Injection Mixers
 - a. Paragraph 1.01.B: Change **"two (2)"** to read as **"one (1)"**.
 - b. Paragraph 1.03.A: Change item 11 to read as **"Mixer Head Loss – 1.11 and a BETA of 0.8 at maximum flow"**.
 - c. Paragraph 1.05.A: Change **"five (5)"** to read as **"ten (10)"** and change **"three (3)"** to read as **"five (5)"**.
7. Section 11352, Floating Decanters
 - a. Paragraph 1.04.A: Change **"01400"** to read as **"01450"**.
 - b. Paragraph 1.04.A: Change item 2 to read as **"The equipment shall be as manufactured by Evoqua Water Technologies or equal."**
 - c. Paragraph 2.01.E: Change the third sentence to read as **"The supports shall be fabricated of Type 304 Stainless Steel."**
 - d. Part 2.01, Materials: Add the following paragraph – **"F. A 3/4" hose bib connection shall be installed by the Contractor on the 10" DIP wall pipe between the decant valve and the decant manhole wall as shown on the plans. The 3/4" liquid line shall have a readily accessible shut off valve adjacent to the manhole cover with a male threaded 3/4" NPT connection for standard hose attachment. Plant personnel shall be capable of attaching a standard garden hose carrying plant water to this point to sink the decanter during start-up or anytime after the decanter is drained for maintenance and brought back online. Provide a 3/4" hose cap with chain to close off this liquid line when not in use and prevent air from entering the decanter."**
8. Section 13206, Prestressed Concrete Water Tank
 - a. Paragraph 1.01.C: Delete item 4 in its entirety.
 - b. Paragraph 1.05.A.2: Add the following sentence **"The galvanized steel diaphragm used in the construction of the core wall shall be 26-gauge with a minimum thickness of 0.017 in. conforming to the requirements of**

ASTM A653/A653M. Weight of zinc coating shall not be less than G 90 of Table 1 of ASTM A653/A653M."

- c. Paragraph 2.03.D: Aluminum ladders shall have an anodized finish.
- d. Delete Paragraph 3.09 in its entirety.
- 9. Section 13220, High Rate Filter Equipment
 - a. Paragraph 2.02.D: Change the specific gravity of the anthracite media from "1.4" to read as "**1.65 +/- 0.05**".
 - b. Paragraph 2.02.D: Add the following sentence at the end of the paragraph – "**The anthracite shall be flame dried and shall have a moisture content by weight of 2% or less.**".
- 10. Section 16420, Motor Controllers
 - a. Replace the Specification Section in its entirety with the attached Section 16420, Motor Controllers.

E. Drawing Requirements

- 1. Sheet No. C204, WTP Piping Plan
 - a. See attached Drawing A1-1 showing new 12" drain line from Sedimentation Basin No. 4 extending to new MH #7B. Note adjustments to new MH #7B for 12" Drain Line Invert In.
- 2. Sheet No. C209, Reservoir Details
 - a. Change Detail "1/C203" to read as "1/206" and change Detail "2/203" to read as "2/206".
- 3. Sheet No. A601, Door/Window Schedules
 - a. Window Schedule: Change Window G Material from "**Aluminum**" to "**Fiberglass**".
 - b. Window Schedule: Change Window G Finish from "**Match Existing**" to "**White**".
- 4. Sheet No. M101, Raw Water Pump Station – Modification Plan and Section
 - a. Plan – Raw Water Pump Station (1/M101): Provide floor stand with handwheel operator for new 24" Gate Valve replacing the existing 24" gate valve. The 1968 plans indicate a flanged valve, but this will need to be field verified. The 1968 plans note the existing valve as a "Darling 24" G.V. Fig. 58 non-rising stem with Darling Floor Stand Fig. 1801 with indicator".
- 5. Sheet No. M203, Sedimentation Basin No. 4 – Bottom and Top Plan
 - a. Sedimentation Basin No. 4 – Top Plan (2/M203): Delete the note "INLET WEIRS TO FILTER CHANNEL, SEE DETAIL X/XX, TYP" in its entirety.
- 6. Sheet No. M207, New Filter No. 4 – Bottom and Intermediate Plan
 - a. Change the concentric reducer for the filter to waste line from "**16" x 12" DIA CONC REDUCER (FL), AIR GAP**" to read as "**24" x 12" DIA CONC REDUCER (FL), AIR GAP**".
- 7. Sheet No. M211, Filter Blowers Setting Plan
 - a. Plan View 1/M211 – Filter Gallery Plan – Air Piping: Provide a 6-inch flanged butterfly valve with electric actuator located in the horizontal lateral for each new 6" dia. stainless steel air pipe to Filters 1 -4 for the new air scour system. These valves shall be consistent with those noted and shown on Sheet E300 designated as MOV-ASVF1 through MOV-ASVF4.
- 8. Sheet No. M302, Finished Water Storage Ground Tank – Elevation and Details
 - a. Detail 2/M301 and Detail 3/M301: Change pipe invert elevation from "117.25" to "117.875".

9. Sheet No. M304, Finished Water Storage Ground Tank – Tank Accessories and Details
 - a. Detail 11/M301: This detail is provided for **reference only**. The prestressed tank supplier shall be responsible for the final floor and rock anchor/micropile design.
10. Sheet No. M502, Backwash Holding Tank – Section and Details
 - a. Section A/M502 – Decanter: See attached Drawing A1-2 showing 10" Dia. 90 deg. bend added to decant line and 3/4" saddle tap/Sch 80 piping/ball valve/threaded connection with supports for decanter flushing.
 - b. Section C/M502 – Sludge Pump: Change the note "4" DIA 90° BEND (FL)" to read as "6" DIA 90° BEND (FL)" and change the note "4" DIA D.I. PIPE TO MANHOLE, SEE SITE PLAN" to read as "6" DIA D.I. PIPE TO MANHOLE, SEE SITE PLAN".
11. Sheet No. M702, Existing Sludge Building
 - a. Partial Plan – Sludge Press (2/M701) – Delete reference to heat trace requirement in new HDPE valve box.
12. Sheet No. SD-4, Standard Details – Miscellaneous Piping Details
 - a. See attached Drawing A1-3 for revision to the headwall detail for the toe drain discharge. Provide external rodent guard as noted.

Bids will be received until **3:00 pm, Tuesday, November 17, 2020.**

FOR THE OWNER
THE WOOTEN COMPANY

BY

Charles W. Davis, P.E.
22531

6-Nov-20

END OF DOCUMENT



Minutes from Pre-Bid Conference
Town of Smithfield
Water Treatment Plant Improvements
TWC Project No. 2698-BY
10/27/20

1. Bid Date: Thursday, November 12, 2020 @ 2:00 pm at the Town Operations Center
2. General Discussion of Contract
 - a. Raw water reservoir expansion
 - b. Raw and settled water pump improvements
 - c. Flash-Mix improvements
 - d. New Sedimentation Basin / Filter No. 4
 - e. Filter air scour system (all 4 filters)
 - f. Clearwell
 - g. High Service Pump Improvements
 - h. New backwash holding basin
 - i. New powdered activated carbon storage and feed system
 - j. Chemical piping improvements
 - k. New sludge dewatering screw press
 - l. Site work, yard piping, electrical, and all associated appurtenances
3. Work by Owner
 - a. Provision of the new instrumentation, new RTUs, Filter No. 4 Control Panel, final terminations and integration of the new I/O into the existing SCADA System shall be provided by Carolina Technical Services, Inc., P.O. Box 268, China Grove, NC 28023, 704-202-5576. Contact is Danny Kruchkow and email is danny@carolinatechnical.com.
4. Minority Participation Goals: 10%
5. Basis of Bid – Lump Sum, Unit Price and Add Alternates
 - a. Alternate No. 1 – Sludge Dewatering Screw
 - b. Alternate No. 2 – PAC Storage and Feed System
 - c. Alternate No. 3 – Raw Water Reservoir Expansion
 - d. Alternate No. 4 – Engine Generator System and Enclosed Transfer Switch
6. Submittal of Bid: Submit the following with the Bid
 - a. Required Bid Security
 - b. List of Proposed Subcontractors
 - c. Equipment Manufacturer's List
 - d. Good Faith Efforts Form
 - e. Table A – Prime Contractor and list of selected contractors.
 - f. E-verify Affidavit
7. Contract Time – 480 days.
8. Funding: NC Division of Water Infrastructure – State Reserve Project (SRP)
9. Questions regarding the project may be faxed or emailed. Fax number is (919) 834-3589. Email address is cdavis@thewootencompany.com. An addendum will be issued approximately one week prior to bid.

10. Contractor Questions/Comments

The following is a list of questions/comments generated by the Contractors who attended the Pre-Bid Conference. Any response that the Engineer considers necessary as a result of the questions/comments raised at the conference shall be included in an Addendum.

- a. Request for Scope of Work and schedule from Carolina Technical Services to help clarify contractor's scope and scheduling coordination requirements. A specific question was raised re. who is to provide fiber? **Response - fiber is likely not specified in the project.**
- b. Request for CADD files. **Response – Engineer will consider request accordingly.**
- c. Request that TWC advise Johnston County of the project as contractors will be inquiring about building permit requirements and costs. **Response – Engineer will contact the County accordingly.**
- d. Request to delay bidding one week, to 11/19. **After consultation w/ client, decided postponing the bid to Tuesday 11/17 was acceptable.**
- e. Bidder asked who provides power; **answered, Town of Smithfield.**
- f. A question was raised about soils and materials testing. **Response - It is the contractor's responsibility to provide all soils and concrete testing.**
- g. Bidders requested the contract time of 16 months be extended. Client stated he has no problem granting this request and extending the contract time to 18 or 20 months. **After additional discussion and consideration of having bidders include price and time for each alternate; it was decided to change the contract time to 20 months (600 CDs) with no consideration of alternates.**
- h. Bidder raised concern over scheduling critical work involving shut-downs during summer months (periods of high demands). **Town reiterated the need to get the new clearwell constructed and on-line so as to offer more flexibility for future shut-downs and storage.**
- i. **Town assured bidders that they could adequately supply sufficient water for testing. Additionally, the client advised that there would be no charge for water.**
- j. **During the site visit, bidders were advised that the greenway trail which runs through the site would be closed.**
- k. Questions were posed by several contractors concerning work sequencing; specifically as it relates to timing, duration and notice requirements for shut-downs. **The Town agreed to provide a list of critical shut-down limitations. Examples include: 36-inch DIP tie-ins for new clearwell and existing sed basin/filter retrofits for sludge removal and air scour systems.**
- l. Bidder asked about drain line from new Sed Basin #4 as it's not shown on C204 "WTP Piping Plan". 12-inch DIP indicated on M203. **This will be addressed per addendum.**
- m. TWC discussed w/ Town personnel Alternate 4, Engine Generator. Spec'd Tier II generator; Town indicated it will have to be Tier IV. **This will be addressed by an addendum.**

11. Closing Remarks

ATTENDANCE SHEET FOR PRE-BID MEETING
 WATER TREATMENT PLANT IMPROVEMENTS
 TOWN OF SMITHFIELD, NORTH CAROLINA

DATE/TIME: Tuesday, October 27, 2020 @ 11:00 A.M.

TWC No. 2698-BY

NAME	COMPANY	PHONE #	EMAIL
Mike Mc Lamb	State Utility Contractors Monroe, NC	704-289-6400	mikem@sucontractors.com
DAVID LUCAS	STATE UTILITE CONTRACTORS, INC.	704/289-6400	DLUCAS@SUCONTRACTORS.COM
SEAN STANFORD	WHARTON - SMITH	407-321-8410	enestimating@whartonsmith.com
MICHAEL COX	T.A. LOVING COMPANY	919-734-8400	MCOX@taloving.com
Andrew Parks	Kiewit	510-230-3614	andrew.parks@kiewit.com
Steven Perry	CROM	352-538-0766	SPERRY@CROMCORP.COM
MATTHEW J. DONOVAN	SHOOK CONSTRUCTION	(919) 895-2182	mattdonovan@shookconstruction.com
Louis E. Solomon III	K.I. SUNNIE, INC	919-833-6343	lsolomon@klsunnie.com
DUSTEN DOWNS	ADAMS ROBINSON CONSTRUCTION	937-274-5318	ARCO@ADAMSROBINSON.COM

ATTENDANCE SHEET FOR PRE-BID MEETING
 WATER TREATMENT PLANT IMPROVEMENTS
 TOWN OF SMITHFIELD, NORTH CAROLINA

DATE/TIME: Tuesday, October 27, 2020 @ 11:00 A.M.

TWC No. 2698-BY

NAME	COMPANY	PHONE #	EMAIL
Andrew Parks	Kiewit	510-230-3614	andrew.parks@kiewit.com
Steven Perry	CROM	352-538-0766	SPERRY@CROMCORP.COM
MATTHEW J. DOWNUM	SHOOK Construction	(919) 895-2182	estimating@shookconstruction.com
JAMES GRAYSON	PRECON TANKS	352-215-1135	JAG@PRECON TANKS.COM
Melissa Roldan	M. B. Kahn Construction	803-227-1279	mroltan@mbkahn.com
Louis E. Solomon III	K.L. SHANE, Inc.	919-833-6343	LSolomon@KLSHANEINC.COM
DUSTIN DOWNS	ADAMS ROBINSON CONSTRUCTION	437-274-5318	ARCO@ADAMSROBINSON.COM
Leon Marten	TURNER MURPHY & C	803-328-3874	Leon@Turner-murphy.com

SECTION 16420

ENCLOSED MOTOR CONTROLLERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Individual magnetic motor starters
- B. Individual manual motor starters
- C. Variable frequency drives

1.02 RELATED SECTIONS

- A. The following Sections have work that is directly related to this Section. This does not relieve the Contractor of his responsibility of proper coordination of all the work:
 - 1. Section 16070 Supporting Devices.
 - 2. Section 16075 Electrical Identification: Engraved nameplates.

1.03 REFERENCES

- A. NFPA 70 - National Electrical Code.
- B. NECA "Standard of Installation," published by National Electrical Contractors Association.
- C. NEMA AB 1 - Molded Case Circuit Breakers.
- D. NEMA ICS 2 - Industrial Control Devices, Controllers, and Assemblies.
- E. NEMA ICS 6 - Enclosures for Industrial Controls and Systems.

1.04 SUBMITTALS

- A. Submit under provisions of Division 1.
 - 1. A Compliance, Deviations, and Exceptions (CD&E) letter. If the shop drawings are submitted without this CD&E letter, the submittal will be rejected. The letter shall include all comments, deviations and exceptions taken to the Drawings and Specifications by the Contractor AND Equipment Manufacturer/Supplier. This letter shall include a copy of this specification section. In the left margin beside each and every paragraph/item, a letter "C", "D", or "E" shall be typed or written in. The letter "C" shall be for full compliance with the requirement. The letter "D" shall be for a deviation from the requirement. The letter "E" shall be for taking exception to a requirement. Any requirements with the letter "D" or "E" beside them shall be provided with a full typewritten explanation of the deviation/exception. Handwritten explanation of the deviations/exceptions is not acceptable. The CD&E letter shall also address deviations, and exceptions taken to each Drawing related to this Specification Section.
 - 2. Complete layout and installation drawings with clearly marked dimensions for each type/size/rating of individual motor controller. For RVSS starters, in free-standing enclosures, show conduit stub-up area locations on the Drawings.
 - 3. Custom wiring diagrams for each individual motor controller. Standard wiring diagrams that are not custom created by the manufacturer for the individual motor controllers for this project are not acceptable. One wiring diagram which is typical for an equipment group (e.g. high service pump) is not acceptable. Each wiring diagram shall include wire identification and terminal numbers.

Indicate all devices, regardless of their physical location, on the diagrams. Identify on each respective wiring diagram specific equipment names and equipment numbers consistent with those indicated on the Drawings.

4. Product Data: Provide catalog sheets showing voltage, controller size, ratings and size of switching and overcurrent protective devices, short circuit ratings, dimensions, and enclosure details.
5. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product.

1.05 OPERATION AND MAINTENANCE DATA

A. Submit under provisions of Division 1.

1. Maintenance Data: Include spare parts data listing; source and current prices for replacement parts and supplies; and recommended maintenance procedures and intervals.

1.06 QUALITY ASSURANCE

A. Perform Work in accordance with NECA Standard of Installation.

1.07 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years experience.

1.08 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70.

B. Furnish products listed and classified by Underwriters Laboratories, Inc. or other North Carolina recognized third party testing agency.

1.09 EXTRA MATERIALS

A. Furnish under provisions of Division 1.

1. Provide three of each size and type fuse installed.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. The equipment covered by this Specification is intended to be standard equipment of proven performance as manufactured by reputable concerns. Equipment shall be designed, constructed and installed in accordance with the best practices of the trade, and shall operate satisfactorily when installed as shown on the Drawings.

2.02 INDIVIDUAL MAGNETIC MOTOR STARTERS

A. Individual magnetic motor starters shall be combination type complete with motor circuit protectors (MCP's). Starters shall be rated 480 VAC, 3-pole, sized for the intended load unless otherwise indicated. In no case shall a starter smaller than a NEMA Size 1 be used. Each starter shall be furnished with a minimum of two spare auxiliary contacts.

B. In non-hazardous locations, motor starters shall be furnished with the following enclosure type and material of construction, dependent upon the designation of the

area in which they are to be installed. Area designations are indicated on the Drawings.

1. Indoor Dry Area – NEMA 1, Painted Steel
 2. All Outdoor Areas – NEMA 3R
- C. Starters shall be provided with all coils and controls for 120 VAC operation, unless otherwise indicated on the Drawings.
- D. The minimum control power transformer VA requirements are as shown below. Control power transformers shall be sized as required for the connected loads, plus 25% spare capacity.
- a. Size 1 150 VA
 - b. Size 2 150 VA
 - c. Size 3 200 VA
 - d. Size 4 300 VA
 - e. Size 5 500 VA

The motor controller manufacturer is advised to review the total Contract Documents for additional requirements for space heaters, power factor correction capacitors, and similar equipment which may not be specified in this Division or shown on the Drawings. Control power transformers shall be fused on both the primary and secondary sides.

- E. Each starter shall be supplied with a manual reset overload relay. Manual reset shall be accomplished by a door mounted overload reset pushbutton. The relays shall be solid state type, with at least one isolated normally open and one isolated normally closed auxiliary contact that operates when a trip condition has occurred. Relays shall be self-powered, have a visible trip indicator, have a trip test function, and have selectable Class 10 or 20 operation. Overload relays shall be set for Class 10 operation unless otherwise directed by the Engineer. Overload relay shall have phase loss protection built in to trip the unit and protect the motor against single phasing. The Contractor shall provide the overload relay model with the correct current range for each application. Overload relay shall have adjustable current range dial. Eutectic alloy and bi-metallic type overload relays are not acceptable.
- F. Control Devices
1. Furnish and install control devices as required and/or shown on the Drawings. The following control devices shall be provided as specified in Section 16422, Electric Controls and Relays:
 - a. Pilot devices (switches, indicating lights, etc)
 - b. Relays and timers
 - c. Control Terminal blocks
- G. All control wiring shall be No. 14 AWG (minimum) labeled at each end in accordance with the wiring numbers shown on the accepted shop drawings. Power wiring shall be sized to suit the maximum horsepower rating of unit; No. 12 AWG (minimum). Wiring shall be type MTW rated for 105°C. Wire color coding shall be as specified in Section 16123, Low Voltage Cable.
- H. Each motor starter coil shall be equipped with a surge-suppression device for protection of the solid state equipment (e.g. programmable logic controller) wired as part of the control circuit.

- I. Individual magnetic motor starters shall be as manufactured by Eaton using NEMA rated Freedom Series starters and contactors, the General Electric Company equivalent, the Square D Company equivalent, or Siemens Energy & Automation, Inc. equivalent. Schneider Electric

2.03 INDIVIDUAL MANUAL MOTOR STARTERS

- A. Individual manual motor starters in enclosures as specified above shall be furnished and installed for outdoor and indoor exposed work. Furnish and install manual motor starters in outlet boxes with flush wall plates as required for concealed work.
- B. Furnish and install manual motor starters with pilot lights and overload heater elements of correct rating based on motor nameplate data.
- C. Manual motor starters shall be equipped with either a push button or toggle operator with reset device or mechanism accessible without opening the enclosure.
- D. Individual manual motor starters for motors one (1) horsepower and less shall be Eaton Type MS, the General Electric Company equivalent, the Schneider Electric equivalent, Allen-Bradley equivalent, or Siemens Energy & Automation, Inc. equivalent.
- E. Individual manual motor starters for integral horsepower motors shall be Eaton Type B100 or B101, the General Electric Company equivalents, the Schneider Electric equivalents, Allen-Bradley equivalent, or Siemens Energy and Automation, Inc. equivalents.
- F. Miscellaneous
 1. Encapsulate critical components in ceramic or metal.
 2. Auxiliaries, including fans, that are required for rated load operation at maximum ambient temperature, shall be 100 percent redundant. A new and unused spare replacement fan(s) or air conditioning unit(s), shipped in original carton, may be acceptable.
 3. Circuit boards and electrical components shall meet the corrosion protection requirements specified in these Specifications. Varnished or epoxy encapsulated circuit boards and tropicalized contactors suitable for corrosive environments shall be furnished where the VFDs are not located in climate controlled areas.

2.04 VARIABLE FREQUENCY DRIVES

- A. Manufacturers
 1. The equipment covered by this Specification is intended to be standard equipment of proven performance. Equipment shall be designed, constructed, and installed in accordance with the best practices of the trade, and shall operate satisfactorily when installed as shown on the Drawings.
 2. It is the intent of these specifications that the VFD's be provided as stand-alone drive systems.
 3. The Contractor shall obtain the VFD's from one manufacturer who shall also manufacture the enclosure and major equipment components. The manufacturer shall have a minimum of five years experience in the manufacture of similar units and shall have a general distribution to the electrical trade. Subcontracting of wiring will not be acceptable.
 4. The VFD's shall be as manufactured by , Halmar Robicon Group Clean Power Series, ABB ACS-600, Cutler-Hammer CP9000, the Allen Bradley equivalent, General Electric or equal.

5. Motor control circuits shall be wired in accordance with the requirements specified herein or indicated on the Drawings. Where not indicated, the control circuits shall be standard three-wire "start-stop" and the Contractor shall furnish wiring accordingly.
6. Variable frequency drive manufacturer shall be responsible for the successful application and operation of the entire drive and control system serving the motor and driven equipment. This includes the responsibility for obtaining all load, torque, speed and performance requirements from the respective sources and integrating these into a variable frequency drive system that fulfills the requirements of this Specification.
7. The Contractor and variable frequency drive system manufacturer are cautioned regarding the review and compliance with the total Contract Documents. Typical examples are circuit breakers, motor circuit protectors, magnetic starters, relays, timers, control and instrumentation products, pilot devices including pushbuttons, selector switches and pilot lights, enclosures, conduit, disconnect switches, terminal boxes, and other equipment.

B. Product Requirements

1. Variable speed drives shall be adjustable frequency, adjustable voltage, pulse width modulated (PWM) design. The units shall be microprocessor controlled, fully digitally programmable, and capable of precise and repeatable speed regulation of three phase 480 volt AC NEMA Design B induction motors. Variable frequency drives for other than NEMA Design B induction motors (e.g. NEMA Design C) shall be coordinated with the requirements of that respective load.
2. Drive units shall perform continuous self-diagnostics as well as load and drive self-check on startup.
3. All drives shall have permanently mounted programming and display modules. These modules shall provide programming access to all drive parameters, display all fault codes to assist with diagnostics and provide a display of output speed in percent or load.
4. This specification describes variable speed motor control which includes the design, fabrication, testing, installation and support requirements for variable frequency drive systems for 3-phase, squirrel cage rotor, induction motors driving pumps. In addition to the variable frequency drive system, provide a motor controller for bypass starting during variable frequency drive downtime, where specified herein and indicated on the Drawings.
5. Each variable frequency drive to be a complete alternating current electric drive system including hardware, software, technical data, and spare parts necessary to accomplish variable speed operation of an induction motor and load combination in accordance with the requirements as indicated on the Drawings and as described in these Specifications.
6. Variable frequency drive system manufacturer shall be responsible for the design and performance of the entire drive system and shall either manufacture all items of equipment or supply them using coordinated specifications furnished to the original equipment manufacturers to insure compatibility and performance in accordance with this Specification. Variable frequency drive manufacturer shall coordinate with suppliers of the drive motors and driven equipment.
7. Variable frequency drive system shall be suitable for operation as part of a 480 VAC, 3 phase, 60 Hertz power distribution system. The complete variable frequency drive system shall withstand the mechanical forces exerted during

short circuit conditions when connected directly to a power source having available fault current of 65,000 amperes symmetrical at rated voltage.

8. The variable frequency drive system shall be suitable to operate, at times, on a limited power source engine-generator set. The system shall be provided with equipment and devices to prevent waveform distortion as specified herein.
9. Provide control and sequence logic as specified herein and indicated on the Drawings. Control and sequence logic shall be designed such that the motor-load combination can be operated in the manual mode upon control and sequence logic failure, including all necessary personnel and equipment safety interlocks.
10. Design each variable frequency drive motor drive speed control system so that through simple programming by either factory engineers or Owner's trained operating personnel, specific control and protection functions can be attained.

C. Design Requirements

1. Each variable frequency drive system shall meet the requirements of this Specification without derating any of the induction motor operating parameters including service factor and nameplate horsepower. The variable frequency drive system manufacturer shall specifically identify special requirements or restrictions of the motor-load combination that may result from operation on the variable frequency drive system.
2. The variable frequency drive shall consist of a 6 pulse diode semiconductor rectifier system, direct current link, and pulse width modulated inverter. The inverter shall invert the direct current voltage into an alternating current voltage at a frequency which shall be proportional to the desired speed. This alternating current voltage and frequency shall both vary simultaneously at a constant "Volts-Per-Hertz" ratio to operate the induction motor at the desired speed.
3. Variable frequency drive shall operate from fixed frequency power supply and convert this input power into variable speed induction motor shaft power as required by this Specification. The drive shall operate the motor and produce full rated nameplate horsepower at the motor output shaft without exceeding motor nameplate full load current and with the motor not exceeding rated total temperature not including the additional temperature increment that constitutes the motor service factor. Motor shall retain its service factor when operated by the variable frequency drive.
4. The overall drive system efficiency shall be a minimum of 95 percent when operating the specified motor-load combination at rated voltage, frequency, and current.
5. Power (Load) is the total 3-phase power delivered to the motor, measured at the output terminals of the drive system, including output filters or transformers. Power (Supply) is the total electrical power delivered to the drive system, measured at the input terminals of the variable frequency drive including input filters, line reactors, isolation transformers, or other harmonic distortion suppression equipment. Include power input required for auxiliary equipment (e.g., controls, fans, air conditioning, pumps) for complete system operating in this Power (Supply) total.
6. Variable frequency drive shall provide smooth, stepless changes in motor speed and acceleration over the entire operating speed range from minimum to maximum speed (revolutions per minute). The variable frequency drive shall be provided with maximum and minimum frequency limits.

7. Variable frequency drive system to maintain a desired output frequency (setpoint) with a steady state accuracy of 0.5 percent of rated frequency of 60 Hertz for a 24 hour period.
8. Variable frequency drive to have an automatic current limit feature to control motor currents during startup and provide a "soft start" torque profile for the motor-load combination. The variable frequency drive shall also limit current due to motor winding or motor lead phase-to-phase short circuit or phase-to-ground short circuit. The current limit protection setting shall be field adjustable.
9. Variable frequency drive shall be furnished with programmable electronic overload and torque limits.
10. Drive system shall achieve a desired output frequency (setpoint) with a repeatability of 0.1 percent of rated frequency of 60 Hertz.
11. Drive system to be capable of operating the specified load continuously at any speed within the operating speed range of 10 percent to 100 percent of rated speed. The minimum and maximum continuous operating speeds shall each be adjustable within this speed range. The variable frequency drive shall provide for field adjustment of these setpoints.
12. Drive system controls to be microprocessor-based and have controlled linear acceleration capability to ramp up the speed, revolutions per minute, of the motor-load combination from the minimum selected operating speed to the maximum selected operating speed in a minimum of 30 seconds. Provide two (2) field-adjustable speed setpoints for the variable frequency drive to skip equipment resonant frequencies. Provide controlled linear deceleration capability. The acceleration and deceleration time limits shall be field adjustable to values up to 120 seconds.
13. Voltage or current unbalance between phases of the variable frequency drive output voltage shall not exceed 3 percent of the instantaneous values. The variable frequency drive system shall continuously monitor the output voltages and generate an alarm condition when the unbalance exceeds 3 percent. The system shall detect and generate a separate alarm for loss of any output phase voltage (single phasing). Phase unbalance shall be as defined by NEMA Standard MG-1.
14. Variable frequency drive system to operate continuously without interruption of service or damage to equipment during transient input voltage variations of plus or minus 10 percent for a duration of 15 cycles. Unacceptable voltage fluctuations on the supply bus shall cause under or overvoltage protection to trip and remove supply voltage from the drive system. Variable frequency drive output voltage regulation shall be plus or minus 2 percent.

D. Operating Conditions

1. The following operating conditions are applicable for all equipment of this Specification.
 - a. Humidity: 0-95 percent.
 - b. Ambient Temperature: Minus 20 degrees Celsius to plus 50 degrees Celsius.
 - c. Altitude: up to 3,300 feet
 - d. Power Supply: 480 volts, 3-phase, 60 Hertz.
 - e. Available Short Circuit Duty: as specified herein.

E. System Features and Characteristics

1. Controls and indicators to accomplish operation and maintenance shall be located on the variable frequency drive equipment assembly as specified herein

and indicated on the Drawings. As a minimum, each VFD shall provide indication of the following:

- a. Digital Speed Indicator: Revolutions per minute.
 - b. Variable Frequency Drive Mode Indicator: Red; as required.
 - c. Bypass Mode Indicator: Red; as required;
 - d. Input Voltage
 - e. Output Voltage
 - f. Output Current
 - g. Output Frequency
 - h. Output Speed: 0-100%
 - i. Drive Ready Indicator: White
 - j. Run Indicator: Red.
 - k. Stop Indicator: Green.
 - l. Running Time Meter.
 - m. Enclosure Overtemperature.
 - n. Alarm Indicator: Amber.
 - o. Alarm Read-out: Display.
2. Each VFD shall provide the following automatic and manual controls:
 - a. Hand-Off-Auto Selector Switch (as required).
 - b. Start and Stop pushbuttons (as required).
 - c. Local - Remote Speed Control Selector Switch (as required).
 - d. Local Speed Potentiometer.
 - e. Alarm Reset Pushbutton.
 - f. 24 VDC coil pilot relay for remote run command.
 - g. Alarm auxiliary contacts and other devices as indicated on the Drawings and specified.
 - h. Provision for a run permissive from other equipment when the drive is in "Auto".
 3. Each VFD shall provide "potential-free" output contacts for the following conditions:
 - a. Drive running.
 - b. Drive in "Auto" and all trip conditions cleared.
 4. Variable frequency drive system shall provide a 4-20 mADC output signal that is proportional to the drive output frequency for use as speed feedback or control and remote speed indication.
 5. Variable frequency drive system shall accept a 4-20 mADC input command signal to control the output frequency in the automatic and/or manual control modes as specified herein or indicated on the Drawings. The system shall accept the input increase/decrease command with a resolution that permits incremental changes in speed, revolutions per minute, equal to or less than 0.1 percent of rated speed.
 6. When operating in the automatic mode, the variable frequency drive system shall shut down during a power outage. Upon restoration of normal power and after an adjustable time delay (0-2 minutes; motor has coasted to zero speed and there is no backspin), the variable frequency drive system shall automatically restart and then ramp up to speed as required by the control system. The process operator shall not be required to reset the system manually after a shutdown caused by a power outage.
 7. Variable frequency drive shall be furnished with a multiple attempt restart feature.
 8. Furnish a door mounted selector switch or other pilot device for those variable frequency drives where an additional speed reference signal is to be supplied to

the variable frequency drive in addition to the door mounted manual speed control.

9. Provide a NEMA rated (IEC or dual rated not acceptable) motor circuit protector and current-limiting fuses (as required) for each variable frequency drive. Provide each variable frequency drive with its respective drive controller and output contactors for each motor.
10. Include in each variable frequency drive system an automatic trip feature which will open the output contactor and remove the drive output from the motor and allow it to decelerate safely. This automatic system shall trip and indicate the fault only upon the following conditions:
 - a. Output voltage unbalance (trip threshold field set).
 - b. Open phase.
 - c. Motor overload.
 - d. Motor stator winding fault (phase-to-ground, phase-to-phase).
 - e. Loss of input power to the variable frequency drive or unacceptable voltage variation.
 - f. High variable frequency drive equipment temperature.
 - g. Variable frequency drive system failure as determined by the manufacturer.
 - h. Component failure.
 - i. Overcurrent.
 - j. Undercurrent.
11. Provide variable frequency drive system with transmitted and received radio interference protection. In addition, provide protection against starting a rotating motor, both directions (coasting to zero speed and backspin). In the event that a motor automatic restart feature (catch the motor "on-the-fly") is provided in the drive controller as standard, this feature shall be capable of being disabled.
12. Variable frequency drive design shall include on-line diagnostics, with an automatic self-check feature that will detect a variable frequency drive failure which in turn affects motor operation and generates an alarm contact output rated for 125 VDC suitable for interfacing with the control system.
 - a. Diagnostics shall operate a visual alarm indicator that is visible on the variable frequency drive equipment cabinets without opening the cabinet doors.
 - b. Diagnostics shall provide an easily readable output that will isolate a failure.
 - c. Provide an event and diagnostic recorder to printout in narrative English of the specific fault(s) and the sequence in which the faults occurred. An indication of the "First Out" failure is a minimum for fault sequence detection.
 - d. Provide a normally open dry contact for each alarm function to enable remote indication. A communication port shall be provided for possible future link to the plant control system.

F. Enclosures

1. Unless otherwise specified or indicated on the Drawings, the variable frequency drive enclosures shall be NEMA 12, force ventilated, dead-front, with front accessibility. Design variable frequency drive system so that rear cabinet access is not required for operations, maintenance, and repair tasks. Other enclosure requirements are:

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surface is suitable for controller installation.
- B. Do not install controller until building environment can be maintained within the service conditions required by the manufacturer.

3.02 INSTALLATION

- A. Install enclosed controllers where indicated, in accordance with manufacturer's instructions.
- B. Install enclosed controllers plumb. Provide supports in accordance with Section 16070.
- C. Height: 5 ft. to operating handle unless otherwise indicated.
- D. Select and install overload heater elements in motor controllers to match installed motor characteristics.
- E. Provide engraved plastic nameplates under the provisions of Section 16075.
- F. Install control wiring inside starter enclosures in a neat, workmanlike manner and run in PVC wiring duct where practical. Where not practical, wiring shall be supported and tied in position with nylon ties.
- G. Identify wiring by a number code. Terminate wiring for external connection to a numbered terminal strip.
- H. Label control components inside controller enclosures. Match information included in control wiring diagram.
- I. Provide a copy of the control wiring diagram for each controller and place inside each starter enclosure.

3.03 FIELD QUALITY CONTROL

- A. Field testing will be performed under provisions of Division 1.
- B. Inspect and test each enclosed controller to NEMA ICS 2.
- C. Inspect completed installation for physical damage, proper alignment, anchorage and grounding.

3.04 MANUFACTURER'S FIELD SERVICES

- A. Prepare and start systems.
- B. Provide start-up and adjustment services for a minimum period of twenty four hours.

3.05 ADJUSTING

- A. Adjust work under provisions of Division 1.
- B. Make final adjustments to installed drive to assure proper operation of system. Obtain performance requirements from installer of driven loads.

3.06 CLEANING

- A. Touch up scratched or marred surfaces to match original finish.

3.07 DEMONSTRATION

- A. Demonstrate operation of controllers in automatic and manual modes to the Owner and Engineer.

END OF SECTION

INSTALL NEW 5'-0" DIA
DOGHOUSE MANHOLE
ON EX 24" RCP LINE
NEW MH #7B
TOP EL = 124.00
INV IN = 120.00 (12" BYPASS)
INV IN = 119.50 (12" DRAIN)
BOT EL = 115.33 +/-

12" DIA DI
SLUDGE /
BACKWASH
BYPASS PIPE

12" DIA DI DRAIN,
SEE M203

NEW SLUDGE
DRAW-OFF BOXES

EX SLUDGE
STORAGE BASIN
(SEE DWG M703)

ROUTE 2" SLUDGE LINE
AROUND EX MANHOLE,
SEE DWG M702

EX SLUDGE
DEWATERING
BUILDING

EX. BACKWASH TANK
CORE DRILL EX MH TO
INSTALL NEW 12"
BACKWASH DECANT
DRAIN PIPE, INV 108.63

NEW SEDIMENTATION BASIN / FILTER

6" DIA DI
BACKWASH
SLUDGE

5 YARD PIPING PLAN - WTP

SCALE: 1" = 30'-0"

1"=30'-0"



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THE WOOTEN COMPANY
ENGINEERING | PLANNING | ARCHITECTURE
120 North Boylan Avenue Raleigh, NC 27603-1423
919.828.0531 fax.919.834.3589

NORTH CAROLINA

TOWN OF SMITHFIELD

JOHNSTON COUNTY

ADDENDUM No. 1 DRAWING

SEDIMENTATION BASIN No. 4
DRAIN PIPING CHANGES

PROJECT NO.:

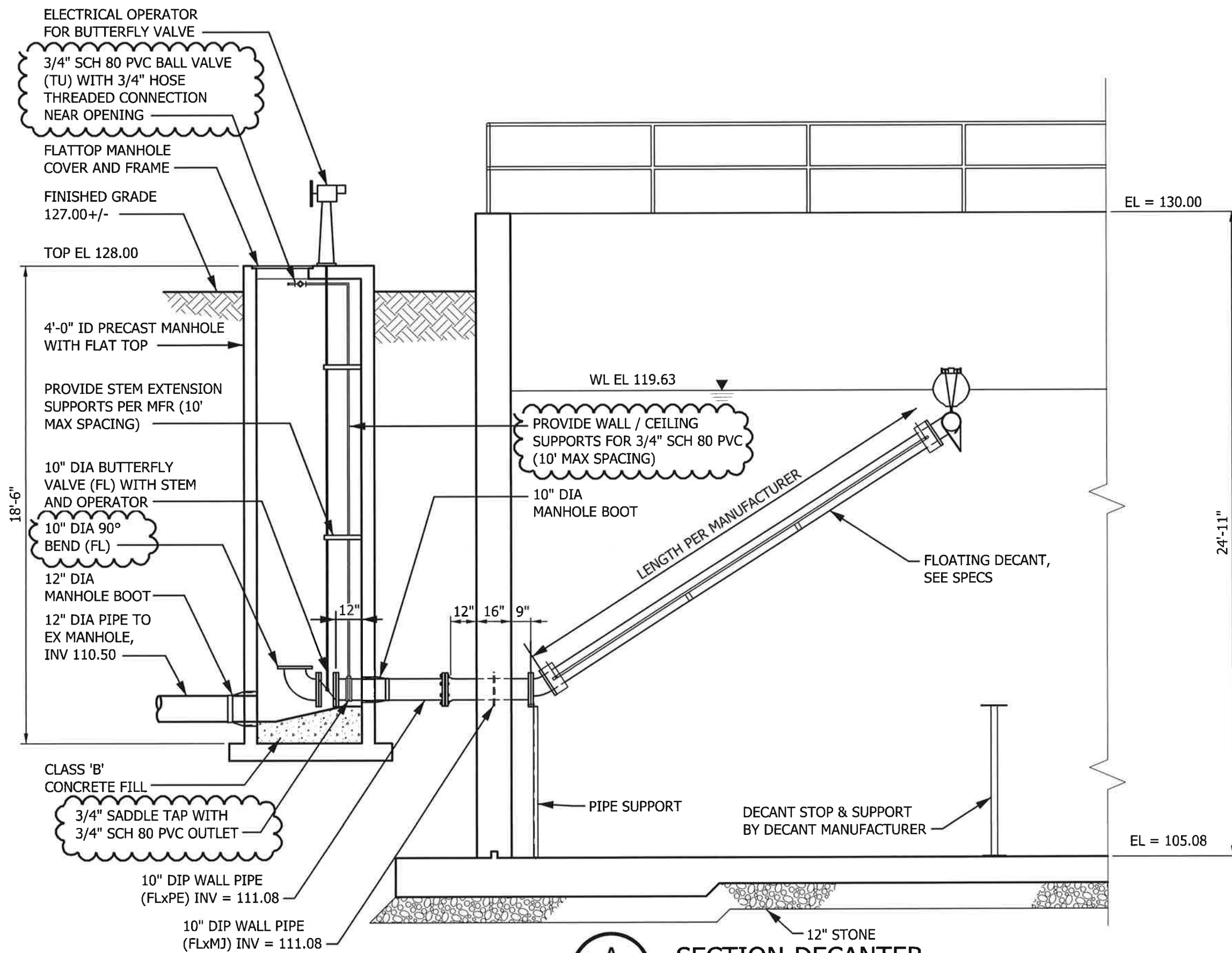
2698-BY

DATE:

NOVEMBER 2020

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A
 SECTION-DECANTER
 M502
 SCALE: 1/4"=1'-0"



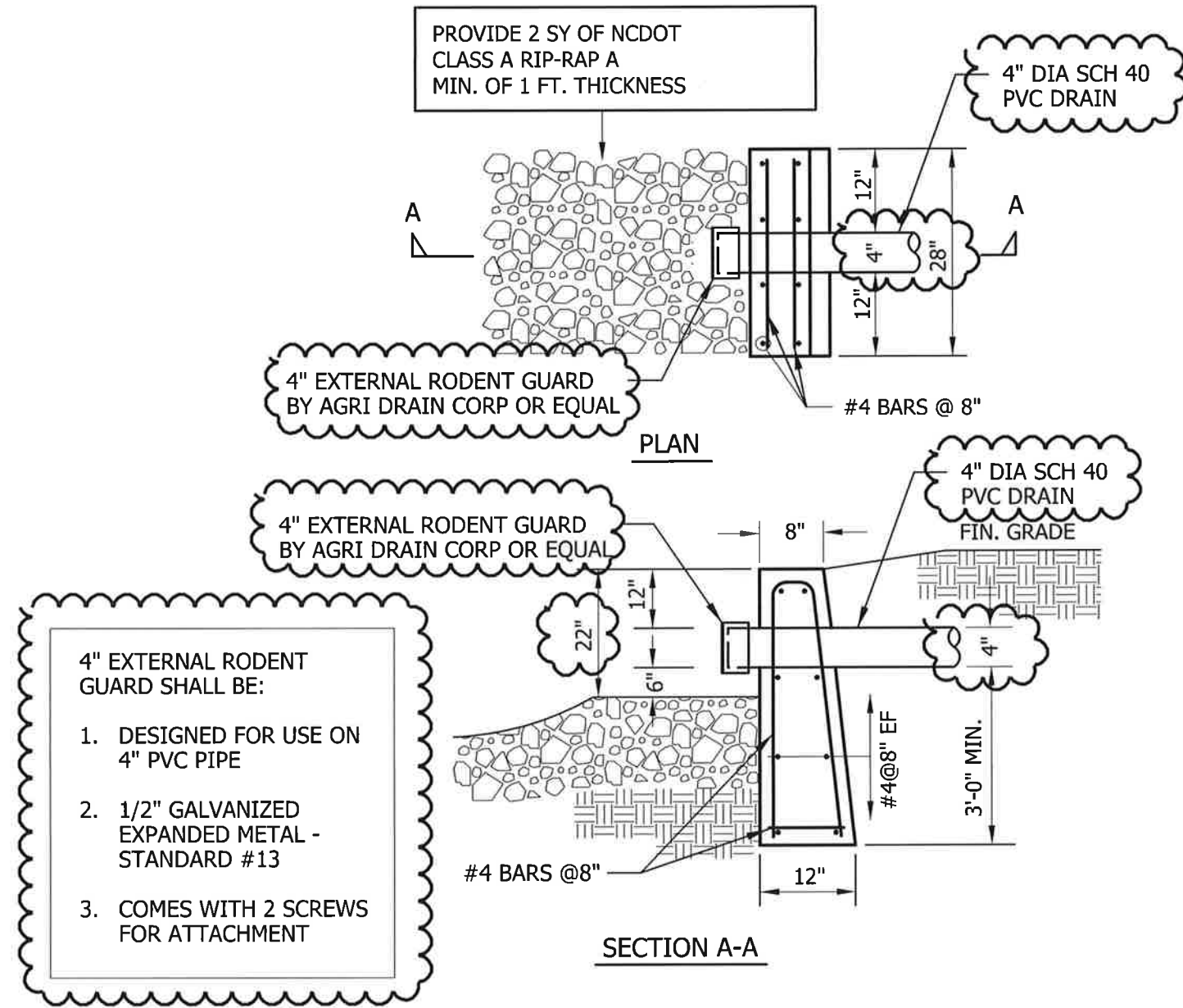
JOHNSTON COUNTY
 TOWN OF SMITHFIELD
 NORTH CAROLINA

ADDENDUM No. 1 DRAWING
**NEW BACKWASH HOLDING TANK
 DECANTER CHANGES**

PROJECT NO.:
 2698-BY
 DATE:
 NOVEMBER 2020

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12 CONCRETE HEADWALL DETAIL
 SD-4 N.T.S.

JOHNSTON COUNTY	NORTH CAROLINA
TOWN OF SMITHFIELD	
ADDENDUM No. 1 DRAWING	
NEW RESERVOIR TOE DRAIN HEADWALL OUTLET CHANGES	

PROJECT NO.:	2698-BY
DATE:	NOVEMBER 2020

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