Alabama State Port Authority

Addendum to R&P or Specification Booklet

Project Name North McDuffie Drainage Integration

Project No. 11093 **Task No.** 1 **Addendum No.** 1

To: Prospective Bidders **Date:** 5/13/2022

The following items are clarifications, notes and/or answers to questions received during the Pre Bid Meeting.

Item	Description
1.	**REVISIONS AND CLARIFICATIONS** 1) TECHNICAL SPECIFICATIONS a) *Section 2.1.1, General System Requirements, Warranty:* Pump warranty period was changed to five (5) years b) *Section 3.1.7, Pump Station Installation, Excavation:* Concrete compressive strength was changed to at least 4,000 psi at 28 days c) *Section 3.4.4, Force Main Extension Installation, Thrust Blocks*: Concrete compressive strength was changed to at least 4,000 psi at 28 days *d) Section 3.6, Concrete:* Concrete compressive strength was changed to at least 4,000 psi at 28 days *e) Section 3.6.1, Concrete, Proportioning Materials:* Concrete compressive strength was changed to at least 4,000 psi at 28 days 2) DRAWINGS & PLANS a) *Sheet 3, Proposed Site Plan:* Leader text was deleted stating the proposed 18" force main was above ground along bridge b) *Sheet 9, Anti-Float Details:* Drawing was revised to clarify details and specifications for construction *c) Sheet 10, Pump Station Site Plan:* Aggregate collar around pump station slab was deleted, *Notes* box was revised to clarify details and specifications for construction d) *Sheet 12, Force Main Plan View*: Aggregate collar around pump station slab was deleted
2.	**Attachments** ▪ Pre-Bid Sign-in Sheet ▪ Technical Specifications_REV1 ▪ Revised Drawing, Sheet 3 ▪ Revised Drawing, Sheet 9 ▪ Revised Drawing, Sheet 10 ▪ Revised Drawing, Sheet 12
3.	A new specification booklet titled *Specification Booklet_PN11093-North McDuffie Drainage Integration_REV1* with the attached revisions can be accessed at **ASPA PN11093-North McDuffie Drainage Integration**

Please indicate your receipt of this addendum by adding the addendum number in the appropriate place in your Requisition & Proposal or Specification Book.

5/13/22

Wesley Jackson, E.I. **Date**
Project Manager

Alabama State Port Authority

Pre-bid Sign-in Sheet

Project Name North McDuffie Drainage Integration **Project #** 11093 **Task #** 1

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Bobby Pardue			

Contractor (Business) Name	Address 1	Address 2	City, State Zip
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Contractor (Business) Name	Address 1	Address 2	City, State Zip
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1.0 GENERAL PROJECT DESCRIPTION

The Alabama Port Authority (APA) operates McDuffie Coal Terminal (MCT) which is a 550-acre bulk terminal located at 1901 Ezra Trice Boulevard in Mobile, Alabama. MCT currently accepts stormwater from a pump station that collects stormwater from the Radcliff Rail Yard and Ezra Trice Boulevard. The stormwater is stored in a detention pond on the north side of the MCT facility near the APM Terminal. The project is described as the rerouting of this storm water from the existing detention pond to the sedimentation ponds on the southern portion of the facility.

A 12-inch HDPE SDR 17 force main that conveys storm water from the pump station to the existing detention pond will be extended approximately 1,400 ft to the new pump station facility. In addition, the gravity storm sewer system that collects water in the MCT administrative area and routes it to the existing detention pond will be re-routed to the new pump station. This will be accomplished by the installation of 1,300 ft of gravity storm sewer which includes 30-inch reinforced concrete pipe and 5 storm sewer manholes. Erosion control measures will be implemented adjacent to the force main extension and gravity storm sewer construction which includes the installation of erosion control and inlet protection along the route.

The stormwater transfer pump station will be installed northwest of the T-19 tower where conveyors 32 and 33 converge. This area is currently undeveloped but will eventually be developed into a warehouse facility for MCT. The pump station will consist of the installation of two, 12 ft diameter, 12 ft deep fiberglass basins. The first basin will serve as a stormwater surge tank to provide additional capacity during large storm events. The second basin will be a triplex pump station that houses submersible pumps. In addition, a 8.5 ft diameter, 4 ft deep fiberglass valve box will be installed adjacent to the outlet of the pump basin. Miscellaneous electrical will be required to provide power to the pump station and controls.

The discharge force main consists of approximately 2,350 ft of 18-inch HDPE SDR 11 pipe. The pipe will be installed through directional boring methods and will be routed down the access road to the sedimentation ponds. A sloped paved headwall discharge will be installed in the first cell of the sedimentation ponds as noted on the drawings.

2.0 EQUIPMENT SPECIFICATIONS

2.1 Submersible Pumps

2.1.1 General System Requirements

PERFORMANCE REQUIREMENTS:

Pump shall be KSB pump model KRT K 200-403/654XEG-S
Operating Conditions - Design: 2,500 GPM @ 92 FT TDH
Supplemental Design point: 3,700 GPM @ 58 FT TDH
Maximum Motor HP: 87 HP

QUALITY ASSURANCE - REFERENCED STANDARDS:

American Iron & Steel Institute (AISI)
American Society for Testing and Materials (ASTM)
Factory Mutual (FM)
Hydraulic Institute Standards for Centrifugal, Rotary, and Reciprocal Pumps (HI)
National Fire Protection Agency (NFPA)
National Electric Code (NEC)
National Electrical Manufacturers Association (NEMA)
Anti-Friction Bearing Manufacturers Association (AFBMA)
International Standards Organization (ISO) - ISO9001

WARRANTY:

The pump manufacturer shall warrant the pump, motor and guide system to the Owner against defects in workmanship and materials for a period of five (5) years under normal use and service. Pump manufacturer warranty shall be in published form and shall apply to all similar units. A copy of each warranty shall be provided to the Owner at startup.

2.1.2 Products

ACCEPTABLE MANUFACTURERS & REPRESENTATIVES:

Subject to compliance with the Contract Documents, the following are acceptable:

- KSB as represented by Pump & Process, Inc. The contact phone number for Pump & Process is (205) 529-8432.
- Equal alternates as approved by the APA no later than 3 weeks prior to bid.

Other special requirements for the acceptable manufacturer and representatives of the manufacturer:

- Local Representative shall employee at least 2 Alabama state licensed professional engineers to support field troubleshooting and pump selection.

- Local Representatives' field service technicians shall have combined field experience of 75 years or more with pumps and controls.
- Local Representatives shall have a service facility within 2-hours of the project site.

All products, whether named as "acceptable" or proposed as "equal" must fully comply with these specifications:

- Standard product must be modified, if required, for compliance.
- The contractor shall base his bid price on product offered by KSB, Inc. for purposes of determining the successful bidder on this project.
- The contractor may submit, with the bid, an alternate proposal with applicable deduct if any for supplying product other than KSB.
- Alternate proposals must include a clear statement of each point of difference between the proposed alternate product and these specifications. The Owner and Engineer reserve the right to reject any bid not based on KSB product.

SUBMERSIBLE SEWAGE PUMPS MATERIALS:

The following materials shall be used in the manufacturing of the submersible pumps used in the project:

- Pump Case: Cast Iron, ASTM A48, Class 35B
- Motor Housing: Cast Iron, ASTM A48, Class 35B
- Impeller: wear resistant high chrome white iron, minimum Brinell Hardness (HBW) of 550-581 Intermediate Housing (Backplate): wear resistant high chrome white iron, minimum Brinell Hardness Rating (HBW) of 550-581
- Discharge Base Elbow: Cast Iron, ASTM A48, Class 35B
- Pump/Motor Shaft: Carbon Steel, ASTM A576, Gr.1045 with replaceable ASTM A276 Type 420 shaft protection sleeve. (NOTE: If sleeve is not supplied, entire shaft is to be ASTM A276 Type 420 stainless steel)
- Shaft Sleeve (if used): Stainless Steel, ASTM A276 Type 420
- Wear Ring, case: Stainless steel, AISI 329, 350 Brinell
- O-Rings: Nitrile Rubber (NBR)
- Fasteners (including impeller fastener): Stainless Steel, ASTM A276 Type 316Ti.
- Lower Seal Faces: Silicon Carbide/Silicon Carbide
- Upper Seal Faces: Silicon Carbide stationary/Carbon rotating
- Guide rails/cables and mounting brackets: Stainless Steel, ASTM A276 Type 316
- Lifting Chain or cable: Stainless Steel, ASTM A276 Type 316
- Oil-all uses (seal lubrication, etc): ecologically safe, parifin or mineral base
- Power/Control Cable Jacket: Chloroprene with non-wicking fillers

POWER CABLE:

Supplier shall provide 33 ft of power/control cable with each pump, suitable for submersible wastewater application, sized in accordance with NEC requirements. Provide cable terminal box on side of motor

housing, with cable entry sealed to insure that no entry of moisture is possible into the high-voltage motor/ terminal area even if the cable is damaged or severed below water level. Cable seal shall include a compressed rubber grommet to seal the cable exterior and epoxy fill to seal the interior passages. A strain relief device, in direct contact with both the cable and the cast iron entry housing, shall be provided. The cable entry shall be rated by Factory Mutual (or UL) for submerged operating depths to 85 feet.

TEMPERATURE PROTECTION:

Supplier shall furnish temperature monitoring devices in motor windings for use in conjunction with and supplemental to external motor overload protection. Arrange controls to shut down pump should any of the monitors detect high temperature and automatically reset once motor temperature returns to normal. Set temperature monitors at levels recommended by pump manufacturer.

SEAL LEAK DETECTION:

Provide a detector in the motor's stator cavity which allows a control panel mounted relay to indicate leakage into the motor. In addition, on motors 80HP and larger provide a stainless-steel float switch in a separate leakage collection chamber to indicate leakage past the inner mechanical seal prior to its entrance into either the motor stator cavity or the lower bearing. Electronic probes which depend on sensing resistance value changes in seal oil will not be acceptable as seal leak indicators.

MOTOR SENSOR MONITORING RELAY:

The pump supplier shall furnish all relays required for monitoring all motor sensors. The relays shall be installed by others in the motor control panel and properly wired in accordance with pump manufacturer's instructions. Relays shall mount in standard 12-pin socket bases (provided) and shall operate on available control voltage of 24-240 VAC. If relays require an input voltage that is not available in the motor control panel an adequate transformer (with fused input) shall be provided by the pump supplier. Relays shall have a power consumption of no more than 2.8 watt and shall be UL approved. Relays shall be modular in design, with each relay monitoring no more than two motor sensor functions.

Each relay module shall include a dual color (red/green) LED to indicate the status of each monitored sensor. Green will indicate "status OK"; red will indicate a failure or alarm condition. A self-corrected fault will allow the relay output contacts to reset and cause the LED to change from a steady alarm indication to a flashing signal. The LED shall continue to flash until locally cleared, providing the operator an indication of a potential intermittent fault. Each relay shall also include a power-on LED and both "test" and "reset" pushbuttons.

An independent fail-safe (switch on power loss) form-C output contact shall be included for each monitored sensor to provide a normally-open / normally-closed dry contact to initiate a remote alarm device or shut down the motor. Contacts shall be rated for 5 amps at 120 volt.

PUMP FABRICATION:

Provide pumps capable of handling raw unscreened wastewater. Although this is not a wastewater application, the water being pumped does have wastewater characteristics similar to unscreened wastewater. The pumps shall meet the following requirements:

- Pumps shall be designed to allow for removal and reinstallation without the need to enter the wet well and without removal of bolts, nuts or other fasteners.
- Provide a pump which connects to a permanently mounted discharge connection by simple downward motion, without rotation, guided by at least two non-load-bearing guides.
- All system components for guide cable systems, including cable, shall be supplied, and warranted by the pump manufacturer. For guide pipe systems the pipe shall be supplied and warranted by the installing contractor. Guide cable systems shall be suitable for proper operation when installed at up to 5 degree misalignment from vertical, pipe guides must be installed perfectly plumb and vertical. Intermediate guide supports (between upper bracket and discharge elbow connections) shall not be required for cable systems but MUST be supplied where needed to maintain perfect alignment for pipe guides.
- Final connection shall ensure zero leakage between pump and discharge connection flange.
- Supplier shall provide a discharge connection/ guide system so that no part of the pump bears directly on the floor of the wet well.
- Supplier shall provide Type 316 stainless steel chain of sufficient length to lift pumps properly and safely from the wet well. All exposed cast iron and ferrous surfaces shall be cleaned of dirt and grease, sandblasted to near white finish, and coated with an anti-corrosion reaction primer. The pump shall then be coated with two-component thick coat paint, with an epoxy resin base, having at minimum 83% solids by volume. This coating shall be non-toxic and approved for both wastewater and water applications.

OTHER MAJOR COMPONENTS:

Supplier shall furnish major components (pump case, impeller, intermediate housing, motor housing) of cast material as specified with smooth surfaces devoid of blow holes and other irregularities. Pump case design shall incorporate a centerline discharge for stability when mounted on the base elbow.

IMPELLER AND WEAR RINGS - SINGLE VANE OR MULTIVANE ENCLOSED TYPE:

The impeller(s) shall be manufactured of gray cast iron, Class 35B, dynamically balanced, semi-open, non-clogging design capable of handling soils, fibrous materials, heavy sludge and other matter found in wastewater. The impeller(s) shall have a back shroud only with back pump-out vanes to equalize axial thrust, and curved blades which protrude into the pump casing for maximum efficiency. The impeller will create a vortex which carries solids through the pump casing without passing through the blades. Impeller(s) shall be capable of passing a minimum 3.5 inch diameter solid.

PUMP/MOTOR SHAFT:

Supplier shall provide common pump/motor shaft of sufficient size to transmit full driver output with a maximum deflection of 0.002 inches measured at the lower mechanical seal. Machine the shaft of carbon

steel or stainless steel and isolate the shaft from the pumped media with a replaceable Type 420 stainless steel shaft sleeve under the lower mechanical seal. Pump shafts without shaft sleeves are not acceptable due to higher maintenance costs associated with repairing shafts / rotor assemblies that are left unprotected.

SHAFT SEAL:

Supplier shall provide two totally independent mechanical shaft seals, slurry seal type, installed in tandem, each with its own independent single spring system acting in a common direction. The supplier shall install the upper seal in an oil-filled chamber with drain and inspection plug (with positive anti-leak seal) for easy access from external to the pump. The seals provided shall require neither routine maintenance nor adjustment but shall be capable of being easily inspected and replaced. The seals shall be non-proprietary in design, with replacements available from a source other than the pump manufacturer or its distributors. Seals with the following characteristics will not be accepted:

- conventional double mechanical seals with single or multiple springs acting in opposed direction
- cartridge-type mechanical seals
- seals incorporating coolant circulating impellers
- seals with face materials other than those specified

BEARINGS:

Supplier shall furnish upper and lower bearings, single row (preferred) or double row as needed to provide a B10 life of, at minimum, 100,000 hours at all anticipated axial and radial loadings. In addition, sealed/shielded (permanently lubricated) bearings shall be provided. If open-type (non-shielded) bearings are used, re-lubrication ports shall be provided with positive anti-leak plugs for periodic addition of lubrication from external to the pump.

MOTOR:

Supplier shall provide a motor which is squirrel cage, induction in design, housed in a completely watertight and air-filled chamber, with a min 1.15 service factor. The motor shall be adequately sized and rated for continuous operation at a maximum fluid temperature of 104º F (40º C) [optional: 140ºF (60º C)]. Allowable maximum submergence shall not be less than 100 ft (30 m). The motor stator shall be insulated with, at minimum, Class H insulation rated for 180° C. Windings shall be insulated using trickle impregnation process to ensure uniformity with a winding fill factor of at least 95%. The use of multiple step “dip and bake” type stator insulation method shall not be acceptable. The rotors bars and short circuit rings shall be made of cast aluminum. The motor and pump set complete shall be designed and manufactured by the same company. Temperature protection and seal leak detection shall be provided as described. The motor shall be adequately rated with sufficient surface area for ambient only cooling suited for the intermittent mode of operation in a wet well wastewater application, submerged or partially submerged, without damage. Motors containing di-electric oils used for motor cooling and/or bearing lubrication or motors where the pumped media or externally provided fresh water is directed through the motor shell for cooling are not acceptable. The motors shall be FM listed for use in Class I Division 1 Groups C&D hazardous locations as defined by the National Electric Code.

SOURCE QUALITY CONTROL:

Non-Witness factory performance testing is required. Tests shall be performed in accordance with the Test Code for Centrifugal Pumps per the Standards of the Hydraulic Institute, Level A. Tests shall be performed on the actual assembled pumps to be supplied. Tests shall cover a range from shut-off to, at minimum, 20% beyond specified design capacity. Test shall be conducted per above specification on all supplied pumps, generating a curve showing actual flow, head, BHP and hydraulic efficiency.

2.2 Pump Basins

2.2.1 General

The product listed under this section shall include all labor, materials and equipment necessary to furnish a Fiberglass Reinforced Plastic (FRP) Wet Well. FRP Wet Wells shall be one piece units manufactured to meet or exceed all specifications of ASTM D3753. Fiberglass reinforced polyester wet wells shall be manufactured from commercial grade unsaturated polyester resin with fiberglass reinforcements as manufactured by the following approved manufacturers:

- Fiberglass Tank Solutions (FTS) as represented locally by Pump & Process, Inc. The contact number for Pump & Process is (205) 529-8432.

SUBMITTAL REQUIREMENTS

The manufacturer shall be prepared to supply the following submittal information to Owner and Engineer for review prior to acceptance of the basin:

- The manufacturer shall supply a complete set of scale drawings detailing dimensions of heights, diameter, elevations to invert, pipe sizes and any other necessary details.
- A set of signed and sealed (by a State of Alabama Professional Engineer) anti-flotation calculations shall be provided which meet the following criteria:
    - Wet well weight and soil pressure on concrete base collar may be used to calculate down forces, but pump and piping weights shall not be used.
    - Assume groundwater is at grade.
    - A factor of safety of 1.2, minimum, must be used.
    - The design calculations shall include the design conditions as noted on the drawings.
- Manufacturer shall provide a complete Composite Engineering Design using a Finite Element Analysis for the wet well. The calculations shall include:
    - Design Inputs
    - Design of Cylindrical Shell
    - Flat Top Head Design
    - Bottom Head Design
    - Pump Anchorage on Flat Bottom
    - Component Weight
    - Buoyancy Calculations
    - Lifting Trunnion Design

- Access Cover Opening Reinforcement
- Design Summaries and Sketches
- P.E. Stamp for the Design

- Pumps shall be anchored to a mounting plate (see details on the project drawings). The complete design (signed and sealed by a State of Alabama Professional Engineer) shall be submitted. Mounting plates are not permitted to be bolted through the bottom of the basin.

QUALITY ASSURANCES

Basin construction shall comply with the latest published editions of AWWA and ASTM Standards:

ASTM D883	Standard Terminology Related to Plastics
ASTM D3299	Standard Specification for Filament-Wound Glass-Fiber-Reinforced Thermoset Resin Corrosion-Resistant Tanks
ASTM D3753	Standard Specifications for Fiberglass (Glass-Fiber-Reinforced Reinforced Thermosetting-Resin) Manholes and Wet Wells
ANSI / AWWA D120-09	AWWA Standard for Thermosetting Fiberglass- Reinforced Plastic Tanks

2.2.2 Products

MATERIALS

The following material specifications shall be used in the manufacturing of the FRP wet well.

- The resins used shall be commercial grade unsaturated 100% polyester resins. Interior corrosion liner shall be a Vinyl Ester resin.
- The reinforcing materials shall be a commercial Grade "E" type glass in the form of mat, continuous roving, chopped roving, roving fabric, or a combination of the above, having a coupling agent that will provide a suitable bond between the glass reinforcements and the resin.
- If reinforcing materials are used on the surface exposed to the contained substance, it shall be a commercial grade chemical-resistant glass that includes a C-Veil or Nexus liner that will provide a suitable bond with the resin and leaves a resin rich surface.
- A minimum of a 10mm interior laminate layer of the tank construction shall include the reinforcing materials, C-Veil or Nexus, and a commercial grade Premium Vinyl Ester resin for added chemical resistance.
- Fillers, when used, shall be inert to the environment and wet well construction. Additives, such as thixotropic agents, catalysts, promoters, etc., may be added as required by the specific manufacturing process to be used. The resulting reinforced plastic material must meet the requirement of this specification. No sand fillers will be allowed.

FABRICATION

The following specifications shall be referenced in the fabrication of the FRP wet well:

- The exterior surface shall be relatively smooth with no sharp projections. Hand-work finish is acceptable if enough resin is present to eliminate fiber show. The exterior surface shall be free of blisters larger than 1/2 inch in diameter, delamination and fiber show.
- The interior surface shall be resin rich with no exposed fibers. The surface shall be free of crazing, delamination, blisters larger than 1/2 inch in diameter, and wrinkles of 1/8 inch or greater in depth. Surface pits shall be permitted if they are less than 3/4 inch in diameter and less than 1/16 inch deep.
- Interior and Exterior of the lift station shall be either white or light gray in color.
- The following defects are not permitted and will lead to the FRP wet well being rejected and replaced by the manufacturer:
    - Exposed fibers – Glass fibers not wet out with resin.
    - Resin runs – runs of resin and sand on the surface.
    - Dry areas – areas with glass not wet out with resin.
    - Delamination – separation in the laminate.
    - Blisters – light colored areas larger than ½ inch in diameter.
    - Crazing – cracks caused by sharp objects.
    - Pits or Voids – air pockets.
    - Wrinkles – smooth irregularities in the surface.
    - Sharp projection – fiber or resin projections necessitating gloves for handling.

- Manufacturer or a manufacturer-certified field personnel shall glass in all stainless-steel fasteners and brackets, discharge piping brackets, etc. Manufacturer of wet well shall be responsible for integrity of all field glassing.
- Each wet well shall have wet well data integrated into fiberglass and affixed inside and top outside walls at or near the top. Data on the inside of the wet well should be legible from the top of the completed lift station installation. Product data shall not be written in ink or paint. Production/serial numbers shall be kept on file by Manufacturer for a minimum of 20 years and shall be accompanied by project data for future reference and recall. Data required includes the following as an example:
    - Manufacturer's Name
    - ASTM Designation
    - Production or Serial Number
    - Production date
    - Wet Well Depth
    - Wet Well Diameter
    - Warranty Length

- The wet well flange shall have an outside diameter of at least 3.0 inches greater than the diameter of the wet well.
- Cutouts/stub-outs must be installed by the manufacturer. Installations in the field are not recommended and may void the manufacturer's warranty. Penetrations of FRP pipe will be

performed using resin and reinforced hand lay-up procedures. All resin and fiberglass shall be the same type and grade as used in the manufacturer of the basin.

- Discharge wall penetrations are to have sleeves large enough to accept O.D. of pipe discharge flange. All discharge sleeves shall be sealed via a gas tight-water tight Link Seal system or approved equal. Influent pipe connections shall be made with a Press Seal Boot with stainless steel band or approved equal.
- The FRP wet well top shall be concrete and designed for 300 PSF or H-2O Traffic loading as noted on the drawings. Hatches shall be as specified in this specification and as detailed on the Contract drawings. Bottom of top slab and around side of hatch opening shall be fiberglass lined and shall meet all the requirements of this specification.
- Access frame and covers shall be suitably sized for pumping units furnished as specified on the Construction plans and details. Access frame and covers shall be constructed of skid-proof aluminum with a minimum load rating of 300 pounds per square foot or H-20 traffic loading in accordance with the drawings. Frame and covers shall be furnished complete with stainless steel staple assembly (not recessed) for the locking mechanism, hold-open device, upper guide holder and cable holder. Access covers shall be hinged to open as indicated on the drawings. Hatches shall be sized to provide a 4-inch minimum clearance between hatch and pump volute (measured from all sides and includes the pump and rail system). Hatches shall be gasketed to minimize water intrusion and odors, with drain piping. All hatch openings shall be provided with aluminum powder coated safety grates.
- All hinges, fasteners and miscellaneous hardware shall be 316 stainless steel. For tamper proof and security purposes, the hinges shall be bolted to the door(s) with stainless steel carriage bolts and nuts. The nuts shall be welded to the bolts on both the door(s) and frame. The Owner will provide pad locks, as required. Locks shall be easily accessed, no slam-lock-type locking mechanisms will be allowed.
- Hatches to be installed by tank manufacture in the factory.
- Pump discharge piping systems shall be constructed using either ductile iron, stainless steel, or poly propylene, per the plans.
- Pump guide rails shall be Schedule 40 Stainless Steel sized per the plans.
- All interior piping and guide rail systems shall be installed by tank manufacturer in the factory.

2.3 Pump Controllers

2.3.1 General

Control panels will be provided for the pump station, designed to automatically operate pumps in response to excursions in liquid level as specified for each station. Each control panel shall be UL 508A certified, completely assembled, wired, tested and properly labeled prior to shipment. The control panel shall be supplied by the selected pump distributor to insure compatibility between pumps and controls.

The pump control will be housed in a NEMA 4X stainless steel enclosure with an aluminum inner door. Wiring having not less than 600-volt insulation with a 75-degree Celsius rating. The enclosure will have a 3-point pad lockable stainless-steel latch and stainless-steel hinge.

2.3.2 Products

The 87 HP triplex submersible pump control panel shall consist of the following components:

- Voltage 460V 3 Phase
- Hand-Off-Automatic switch for each pump.
- Overload and short circuit protection for each pump.
- Control Transformer with fuse primary.
- Control breaker.
- Red high level tamper resistant LED alarm light with steady and flash circuits.
- Solid state cross wired alternator with pump isolation switch.
- Circuit breaker protection capable of full panel operation with interlocked handle when required or main power distribution block.
- Circuit breaker for each pump.
- Pump seal fail and thermal monitor.
- Pump run green LED pilot light for each pump.
- ABB brand Softstarter with internal bypass contactor rated for each pump.
- Softstarter HMI mounted on inner door.
- Run time hour meters.
- Lightning arrestor.
- Red fault trip LED pilot light for each pump.
- Amber seal fail LED pilot light for each pump.
- All switches and pushbutton to be oil tight NEMA 4X rated mounted on inner door.
- Field wiring connection points will be supplied using terminal strips with the exception of supply power. The terminals will have printed tabs using industrial printer ink.
- Pump control will use 5 floats.

2.3.3 Control Sequencing

The panel shall employ the following sequencing and logic:

- Panel control sequencing will alternate pumps on each off cycle.
- The alternator shall have a selector switch for pump 1, pump 2, pump 3 or alternate.
- No pump will run with the off float in the deactivated position. When the off float is activated, and the level continues to rise and activates the lead float the lead pump will start and run until the off float is deactivated. Should the level continue to rise upon activation of the lag float the second pump will start and if the level continues to rise to the lag lag float all three pumps run until the off float is deactivated. Should the level continue to rise the high-level alarm float will be activated turning on the alarm light.

2.3.4 Miscellaneous

- The control panel will contain a thermal motor temperature circuit and pump seal moisture detector. The thermal circuit will shut down the corresponding motor on winding over temperature.
- The panel will contain a correctly sized pump breakers. All breakers shall be accessible from the inner door without exposing any high voltage circuits.
- Each pump will have a correctly sized breaker, soft starter with HMI on inner door. Hour meters will be installed for pump run time display.

3.0 CONSTRUCTION SPECIFICATIONS

3.1 Pump Station Installation

3.1.1 General

The FRP wet well shall be installed in the location shown on the plans in accordance with the manufacturer's recommendations, the geotechnical report (if applicable) and these specifications. The limit of excavation for the FRP shall allow for placing and removing forms, installing sheeting, shoring, bracing, etc. The Contractor shall pile excavated material in a manner that will not endanger the work and will avoid obstructing sidewalks, driveways, power poles, etc.

3.1.2 Handling of Basin

The wet well shall not be dropped or impacted. Wet wells shall be appropriately secured if stored horizontally. If wet wells must be moved by rolling, the ground transverses shall be smooth and free of rocks, debris, etc. FRP wet wells may be lifted by the installation of three lifting lugs as specified by the manufacturer on the outside surface near the top or by a sling or "choker" connection around the center. Use of chains or cables in contact with the wet well surface is prohibited. Wet wells may be lifted horizontally using one support point.

3.1.3 Basin Installation

Bottom of excavation should be compacted in accordance with the geotechnical report (if available) or to a minimum 95 percent Modified Proctor Density. Pour reinforced concrete base a minimum of one foot deep and at least two feet in diameter larger than the fiberglass wet well outside diameter.

3.1.4 Sheeting Shoring and Bracing

When necessary to protect existing or proposed structures or other improvements, the Contractor shall maintain vertical sides of the excavation. The limit shall not exceed three feet outside the footing on a vertical plane parallel to the footing except where specifically approved otherwise by the Engineer. The Contractor shall provide and install any sheeting, shoring, and bracing as necessary to provide a safe work area as required, protecting workers, structures, equipment, power design and adequacy of all sheeting, shoring, and bracing. For excavations deeper than 20 vertical feet, which utilize sheeting, shoring or bracing, the sheeting, shoring and bracing plan shall be designed by an Alabama Professional Engineer, (signed and sealed). This plan shall be submitted to the Owner for review and approval, prior to construction. The construction of sheeting, shoring and bracing shall be in accordance with the approved plan. All major field modifications shall be approved by the Professional Engineer. The sheeting, shoring, and bracing shall be removed as the excavation is backfilled in such manner as to prevent injurious caving. Excavation shall meet OSHA Excavation Standards (29 CFR sub- part P 1926.650) at a minimum.

3.1.5 Side Slopes

Where sufficient space is available, the Contractor shall be allowed to back slope the sides of the excavation. The back slope shall be such that the excavation shall be safe from caving. The type of material being

excavated shall govern the back slope used, but in any case the back slope shall be no steeper than 1 foot horizontal to 1 foot vertical without sheeting or shoring.

3.1.6 Dewatering Requirements

The Contractor shall keep excavation free from water by use of cofferdams, bailing, pumping, well pointing, or any combination as the particular situation may warrant. All de-watering devices shall be installed in such a manner as to provide clearance for construction, removal of forms, and inspection of exterior of form work. It is the intent of these specifications that the foundation be placed on a firm dry bed. The foundation bed shall be kept in a de-watered condition for a sufficient period of time to ensure the safety of the structure. The excavation shall be protected from excessive rainfall, drainage and drying. The excavation shall be inspected and approved by the Owner's representative before work on the structure is started. It is the intent of these specifications that the Contractor provides a relatively smooth, firm foundation bed for footing and slabs that bear directly on the undisturbed earth without additional cost, regardless of the soil conditions encountered. The Owner's representative will be the sole judge as to whether these conditions have been met.

The details in the drawings shall be referenced for details on anti-floation devices incoiporated in this project. Alternative or additional methods to address high groundwater conditions (i.e. deadmen) may be required if deemed necessary by the Contractor.

3.1.7 Excavation

Excavation for slabs, footings, etc., that bear on earth shall not be carried below the elevation shown on the drawings. In the event the excavation is carried on below the indicated elevation, the Contractor shall bring the slab, footing etc., to the required grade by filling with concrete having a minimum compressive strength of at least 4,000 psi at 28 days unless otherwise specified in the drawings.

3.1.8 Backfill

Unless shown otherwise on the drawings, suitable backfill in accordance with the Manufacturer's Installation Guidelines shall be used for backfill around the wet well for a distance of two feet from the outside surface and extending from bottom of the excavation to the bottom of the top slab. The material chosen shall be free of large lumps or clods (which will not readily break down under compaction), clay or rocks larger than 3/4-inch size. This material will be subject to approval by the Owner's Representative. Backfill material shall be free of vegetation or other extraneous material. The Contractor may begin backfilling of wet well as soon as the concrete has been allowed to cure and the forms removed. Backfill shall be placed in accordance with the recommendations contained within the geotechnical report (if applicable). Otherwise backfill shall be placed at a minimum in layers of not more than 12 loose measure inches and mechanically tamped to at least 95 percent Modified Proctor Density. Flooding will not be permitted. Backfill shall be placed in such a manner as to prevent any wedging action against the structure.

3.2 Horizontal Directional Drilling (HDD) Work

3.2.1 General

High density polyethylene pipe (HDPE) installed by directional drilling method shall use acceptable methods and materials for the installation as set forth in this section. The work specified in this section consists of furnishing and installing an underground stormwater force main using the directional boring (horizontal directional drilling, HDD) method of installation, also commonly referred to as guided horizontal boring. HDD is a trenchless method for installing a product that serves as a conduit. This work shall include all services, equipment, materials, and labor for the complete and proper installation, testing, restoration of underground utilities and environmental protection and restoration. The exact method and techniques for completing the directionally drilled installation will be determined by the Contractor, subject to the requirements of these Specifications.

Where discrepancy exists between the Drawings and Specifications, the Specifications shall take precedence. All other applicable standards, codes and specifications referred to by this document that form part of this Specification shall also be followed.

3.2.2 Materials

Pipe used in the HDD activities shall be 18-inch SDR 11 HDPE. All piping and system components shall be the product of one manufacturer and shall conform to the latest edition of ASTM D3350.

3.2.3 Equipment

The directional drilling equipment shall consist of a directional drilling rig of sufficient capacity to perform the bore and pullback of the pipe, a drilling fluid mixing & delivery system of sufficient capacity to successfully complete the installation, a guidance system to accurately guide boring operations, and trained and competent personnel to operate the system. All equipment shall be in good, safe operating condition with sufficient supplies, materials and spare parts on hand to maintain the system in good working order for the duration of this project.

DRILL RIG:

The directional drilling machine shall consist of a hydraulically powered system to rotate, push and pull hollow drill pipe into the ground at a variable angle while delivering a pressurized fluid mixture to a guidable drill (bore) head. The drilling machince shall be able to produce a minimum of 250 tons of pull back force. Other items that are specifically required are asa follows:

- The machine shall be anchored to the ground to withstand the pulling, pushing and rotating pressure required to complete the crossing.
- The hydraulic power system shall be self-contained with sufficient pressure and volume to power drilling operations. The hydraulic system shall be free of leaks.
- The rig shall have a system to monitor and record maximum pull-back pressure during pull-back operations.
- The drill head shall be steerable by changing its rotation and shall provide the necessary cutting surfaces and drilling fluid jets.

- Mud motors (if required) shall be of adequate power to turn the required drilling tools.
- The drill pipe shall be constructed of high quality 4130 seamless tubing, grade D or better.
- The guidance system shall be of a proven type and shall be setup and operated by personnel trained and experienced with this system. The Operator shall be aware of any magnetic anomalies and shall consider such influences in the operation of the guidance system. The guidance system used shall be a wireline guidance system for guiding the drill head during the drilling process. Contractor shall also provide GPS coordinates and depths of the pipe on 25-ft increments of bore length so that the location of the bore route can be tracked throughout the process.

3.2.4 Drilling Fluid (Mud) System

MIXING SYSTEM:

A self-contained, closed, drilling fluid mixing system shall be of sufficient size to mix and deliver drilling fluid composed of bentonite clay, potable water and appropriate additives. Mixing system shall be able to molecularly shear individual bentonite particles from the dry powder to avoid clumping and ensure thorough mixing. The drilling fluid reservoir tank shall be sized for adequate storage of the mud. Mixing system shall continually agitate the drilling fluid during drilling operations.

DRILLING FLUIDS:

Drilling fluid shall be composed of clean water and an appropriate additive. Water shall be from a clean source with a pH of 8.5 – 10 and/or as per mixing requirements of the manufacturer. Water of a lower pH or with excessive calcium shall be treated with the appropriate amount of sodium carbonate or equal. The water and additives shall be mixed thoroughly and be absent of any clumps or clods. Additives shall be environmentally friendly, and no hazardous additives may be used. Drilling fluid shall be maintained at a viscosity sufficient to suspend cuttings and maintain the integrity of the bore wall.

DELIVERY SYSTEM:

The mud pumping system shall have a minimum capacity to supply mud in a accordance with the drilling equipment pull-back rating at a constant required pressure. The delivery system shall have filters in-line to prevent solids from being pumped into the drill pipe. Connections between the pump and drill pipe shall be relatively leak-free. Used drilling fluid and drilling fluid spilled during drilling operations shall be contained and properly disposed of. A berm, minimum of 12 inches high, shall be maintained around drill rigs, drilling fluid mixing system, entry and exit pits and drilling fluid recycling system (if used) to prevent spills into the surrounding environment. Pumps and/or vacuum truck(s) of sufficient size shall be in place to convey excess drilling fluid from containment areas to storage facilities.

3.2.5 Piping and Bends

Piping and Bends shall be extruded from a polyethylene compound and shall conform to the following requirements:

- The polyethylene resin shall meet or exceed the requirements of ASTM D3350 for PE 3408 material with a cell classification of 335434C, or better.
- The Contractor shall provide personnel certified to fuse the pipe as per ASTM D2657.

- The polyethylene compound shall be suitably protected against degradation by ultraviolet light by means of carbon black, well dispersed by pre-compounding in a concentration of not less than 2 percent.
- The maximum allowable hoop stress shall be 800 psi.
- The pipe manufacturer shall be listed with the Plastic Pipe Institute as meeting the recipe and mixing requirements of the resin manufacturer for the resin used to manufacture the pipe in this project.
- The pipe and bends shall have a minimum standard dimension ratio (SDR) wall thickness as specified.
- Joining shall be performed by welding or thermal fusion in accordance with the manufacturer's recommendations.

3.2.6 Transportation, Storage and Handling of Pipe

The contractor shall at all times handle the HDPE pipe in a manner that does not over stress the pipe. Vertical and horizontal curves shall be limited so that wall stresses do not exceed 50% of yield stress for flexural bending of the HDPE pipe. If the pipe is buckled or otherwise damaged, the damaged section shall be removed and replaced by the Contractor at his expense. The Contractor shall take appropriate steps during pullback to ensure that the HDPE pipe will be installed without damage.

The handling of the joined pipeline shall be in such a manner that the pipe is not damaged by dragging it over sharp and cutting objects. Ropes, fabric, or rubber- protected slings and straps shall be used when handling pipes. Chains, cables, or hooks inserted into the pipe ends shall not be used. Two slings spread apart shall be used for lifting each length of pipe. Pipe or fittings shall not be dropped onto rocky or unprepared ground. Slings for handling the pipeline shall not be positioned at butt-fused joints. Sections of the pipes with cuts and gouges exceeding 10 percent of the pipe wall thickness or kinked sections shall be removed and the ends rejoined.

The open ends of all sections of joined and/or installed pipe (not in service) shall be plugged at night to prevent animals or foreign material from entering the pipeline or pipe section. Where possible, the pipe shall be raised and supported at a suitable distance back from the open end such that the open end will be below the level of the pipe at the point of support.

3.2.7 Drilling Operations

GENERAL:

The Contractor shall install the pipelines by means of horizontal directional drilling. The Contractor shall assemble, support, and pretest the pipeline prior to installation in the directional drill tunnel. Horizontal directional drilling shall consist of the drilling of a small diameter pilot hole from one end of the alignment to the other, followed by enlarging the hole diameter for the pipeline insertion. The exact method and techniques for completing the directionally drilled installation will be determined by the Contractor, subject to the requirements of these Specifications.

The Contractor shall prepare and submit a plan to the APA for insertion of the HDPE pipe into the opened bore hole. The plan shall include all pertinent details for completion of the proposed bore.

SITE PREPARATIONS:

Prior to any work being performed on the project, the Contractor shall photograph or video record the entire work area, including entry and exit points. One copy of which shall be given to the APA and one copy shall remain with the Contractor for a period of one year following the completion of the project.

The work site as indicated on the Drawings shall be graded or filled to provide a level working area. No alterations beyond what is required for operations are to be made. The Contractor must confine all activities to the designated work areas.

ALIGNMENT:

The proposed plan and profile installation locations are based on alignments to the best of APA's knowledge to avoid obstructions and to properly maintain operation flow velocities. The Contractor may request changes to the proposed vertical and horizontal alignment of the installation and the location of the entry and exit points. Proposed changes shall be submitted in writing to APA and receive approval prior to construction.

SAFETY:

The Contractor shall adhere to all applicable state, federal and local safety regulations and all operations shall be conducted in a safe manner. Safety meetings shall be conducted daily with a written record of attendance and topic submitted to ASPA.

PIPE:

The pipe shall be welded/fused together in one length, if space permits. Pipe will be placed on pipe rollers before pulling into bore hole with rollers spaced close enough to prevent excessive sagging of pipe.

PILOT HOLE:

Pilot hole shall be drilled on bore path with no deviations greater than 5% of depth over the length of 100 feet. In the event that the pilot does deviate from the bore path more than 5% of depth in 100 feet, the Contractor must notify APA and the Contractor may be required to pull-back and re-drill from the location along the bore path before the deviation.

If a drilling fluid fracture, inadvertently returns or returns loss occurs during pilot hole drilling operations, the Contractor shall cease drilling, wait at least 30 minutes, inject a quantity of drilling fluid with a viscosity exceeding 120 seconds as measured by a March funnel and then wait another 30 minutes. If mud fracture or returns loss continues, the Contractor must cease operations and notify the APA. The APA and Contractor will discuss additional options and work then will proceed accordingly.

REAMING:

Upon successful completion of the pilot hole, the Contractor will ream bore the hole to a minimum of 25% greater than outside diameter of the pipe using the appropriate tools. The Contractor shall not attempt to ream, at one time, more than the drilling equipment and mud system are designed to safely handle.

PULL BACK:

After successfully reaming the bore hole to the required diameter, the Contractor will pull the pipe back through the bore hole. In front of the pipe will be a swivel to prevent torsional stresses occurring in the pipe. Once pull-back operations have commenced, operations must continue without interruption until the pipe is completely pulled into the bore hole. During pull-back operations the Contractor shall not apply more than the maximum safe pipe pull pressure at any time.

In the event that the pipe becomes stuck, the Contractor will cease pulling operations to allow any potential hydro-lock to subside and will then continue pulling operations. If the pipe remains stuck, the Contractor must immediately notify the APA. The APA and Contractor will discuss options and work then will proceed accordingly.

PIPE TESTING:

The pipe shall be hydrostatically tested after joining into continuous lengths prior to installation and again after installation. Pressure and temperature shall be monitored with certified instruments during the test. As a minimum, the force main pipe shall be tested in accordance with the Hydrostatic Testing Requirements of AWWA C600. Erosion prevention procedures will be used during removal and discharge of the water.

3.2.8 Environmental Provisions

The HDD operation is to be operated in a manner to eliminate the discharge of water, drilling mud and cuttings to the water bodies (i.e. Mobile River) or land areas during the construction process. The contractor shall provide equipment and procedures to maximize the recirculation or reuse of drilling mud to minimize waste. All excavated pits used in the drilling operation shall be lined by the Contractor with heavy duty plastic sheeting with sealed joints to prevent the migration of the drilling fluids and groundwater.

The Contractor shall visit the site to be aware of all structures and site limitations so a drilling plan can be provided to ASPA outlining procedures to prevent drilling fluid from adversely impacting the surrounding areas.

The general work areas on both the entry and exit side of the bore shall be enclosed by a berm to contain unplanned spills or discharges. Waste cutting and drilling fluids shall be dewatered and dried by the Contractor to the extend necessary for landfill disposal. Water generated from the dewatering process shall be treated and disposed of properly by the Contractor. All permits, approvals and coordination for this shall be the responsibility of the Contractor.

Equipment and materials for cleanup and the implementation of contingency plans shall be provided in sufficient quantities by the Contractor and maintained at the project site for use in the event of inadvertent leaks or spills.

3.3 Gravity Storm Sewer Installation

3.3.1 General

Storm drain construction shall conform to the details shown on the Drawings and detailed in these Specifications. The Contractor shall furnish and install 30-inch diameter (nominal size) reinforced concrete

storm sewer pipe and the associated manholes as part of this project as shown in the project Drawings. The storm sewer pipe shall meet the specification of ASTM C76 – Standard Specification for Reinforced Concrete culvert, Storm Drain, and Sewer Pipe. The exact method and techniques for completing the installation of the gravity storm sewer will be determined by the Contractor, subject to the requirements of these Specifications.

3.3.2 Scope of Work

The work to be done under this contract shall include the furnishing of all labor, materials, tools and equipment to construct complete in place the storm sewer and all appurtenances as show on the drawings, plans and as specified herein.

The Contractor shall excavate all materials encountered, furnish and compact foundations where required, furnish and install all timbering, sheeting and bracing necessary to safely support the work, remove any ground water encountered during excavation operations, protect, repair, relocate, maintain and restore all sub-surface, surface and overhead structures directly disturbed, damaged or affected by construction operations and furnish all backfill and other appurtenant items as necessary.

All existing drainage features in and around a new project and utilized by the project such as existing pipes and ditches that will remain in service after the project completion shall be in good condition at the completion of the project. If these existing drainage features are not in good condition, they will need to be cleaned, repaired, or replaced at the expense of the Contractor.

3.3.3 Materials

The storm sewer pipe, fittings, manholes and all appurtenances shall be new materials and shall be of the type, class, and size as shown or specified in this document and the project Drawings.

3.3.4 Manholes

Manholes shall be constructed at the designated locations according to the Drawings and Specifications associated with this project. Manholes shall meet the requirements of ASTM Specification C-478. Precast manholes shall be used whenever possible. Manhole castings shall be Neenah R-1642-B or approved equal with machine bearing surfaces with concealed pick holes and “Storm Sewer” stamped on the cover.

3.3.5 Excavation and Pipe Foundation

The trench shall be excavated beginning at the outlet end and proceeding upgrade, true to the established line and grade. Tunneling will not be permitted unless authorized in writing. The removal of trees or other obstructions encountered necessary for the construction of the work shall be done by the Contractor without extra compensation. Trenches shall be properly sheeted and braced wherever needed. If deemed necessary, foundation backfill shall be used. The foundation in the trench shall be so formed and treated as to prevent subsequent settlement. If the foundation is in rock, foundation backfill consisting of a 12 inch {300 mm} cushion of well compacted sand, fine gravel, slag, broken stone, or other approved material shall be placed upon the rock. If the excavation has been made deeper than necessary, proper bearing shall be secured by means of a layer of fine gravel, or other suitable material. In all cases recesses shall be formed to receive the bell or hub, so that the full length of the pipe barrel will rest on the trench bottom. Excavation and

backfill shall be handled as per ALDOT Standard Specifications, latest edition, Section 533 for Storm Sewers.

3.3.6 Pipe Laying Considerations

Pipe shall not be covered until approved by APA or their representatives. The laying of pipes in finished trenches shall be started at the outlet end and proceed upgrade so that the spigot or groove ends point in the direction of flow. All pipes shall be laid with ends abutting and with not more than 1 inch {25 mm} variation from established alignment at the vertical centerline or from grade at the flow line. The bottom of the trench shall be shaped accurately to the outside surface of the pipe for a depth at least 0.10 times the outside diameter. Pipes shall be fitted and matched so that when laid in the work they will form a sewer with a smooth, uniform invert. Hubs or bells shall be carefully cleaned before pipes are lowered into the trenches. Pipe shall be so lowered as to avoid damage and unnecessary handling in the trench.

3.3.7 Connection and Assembly of Joints

Unless otherwise directed, all joints shall be sealed as specified in ALDOT Standard Specifications, latest edition, 530.03(d)3 for the entire circumference of the pipe. Concrete pipe and fitting joints shall be compression type rubber gasket seals conforming to the requirements of ASTM C-443, ASTM C-361 or AASHTO M-198 for circular pipe. Rigid pipe may be of bell and spigot, tongue and groove, or other approved design unless a specific type is specified. The method of joining pipe sections shall be such that the ends are fully entered, and the inner surfaces are reasonably flush and even. Joints shall be sealed with bituminous plastic cement, preformed flexible sealant, rubber gaskets, or other type sealers that may be approved. Joints shall be thoroughly cleaned before being sealed and shall be sealed for the full circumference of the joint unless otherwise directed. When joining round R.C. pipe, only rubber gaskets shall be used unless otherwise approved by the APA. When bituminous plastic cement is used, the interior surface of the hub, beginning at the lip of the normal interior surface of the pipe, shall be coated with a layer of sealing material that will cover at least 0.33 times the distance, measured along the surface of the hub, parallel to the normal length of the pipe. The thickness of the mastic placed shall be such that it will provide a uniform seal between the edges of the pipe sections being joined (approximately 1/2 of an inch {10 mm} on the inside shoulder of the hub and approximately 1/8 of an inch {3 mm} of material on the remaining area to be covered). When Pre-formed flexible sealant is used it shall be placed according to the manufacturer's requirements. No joint shall be considered satisfactory when the space between the edges of the pipes being joined exceeds 1/2 of an inch {10 mm} for more than 0.33 times the circumference of the pipe. The inside of the joint shall be wiped and finished smooth. Rubber or other types of gaskets shall be installed as recommended by the manufacturer. Trenches shall be kept free from water until mortar in the joints and masonry has hardened. Walking or working on or over the completed pipeline, except such as is necessary for tamping or backfilling, will not be permitted until at least 3 feet of backfill is in place over the pipe. Joint material for storm sewers shall be the same as specified in ALDOT Specifications, latest edition, Section 530 for Roadway Pipe.

3.3.8 Backfilling

All trenches and excavations shall be backfilled with approved natural soil or, if directed or provided by the plans, with foundation backfill material after the sewer pipe is laid therein, unless otherwise specified. Backfilling shall not begin until mortar joints have cured or until backfilling is authorized by the Engineer.

The material shall be carefully deposited simultaneously on both sides of the pipe in uniform layers not to exceed 6 inches {150 mm} in compacted thickness, solidly tamped or rammed with proper tools so as not to injure or disturb the pipe. If stone, gravel, or slag is provided or specified as backfilling, the sewer pipe shall be covered with clean gravel or broken stone or slag placed around and above it to a height of not less than 4 inches {100 mm} above the upper surface of the pipe. The remainder of the trench shall then be backfilled with the excavated material. The Contractor shall restore all roadways or crossings, which are disturbed by the placing of sewers, to their original condition and shall replace all surface material and all paving, macadam, sidewalk, sod, or other surface disturbed, furnishing all the new material necessary without extra compensation, except as herein provided. Whenever excavation is made for installing sewer pipe across private property, the topsoil disturbed by excavation operations shall be replaced as nearly as possible in its original position. Bedding, placing, and backfilling of storm sewers within roadway limits (right-of-way) shall be as provided in ALDOT Standard Specifications, latest edition, Section 530, using the type and strength of pipe specified on the plans.

3.3.9 Storm Sewer Testing Requirements

COMPACTION:

Compaction and density requirements shall meet that specified by ALDOT Standard Specifications, latest edition, Section 530.03. Ramming of material over, around, and to within 1 foot {300 mm} above the top of the sewer shall be done by careful use of approved mechanical tampers.

PIPE CLASS:

Pipe strength class shall be stamped on the pipe and test results submitted indicating that this pipe meets strength requirements.

3.4 Force Main Extension Installation

The force main extension to the proposed pump station on APA property shall be constructed to the alignment and depth required. The proposed force main extension shall be constructed with 12-inch diameter SDR 17 HDPE pipe. The pipe shall meet the specifications of ASTM D 2241 – Standard Specifications for PVC Pressure Rated Pipe (SDR Series).

3.4.1 Pipe Foundation

The trench shall have a flat bottom with bell holes of ample dimensions to allow jointing and so the barrel of the pipe will have a bearing for its full width.

3.4.2 Pipe Laying

All pipe, fittings, etc., shall be lowered into the trench by means of derrick, ropes, or other suitable tools, and under no circumstances shall be dropped into the trench. Any defective pipe shall be rejected. The force main shall have at least 30 inches of cover. The trench shall be braced and drained so that workmen may work safely therein. The width of the trench shall be at least 1 foot greater than the nominal diameter of the pie and maximum clear width of the trench shall be not more than 2 feet greater than the pipe diameter. General pipe laying directions are as follows:

- Place pipe beginning at low point and progress uphill. Install on grade with horizontal and vertical alignment as indicated on construction plans. Install all pipe and fittings per manufacturer's installation requirements.
- Materials shall be cleaned and inspected prior to installation. No cracked, broken or defective material shall be used in the work.
- The interior surfaces of all piping and equipment shall be cleaned and free of all dirt, loose scale, rust and other foreign material before installation.
- Pipe ends shall be reamed to remove all burrs and pipe sections shall be cleaned inside to remove all chips and foreign material prior to making up joints. Pipelines shall be installed with as few joints as possible and short lengths of pipe coupled together shall not be used.
- When the trench is left of the night or if pipe laying is suspended, the upper end of the pie shall be plugged to keep out dirt, water animals and other foreign matter or substances. This plug shall be kept in the end of the pipeline at all times when laying is not in actual progress.

3.4.3 Jointing

Joints shall be installed in strict accordance with the recommendations of the pipe manufacturer.

3.4.4 Thrust Blocks

At bends, thrust blocks of concrete of a mix not leaner than 1 cement, 2 fine aggregate, 4 coarse aggregate, having a compressive strength of not less than 4,000 psi at 28 days shall be installed unless otherwise specified in the drawings. The blocking shall be poured against undisturbed earth.

3.4.5 Air Vacuum Valves

During construction activities, the Contractor shall pay specific attention to vertical deviations in the pipeline and notify APA when required. When these deviations occur, additional air vacuum valves may be required. Air and vacuum valves shall permit unrestricted passage of air during filling of the force main and unrestricted entry of air into the force main under vacuum conditions. Float shall be stainless steel, and valve shall be designed so that the venting mechanism does not come into contact with water. Valves shall have a NPT inlet and shall be fitted with a back flushing device. Pit shall consist of 36-inch concrete pipe with cast iron cover. Cover of pit shall be flush with ground.

3.4.6 Testing

After the pipe has been laid and partially backfilled, all pipe, or any valved section shall be subjected to hydrostatic pressure of 100 psi. The pressure test shall be for at least 2 hours or until the line has been completely inspected for visible leaks, whichever is longer. Before testing, all air shall be expelled from the line. All necessary taps to expel the air shall be made and then the taps plugged watertight. Water for testing of force mains shall be furnished by the contractor but in no case will water be obtained from existing water mains through direct connections to the force mains. Approved and suitable means shall be provided for determining the quantity of water lost by leakage. No pipe installation will be accepted until or unless the leakage (evaluated on a pressure basis of 100 psi) is less than 25 U.S. gallons per 24 hours per mile of pipe per inch nominal diameter of pipe. Any observed leaks shall be repaired whether within the prescribed limits or not.

3.5 Trench Excavation Protection and Temporary Shoring

The exact method and techniques for completing the necessary trench installations and temporary shoring, if required for this project, will be determined by the Contractor, subject to the requirements of these Specifications.

3.5.1 Trench Excavation Protection

The Contractor shall be responsible to furnish and place excavation protection for trenches 5 ft. or greater in depth. The Contractor shall provide vertical or sloped cuts, benches, shields, support systems, or other systems providing the necessary protection in accordance with OSHA Standards and Interpretations, 29 CFR Part 1926, Subpart P, "Excavations."

3.5.2 Temporary Shoring

If temporary shoring is required to complete the project, the Contractor shall furnish and install temporary shoring to hold the surrounding earth, water, or both out of the work area.

The Contractor shall furnish new or used materials for shoring. The Contractor is responsible for the temporary special shoring design unless complete details are included on the plans. The Contractor shall submit details and design calculations to APA bearing the seal of a licensed professional engineer before constructing the shoring. APA reserves the right to reject designs. The shoring design shall comply with OSHA Standards and Interpretations, 29 CFR Part 1926, Subpart P, "Excavations." Design structural systems to comply with AASHTO Standard Specifications for Highway Bridges or AASHTO LRFD Bridge Design Specifications.

3.6 Concrete

The work described in this section shall cover the furnishing of concrete to be used in constructing concrete structures that shall include but not be limited to headwalls, anti-floatation rings, thrust blocks, and other miscellaneous structures. The concrete used in this project shall reach a minimum 28-day compressive strength of 4,000 psi unless otherwise specified in the drawings. The concrete work performed as part of this project shall be performed in accordance with ACI 301, ACI 304, ACI 305R, ACI 306R, ACI 318, ACI 347, and ACI 350. The latest edition of these documents shall be referenced.

3.6.1 Proportioning Materials

The mix design shall be as follows:

- Minimum 28-day compressive strength = 4,000 psi unless otherwise specified in the drawings
- Maximum water/cement ratio = 0.5
- Range of total air content = 2.5-6.0%
- Slump = 3.0 inches
- Largest nominal maximum aggregate size = 1.0 inch

3.6.2 Construction Requirements

All materials, labor, equipment, tools, and machinery necessary for forming, mixing, placing, finishing, and curing shall be available as required and all necessary equipment for the proper construction and completion of any section of the work shall be in satisfactory working condition before the Contractor will be permitted to start placing concrete. All batching plants shall meet the requirements of the Specifications and ALDOT-352. The Contractor should determine the compressive strength of concrete through molded cylinders and drilled cores as defined by ASTMC39. These cylinders shall be broken by a materials testing laborotatory to show that the concrete used on the project meets the compressive strength requirements. A report of the cylinder tests shall be provided to APA.

GENERAL:

The Contractor shall furnish equipment capable of producing concrete meeting the requirements noted in this Section in sufficient quantities to provide for orderly construction of the project. All equipment must be in good working order and so maintained throughout the requirement for its use.

MIXING AND TRANSPORTING:

Concrete for all major structure work (greater than 3 cubic yards) shall be "ready-mixed" concrete. Ready-mixed concrete is defined as portland cement concrete manufactured for delivery and delivered to the work site in accordance with AASHTO M 157 “Ready-Mixed Concrete” Modified and the requirements written herein in other parts of these specifications. In case of discrepancy these specifications shall govern. Concrete for minor structure work (headwalls, inlets, junction boxes, and other miscellaneous individual concrete units) requiring three cubic yards or less of concrete, may be mixed in mixers as noted above or an approved type of mobile mixing plant designed with separate bins for fine aggregate, coarse aggregate, cement, water, additives, etc. that will automatically proportion all concrete aggregates either by weight or volume and be capable of combining the ingredients into a uniform mass and discharging such without segregation. All mixing and transporting equipment shall be supplied in sufficient amounts to provide continuous delivery of the concrete as needed for an acceptable, satisfactory operation. The volume of concrete mixed or transported in a concrete truck mixer shall not be less than 15% of the gross volume of the drum.

Field addition of water to concrete shall be allowed only upon arrival of the truck at the jobsite, if slump tests indicate the mix is too stiff. If water is added, the drum shall be turned an additional 30 revolutions prior to discharging any more concrete. In no instance shall the maximum water-cementitious ratio of the mixture design, or the maximum slump be exceeded.

3.6.3 Light, Temperature, and Weather Limitations

All concrete shall be placed and finished during daylight hours unless written permission to the contrary is given. Such permission will not be given unless an adequate approved lighting system is available for all operations after sundown.

The temperature of the concrete, at the time of placing in the forms shall not be less than 50°F nor more than 95°F, except that for bridge deck slabs the temperature of the concrete at the time of placing shall not be more than 90ºF, unless otherwise provided or directed.

No concrete shall be placed when the ambient air temperature is below 40°F without written permission of the APA. If the Contractor proposes to place concrete during seasons when there is a probability of temperatures lower than 40°F, the Contractor shall have available on the project such suitable approved equipment and materials as necessary to enclose the uncured concrete and keep the air temperature inside the enclosure within acceptable ranges.

3.6.4 Handling and Placing Concrete

In preparation for the placing of concrete, all sawdust, chips, and other construction debris and extraneous matter shall be removed from the interior of forms. Temporary struts, stays, or braces serving to hold the forms in place until the concrete is placed shall be removed prior to being encased in the concrete. All permanent struts, stays, or braces shall be precast concrete struts or, at the Contractor's option, approved steel struts; no wooden struts shall be permitted. During the placing of concrete, the Contractor shall continuously check the alignment of forms and immediately correct any yielding of the forms or falsework. Concrete shall be deposited continuously for each monolithic section of the work by placing the fresh concrete in horizontal layers of approximately 12 inches in thickness. Each additional layer shall be placed and compacted before the preceding layer has taken its initial set for 60 minutes.

Concrete shall not be dropped a distance of more than 5 feet unless confined in an approved mortar tight downspout of not less than 4 inches in diameter. Downspouts shall be equipped with suitable hoppers at their inlet end and shall be provided in sectional lengths that will permit adjustment of the level of the outlet during placement.

Direct placement of concrete by an approved pumping device will be permitted. The equipment shall be so arranged that no vibration result that might damage freshly placed concrete. The operation of the pump shall be such that a continuous stream of concrete without air pockets is produced. When pumping is completed, the concrete remaining in the pipeline, if it is to be used, shall be ejected in such a manner that there will be no contamination of the concrete or separation of the ingredients. After each placement the equipment shall be cleaned to prevent improper results on subsequent operations.

3.6.5 Construction Joints

Construction joints shall be placed only at the locations shown on the plans or as needed during construction. In case of an emergency, if a construction joint is permitted, it shall be placed as approved by the Engineer. Horizontal joints shall be made by placing the concrete slightly above the grade of the construction joint, and after the surface has reached its final set, the surface shall be prepared as outlined below. Insert formwork shall be used to obtain neat, horizontal lines. Vertical joints shall be formed with substantial bulkheads or headers as required. Feather-edged joints will not be permitted. Before placing concrete against any construction joint, the surface of the hardened concrete shall be scarified in such a manner that all foreign matter, laitance, and loose material is removed to expose sound concrete. The prepared concrete at the construction joint shall be kept wet for a minimum of one hour prior to placing concrete against it. An approved epoxy, listed in the MSDSAR manual, List II-7, "Epoxy Resin Systems for Use with Portland Cement Concrete", shall be used. Keyways and dowels shall be placed as shown on the plans or directed. Water stops shall be furnished and placed as required by the plans. They shall form continuous watertight joints.

3.6.6 Expansion Joints

All expansion joints shall be constructed according to details shown on the plans or as needed, providing the design width designated for the expansion joint. The insertion and removal of joint forming material shall be accomplished without chipping or breaking the corners of the concrete. Expansion material, when required, shall be placed as needed.

3.6.7 Forms

All removable forms shall be designed so that they may be removed without damage to the concrete. Forms shall be so constructed that portions where finishing is required can be removed for that purpose without loosening supports or disturbing portions of forms that must still remain in place.

3.7 Traffic Control

These Specifications shall govern and establish traffic control and maintaining the safe use of roads at eh facility during construction.

TRAFFIC AND ACCESS:

The contractor's operations shall cause no unnecessary inconvenience to the public. The public rights-of-way shall be maintained at all times unless interruption is authorized by proper local authority. Access roads internal to the MCT facility shall remain open at all times during construction unless it is determined that it is not feasible. If the Contractor requires that a access road must be closed inside the MCT facility, a closing or detour plans shall be provided to APA for approval.

Safe and adequate access shall be provided and maintained to all public protection devices and to all critical utility control locations. Facility access shall be continuous and unobstructed unless otherwise approved.

STORAGE OF EQUIPMENT AND MATERIAL IN PUBLIC STREETS:

Construction materials and equipment shall not be stored or parked on public streets, roads, or highways or access roads internal to the MCT facility. During any material or equipment loading or unloading activities that may temporarily interfere with traffic, an acceptable detour shall be provided for the duration of the activity. Any associated expense for this activity is the responsibility of the contractor.

Excavated material, including suitable material that is intended for adjacent trench backfill or other earth backfill, shall not be stored on public streets, roads, or highways or access roads to the MCT facility that remain in service. Any waiver of this requirement must be obtained from the proper local authority or APA. All excess and unsuitable material shall be removed from the site as soon as possible. Any spillage shall be removed from roadways before they are used by the public.

STREET CLOSURES, DETOURS, AND BARRICADES:

The contractor shall comply with the requirements of all applicable responsible units of government for closure of any street, road, or highway. If access roads inside the MCT facility require closure, then approval from APA must be received. The contractor shall provide the required barriers, guards, lights, signs, temporary bridges, and flaggers together with informing the public of any detours and construction hazards

by the most suitable means available, such as local newspapers or radio stations. The contractor is also responsible for compliance with additional public safety requirements that may arise during construction. The contractor shall furnish, install, and, upon completion of the work, promptly remove all signs, warning devices, and other materials used in the performance of this work.

Unless otherwise specified, the contractor shall furnish to APA a written plan showing the proposed method of signing, barricading for traffic control, and safety for street detours and closures.

REFERENCES:

All signs, signals, barricades, use of flaggers, and other traffic control and public safety devices shall conform to the general requirements set forth in the Manual of Uniform Traffic Control Devices (MUTCD) and the latest edition of *Standard Highway Signs and Standard Alphabets for Highway Signs* and/or OSHA *Construction Industry Standards (29 CFR Part 1926), Subpart G, Signs, Signals, and Barricades* unless otherwise specified in section 7 of this specification.

3.8 Erosion Control

These Specifications form a part of the Contract Documents and shall govern the erosion control requirements for force mains, storm sewers, pumping stations, and appurtenances. These Specifications, in addition to applicable regulatory requirements, shall be accommodated to ensure that the lands in the construction project area are not adversely affected as a result of the constructed improvements.

PROPERTY PROTECTION:

Trees, grass, fences, signboards, poles and all other property shall be protected unless their removal is authorized. Any property damage shall be satisfactorily restored by the Contractor.

MAINTENANCE OF EROSION CONTROL MEASURES:

The Contractor shall at all times take necessary precautions to prevent erosion or transportation of soil due to natural or induced water flows. Spoil banks and soil stockpiles shall be contained to prevent transportation of soil by run-off waters. All temporary erosion control measures installed and paid for shall be properly maintained for the entire duration of construction. Failing to maintain these structures will be grounds for the Engineer to recommend to the Owner the halting of construction until the measures are properly restored.

CONSTRUCTION REQUIREMENTS:

The purpose of the erosion control plan is to assist the Contractor with compliance of state and federal non-point source pollution legislation. Additional erosion control measures may be required at the discretion of the contractor to achieve compliance and protect property. The erosion control measures presented in the project drawings include silt fence and inlet protection.

- **Silt Fence** - Silt fences shall be constructed at the necessary locations and installed in accordance with the State of Alabama Department of Transportation Standard Specifications for Highway Construction, latest edition, as specified on the Plans, shall be provided by the Contractor.
- **Inlet Protection** - Inlet protection used to reduce sediment entering storm drains shall meet Filtrexx Soxx Mesh Material or approved equal. Inlet protection shall be placed at locations indicated on

plans as directed by the Engineer. Inlet protection should be installed in a pattern that allows complete protection of the inlet area. If inlet protection becomes clogged with debris and sediment, Contractor shall be maintained to assure proper drainage and water flow into the storm drain. In severe storm events, overflow of the inlet protection may be acceptable to keep the area from flooding. Inlet protection shall be positioned to provide a permeable physical barrier to the drain itself, allowing sediment to collect on the outside of the inlet protection. For drains and inlets that have only curb cuts, without street grates, a spacer is required in order to keep the inlet protection away from the drain opening. This spacer should be cinder blocks, or a hog wire screen bent to overlap the grate opening and keep the sock from falling into the opening. Use at least one spacer for every 4 ft of curb drain opening. The wire grid also prevents other floatable waste from passing over the inlet protection. Stakes shall be installed through the middle of the drain inlet protection on 5 ft centers, using 2 in by 2 in by 3 ft wooden stakes. Staking depth for sand and silt loam soils shall be 12 in and 8 in for clay soils.

4.0 CONTRACTOR REQUIREMENTS

4.1 Qualifications and Performance Specifications for General Contractor

Because of the complexity of this project and the construction activities, the General Contractor shall have been in operation for a minimum of 20-years whose key personnel have at least 10-years' experience in this work. Furthermore the Contractor shall be able to show the following experience:

- Installed at least 10 miles of 12-inch HDPE force main or larger
- Installed at a minimum 10,000 linear feet of 28-inch diameter (or equivalent arch pipe) for storm sewer.
- Installed at least 10 pump stations a minimum of 10-ft diameter with at least 3 of these installations requiring dewatering.

A summary of projects that documents these activities shall be provided to APA as part of the bid package.

4.2 Qualifications and Performance Specifications for HDD Contractor

Directional drilling and pipe installation shall be done by an experienced Contractor specializing in directional drilling and whose key personnel individually have at least ten (10) years' experience in this work. Furthermore, the Contractor must be able to show the following experience:

- Installed directionally drilled pipe at least as large as 24 inches in diameter
- Performed installations of at least 5,280 feet (i.e. 1 mile) in continuous length.
- Installed at least 50,000 feet in total length.

The Contractor shall provide as part of bid information five (5) successfully completed projects with contact information for those projects that are considered similar to this project and include portions of the above-mentioned criteria.

4.3 Monthly Progress Reports

Monthly progress reports shall be submitted at the end of each month to APA and Engineer to provide a summary of project activities for the month. This shall include the following:

- Major activities conducted and completed for each week of the month.
- A discussion of upcoming activities for next month including a schedule update that includes any foreseeable changes, delays, etc. in the project.
- Photos from the construction activities conducted during the course of the month.

This progress report shall be submitted no later than the fifth day of the following month.

4.4 As-Built Drawings

The Contractor shall maintain one set of blue or black line white prints of the Drawings to be used for As-Built Drawings. The Contractor shall mark As-Built prints to show the actual installation where installation varies from that shown originally. The Contractor shall give particular attention to the following items:

- Information on concealed elements that would be difficult to identify or measure and record later.
- Accurately record information in an understandable drawing technique.

CONTENT OF DRAWINGS:

Types of items requiring marking include, but are not limited to, the following:

- Initial operation parameters (include design and actual operating): GPM, TDH, etc.
- Dimensional changes to Drawings.
- Revisions to details shown on Drawings.
- Depths of foundations.
- Locations and depths of underground utilities.
- Revisions to routing of piping and conduits.
- Revisions to electrical circuitry.
- Actual equipment locations.
- Adjustments in pipe size, duct size, and routing.
- Locations of concealed internal utilities.
- Changes made by Change Order.
- Changes made following written orders from APA or the Engineer.
- Details not on the original Contract Drawings.
- Field records for variable and concealed conditions.
- Record information on the portions of the project that is shown only schematically.
- Pump Curve for installed pump.
- Installed pump make and model.

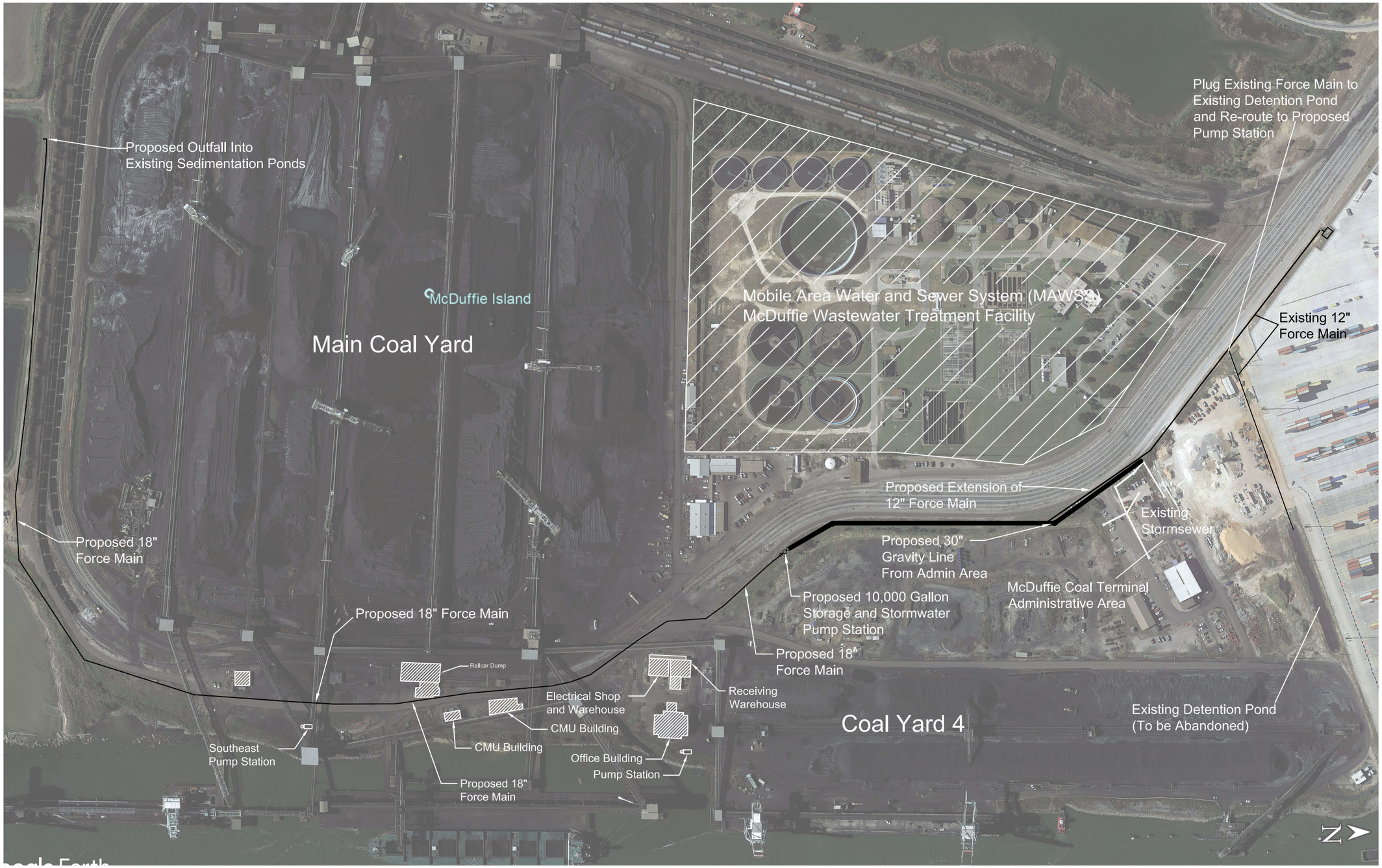
The Drawings shall be marked and revised completely and accurately. The record sets shall be marked with red-colored ink or pencil. Use other colors to distinguish between changes for different categories of the Work at same location. Important additional information shall be marked that was either shown schematically or omitted from original Drawings. Change Order numbers shall be referenced where applicable.

A final version of the drawings that incorporates the changes in the construction drawings shall be submitted in a black and white print format to APA. Revision clouds shall be used to designate areas of the drawings where changes occurred during construction.

4.5 Project Photographs

The Contractor shall document the pre-construction view of the entire construction area before any work begin. Views shall be high resolution digital photographs that shall be furnished to APA in digital and paper formats. The Contractor shall also keep a set of the digital photographs for his records. The Contractor shall provide the imaging from commencement of Project through completion of all Work. These progress images shall be submitted to APA and the Engineer each month in conjunction with the current monthly progress reports that summarizes the project activities. Specific views of construction shall be made as requested by APA and the Engineer.

Proposed Site Plan
McDuffie Coal Terminal Stormwater Transfer Project

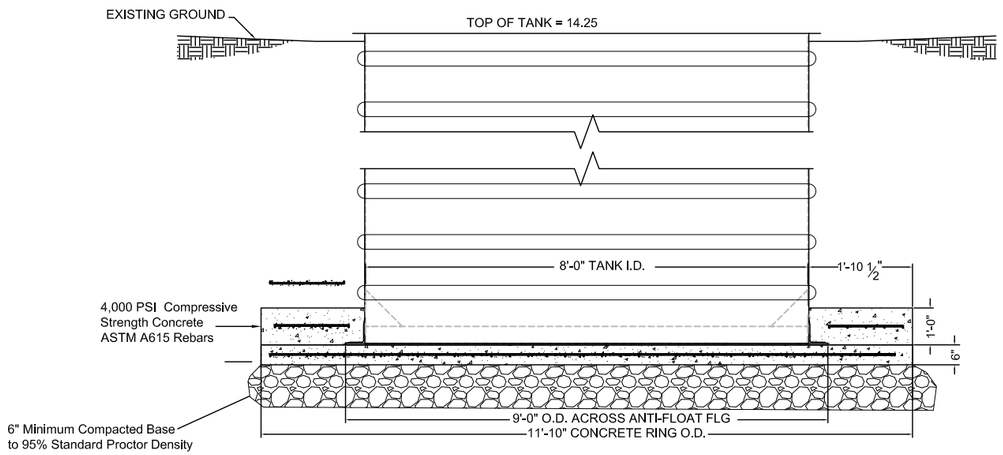


REVISION:	DESCRIPTION:	DATE:

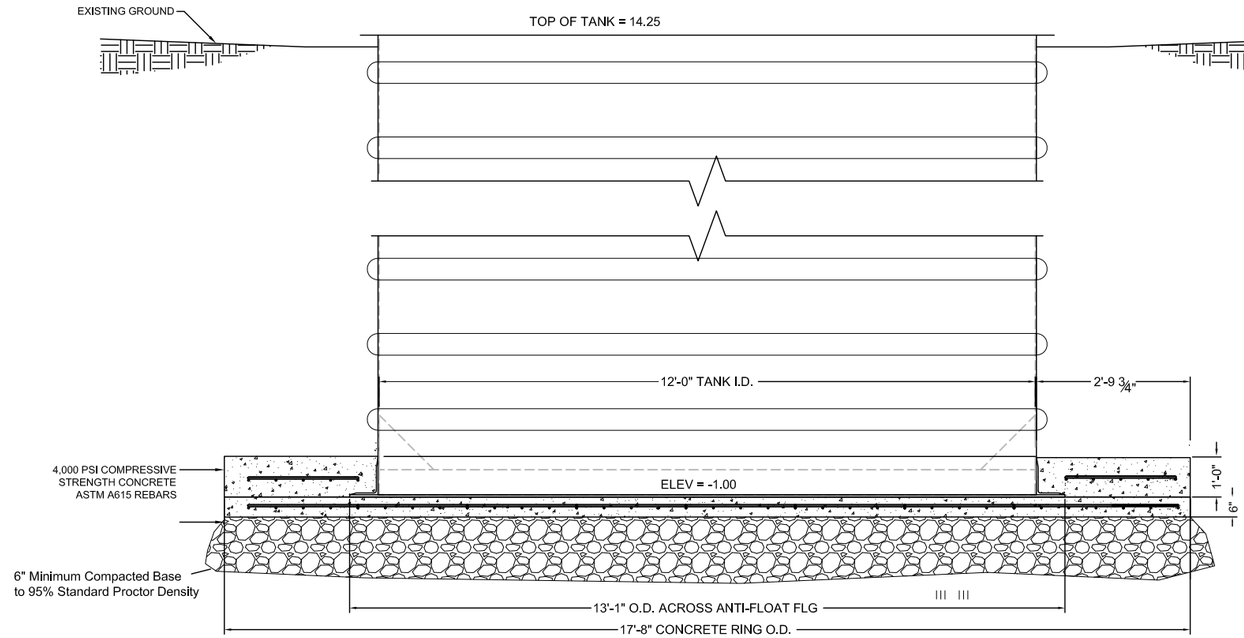
McFadden Engineering, Inc.
2860 Dauphin Street, Suite D
Mobile, Alabama 36606
www.mcfaddenengineering.com
Phone: (251) 470-6870
Fax: (251) 470-6872

SEAL:

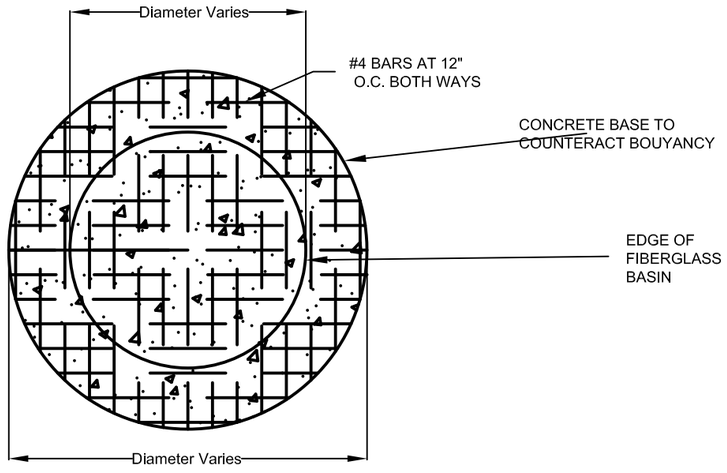
PROJECT NAME: McDuffie Coal Terminal Stormwater Transfer Mobile, AL				PROJECT No. ASPA012	REVISION:
CADD NAME: M:\Projects\ASPA\ASPA012\Project Drawings\Site Plan				SCALE: 1"=333'	TITLE: Proposed Site Plan
DESIGNED BY: JBN	DRAWN BY: JBN	CHECKED BY: JBN	APPROVED BY: JBN	DATE CREATED: 7/9/21	SHEET #: 3



ANTI FLOAT DETAILS FOR VALVE BOX



ANTI FLOAT DETAILS FOR PUMP BASINS



CONCRETE BASE PLAN

REVISION:	DESCRIPTION:	DATE:
1	Revise Anti-float concrete detail and provide spec on gravel base.	5/11/2022

McFadden Engineering, Inc.
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SEAL:

PROJECT NAME: McDuffie Coal Terminal Stormwater Transfer
Mobile, Alabama

PROJECT No. ASPA012

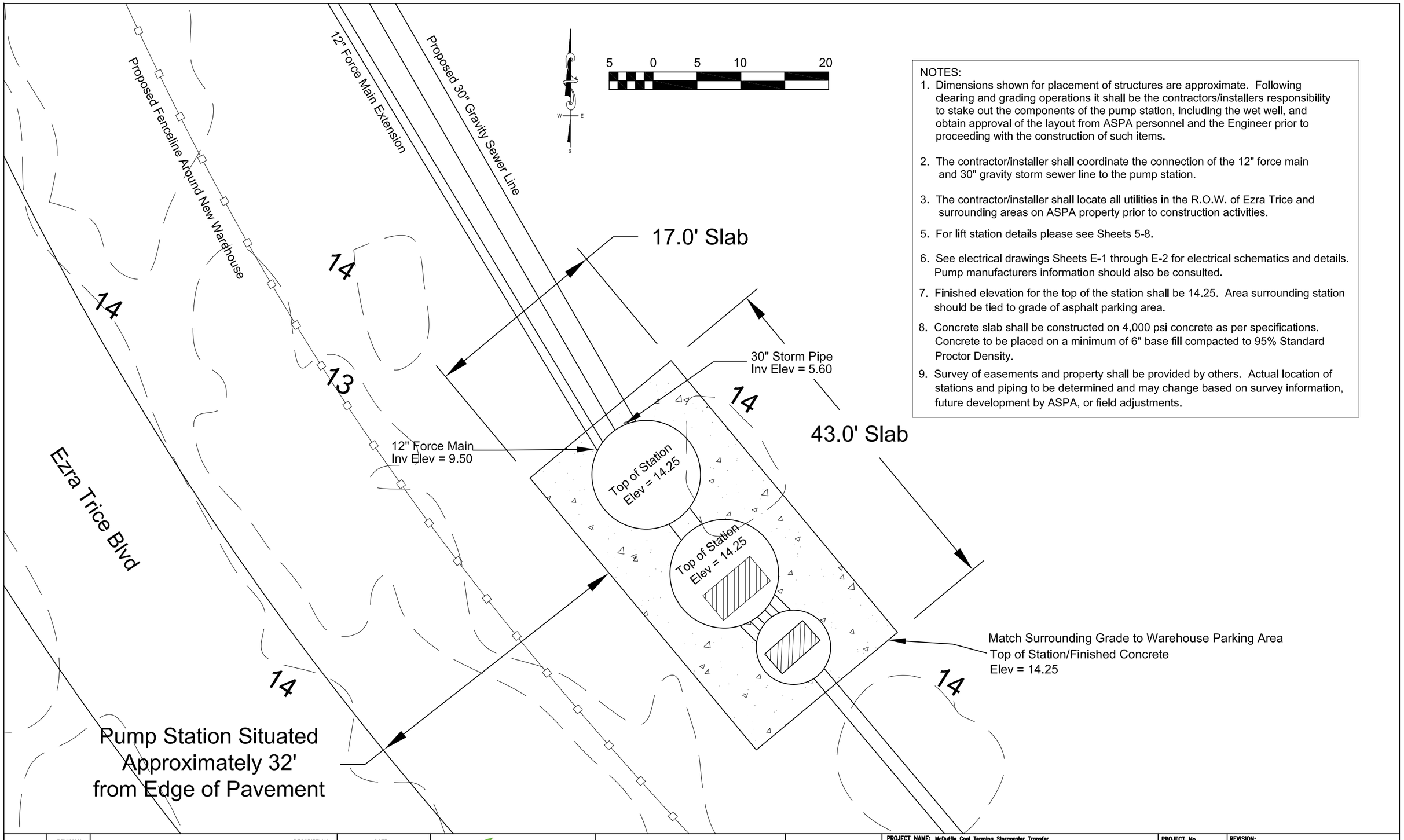
REVISION:

CADD NAME: M:\ME1 Projects\ASPA\ASPA012\Project Design Drawings\Pump Station Details

SCALE: N.T.S.

TITLE: Anti-Float Details

DESIGNED BY:	DRAWN BY:	CHECKED BY:	APPROVED BY:	DATE CREATED:	SHEET #:
JBN	EHB	JBN	JBN	6/24/21	9



NOTES:

1. Dimensions shown for placement of structures are approximate. Following clearing and grading operations it shall be the contractors/installers responsibility to stake out the components of the pump station, including the wet well, and obtain approval of the layout from ASPA personnel and the Engineer prior to proceeding with the construction of such items.
2. The contractor/installer shall coordinate the connection of the 12" force main and 30" gravity storm sewer line to the pump station.
3. The contractor/installer shall locate all utilities in the R.O.W. of Ezra Trice and surrounding areas on ASPA property prior to construction activities.
5. For lift station details please see Sheets 5-8.
6. See electrical drawings Sheets E-1 through E-2 for electrical schematics and details. Pump manufacturers information should also be consulted.
7. Finished elevation for the top of the station shall be 14.25. Area surrounding station should be tied to grade of asphalt parking area.
8. Concrete slab shall be constructed on 4,000 psi concrete as per specifications. Concrete to be placed on a minimum of 6" base fill compacted to 95% Standard Proctor Density.
9. Survey of easements and property shall be provided by others. Actual location of stations and piping to be determined and may change based on survey information, future development by ASPA, or field adjustments.

REVISION:	DESCRIPTION:	DATE:
1	Remove aggregate around pump station perimeter; add note about concrete slab construction	5/12/2022

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SEAL:

PROJECT NAME: McDuffie Coal Termina Stormwater Transfer
Mobile, Alabama

PROJECT No.: ASPA012

REVISION:

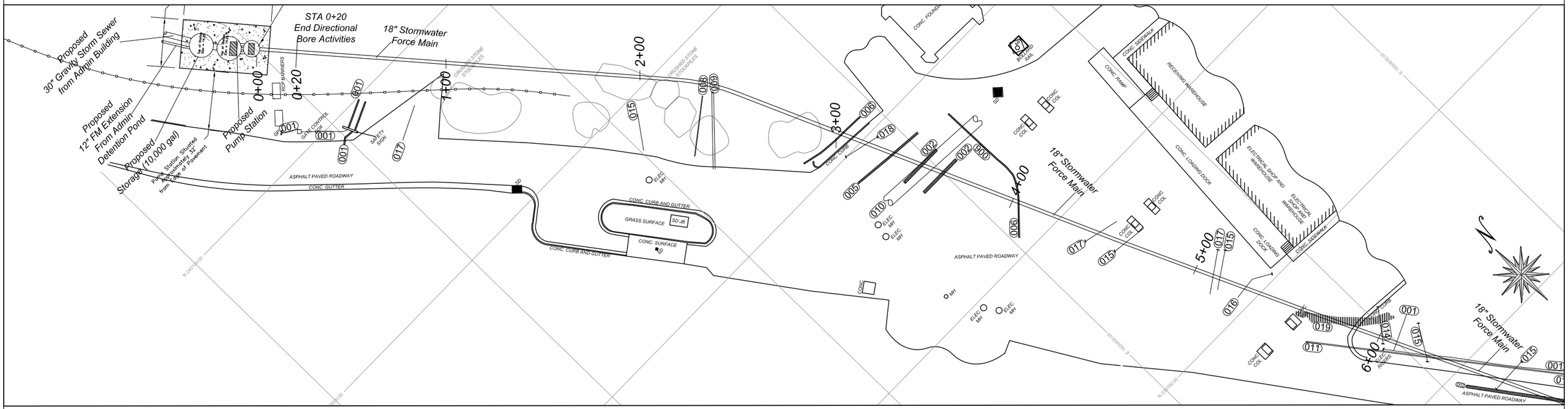
CADD NAME: M:\MEI Projects\ASPA\ASPA012\Pump Station Site Plan

SCALE: 1"=10'

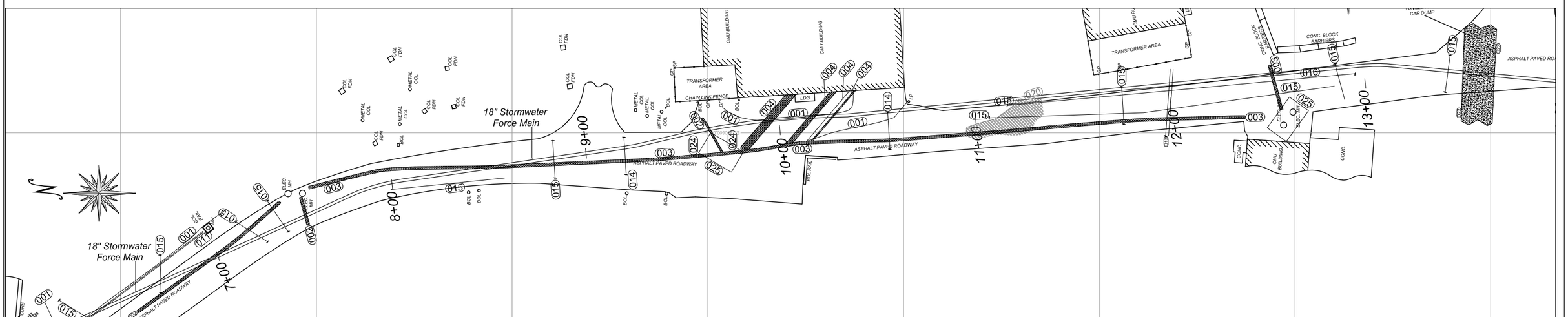
TITLE: Pump Station Site Plan

DESIGNED BY:	DRAWN BY:	CHECKED BY:	APPROVED BY:	DATE CREATED:	SHEET #:
JBN	EB	JBN	JBN	8-25-21	10

PROPOSED FORCE MAIN DETAILS
STA 0+00 through STA 6+50



PROPOSED FORCE MAIN DETAILS
STA 6+50 through STA 13+00



REVISION:	DESCRIPTION:	DATE:
1	Remove aggregate around pump station	5/11/2022

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SEAL:

PROJECT NAME: McDuffie Coal Terminal Stormwater Transfer Mobile, Alabama			PROJECT No. ASPA012
CADD NAME: M:\MEI Projects\ASPA\ASPA012\Project Design Drawings\Force Main Details			SCALE: 1" = 50'
DESIGNED BY: JBN	DRAWN BY: EHB	CHECKED BY: JBN	APPROVED BY: JBN
DATE CREATED: 6/10/21			SHEET #: 12

REVISION:

TITLE: Force Main Plan View