STANDARD
TECHNICAL SPECIFICATIONS

JACKSON COUNTY
UTILITY AUTHORITY

January, 2012
Jackson County, Mississippi

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WATER AND SEWER STANDARD SPECIFICATIONS

SECTION 0100
CONSTRUCTION ADJACENT TO AUTHORITY UTILITY SYSTEMS

JACKSON COUNTY UTILITY AUTHORITY
WATER AND SEWER STANDARD SPECIFICATIONS

PART 1 – GENERAL

1.01 Description

These Specifications shall govern the installation of infrastructure which crosses or connects to utility systems and property owned, operated, and/or maintained by the Authority. This shall include work within the Authority's utility easements. The work shall be installed in accordance with the requirements of these specifications at the locations and depths indicated on the plans approved by this Authority and the governing regulatory agencies.

1.02 Submittals

A. Submit a written request to the AUTHORITY well in advance of executing any cutting, patching, or alteration which may be required to access, cross, or connect to AUTHORITY property.

B. Request shall include:
   1. Identification of the work to be performed.
   2. Description of affected property owned, operated, or maintained by the AUTHORITY.
   3. The necessity for cutting, alteration or excavation.
   4. Description of proposed work:
      a. Construction Drawings and Technical Specifications.
      b. Scope of cutting, patching, alteration, or excavation.
      c. Trades who will execute the work.
      d. Submittal of products and materials proposed to be used.
      e. Extent of refinishing to be done.
   5. Alternatives to cutting and patching.
   6. Schedule including date and time work will commence and duration of work.
   7. State of Mississippi license number of Contractor who will be completing the work.

PART 2 – PRODUCTS

2.01 Materials

Comply with specifications and standards for each specific product involved.

PART 3 – EXECUTION

3.01 General

A. Contractor shall be responsible for locating all underground utilities prior to construction including contacting MS One Call and other locate services as required by state law.

B. Contractor shall not begin construction within road right-of-way without proper traffic

maintenance devices. Maintenance of Traffic shall be in accordance with the Manual of Uniform Traffic Control Devices (MUTCD) and the governing authority of the right-of-way. Contractor shall be responsible for notifying all applicable emergency services of any possible lane closures or impacts to vehicular traffic prior to construction.

C. Contractor shall not begin construction until proper erosion control measures are established to protect adjacent properties and water resources. Erosion, sediment, and storm water control measures shall be in accordance with Best Management Practices as stated in the *Mississippi Storm Water Pollution Prevention Plan (SWPPP), Guidance Manual, for Construction Activities, latest edition*, established by Mississippi Department of Environmental Quality. All control measures shall be maintained for the life of the project and until permanent vegetation is established. Once permanent vegetation is established the contractor shall remove the control measures.

D. All connections to existing Authority systems shall begin no later than 8:00 a.m. and be completed in the same business day within the Authority's normal business hours. No connection shall begin that requires work on Fridays or the last business day of the week. Work required outside of these parameters shall be approved in writing a minimum of five (5) business days by the Authority as to confirm schedules with appropriate personnel.

3.02 Performance

A. Cutting, patching, alterations, and excavations shall be conducted as to prevent damage to existing infrastructure, including ground and surface water. Excavations and backfilling shall be performed by methods which prevent settlement to existing infrastructure.

B. Disturbed areas shall be returned to their pre-work condition. Ponding of water above utility infrastructure shall not be approved. If additional work is deemed necessary by the Authority to protect the utility systems then it shall be completed before work will be accepted.

3.03 Replacement of Pavement Surfaces and Permanent Structures

When work requires the removal of a permanent structure or surface, i.e. asphalt, concrete, or gravel pavements, curb and gutter, sidewalk, fences, poles, landscaping, etc., the item shall be removed and shall be replaced after the work is accepted to a condition which is equal in appearance and quality to the condition before work began. Asphalt, concrete, and gravel pavement surfaces, including curb and gutter and sidewalk, shall meet the requirements of the governing regulatory agency.

3.04 Connections to Pressure Utility System

Connections to the pressure utility (water or sewer) system shall be completed by means of hot tapping the main. No connections shall be made that require the Authority to suspend service to any customer without written permission and scheduling in advance in accordance with these specifications.

3.05 Connections to Gravity Sewer System

Connections shall be made at an existing manhole by means of core drilling the wall of the manhole and utilizing a flexible boot for connecting the proposed sewer main to the manhole. All coatings and linings shall be touched up in the field. If a connection to an existing manhole is not possible, the contractor may be approved to install a dog-house style manhole on the existing sanitary sewer main. All connections shall be watertight.

3.06 Inspection

A. Once approved in writing to make a connection to the AUTHORITY's system the Contractor shall notify the AUTHORITY in writing a minimum of three (3) business days prior to approved connection. No work shall commence without AUTHORITY's representative inspecting work.

B. No work shall be allowed that requires the AUTHORITY to suspend service to any customer without proper notification and written permission from the AUTHORITY.

C. Inspect existing conditions of area surrounding proposed work, including elements subject to damage or to movement during cutting and patching. Document the conditions of such with pictures prior to disturbance.

D. After uncovering work, inspect conditions affecting installation of products or performance of work. Document the conditions of such with pictures prior to disturbance.

**** END OF SECTION ****

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SECTION 0110
SITE PREPARATION

JACKSON COUNTY UTILITY AUTHORITY
WATER AND SEWER STANDARD SPECIFICATIONS

PART 1 – GENERAL

1.01 Description

These Specifications shall govern the installation of infrastructure which is constructed on behalf of the Authority. The work shall be installed in accordance with the requirements of these specifications at the locations and depths indicated on the plans approved by this Authority and the governing regulatory agencies.

1.01 Quality Assurance

Codes and Standards: State and local laws and code requirements shall govern the hauling and disposal of trees, shrubs, stumps, roots, rubbish, debris and other matter.

1.02 Job Conditions

Streets, roads, adjacent property and other works and structures which are the property of the AUTHORITY or other governmental entities shall be protected throughout the entire project. CONTRACTOR shall return to original condition, satisfactory to the AUTHORITY or other governmental entity, damaged facilities caused by the CONTRACTOR'S operations.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.01 Clearing and Grubbing

A. Limits of clearing shall be all areas within the construction limits noted on the drawing or marked in the field. In no case shall the contractor work beyond the limits of available public Right-of-Way (as permitted with the governing regulatory authority), Authority owned property, and Authority owned utility easements. Damage outside these limits caused by the CONTRACTOR'S operations shall be corrected by the CONTRACTOR at no expense to the Authority.

B. Except as noted below, CONTRACTOR shall remove from the site and satisfactorily dispose of all trees, shrubs, stumps, roots, brush, masonry, rubbish, scrap, debris, pavement, curbs, fences and miscellaneous other structures. Trees, stumps and other cleared and grubbed material may not be disposed on site.

C. Prior to disturbance of the existing ground conditions, the Contractor shall install necessary erosion control measures. No work shall commence until the Contractor has obtained permits from the governing regulatory authorities.

D. After clearing and grubbing, the Contractor shall grade areas to drain. Areas of proposed and completed work shall not pond water. Installation of utility infrastructure shall not be allowed in unsatisfactory soil conditions.

E. The CONTRACTOR shall comply with all rules and regulations of the Mississippi Forestry Commission, Office of Pollution Control and any other authority having jurisdiction.

F. Easements for utility systems shall be cleared and grubbed as to provide access to the utilities for the Authority.

*** * END OF SECTION * ***

SECTION 0120
EXCAVATION, EARTHWORK, AND BACKFILL

PART 1 – GENERAL

1.01 Description

These Specifications shall govern the work required for excavation and furnishing and installation of bedding and backfill for the purpose of constructing pipelines, grading, and other facilities for the Authority. The excavation, bedding, and backfill shall be installed in accordance with the requirements of these specifications at the locations and depths indicated on the plans approved by this Authority and the governing regulatory agencies. The bedding and backfill material shall be of the type shown thereon.

1.02 Related Work Specified Elsewhere

Section 0160, Pipe Installation.

1.03 Quality Assurance

A. Contractor shall be required to obtain all necessary permits for work in roads, rights-of-way, railroads, etc. Contractor shall obtain permits required by local, state and federal agencies for discharging water from excavations to rivers and streams. Perform excavation work in compliance with applicable requirements of governing authorities having jurisdiction.

B. Contractor shall provide testing reports from a qualified testing laboratory to determine the acceptability of the soil. Test shall include gradation (ASTM D 422), liquid limit (ASTM D 423), and plastic limit/plasticity index (ASTM D 424) for all select backfill and bedding samples (where applicable). Compacted backfill shall be tested for compaction in accordance with ASTM D 698.

C. Reference Standards: The work, materials and related activities shall be in accordance with the latest standards of the American Water Works Association (AWWA), American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM), Uni-Bell Pipe Association, Mississippi Department of Health, Mississippi Department of Environmental Quality, and any other related State or Federal standards or requirements.

1.02 Protection of Property

A. Barricade open excavations and post with warning lights. Operate warning lights during hours from dusk to dawn each day and as otherwise required.

B. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork and excavation operations.

C. Protect work from ground and surface water which may damage work or infrastructure. Locate existing underground utilities prior to work. Underground utilities which are to remain shall be protected from damage. Damaged infrastructure shall be replaced at no expense to the Authority.

PART 2 – PRODUCTS

2.01 Soil Materials

A. Select Backfill and Select Fill Materials: Select backfill and fill shall be Class II or II as classified by ASTM D 2321. Class II shall be coarse-grained soils borderline clean to with fines (e.g. GW-GC, SP-SM). Class III shall be coarse grained soils with fines (e.g. GM, GC, SM, & SC).

B. Structure Foundation Material: Material used for foundations under manholes, wetwells and other structures shall be size 67 as specified in the "Mississippi Standard Specifications for Road and Bridge Construction", 2004 Edition.

C. Driveway Material: Material used for temporary driveway repair or access drives shall be size 57 or 67 as specified in the "Mississippi Standard Specifications for Road and Bridge Construction", 2004 Edition.

D. Pipe Bedding Material: Pipe bedding material used around and under pipes of all materials shall be Class IB as classified by ASTM D2321, conforming to the gradation set out below, unless otherwise approved by the Authority or as recommended by the pipe manufacturer:

Sieve Size	% Passing by Weight
1 ½"	100%
No. 4	≤ 50%
No. 200	< 5%

In addition, should ground water be encountered in the trench, the Class IB material shall be provided as a filter material in accordance with Section XI.8 of ASTM D2321 and shall have the following gradation requirements:

1. D15/d85 < 5 where D15 is the sieve opening size passing 15% by weight of the coarser material (bedding) and d85 is the sieve opening size passing 85% by weight of the finer material.
2. D50/d50 < 25 where D50 is the sieve opening size passing 50% by weight of the coarser material (bedding) and d50 is the sieve opening size passing 50% by weight of the finer material.
3. If the finer material is a medium to highly plastic clay without sand or silt partings (CL or CH) then the following criteria may be used in lieu of the above:

   D15 < 0.02, where D15 is the sieve opening size passing 15% by weight of the coarser material.

E. General Backfill and Fill Material: Acceptable on site material shall comply be free of clay, rock or gravel larger than 6 inches in any dimensions, debris, waste, frozen materials, vegetable and other deleterious matter. General backfill and fill shall consist of any non-organic soil, free of debris and capable of being placed and compacted to the specified densities. Unsuitable soils for general backfill and fill material shall include soils which contain: vegetable matter, sod, mud, roots, rubbish, highly plastic clay soils of the CH and MH descriptions, borderline soils of the CL-CH description, and organic soils.

F. All costs associated with tests required by the AUTHORITY to verify that material obtained either on-site or off-site meets the above requirements shall be borne by the CONTRACTOR.

PART 3 – EXECUTION

3.01 Site Preparation

CONTRACTOR shall clear all areas to be occupied by permanent construction of all trees, brush, roots, stumps, logs, wood and other materials and debris in accordance with Section 0110. Sub-grades for fills shall be cleaned and stripped of vegetation, sod, topsoil and organic matter. Infrastructure shall be staked in the field prior to installation. At a minimum stake work lines, property lines, easements, and rights-of-way.

3.02 Excavation

A. Structures and Pipelines Excavations: Open excavations shall be shored and braced where necessary. All open excavations shall comply with current OSHA requirements.

B. Dewatering: when proposed infrastructure is placed below the groundwater table, use well points, coffer dams or other acceptable modes to permit construction of said structure or pipeline under dry conditions. Maintain water level below the bottom of the trench at all times to provide a stable surface for construction operations, a stable subgrade for the permanent work, and to prevent damage to the work. Under no conditions shall water be permitted to stand in the bottom of an excavation for more than 24 hours. Prevent surface and subsurface water from flowing into excavations and flooding adjacent areas. Remove all water entering excavations as fast as it collects. Under no circumstances shall sanitary sewers be used for dewatering operations. Dispose of all water removed from the excavations in such a manner as not to endanger public health, property or any portion of the work.

C. Size of Excavations: Extend excavation sufficiently on each side of structures, footings, etc., to permit setting of forms, installation of sheeting or the sloping of banks.

D. Subgrades requirements for Pavements, Structures and Trench Bottoms shall have be strong, dense, and thoroughly compacted and consolidated. They shall be free from mud, muck and other soft or unsuitable materials and remain firm and intact under all construction operations. For subgrades which are otherwise solid, but which become soft or mucky on top due to construction operations, overlay with geotextile fabric prior to placement of crushed stone or gravel. Fabric shall be as manufactured by Marifi 600X by Marifi, Inc., Typar Style 3601 by Dupont Co., or equal. Install fabric in accordance with manufacturer's recommendations.

E. Pipe Trench: Trenches shall be excavated so that pipes can be laid straight and at uniform grade and without dips or humps between terminal elevations. Pressure mains shall be installed to alleviate high points which may trap air. Trenches shall not be excavated more than 100 feet in front of pipe installation activity nor shall more trench be excavated than can be backfilled at the end of each workday. Trench width shall be minimized but shall provide adequate working space and sidewall clearances for pipeline installation. Trench widths shall be of sufficient to provide room for installing, jointing and inspecting piping and compacting of bedding or backfill around pipe, but in no case wider at top of pipe than pipe barrel O.D. plus 2 feet.

F. Excavated material shall be stockpiled in approved areas until required for backfill or fill. It shall be placed, graded, and stored as to allow for proper drainage and located away from excavation. Unsuitable and excess material shall be disposed of offsite. When unsuitable soils are beneath the subgrade, contact the Engineer for approval to remove and replace with select bedding or backfill materials.

G. Where pipe is laid in rock, provide a minimum of four (4) inches of bedding under pipes

smaller than four (4) inches in nominal diameter and a minimum of six (6) inches of bedding under pipes four (4) inches and larger in nominal diameter.

3.03 Unauthorized Excavation

All excavation outside the lines and grades required shall be considered unauthorized. All unauthorized excavations shall be backfilled with select backfill or bedding at the Contractor's expense. Excavated material shall be removed from the site and disposed of at the Contractor's expense.

3.05 Backfill, Fill and Embankments

A. General: Furnish, place and compact all backfill required for embankments and trenches as required to provide the finished grades as required by the project plans and the Authority. Select backfill and fill shall be installed as support for structure foundations, where the contractor excavates below design subgrade, around and below wetwells, manholes, and valve vaults, in utility trenches through pavements, or as directed by the Authority. General backfill and fill shall be installed in all other locations, unless select fill or backfill is required by the Authority. Backfill and fill shall be brought up in even lifts on all sides and around structures and piping.

B. Backfill and fill shall only be placed on level, dry and firm subgrades approved by the Authority. No fill or backfill shall be placed if water is on the surface of the area to receive the fill or backfill. No fill or backfill shall be placed in a frozen condition or on top of frozen subgrade or previously placed material. All excavations shall be backfilled promptly as work permits but not until the following are completed:

1. Construction below finish grade including dampproofing, waterproofing, and meter insulation.
2. Inspection, testing, approval, and recording of locations of underground utilities.
3. Removal of concrete formwork.
4. Removal of shoring and bracing, and backfilling of voids with satisfactory materials.
5. Removal of trash and debris.
6. Permanent or temporary horizontal bracing is in place on horizontally supported structures.

C. If pipes are installed in fill sections, prior to installation of the pipe fill shall be placed and compacted until it is a minimum of two (2) feet above the top of the proposed pipe. The fill shall then be excavated for the trench width and the pipe installed and backfilled. Then the remainder of the fill shall be placed.

D. Place fill and backfill in horizontal loose lifts not exceeding 6 inches in thickness and mix and spread in a manner assuring uniform lift thickness after placing. Compact each layer of fill or backfill before placement of the next layer.

E. Control the water content of fill and backfill material during placement within the range necessary to obtain the compaction specified. For general fill and backfill maintain the moisture content of the fill within 3 percent of the optimum moisture content for compaction as determined by laboratory tests. For select fill and backfill maintain the moisture content of the fill within 4 percentage points from the optimum moisture content of the material unless otherwise specified. Wet the fill as needed during placement to achieve moisture content for effective compaction. No compaction of fill will be permitted with free water on any portion of the fill to be compacted.

F. Remove fill and backfill containing organic materials or other unacceptable material and replace with approved fill or backfill material. Unacceptable material is material containing rubble, debris, wood, other organic matter, and unsuitable soils as described in Paragraph 2.02.C.3.

G. Compact fill and backfill by at least two coverages of all portions of the surface of each lift by compaction equipment. One-coverage is defined as the condition obtained when all portions of the surface of the fill material have been subjected to the direct contact of the compactor.

H. Follow the specified procedures for backfill around structures except that within 10 feet of foundations and underground structures, use light compaction equipment with the gross weight of the equipment not exceeding 7,000 pounds. Provide equipment that is capable of the required compaction within restricted areas next to structures and around piping.

I. Compaction:
   1. Minimum Density for General Backfill and Fill: CONTRACTOR shall provide independent analysis to demonstrate 90 percent of maximum density obtained in the laboratory in accordance with ASTM D 698 Method C including Note 2. This percentage is of standard Proctor density.
   2. Minimum Density for Select Backfill and Fill: The minimum density to be obtained in compacting the select backfill or fill shall be 95 percent of the maximum density obtained in the laboratory in accordance with ASTM D 698 Method C including This percentage is of standard Proctor Density.
   3. All fill and backfill shall be tested by an independent lab during construction for compaction. At a minimum all fill shall be have one field density test for every layer for each 2500 square feet of surface area of material installed. Trench backfill shall have one field density test for each of the top 4 layers of backfill for every 500 linear feet of trench backfilled. If trench is located under pavement test shall be completed by an AASHTO certified lab and two additional tests shall be taken at different depths for every 200 linear feet of pipe located under pavement.
   4. If the specified densities are not obtained, perform whatever work is required to provide required densities. This shall include removing unacceptable fill or backfill and replacing with compacted acceptable material at no expense to the Authority.

J. Repair any settlement that occurs during construction or within warranty period that follows acceptance of infrastructure by the Authority within thirty (30) calendar days of notification from the Authority. Repairs of settlement shall be at no expense to the Authority.

K. If subgrade is disturbed and becomes soft as a result of construction, then remove soft subgrade material and replace with compacted select backfill or fill to provide a subgrade that meets these specifications at no expense to the Authority.

3.07 Grading

A. Uniformly grade areas within limits of grading under this Section, including adjacent transition areas. Smooth subgrade surfaces within specified tolerances. Grade areas adjacent to structures away from the structure. **No grading shall be accepted that ponds water**. Graded areas shall be compacted with uniform slopes between elevations shown on the plans or between existing grades. Finished surfaces shall be free of irregular surface changes.

B. Place crushed stone material for foundations and driveways over prepared subgrade as required in these specifications and standard drawings. Minimum thickness of crushed stone for foundations is four (4) inches and for driveways is six (6) inches. During construction maintain lines and grades including crown and cross slope.

C. Maximum allowable vertical deviations shall be ± one quarter (1/4) of an inch for areas under pavements, structures, and foundations and ± two (2) inches in general site areas.

3.08 Disposal of Excavated Materials

All excess and/or unsuitable materials shall be removed from the project site and disposed of in accordance with governing regulatory agencies.

*** * END OF SECTION * ***

SECTION 0122
EROSION CONTROL AND GRASSING

JACKSON COUNTY UTILITY AUTHORITY
WATER AND SEWER STANDARD SPECIFICATIONS

PART 1 — GENERAL

1.01 Description

These Specifications shall govern the installation of temporary and permanent erosion and sediment control devices. The devices shall be installed in accordance with the requirements of these specifications and all governing regulatory agencies.

1.02 Quality Assurance

A. Comply with the requirements of the Mississippi Department of Environmental Quality, *Planning and Design Manual for the Control of Erosion, Sediment, and Storm Water,* herein referenced as the Manual. Contractor shall protect adjacent properties and water resources from erosion, sediment, and storm water related damage throughout the life of the project.

B. Contractor shall install temporary erosion and sediment control items prior to clearing or demolition and commencing earthwork. All disturbed areas shall be stabilized to prevent erosion and control sediment. Devices such as sediment basins, silt fencing, hay bales, rock check dams, and permanent and temporary vegetation shall be utilized at a minimum.

C. Contractor shall maintain erosion and sediment control devices until permanent vegetation is established. Once this is complete all temporary erosion and sediment control devices shall be removed. If work in an area is scheduled to be suspended for 14 calendar days or more, then temporary grassing shall be established within 7 calendar days of the last work in the area.

D. Contractor shall review status of erosion control after every rain event or every two weeks to ensure that all devices are operating properly. Any deficiencies shall be noted on the project log book/report and corrective action shall be taken within 48 hours.

1.03 Related Sections

A. Section 0110 — Site Preparation

B. Section 0120 — Excavation and Backfill

1.04 Regulatory Requirements

A. Comply with all applicable codes and with the requirements of agencies having jurisdiction over the work in this Section.

B. If the owner does not already have, Contractor shall bear the responsibility of obtaining the applicable storm water permits from the Mississippi Department of Environmental Quality.

PART 2 — PRODUCTS

2.01 Materials

Erosion and sediment control materials suitable for site conditions shall be in accordance with requirements imposed by the Mississippi Department of Transportation *Standard Specifications for Road and Bridge Construction*, latest edition.

A. Erosion Control Blankets (Ditch Liner and Erosion Control Blanket):
Per Section 217 of the MDOT Standard Specifications.

B. Soil Reinforcing Mat (SRM):
Per Section 224 of the MDOT Standard Specifications.

C. Mulch: Use one of the following: 1) Wheat or Oat Straw, 2) Wood chips or bark produced from on-site grinding of the trees that were cleared or from off-site supply, or 3) Hydromulch.

D. Grassing: Per Section 225 of the MDOT Standard Specifications. All work necessary to establish vegetation including but not limited to fertilizing, mulching, watering, mowing, etc. shall be completed.

E. Hay Bales: Per Section 235 of the MDOT Standard Specifications.

F. Silt Fence Fabric: Per Section 234 of the MDOT Standard Specifications.

PART 3 — EXECUTION

3.01 Erosion Control and Slope Protection Implementation

A. Erosion and Sedimentation control best management practices are required during all ground disturbing activity until permanent measures have been installed.

B. In all cases, if permanent erosion resistant measures have been installed, temporary preventive measures are not required.

C. All preventive measures shall comply with the BMPs as indicated in the *Manual.*

D. Mulching shall be installed on all disturbed areas where slopes are steeper than 3%. Erosion Control Blanket shall be installed on all disturbed areas with slopes steeper than 4H:1V.

3.02 Installation and Maintenance

A. Installation and Maintenance of Erosion Control Measures shall be in accordance with the requirements of Mississippi *Standard Specifications for Road and Bridge Construction,* latest edition, and the *Manual*.

B. Visually determine storm water discharge locations on the project site and modify erosion control plan as required to eliminate sediment and erosion from discharging off project site.

C. Repair all deficiencies to erosion and sediment control devices immediately. Remove silt deposits that exceed 1/3 of the height of the silt fence, hay bales or check dams.

3.03 Clean Up

A. Remove temporary measures after permanent measures have been installed.

B. Clean out temporary sediment control structures that are to remain as permanent measures.

C. Where removal of temporary measures would leave exposed soil, shape surface to an acceptable grade and finish to match adjacent ground surfaces.

**** END OF SECTION ****

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SECTION 0130
CONCRETE

PART 1 – GENERAL

1.01 Description

These Specifications shall govern the furnishing and installing of concrete for the Authority. The concrete shall be installed in accordance with the requirements of these specifications or as approved by this Authority and the governing regulatory agencies.

1.02 Reference Standards

Reference Standards: The work, materials and related activities shall be in accordance with the latest standards of the American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM), American Reinforcing Steel Institute, Manual of Standard Practice, and American Concrete Institute (ACI).

PART 2 – PRODUCTS

2.01 Concrete Materials

Concrete materials shall include type II portland cement per ASTM C150; aggregates per ASTM C33, course shall be either number 57 or 67 stone, fine shall be clean, sharp, natural sand free of loam, clay, lumps or other deleterious substances (dune sand, bank run, and manufactured sands are not acceptable); water shall be clean and potable; air-entraining admixtures shall be per ASTM C260; water reducing admixtures shall be per ASTM C494 as approved in the mix design; and slump limits shall be no less and one (1) inch and no more than four (4) inches.

2.02 Form Materials

Form materials shall have sufficient stability to withstand the pressure of the placed concrete without bow or deflection. Exposed surfaces shall be panel-type to provide continuous, straight, smooth, as-cast surfaces with the largest practical form size to minimize joints. Exposed corners shall have three quarter (3/4) inch chamfer. Unexposed surfaces shall be suitable material for the project conditions.

2.03 Reinforcing Materials

A. Reinforcing Bars: ASTM A 615, Grade 60.

B. Welded Wire Fabric: ASTM A 185.

C. Steel Wire: ASTM A 82.

D. Supports for Reinforcement: Bolsters, chairs, spacers and other devices for spacing, supporting and fastening reinforcement in place.
   1. Use wire bar type supports complying with CRSI recommendations, except as specified below. Do not use wood, brick, or other unacceptable materials.
   2. For slabs on grade, use supports with sand plates or horizontal runners where base materials will not support chair legs.
   3. For all concrete surfaces, where legs of supports are in contact with forms,

provide supports complying with CRSI, Manual of Standard Practice as follows: Either hot-dip galvanized, plastic protected or stainless steel legs.

2.04 Grout

A. High Performance, Non-metallic Grout shall be 100 percent solids, high strength epoxy grout. Grout shall use clean well graded sand with epoxy resins suitable for use on dry or damp surfaces. Grout shall be Polygrout by the Euclid Chemical Company or equal.

B. Nonshrink, Nonmetallic Grout shall be premixed nonstaining cementitious grout requiring only the addition of water at the job site. Non-shrink grout shall be NS Grout by Euclid Chemical Company or equal.

C. Ordinary Cement-Sand Grout: Except where otherwise specified use 1 part cement (per ASTM C150, type II) to 3 parts sand (per ASTM C33).

2.05 Expansion Joints

Expansion joint filler shall be preformed complying with ASTM D1752, Type II cork. Joint shall be sealed with two-component polyurethane sealant. Sealant shall be FS TT-S-00227, type 1 (self-leveling) Class A. Sealant shall be Sonolastic Paving Joint Sealant by Sonneborn or equal.

PART 3 – EXECUTION

3.01 Formwork

A. Formwork: Construct so that concrete members and structures are correct size, shape, alignment, elevation and position, complying with ACI 347.

B. Clean and adjust forms prior to concrete placement. Apply form release agents or wet forms, as required. Retighten forms during and after concrete placement if required to eliminate mortar leaks.

3.02 Reinforcement, Joints, and Embedded Items

A. Comply with the applicable recommendations of specified codes and standards, and CRSI, Manual of Standard Practice, for details and methods of reinforcement placement and supports.

B. Clean reinforcement to remove loose rust and mill scale, earth, ice, and other materials which reduce or destroy bond with concrete.

C. Position, support, and secure reinforcement against displacement during formwork construction or concrete placement. Locate and support reinforcing by metal chairs, runners, bolsters, spacers and hangers, as required.

1. Place reinforcement to obtain the minimum concrete converges as shown and as specified in ACI 318. Arrange, space, and securely tie bars and bar supports together with 16 gage wire to hold reinforcement accurately in position during concrete placement operations. Set with ties so that twisted ends are directed away from exposed concrete surfaces.
2. Reinforcing steel shall not be secured to forms with wire, nails or other ferrous metal. Metal supports subject to corrosion shall not touch formed or exposed concrete surfaces.

D. Provide sufficient numbers of supports of strength required to carry reinforcement. Do not place reinforcing bars more than 2 inches beyond the last leg of any continuous bar support. Do not use supports as bases for runways for concrete conveying equipment and similar construction loads.

E. Splices: Provide standard reinforcement splices by lapping ends, placing bars in contact, and tying tightly with wire. Comply with requirements shown for minimum lap of spliced bars.

F. Install welded wire fabric in as long lengths as practical, lapping at least one mesh.

G. Joints: Provide construction, isolation, and control joints as indicated or required. Locate construction joints so as to not impair the strength and appearance of the structure. Place isolation and control joints in slabs on ground to stabilize differential settlement and random cracking.

H. Installation of Embedded Items: Set and build into the Work anchorage devices and embedded items required for other Work that is attached to, or supported by cast-in-place concrete. Use setting diagrams, templates and instructions provided under other Sections and other contracts for locating and setting.

3.03 Concrete and Placement

A. Proportioning and Design of Mix:
   1. Minimum compressive strength at 28 days: 4000 psi, unless otherwise specified.
   2. Maximum water cement ratio by weight: 0.45.
   3. Minimum cement content: 564 pounds per cubic yard.
   4. Normal weight: 145 pounds per cubic foot.
   5. Use air-entraining admixture in all concrete: Provide not less than 4 percent nor more than 8 percent entrained air for concrete exposed to freezing and thawing, and from 2 percent to 4 percent for other concrete.
   6. Calcium Chloride: Do not use calcium chloride in concrete. Do not use admixtures containing calcium chloride.

B. Job-Site Mixing: Use drum type batch machine mixer, mixing not less than 1 minute for one cubic yard or smaller capacity. Increase mixing time at least 15 seconds for each additional cubic yard or fraction thereof.

C. Ready-Mixed Concrete: ASTM C 94.

D. Concrete Placement: Comply with ACI 304, placing concrete in a continuous operation within planned joints or sections.

E. Consolidate placed concrete using mechanical vibrating equipment with hand rodding and tamping, so that concrete is worked around reinforcement and other embedded items and into all parts of forms.

F. Protect concrete from physical damage or reduced strength due to weather extremes during mixing, placement, and curing.
   1. In cold weather comply with ACI 306.
   2. In hot weather comply with ACI 305.

3.04 Quality of Concrete Work

Make all concrete solid, compact and smooth, and free of laitance, cracks and cold joints.

3.05 Curing

Begin initial curing after placing and finishing concrete as soon as free water has disappeared from exposed surfaces. Where possible, keep continuously moist for not less than 72 hours. Continue curing use of moisture-retaining cover or membrane-forming curing compound. Cure formed surfaces by moist curing until forms are removed. Provide protection as required to prevent damage to exposed concrete surfaces.

3.06 Finishes

A. After placing concrete slabs, do not work the surface further until ready for floating. Begin floating when the surface water has disappeared or when the concrete has stiffened sufficiently. Use a wood float only. Check and level the surface plane to a tolerance not exceeding ¼" inch in 10 feet when tested with a 10 foot straightedge placed on the surface at not less than 2 different angles. Cut down high spots and fill all low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat the surface to a uniform, smooth, granular texture.

B. After floating, begin the first trowel finish operation using a trowel. Begin final toweling when the surface produces a ringing sound as the trowel is moved over the surface.

C. Consolidate the concrete surface by the final hand troweling operation. Finish shall be free of trowel marks, uniform in texture and appearance, and with a surface plane tolerance not exceeding ¼" inch in 10 feet when tested with a 10 foot straight edge. Grind smooth surface defects.

D. Use trowel finish for the following: Interior exposed slabs unless otherwise shown or specified.

E. Apply non-slip broom finish to exterior concrete slab.

3.05 Grout Placement

A. Place grout as shown and in accordance with manufacturer's instructing.

B. Drypacking will not be permitted.

C. Placing grout shall conform to the temperature and weather limitations described in Article 3.03 above.

*** * END OF SECTION * ***

SECTION 0140
CASED CROSSINGS

JACKSON COUNTY UTILITY AUTHORITY
WATER AND SEWER STANDARD SPECIFICATIONS

PART 1 — GENERAL

1.01 Description

These Specifications shall govern the furnishing and installing of cased crossings for the Authority. The casing pipe and accessories shall be installed in accordance with the requirements of these specifications at the locations and depths indicated on the plans approved by this Authority and the governing regulatory agencies. The casing shall be of the class, size and dimensions shown thereon.

1.02 Related Work Sections

A. Section 0120, Excavation and Backfill

B. Section 0160, Pipe Installation

1.03 Quality Assurance

A. Cased crossings shall be performed by Contractors who are familiar with and experienced in such work.

B. The Contractor shall provide and maintain the principal equipment necessary to perform all of the work herein specified in an orderly manner. The equipment shall consist of approved units designed or selected to perform and expedite all of the work and incidental items of construction.

C. Reference Standards: Comply with the applicable provisions of ASTM A 139, Specification for Electric fusion (Arc) — Welded Steel Pipe

1.03 Job Conditions

Scheduling: The Contractor shall notify the Authority's Representative not less than three (3) business days in advance of commencing work. Contractor shall obtain all necessary permits and submit them to the Authority prior to commencing work. Contractor shall dispose of all fluids and other spoils to the requirements of the governing agencies. No drilling mud shall be left on site. Contractor shall provide and maintain sufficient dewatering systems should water be encountered.

PART 2 — PRODUCTS

2.01 Casing Pipe

A. General: For carrier pipes three (3) inches in nominal diameter and smaller, casing pipes may be either HDPE or Steel meeting the material specifications of the Authority. Carrier pipes large than three (3) inches in nominal diameter, casing pipes shall be steel unless otherwise approved by the Authority in writing prior to installation.

B. High Density Polyethylene Casing Pipe: Casing material shall be extra high molecular weight high density polyethylene (PE 3408) per ASTM D 3350. Casing pipe shall meet the requirement of ASTM F714 and D3261. Casing internal diameter shall be adequate to allow for installation of carrier pipe, but the nominal diameter of the casing shall not be less than twice the nominal diameter of the carrier pipe. The casing pipe wall thickness shall be determined by the Engineer but shall not be less than DR17.

C. Steel Casing Pipe: Casing material shall be arc welded steel pipe, Grade B or better, meeting the requirements of ASTM A139 with a minimum yield strength of 35,000 psi. Casing internal diameter shall be adequate to allow for installation of carrier pipe, but the nominal diameter of the casing shall not be less than twice the nominal diameter of the carrier pipe. Casing pipe shall be coated with two coats of high build coal tar epoxy per AWWA C-210 for exterior applications, 10-12 dry mils per coat. Casing pipe minimum wall thickness shall be as approved by the governing agencies permitting the crossing but shall not be less than the thickness stated in the table below.

Outside Diameter (inches)	Minimum Wall Thickness (inches)	
	Highways	Railroads*
16	0.250	0.281
20	0.250	0.281
24	0.313	0.313
30	0.375	0.469
36	0.438	0.469
42	0.500	0.562
48	0.500	0.625

*Meets A.R.E.A. Specifications for Pipelines for Conveying Nonflammable Substances

2.02 Casing Spacers

Provide carrier pipe spacers according to AWWA specifications for each cased crossing. Spacer shell, risers, and fasteners shall be made of T304 stainless steel with PVC liner and ultra-high molecular weight polymer runners to protect the carrier and casing pipe during installation. Spacers shall be as manufactured by Cascade Waterworks or equal.

2.03 Casing End Seals

Provide casing end seals made of 0.093" thick neoprene rubber. End seal shall be in a cone shape with a standard 20" length and fastened to the casing and carrier pipe with stainless steel bands.

PART 3 — EXECUTION

3.01 General

No work shall begin until all permits are obtained and all required bonds, cash deposit, and insurance are furnished to the governing agencies.

3.02 Jack and Bore

Steel casings shall be installed by jack and bore and drilling a hole of a size no larger than one (1) inch in diameter around the outside circumference of the casing pipe. Boring shall be made with an auger inside the casing pipe with the cutting edges positioned just ahead of the pipe.

Water-bearing sands and mucky soils shall be well-pointed prior to commencing the bore. Care shall be exercised to keep the auger properly positioned with respect to the casing pipe and maintain forward pressure on the casing to quickly run through any pockets of loose soil. Bore shall be completed with extreme care to maintain line and grade. Proposed line and grade shall be submitted to the Authority prior to construction. Excessive deviations from the proposed line and grade will not be accepted.

3.03 Horizontal Directional Drill

A. HDPE Casing shall be installed means of Horizontal Directional Drill (HDD). Contractor shall provide as-built drawing for any HDD to include vertical and horizontal location of the pipeline installed. Position of the pipe shall be documented in thirty (30) foot intervals for location on X, Y, and Z axis.

B. HDD shall be performed with a rig of sufficient capacity to perform the bore and pull back of the pipe. The pilot holes shall be drilled on the bore path with no deviations greater than 25% of the nominal pipe diameter. Reaming hole shall be a minimum of 25% greater than the outside diameter of the drilling pipe. Final installation shall provide a minimum of five (5) feet of cover and not establish new high points in the main. Contractor shall provide at a minimum of one test pit per bore to verify grade and alignment. For bores greater than 300 linear feet two test pits shall be provided and an additional pit for every additional 500 linear feet of bore length. Additional test pits will be performed should installation not be in compliance.

C. Installation shall be completed in a manner to eliminate the discharge of water, mud, fluid, and cutting to the adjacent waterways and property. Work areas at the entry and exit points shall be enclosed to contain unplanned spills and discharge.

*** * END OF SECTION * ***

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SECTION 0150
CASTINGS

PART 1 – GENERAL

1.01 Description

These Specifications shall govern the furnishing and installing of casting for the Authority. The casting installed on water valves and manholes shall be installed in accordance with the requirements of these specifications at the locations and elevations indicated on the plans approved by this Authority and the governing regulatory agencies.

1.02 Related Work Specified Elsewhere

A. Section 0210, Water Valves and Appurtenances.

B. Section 0310, Manholes and Wetwells.

C. Section 0340, Sewer Valves and Appurtenances.

1.03 Reference Standards

The work, materials and related activities shall be in accordance with the latest standards of the American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM), Mississippi Department of Health, Mississippi Department of Environmental Quality, and any other related State or Federal standards or requirements

1.04 Delivery, Storage and Handling

Castings which are cracked, chipped, distorted or otherwise damaged will not be acceptable.

PART 2 – PRODUCTS

2.01 Materials

A. Manholes and below grade vaults for water air release valves shall be covered frame and cover made of ASTM A48 Class 35B gray iron or ASTM A536 Grade 65-45-12 ductile iron. Frame shall have a thirty (30) inch internal diameter with a casting diameter of thirty-two (32) inches. Frame shall have a seven (7) to nine (9) inch riser and a four (4) inch minimum flange. Casting shall be cast with “JCUA SANITARY SEWER” or “JCUA WATER” to identify manhole owner and type of service. All frames and covers shall be ASSHTO M306 requirements for H-25 traffic ratings. Fabricate castings true to pattern so that component parts fit together. Casting shall be foundry coated with coal-tar epoxy polyamide paint. Minimum thickness shall be ten (10) mils. Prior to coating castings shall have preparation in accordance with SSPC 16. All frames and castings shall extend above the 100 year flood plain by a minimum of one (1) foot or be watertight (if approved by the Authority’s Engineer). Watertight frames and covers shall be furnished with a neoprene gasket to seal the cover to the frame and a plastic manhole cover insert to prevent storm water inflow. Insert shall include a handle for removal. Frames and castings shall be manufactured by Neenah Foundry Company, Vulcan Foundry, or equal.

B. Steps: Steps shall be cast aluminum alloy meeting the requirements of the Aluminum Association (Alloy AA-514) and Federal Specification G4A.

PART 3 – EXECUTION

3.01 Installation

A. Follow manufacturer's printed instructions.

B. Set castings accurately to required location, alignment and elevation, plumb, level, true and free of cracks, measured from established lines and levels. Brace temporarily or anchor temporarily in formwork.

C. Castings shall be set no more than three (3) inches above finished grade when installed within road rights-of-way and flush with pavement when installed in paved areas unless approved by the governing agency and the Authority.

**** END OF SECTION ****

SECTION 0160
PIPE INSTALLATION

JACKSON COUNTY UTILITY AUTHORITY
WATER AND SEWER STANDARD SPECIFICATIONS

PART 1 – GENERAL

1.01 Description

These Specifications shall govern the installation of pipelines for the Authority. The pipelines shall be installed in accordance with the requirements of these specifications at the locations and depths indicated on the plans approved by this Authority and the governing regulatory agencies.

1.02 Quality Assurance

A. Comply with the requirements of the Mississippi State Department of Health, Division of Water Supply and Mississippi Department of Environmental Quality.

B. Reference Standards: The work, materials and related activities shall be in accordance with the latest standards of the American Water Works Association (AWWA), American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM), Uni-Bell Pipe Association, Mississippi Department of Health, Mississippi Department of Environmental Quality, and any other related State or Federal standards or requirements.

1.03 Related Work Specified Elsewhere

A. Section 0120, Excavation and Backfill

B. Section 0200, Water Distribution Pipe

C. Section 0300, Centralized Sanitary Sewer Pipe

D. Section 0400, De-Centralized Sanitary Sewer Pipe

PART 2 – PRODUCTS

2.01 Materials

A. Pipe materials are specified under each applicable pipe material Specification Section.

B. Thrust Blocks: Shall meet the requirements of Specification 0130 except concrete for thrust blocks shall be a minimum of 3000 psi compressive strength at 28 days.

C. Pipe Marking:

1. Marking Tape: All pipelines shall be marked with underground warning tape which shall be placed approximately 12 to 18 inches below the finished grade of the pipe trench. Tape shall be a minimum of 3 inches wide with the message "CAUTION BURIED (TYPE) LINE BELOW", stating either WATER or SEWER for the type of pipeline. Tape color shall conform to the APWA Uniform Color Code.
2. Utility Marker Balls: All pressure pipelines shall include marker balls to precisely mark the location of underground utilities. Markers shall incorporate a different frequency for water and sewer facilities for identification. Markers shall be made

of a watertight polyethylene shell colored blue for water and green for sewer. Active markers shall be programmable with a unique 10 digit ID and 256 bits of memory. Memory shall be capable of containing 6 lines with 8 characters on each line and a 13 character descriptive label. Markers shall be 3M Model 1400 Series or compatible with the Authority's current Utility Marking System. Markers shall be installed in accordance with the manufacturer's recommendations.

a. Passive Marker Balls shall be installed at a maximum spacing of 300 linear feet of continuous pipeline length for sections installed by means of open trench or directional drill.

b. Active Marker Balls shall be installed all valves, fittings, beginning and ends of bored casings and creek or waterway crossings, beginnings and ends of directional drilled crossings.

3. Tracer Wire: 12 AWG Copper

4. Marker Posts: Marking posts shall be provided when pipelines continue in areas not adjacent to public roads and rights-of-way. Markers shall be three and a half (3 ½) inches in diameter by six (6) foot tall polymeric post. Marker shall note in UV and abrasive resistant solvent based ink "CAUTION (TYPE) PIPELINE" and the OWNER and OWNER's contact information.

PART 3 – EXECUTION

3.01 Installation

A. General: Install piping as shown, specified, and recommended by the manufacturer. Pipe and appurtenances shall be delivered, stored, and handled in accordance with the manufacturer's recommendations. Pipe, fittings and accessories that are cracked, damaged or in poor condition or with damaged linings will be rejected. Minimum cover over piping shall be three (3) feet unless otherwise noted or required per Section 0170. Earthwork required is in Section 0120 of these specifications.

B. Maintain separation of sanitary piping from water mains in accordance with governing authorities. Sanitary sewer shall be laid at least 10 feet horizontally and 18" vertically from any water lines with water lines always located above sewer lines. All other scenarios shall be approved on a case by case basis.

C. Pipe Bedding and Backfill:

1. General: Comply with requirements of Section 120, Excavation and Backfill.

2. Pipe Bedding: Installation of bedding requirements to be determined by Engineer based on soil conditions, pipe material, and depth of bury. The select bedding material shall be thoroughly compacted to a density at least equal to 95 percent of the maximum density determined by the Standard Proctor in accordance with ASTM D 698 Method C including Note 2, if applicable. In no case shall water be visible in the trench. Pipelines shall be installed in one of the following Trench Classification:

a. Class "D" Bedding: The pipe shall be bedded in compacted select bedding placed on a flat trench bottom. The select bedding shall have a minimum thickness of four inches under the barrel and extend to six inches above the pipe.

b. Class "C" Bedding: The pipe shall be bedded in compacted select bedding placed on a flat trench bottom. The granular bedding shall have a minimum thickness of four inches under the barrel and shall extend to three inches above the springline on cut depths up to 14 feet deep and shall extend to six inches above the top of pipe in cut depth greater than 14 feet.

c. Class "B" Bedding: The pipe shall be bedded in compacted select bedding placed on a flat trench bottom. The granular bedding shall have a minimum thickness of four inches under the barrel and shall extend to the spring line of the pipe.

d. Class “A: Bedding: The pipe shall be bedded in compacted select bedding placed on a flat trench bottom. The granular bedding shall have a minimum thickness of four inches under the barrel.

e. Or other installations as recommended by pipe manufacturer or designed by the Engineer may be approved by the Authority depending on soil conditions, depth of bury, and materials.

3. Trench Backfill: Materials for backfilling pipe trenches shall be as specified in Section 0120. Backfill shall be general or select backfill depending on the location of the trench. Initial backfill shall be installed by hand and compacted in accordance with these specifications and shall extend to six inches above the top of the pipe. Promptly after the pipe is laid, all trenches and excavation shall be backfilled and compacted by hand or pneumatic tamping until it covers the pipe at least one foot. This backfill shall be brought up and tamped equally and thoroughly along each side of the pipe in such a manner as to avoid displacement of or damage to the pipe.

4. Concrete Encasement: Comply with applicable provisions of Section 0130. Concrete Encasement shall be installed when piping is installed by means of open trench below creeks or other major drainage ways or as required by the Authority on a case by case basis.

D. Laying Pipe:

1. Comply with manufacturer's instructions and with AWWA C600, AWWA M9, AWWA M23 and ASTM 2321 where applicable.

2. No pipe shall be brought into position until the preceding length has been bedded and secured in its final position. Install all pipe accurately to line and grade shown. Remove and relay pipes that are not laid correctly. Slope piping uniformly between elevations given. Place bell and spigot pipe so that bells face the direction of laying.

3. Ensure that water level in trench is at least six inches below bottom of pipe. Do not lay pipe in water. Maintain dry trench until jointing and backfilling are complete.

4. Excavate around joints in bedding and lay pipe so that only the barrel receives bearing pressure from the trench bottom.

5. Permissible deflections at joints shall not exceed 75 percent of the amount allowed by manufacturer.

6. Take every precaution to ensure that no foreign material enters the piping prior to and during installation. Interior of all pipe and fittings shall be inspected and all dirt, gravel, sand, debris or other foreign materials shall be completely removed from pipe interior before it is moved into the trench. Bell and spigot mating surfaces shall be thoroughly wire brushed and wiped clean and dry immediately before pipe is laid. Every time that pipe laying is not actively in progress the open ends of pipe shall be closed by a watertight plug.

7. All pipe and fittings shall be carefully examined for cracks, damage or other defects while suspended above the trench before installation. Defective materials shall be immediately removed from site.

8. Field cutting pipe, where required, shall be made with a machine specially designed for cutting piping. Cuts shall be carefully done, without damage to pipe or lining, so as to leave a smooth end at right angles to the axis of pipe. Cut ends shall be tapered and sharp edges filed off smooth. Flame cutting will not be allowed.

9. Blocking under piping shall be permitted only for special conditions. Comply with

requirements of AWWA C600 where permitted.

10. Tracer Wire, Marking Tape and Utility Marker balls shall be installed per the manufacturer's recommendation on all pressure mains.
11. Touch up protective coatings in a satisfactory manner prior to backfilling.
12. CONTRACTOR shall notify the AUTHORITY in advance of any backfilling operation.

E. Jointing Pipe:

1. General: Clean completely all jointing surfaces and adjacent areas immediately before making joint. Lubricate and adjust gaskets and "O" rings as recommended by manufacturer. After "O"-rings are compressed and before pipe is brought fully home, each gasket shall be carefully checked for proper position around full circumference of the joint. Conform to AWWA C111 and to manufacturers' recommendations pertaining to jointing pipe.
2. Push-on Joints: Comply with AWWA C111 and to manufacturers' recommendations pertaining to jointing pipe.
3. Mechanical Joints: The plain end of pipe shall be centered and pushed into the bell and the gasket shall be firmly pressed evenly into the bell. The gland shall be slid to the bell for bolting. All bolts and nuts shall be heavily coated with an approved bituminous coating. All bolts with oiled threads shall be alternately torque tightened 180 degrees opposite to each other to seat the gasket evenly. The maximum torque shall be as follows:

Bolt Size (Inches)	Applied Torque (ft-lbs)
5/8	50
¾	80
1	90
1 ¼	110

4. Flanged Joints: Use hexagon head nuts and bolts on all flanged joints. Bolts shall project not more than 1/4-inch from nor fall short of the end of the nut. Use 1/8-inch rubber full-faced gaskets unless otherwise approved by AUTHORITY. Gaskets shall be suitable for service intended in accordance with manufacturers' ratings and instructions. Clean and lubricate bolt threads and gasket faces.
5. Butt Fusion: Follow manufacturer's instructions for fusion procedures.

F. Restraints, Supports and Thrust Blocks: All fittings shall be restrained by thrust blocks and mechanical joints. Install restrained joints as shown, specified, required, and as recommended by manufacturer. Provide concrete and steel, collars, thrust blocks and cradles as shown or otherwise approved by AUTHORITY. Thrust blocks shall be poured against **undisturbed** earth. Concrete thrust blocks shall have tar paper between the concrete and the portion of the main being restrained. Concrete shall be kept clear of pipe and fitting joint and joint accessories. Thrust blocks and concrete anchors shall be poured in place and designed to withstand the forces imposed by the main being restrained. Concrete shall be allowed to cure in for a minimum of 24 hours before backfilling and 72 hours before pressure testing accordance with ACI requirements. Utilizing bags of quickcrete or equivalent and backfilling to allow concrete to set and cure over time shall not be permitted.

G. Transitions from One Type of Pipe to Another: Provide all necessary adapters, specials and connection pieces required when connecting different types and sizes of pipe or when connecting pipe made by different manufacturers.

H. Closures: Provide all closure pieces shown or required to complete the Work. Locate

closures in straight runs of pipe.

I. Plastic Piping Supplementary Requirements: Follow manufacturer recommendations for jointing and ASTM D-2321 and D2774 for installation. Backfill with materials free of rocks or other sharp objects from an elevation a minimum of six inches from pipe top surface to surface of ground.

3.02 **Horizontal Directional Drill**

A. Contractor shall provide as-built drawing for any HDD to include vertical and horizontal location of the pipeline installed. Position of the pipe shall be documented in thirty (30) foot intervals for location on X, Y, and Z axis.

B. HDD shall be performed with a rig of sufficient capacity to perform the bore and pull back of the pipe. The pilot holes shall be drilled on the bore path with no deviations greater than 25% of the nominal pipe diameter. Reaming hole shall be a minimum of 25% greater than the outside diameter of the drilling pipe. Final installation shall provide a minimum of five (5) feet of cover and not establish new high points in the main. Contractor shall provide at a minimum of one test pit per bore to verify grade and alignment. For bores greater than 300 linear feet two test pits shall be provided and an additional pit for every additional 500 linear feet of bore length. Additional test pits will be performed should installation not be in compliance.

C. Installation shall be completed in a manner to eliminate the discharge of water, mud, fluid, and cutting to the adjacent waterways and property. Work areas at the entry and exit points shall be enclosed to contain unplanned spills and discharge.

3.03 Work Affecting Existing Piping

A. Location of Existing Piping: CONTRACTOR is responsible for determining exact location of existing piping to which he must make connections, or which he may disturb during earth moving operations, or which may be affected by his work in anyway.

B. Work on Existing Pipelines: Contractor shall install temporary plugs to keep all mud, dirt, water and debris from entering active pipelines. All necessary adapters, fittings, pipe, and appurtenances shall be supplied. Conform with applicable requirement of Section 0100, Construction Adjacent to Authority Utility Systems. Contractor shall have written permission to work on an existing pipeline. A minimum of three (3) business days before scheduled work begins the contractor shall notify the Authority in writing that he/she will commence work.

3.03 Testing of Piping

A. General: Test all piping as specified in each pipe specification section below. Notify the Authority a minimum of three (3) business days in advance of testing. All tests shall be conducted in the presence of the Authority, unless otherwise approved in writing. Contractor shall keep written tabulated results of each test and provide all test results to the Authority for review and approval once testing is complete. Contractor shall provide all testing equipment including pumps, hoses, gauges, fittings, etc. to conduct the required tests. Pipelines which fail test shall be documented, repaired and retested.

B. Gravity Sewer Pipes:

1. Deflection Testing: Gravity sewer pipe will be tested for excessive deflection after installation. A “go, no-go” mandrel that is sized such that it will not pass a deflection greater than 5% shall be used. The mandrel shall be drawn through the pipe by hand from manhole to manhole. Irregularities or obstructions

encountered in the line shall be noted with the station number/location and corrected by the Contractor. If a section of pipe with excessive deflection is found, the Contractor shall uncover the pipe for inspection noting the location and issues found. Damaged pipe will be replaced. If the pipe is undamaged, the Contractor may reinstall the bedding and backfill and retest the pipe. Mandrel test shall also be completed on gravity sewer pipe 1 month prior to end of warranty period.

2. Air Testing Procedure: Air testing shall be conducted for the completed gravity interceptor sewer after backfilling in accordance with Uni-Bell's Uni-B 6. The line to be tested shall be tested between adjacent manholes. The line shall be sealed at both ends, with the seal at one end equipped with an orifice through which to pass air into the pipe. The air supply line shall contain an on-off gas valve and a pressure gauge having a range of 0 to 15 psi. The gauge shall have divisions of 0.10 psi and shall have an accuracy of 0.04 $\pm$ psi. Pressurizing equipment should include a regulator or relief valve to avoid over pressuring and damaging the line being tested. Pressurize the pipe line being tested to a pressure of 4 psig. The line shall be permitted to stabilize between 4 psig and 3.5 psig for a period of no less than 5 minutes. After the stabilization period, the air supply valve should be closed. When the line pressure drops to 3.5 psig, commence timing with a stop watch. The stop watch shall be allowed to run until such time as the line pressure drops to 2.5 psig. The stop watch should be stopped and the measured time lapse compared with the allowable time lapse in the Table 1. If the measured time lapse is greater than that specified in the above table, the section undergoing testing shall have passed, and the test may be discontinued at that time. If the measured time lapse is less than that specified in the above table, the section undergoing testing has not passed the test and the CONTRACTOR shall be required to find the leaks, repair them and retest until the section passes. These repeated tests shall be performed at the CONTRACTOR's expense. The CONTRACTOR is advised to exercise extreme caution when conducting air tests to avoid injury or damage to personnel, equipment or installed pipe and appurtenances.

Table 1: Time in Min:Sec Required for Pressure
To Drop to 2.5 PSIG
(Based on 0.003 CFM per Square Foot and 2.0 CFM)

Length of Test Section (ft)	Pipe Diameter (inches)						
	6	8	10	12	15	18	21
100	5:40	7:34	9:26	11:20	14:10	17:00	19:50
150	5:40	7:34	9:26	11:20	14:10	19:13	26:10
200	5:40	7:34	9:26	11:24	17:48	25:38	34:54
250	5:40	7:34	9:53	14:15	22:15	32:03	43:37
300	5:40	7:36	11:52	17:05	26:42	38:27	52:21
350	5:40	8:52	13:51	19:56	31:09	44:52	61:00
400	5:42	10:08	15:49	22:47	35:36	51:16	69:48
450	6:24	11:24	17:48	25:38	40:04	57:41	78:31

C. Pressure Pipe Test Procedure:

1. General: Backfill and compaction shall be completed except for any mechanical connections at fittings, valves, and service line connections shall be exposed to conduct the hydrostatic pressure and leakage test. Backfill and compact around

all blocking before testing and as required to assure restraint by harnessed joints. Allow concrete for blocking to reach design strength before testing. Fill section to be tested slowly with water (maximum 1.0 fps) and expel all air. Install corporation cocks, if necessary, to remove all air. Test shall be in accordance with AWWA C600

2. Hydrostatic Pressure Test:

a. Maintain test pressure constantly for a four-hour period and accurately measure the amount of water which must be added to maintain the test pressure. Test pressure shall be no less than 1.50 times the normal operating pressure (minimum - 150 psi) of the system. Pressure shall not exceed the design pressure for the pipe and the system appurtenances. Test pressures required are at the lowest elevation of the pipeline section being tested unless otherwise specified. Test pressure shall not vary more than +/- 5 psi from the pressure required for the duration of the test. If at any point the test pressure varies by more than +/- psi the test is considered to be failed.

b. Hydrostatic pressure test shall be conducted on sections of line in no more than 1500 linear foot sections, unless approved by the Authority in writing for transmission mains.

c. No visible leakage shall be accepted.

3.04 Cleaning

All piping shall be thoroughly cleaned and flushed prior to testing. Pipes shall be flushed with clean potable water at a minimum velocity of two (2) feet per second unless otherwise stated. The Contractor shall be careful as not cause erosion or damage to the pipeline or adjacent property while flushing. Piping 24 inches diameter and larger shall be inspected from inside and all debris, dirt and foreign matter removed.

3.05 Disinfection of Potable Water Lines

A. Disinfect all water mains and water services. Flush piping prior to disinfection with water at a minimum velocity of 2-1/2 feet per second. Conform to procedures described in AWWA C651. Water for flushing, testing and chlorination shall be furnished and paid for by the CONTRACTOR. Chlorine will be supplied by CONTRACTOR.

B. Bacteriologic tests will be sampled by the certified water system operator for the system or a certified testing laboratory and shall be analyzed by the Mississippi Department of Health or at a laboratory approved by the Mississippi Department of Health.

C. Chlorine concentration in the water entering the piping shall be between 50 and 100 parts per million, such that a minimum residual concentration of 25 mg/l will be left after a 24-hour retention period. The operation shall be repeated as necessary to provide complete disinfection. Complete disinfection shall be defined as less than one coliform bacteria per 100 ml for samples taken on two consecutive days.

D. Water being collected for testing shall not have a chlorine residual higher than normally maintained in the water system. No chlorine shall be present which is a result of line disinfection.

*** * END OF SECTION * ***

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PART 1 – GENERAL

1.01 Design and Submittal Requirements

A. Submittal Requirements to begin review process
   1. Two sets of construction documents, including full scale drawings and specifications, sealed by an Engineer registered in the State of Mississippi for review by Authority. Drawings shall be construction drawings. Drawings stamped "not for construction" or similar shall not be reviewed.
   2. Submit sanitary sewer system and water system design information for review, stating methods used for determining flow for sizing mains and proposed flow through each section. Description of method and proposed system design flows shall be stated on design plans.
   3. Payment of Utility Plan Review Fee.
   4. Once review process is complete the Owner will receive an approval letter and "will-serve" letter that is contingent upon Mississippi Department of Environmental Quality and Mississippi Department of Health review and approval of the construction documents and payment of all remaining Fees.

B. Submittal Requirements Prior to Installation of Utilities
   1. Approved Permits from governing authorities for any utility that is proposed to cross existing utility easements (i.e. gas pipelines, power transmission mains, etc.) and public roadways and railroads or to be located within public road rights-of-way. All utilities that are to be owned by the Authority shall be permitted in the Authority's name.
   2. Mississippi Department of Health approval letter for the design of the potable water system.
   3. Mississippi Department of Environmental Quality approval letter for the design of the sanitary sewer system.
   4. Payment of Capacity Guarantee Fee to the Authority.
   5. Once all permits and approvals are submitted to the Authority final approval letters will be provided to allow construction to begin. Contractor shall notify Authority three (3) business days prior to construction for scheduling of inspections.

C. Submittal Requirements Prior to Authority Accepting Installed Utilities
   1. Operations and maintenance data, per paragraph 1.03 of this Specification.
   2. Test reports shall be provided to the Authority for review upon completion of installation of water distribution system and sanitary sewer collection system prior to acceptance and connection to the Authority's existing distribution and collection systems.
   3. Record Documents per paragraph 1.02 of this Specification.
   4. **Warranties and Bonds** per the Rules and Regulations.

D. Roadway and Railroad Crossing Requirements
   1. Casing Pipe shall be installed when utility mains cross under all City, County, State, and Federal maintained roadways and railroad crossings. Casing pipe shall meet the requirements governing agency issuing the permit to cross the roadway but shall not be less than the requirements of the Authority. Pressure

mains shall be restrained at each joint located within the casing. Casing shall be installed by jack and bore unless open cutting of the roadway is permitted by the governing authorities, and penetrate at least ½ the material thickness.

2. Where casings are required to be extended along an existing main, the casing shall be split and re-welded. All welds shall be continuous, water-tight
3. **Roadway and Railroad crossings not permitted by the Authority will not be accepted by the Authority for ownership nor will the Authority operate or maintain the crossing.**

E. Water Distribution System Design

1. Domestic water systems shall be designed to provide additional capability that might be necessary to provide domestic water to areas located beyond or away from elements of the existing distribution system as defined by the Authority.
2. Design criteria and parameters for determining peak usage rates and other items not included herein shall be those outlined the Recommended Design Criteria for Public Water Systems, by the Mississippi Department of Health, latest edition, or other criteria and parameters distributed by other nationally recognized associations or institutes, accepted by the governing agencies and authorities.
3. Comply with the requirements of Mississippi Department of Health, Division of Water Supply for separation of water and sanitary sewer mains.
4. Water mains for residential areas shall be capable of supplying each customer fifteen (15) gallons per minute at a residual pressure of forty (40) psi.
5. Water mains shall be designed to provide fire protection to the areas in which they serve. Fire protection shall comply with the requirements of NFPA Standards and all other governing agencies. At a minimum the fire protection system shall be capable of delivering peak usage for domestic purposes plus seven hundred fifty (750) gallons per minute to any hydrant in a residential area or one thousand (1000) gallons per minute to any hydrant in a commercial or industrial area with a residual pressure of twenty (20) psi.
6. Minimum water main size for providing fire protection is eight (8) inch nominal diameter. Maximum fire hydrant spacing is five hundred (500) feet and at all cul-de-sacs or dead end mains.
7. Minimum water main size for providing potable water service shall have a diameter of four (4) inches in residential areas and six (6) inches in commercial and industrial areas.
8. Water mains shall be designed for velocity range of two (2) to four (4) feet per second using Hazen-Williams formula with a coefficient of 120.
9. All fittings shall be restrained by restraining glands as recommended by the manufacturer and concrete thrust blocks.
10. Water system shall be designed to provide an individual service for each lot. Service meter and box shall be located near the proposed right-of-way in a way that will not require damage to the street or any other infrastructure installed for the subdivision when connections are made.
11. Water services shall have a minimum diameter of three quarter (3/4) inches. Service shall be sized according to demand at the structure for which it serves and shall provide a minimum pressure of thirty (30) psi to the structure.
12. Water mains shall have a minimum cover of thirty-six (36) inches, except when installed in the bottom of a road side ditch or crossing an existing ditch or creek a minimum cover of forty-eight (48) inches shall be required or adjacent to farming operations where the minimum cover shall be sixty (60) inches.
13. Water mains shall be located a minimum of 5 feet clear of any paved surface unless otherwise approved by the Authority and the governing authority who owns the paved surface.

B. Sanitary Sewer Collection System Design

1. Sewer collection systems (gravity and pressure) shall be designed to provide additional capability that might be necessary to provide sewer collection to areas located beyond or away from elements of the existing collection system as defined by the Authority.
2. Design criteria and parameters for determining peak flow rates and other items not included herein shall be those outlined in the "Guidance for the Design of Publicly Owned Wastewater Facilities" by MS Department of Environmental Quality, latest edition, or other criteria and parameters distributed by other nationally recognized associations or institutes, accepted by the governing agencies and authorities.
3. Comply with the requirements of Mississippi Department of Health, Division of Water Supply for separation of water and sanitary sewer mains.
4. Minimum gravity sewer collection main size is eight (8) inch nominal diameter. Minimum sewer service line size is four (4) inch nominal diameter for single family residential service and six (6) for all other services, or as required by Authority.
5. Gravity sanitary sewer shall be designed to provide a minimum velocity of two (2) feet per second. Gravity sanitary sewer shall be sized as not to exceed eighty (80) percent of full depth at peak flow rates. Peak flow rates shall be calculated in accordance with "Ten States Standards" for wastewater. Average daily flow shall be calculated utilizing a minimum of seventy (70) gallons per day of domestic wastewater and twenty-five (25) gallons per day of groundwater infiltration per capita for residential areas.
6. Minimum pressure sewer collection main size shall be two (2) inch nominal diameter. Minimum pressure sewer service line size shall be one (1) inch nominal diameter for STEP systems and one and a quarter (1¼) inches for grinder pump systems. Pressure sewer collection lines shall be sized by an engineer and shown on a sealed set of plans for review by the Authority.
7. Pressure sanitary sewer collection mains shall be sized for minimum velocity of two (2) feet per second for grinder pump systems and one (1) foot per second for septic tank effluent pumping (STEP) systems. Design flow in the main shall be calculated utilizing the Rational Method in accordance with EPA Manual 625/1-91/024, Alternative Wastewater Collection Systems.

   Design Flow Formula – Q=AN+B

   Q= Design Flow, Gallons per Minute

   A= Average Daily Flow Coefficient (Flow contribution shall be selected by the engineer based on structures to be connected to the system. Typical Range is 0.5-0.75 based on 200-300 GPD per pumping system respectively for residential, commercial value shall be determined by consulting engineer based on projected daily demands.)

   N= Number of pumping systems

   B= Baseline Flow (Shall be the average flow of any one pump operating in solo in that respective grinder system. Typical Range is 20-50 GPM for grinder pump system.)
8. Pressure and gravity sewer collection systems shall be designed to provide an individual service for each lot.
9. Gravity and pressure sewer mains and services shall have a minimum cover of thirty-six (36) inches, except when installed in the bottom of a road side ditch or crossing an existing ditch or creek a minimum cover of forty-eight (48) inches shall be required or adjacent to farming operations where the minimum cover shall be sixty (60) inches.
10. Drop inlet connections shall be employed when required by the Authority for gravity sewer systems for any drop exceeding two (2) vertical feet.

11. Sewer mains shall be located a minimum of 5 feet clear of any paved surface unless otherwise approved by the Authority and the governing authority who owns the paved surface.

1.02 Record Documents

A. The Contractor shall submit two (2) complete sets of record documents for the project at the completion of the project. The Contractor shall label each document "PROJECT RECORD" with rubber stamp in red ink. The record documents shall be sealed by Engineer of record to certify that the documents are an accurate representation of the installed infrastructure and that the infrastructure was installed in accordance to the approved construction documents. The documents shall include as-built plans, final technical specifications, material submittals, and operations and maintenance manuals. The Contractor shall record information concurrently with construction progress and shall not conceal any work until required information is recorded. The Contractor shall legibly mark record drawings, in red ink, to record actual construction:

1. Elevations of various structure elements in relation to elevation datum. All underground piping with elevations and dimensions, changes to piping location, horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements, actual installed pipe material, class, etc.
2. Location of internal utilities and appurtenances concealed in the construction by referencing to visible and accessible features of the structure
3. Field changes of dimension and detail
4. Details not on original design drawings
5. Equipment and piping relocations

B. Should significant changes be necessary during construction that requires the location of utilities to be changed, a written request shall be submitted to the Authority for approval. Request shall include full scale drawing depicting modification (at the same scale as the original construction drawings) and a written justification for the change. All approved changes shall be included in the record documents. Any significant field changes not approved by the Authority may result in the Authority not accepting the final construction for ownership, operation, and maintenance.

C. The Contractor shall also provide an As-Built AutoCAD file with survey grade accuracy as to the location of the infrastructure for the Authority's mapping files. The points shall include a Northing, Easting, elevation at ground level, and description of the item at that location. The points file shall include a descriptive legend of any symbols and abbreviations used. The surveyed locations shall be on MS State Plane Coordinate System, East Zone, horizontal datum NAD 83, vertical datum NAVD 88.

1.03 Operations and Maintenance Data

A. General: Compile and submit product data and related information appropriate for Authority's maintenance and operation of equipment furnished under Project, unless instructed otherwise by the Authority. Contractor shall coordinate as to ensure that Authority receives all necessary data. Contractor shall schedule training for Authority's personnel by manufacturer's representative in maintenance of products and in operation of equipment and systems. Data shall be compiled and submitted in 3-ring binder on 8½"x11" paper. Data shall be manufacturer's published information or neatly typed. Binder shall be labeled on the cover with the name of the Project and titled "OPERATIONS AND MAINTENANCE MANUAL."

B. Content for Mechanical Equipment or where appropriate:

1. A complete neatly typewritten table of contents listing documents in all volumes

shall be included and arranged in systematic order.

a. Contractor, name of responsible principal, address and telephone number.
b. A list of each product required to be included, indexed to content of the volume.
c. List, with each product, name, address and telephone number of:
   (1) Subcontractor or installer
   (2) Maintenance contractor, as appropriate
   (3) Identify area of responsibility of each
   (4) Local source of supply for parts and replacement

2. Identify each product by product name and other identifying symbols as set forth in Project's Documents.
3. Written text, as required to supplement product data for the particular installation:
   a. Organize in consistent format under separate headings for different procedures.
   b. Provide logical sequence of instructions of each procedure.
4. Copy of each warranty, bond and service contract issued and provide information sheet for Authority's personnel, giving proper procedures in the event of failure and instances which might affect the validity of warranties or bonds.
5. Provide for each unit of equipment and system, as appropriate:
   a. Description of unit and component parts.
      (1) Function, normal operating characteristics, and limiting conditions
      (2) Performance curves, engineering data and tests
      (3) Complete nomenclature number of replaceable parts including standard or manufacturer's part
   b. Operating procedures:
      (1) Start-up, break-in, routine and normal operating instructions
      (2) Regulation, control, stopping, shutdown, and emergency instructions
      (3) Summer and winter operating instructions
      (4) Special operating instructions
   c. Maintenance Procedures:
      (1) Routine operations
      (2) Guide to "troubleshooting"
      (3) Disassembly, repair, and reassembly
      (4) Alignment, adjusting, and checking
   d. Servicing and lubrication schedule including a list of lubricants required
   e. Manufacturer's printed operating and maintenance instructions
   f. Description of sequence of operation by control manufacturer
   g. Original manufacturer's parts list, illustrations, assembly drawings and diagrams required for maintenance including the following:
      (1) Predicted life of parts subject to wear
      (2) Items recommended to be stocked as spare parts
   h. As-installed control diagrams by controls manufacturer
   i. Charts of valve tag numbers, with location and function of each valve
   j. Cataloged list of manufacturer's spare parts supplied with the equipment or system, manufacturer's current prices, and recommended quantities to be maintained in storage
   k. Other data as required under pertinent sections of Specifications

C. Content, for each electric and electronic system, as appropriate:
   1. Description of system and component parts.
      a. Function, normal operating characteristics, and limiting conditions
      b. Performance curves, engineering data and tests
      c. Complete nomenclature including standard or manufacturer's part

number of replaceable parts

2. Circuit directories of panelboards
   a. Electrical service
   b. Controls
   c. Communications
3. As-installed color coded wiring diagrams
4. Operating procedures:
   a. Routine and normal operating instructions
   b. Sequences required
   c. Special operating instructions
5. Maintenance procedures:
   a. Routine operations including recalibration procedures.
   b. Guide to "troubleshooting"
   c. Disassembly, repair, and reassembly
   d. Adjustment and checking
6. Manufacturer's printed operating and maintenance instructions
7. List of original manufacturer's spare parts, manufacturer's current prices, and recommended quantities to be maintained in storage
8. Other data as required under pertinent section of specifications.

*** * END OF SECTION * ***

SECTION 0200
WATER DISTRIBUTION PIPE

JACKSON COUNTY UTILITY AUTHORITY
WATER AND SEWER STANDARD SPECIFICATIONS

PART 1 – GENERAL

1.01 Description

These Specifications shall govern the furnishing and installing of water mains and fittings for the Authority. The pipe and accessories shall be installed in accordance with the requirements of these specifications at the locations and depths indicated on the plans approved by this Authority and the governing regulatory agencies. The pipe and accessories shall be of the classes, sizes, and dimensions shown thereon.

1.02 Quality Assurance

A. Source Quality Control: Obtain pipe and fittings from no more than one manufacturer.

B. Reference Standards: The work, materials and related activities shall be in accordance with the latest standards of the American Water Works Association (AWWA), American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM), Uni-Bell Pipe Association, Mississippi Department of Health, Mississippi Department of Environmental Quality, and any other related State or Federal standards or requirements.

1.03 Related Work Specified Elsewhere

A. Section 0120 – Excavation and Backfill

B. Section 0160 – Pipe Installation

C. Section 0170 – Regulatory and Design Requirements

PART 2 – MATERIALS

2.01 General

Markings: Pipe shall be marked at a maximum of 5 ft. intervals and shall include nominal size, schedule, SDR designation, or pressure class, AWWA designation, National Sanitation Foundation (where applicable), material cell classification (where applicable), and Manufacturer's name and code. All pipe shall be blue to denote for use as potable water. Ductile iron pipe and fittings shall have blue polyethylene encasement.

2.02 Buried Distribution Mains

A. General: Pipe shall be either PVC or Ductile Iron meeting the specifications below. Fittings shall be ductile iron. Pipes shall be considered a Main if the nominal diameter is four (4) inches or larger. Pipes larger than twelve (12) inches in nominal diameter shall be considered transmission infrastructure and be Ductile Iron, unless otherwise approved by the Authority.

B. Ductile Iron Pipe: Pipe shall be non-flanged centrifugally cast in metal or sand lined molds manufactured in accordance with the latest edition of ANSI A21.51 (AWWA C151). Pipe shall have a minimum pressure rating of 350 psi in accordance with ANSI A21.50

(AWWA C150). Joints shall be mechanical or push-on type in accordance with ANSI A21.11 (AWWA C111). Pipe shall be coated with a factory applied bituminous coating approximately one (1) mil thick and lined with a cement-mortar lining in accordance with ANSI A21.4 (AWWA C104). Pipe shall be wrapped in a polyethylene encasement in accordance with ANSI A21.5 (AWWA C105) and installed in accordance with DIPRA Method A. Polyethylene encasement shall have a minimum thickness of 8 mils. Where joint restraints are necessary they shall be a boltless type locking gasket meeting the requirements of ANSI A21.11 (AWWA C111). Joint lubricant shall be as recommended by the pipe manufacturer. Ductile iron pipe shall be as manufactured by American Cast Iron Pipe Company or U.S. Pipe.

C. Ductile Iron Fittings: Fittings shall conform to the latest edition of ANSI A21.10 (AWWA C110) or ANSI A21.53 (AWWA C153) for compact fittings. Fittings shall have a minimum pressure rating of 350 psi in accordance with ANSI A21.50 (AWWA C150). All joints for fittings, valves, and specials shall be mechanical type in accordance with ANSI A21.11 (AWWA C111). Mechanical joints shall have plain rubber gaskets with stainless steel bolts and nuts (threads shall be coated to resist galling). Fittings shall be coated with a factory applied bituminous coating approximately one (1) mil thick and lined with a cement-mortar lining in accordance with ANSI A21.4 (AWWA C104). All fittings shall be wrapped in a polyethylene encasement in accordance with ANSI A21.5 (AWWA C105). Polyethylene encasement shall have a minimum thickness of 8 mils. **No "special" fitting will be allowed without written approval.** Ductile iron fittings shall be as manufactured by American Cast Iron Pipe Company or U.S. Pipe.

D. Polyvinyl Chloride (PVC) Pipe: PVC pipe shall conform to AWWA C900 or C905 depending on size. Pipe shall be pressure rated 235 psi (DR18) for sizes four (4) inches through twelve (12) inches and pressure rated 235 psi (DR 18) for sizes fourteen (14) inches and larger. Pipe shall be made of type 1, grade 1 class 12454-B material in accordance with ASTM D 1784. Pipe outside diameter shall conform to the outside diameter dimensions of ductile iron pipe to facilitate use of Ductile Iron Fittings, cast iron valves and specials. Joints shall be integral bell and spigot type with elastomeric flexible seals in accordance with ASTM F-477. Joint lubricant shall be as recommended by the pipe manufacturer. Fittings shall be ductile iron as specified in Section 2.02 C with joint restraint gland. Joint restraint shall meet the requirements of UNI-Bell 13 and comply with ASTM F1674-96. Where bell restraints are necessary they shall incorporate a split ring behind the bell and a serrated ring on the spigot to grip the pipe with sufficient number of bolts and to provide a minimum working pressure rating equivalent to the pipe.

E. High Density Polyethylene (HDPE) Pipe: HDPE pipe shall only be used for directional drill applications or where otherwise approved in writing by the Authority. Pipe material shall be a high density PE 3608 or 3408 cell classification 345464C per ASTM D3350 and conform to AWWA C906. Outside diameter of the pipe shall be controlled by ductile iron pipe size (DIPS). The pressure rating for the pipe shall be calculated by a licensed engineer in the State of Mississippi based on boring conditions but in no case shall it be less than 160 psi (DR11). The nominal size of the pipe selected shall not restrict the capacity of the main thus increasing the nominal pipe size for HDPE sections may be required. Sections of pipe shall be joined into continuous lengths on the job site above ground by heat fusion method in accordance with manufacturer's recommendations. Fused joint strength shall at a minimum equal the tensile strength of the pipe. Connection of HDPE pipe section to either PVC or DI shall be made with a Mechanical Joint Adapter designed for such connection of dissimilar pipe materials.

2.03 Exposed Distribution Main

Exposed water mains shall be Ductile Iron Pipe and Fittings and will only be accepted with written

approval from the Authority prior to installation. Exposed mains shall meet the requirements of section 2.02 B and C except where modified herein. Pipe and fitting joints shall be flanged in accordance with ANSI A21.15 (AWWA C115) and include 1/8 inch thick red rubber full faced gaskets. Bolts and nuts shall be type 304, stainless steel (threads shall be coated to resist galling). Pipe and fittings shall be coated with 2 coat of epoxy primer for 1.5-2.5 dry mils per coat, 1 coat of intermediate coating, high build epoxy, for 3.0-4.0 dry mils, and 2 coats of finish coating, aliphatic acrylic polyurethane, for 2.0-3.0 dry mils per coat. Ductile iron fittings shall be as manufactured by American Cast Iron Pipe Company or U.S. Pipe.

2.04 Water Service Pipe

Pipes smaller than a nominal diameter of four (4) inches shall be considered a service. Pipe material shall be high density PE 3608/3408 cell classification 345464C per ASTM D3035. Pipe shall be conforming to AWWA C901. Pipe shall be pressure rated 200 psi (SDR9). For pipe sizes ¾" through 2" outside diameter shall be controlled by copper tubing size (CTS) and 3" pipe outside diameter shall be controlled by iron pipe size (IPS). Pipe shall conform to ASTM D2737 or D3035 as applicable depending on size. Pipe shall conform to NSF Standard 14/61.

PART 3 – EXECUTION

Comply with Section 0160, Pipe Installation.

*** * END OF SECTION * ***

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SECTION 0210
WATER VALVES AND APPURTENANCES

PART 1 – GENERAL

1.01 Description

These Specifications shall govern the furnishing and installing of water valves and appurtenances for the Authority. The valves and appurtenances shall be installed in accordance with the requirements these specifications at the locations and depth indicated on the plans approved by this Authority and the governing regulatory agencies. The valves and appurtenances shall be of the classes, sizes, and dimensions shown thereon.

1.02 Quality Assurance

A. Source Quality Control: Obtain pipe and fittings from no more than one manufacturer.

B. Reference Standards: The work, materials and related activities shall be in accordance with the latest standards of the American Water Works Association (AWWA), American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM), Uni-Bell Pipe Association, Mississippi Department of Health, Mississippi Department of Environmental Quality, and any other related State or Federal standards or requirements.

1.03 Related Work Specified Elsewhere

A. Section 0120, Excavation and Backfill

B. Section 0160 – Pipe Installation

C. Section 0200, Water Distribution Pipe

PART 2 – MATERIALS

2.01 Materials

A. General: All valves and appurtenances shall have manufacturer's name and working pressure cast in raised letters on valve body. All exposed valves shall be flanged with ends conforming to ANSI B16.1 Class 125. 1. All bolts, nuts, and studs on or required to connect buried or submerged valves shall be stainless steel. Bolts and nuts shall have hexagon heads and nuts. Gasket material and installation shall conform to manufacturer's recommendations.

B. Water Service:
   1. General: All brass components, except Service Saddles, in contact with potable water must be made from either CDA/UNS Brass Alloys C89520 or C89833 with a maximum lead content of 0.25% by weight.
   2. Service Saddle: Shall be Brass saddle per ASTM B62 and ASTM B584 in accordance with AWWA C800. Saddle shall have double 18-8 type 304 stainless steel straps or band and EPDM rubber gasket per ASTM D2000 as manufactured by Ford Meter Box Company, Inc. Style 202BS, Mueller BR2S

(brass) or equal. Saddle shall have female threaded connection AWWA (CC).

3. Corporation Stop: Corp Stop shall be a ball type valve and comply with AWWA C800 and be made of No-Lead Red Brass. The end connections shall be male tapered AWWA (CC) thread by pack joint with stainless steel insert for connection to water service pipe per Specification 0200. Corporation stop shall be manufactured by Ford Meter Box Company, Inc. Style FB1000 series, Mueller 300 series, or equal.
4. Curb Stop: Curb stop shall be a straight ball meter valve and comply with AWWA C800 and be made of No-Lead Red Brass. Tee head shall be capable of rotating a full 360 degrees. The operating nut shall be lockable. The end connections shall be pack joint for connection to water service pipe per Section 0200 and meter swivel nut. For services with meters larger than one (1) inch the curb stop shall have pack joint or FIP by meter flange. Curb stop shall be manufactured by Ford Meter Box Company, Inc., model Ball Meter Valve, Mueller, model 300 series ball meter valve or equal.
5. Meters: Meters shall be Neptune T-10 with R900i transmitter for residential service. Meters shall include No-Lead Brass straight style dual check backflow prevention device with meter swivel nut for one (1") inch and smaller or flanged for two (2") inch and larger by FIP threaded end connections manufactured by Mueller, Model H-14242 or equal. Check valve shall not require the meter to be removed for service. A MIP meter flange shall be used to for connection of larger meters to backflow prevention device. All meters will be supplied by the Authority when applicable fees are paid and documents are submitted and approved.
6. Pressure Reducing Valve: When necessary due to water system pressures exceeding 80 psi a PRV may be required at individual service lines. Valve shall be a bronze body with integral stainless steel strainer. Valves shall reduce pressure to a maximum of 60 psi at the outlet. Valve shall have FIP threaded end connections with a threaded stainless steel nipple for connection to meter check valve. Valves shall be manufactured by Watts, Model N55B or equal. Verify pressure with the Authority before installing Pressure Reducing Valves.
7. Nipples: Shall be schedule 40, No-Lead Brass and rated for 150 psi working pressure.
8. Coupling: Shall be No-Lead Brass and used for connecting valves to water service pipe with MIP by pack joint end connections. Shall include a stainless steel insert for HDPE pipe connections. Couplings shall be manufactured by Ford Meter Box Company, Inc., Mueller, or equal.
9. Meter Box:
    a. General: Traffic Rated Box shall be used if meter is installed within paved area or in any area where there is a potential for a traffic loading. This includes sidewalks, driveways, parking lots, etc. All meter boxes shall be sized large enough to allow for maintenance and removal of the equipment inside the box. This includes meter valves, meters, check valves, pressure reducing valves, couplings, etc. If located in pavement the box shall be large enough to allow the removal of the meter equipment and appurtenances without disturbing the paved area.
    b. Non-Traffic Rated: Shall be NDS D1200 for automatic meter reading or approved equivalent. Box and cover must be polypropylene material with a minimum body and cover thickness of 0.25". Meter box shall be capable of housing curb stop, straight style dual check valve, water meter and pressure reducing valve (where required). Cover shall have cast iron flip lid.
    c. Traffic Rated: Shall be fiberglass box rated for vehicular traffic loadings and sized to fit the meter, curb stop, check valve and pressure reducing valve (where required). Cover shall be polymer concrete with cast iron flip lid for viewing the meter. Box and cover shall be Quazite, CDR,

Pentek, or equal.

d. Standard Size:13” width x 19” length x 12” height (minimum dimensions)

e. Jumbo Size: 17” width x 30” length x 12” height (minimum dimensions)

C. Backflow Prevention Device:

1. General: Devices shall be installed where a possible health hazard exists. Possible health hazards include cross connections with another water source or locations where hazardous hydraulic connection may exist (pressure drops below minimum requirements of the MS Department of Health). Valve shall be bronze body with minimum rating of 175 psi working pressure. The size of the valve shall be as recommended by the manufacturer for the flow conditions. Device shall be located downstream of the meter in an above ground removable, insulated enclosure. All devices shall be reported to the Authority and inspected in accordance with the regulatory agencies. Classification of hazard level shall be determined based on Mississippi State Department of Health, Division of Water Supply, “Cross Connection Control Program Reference Manual.”

2. Low Hazard Connection: Device shall be a double check valve assembly meeting the requirements of AWWA C510 and all applicable ASSE Standards. Devices shall be Watts Series 719 or 709 depending on the size or equal.

3. High Hazard Connection: Device shall be a reduce pressure principle assembly meeting the requirements of AWWA C511 and all applicable ASSE Standards. Devices shall be Watts Series 909 or equal.

D. Fire Hydrants: Hydrants shall conform to AWWA C502. Main valve shall be 5 ¼ inches with compression type closing utilizing water pressure for positive sealing. Valve shall open left (counter clockwise). Hydrant shall have two 2 1/2 inches hose connections and one 4 ½ inches hose connection including matching chained caps for each opening. Threads shall be National Standard unless otherwise specified by the Local Fire Department. The inlet connection shall be buried with a minimum of four (4) feet cover. The hydrant shall be operated with a 1 ½ inch (point to flat) pentagon operating nut. Hydrant shall include a ground line breakable component that will shear off upon impact at the ground line without damage to the barrel and a stainless steel safety stem coupling that will separate upon impact. Hydrant shall have two drain valves and at least two drain openings. Hydrant Nozzle shall be placed 18 inches from the ground line complying with NFPA Handbook. Hydrant spacing shall not exceed 500 ft. spacing without approval from the Authority and Fire Marshall. Hydrants shall be painted in accordance with manufacturer’s recommendations to the color determined by the local fire agency. Hydrants shall be Mueller Super Centurion 250 (A-423) or approved equal.

E. Gate Valve: Valves shall be resilient seat, non-rising stem type with cast iron body and bonnet complying with AWWA C509. Valves shall turn left (counter clockwise) to open and the valve body shall indicate the direction of operation. All buried valves shall include a 4 ½ inch diameter three piece adjustable cast iron valve box with stem extensions (as required), operating nuts, and heavy duty cast iron covers. Additional extensions may be required to the valve box as necessary to reach finished grade. Use of pipe material to extend box shall not be permitted. Exposed valves shall have flanged ends conforming to ANSI B16.1, Class 125 and buried valves shall have mechanical joints per ANSI A21.11 (AWWA C111). Valves shall be located on all sides of any tee or cross connection and at a maximum spacing of 1000 linear feet for continuous runs of water main. Valves shall be M&H Style 4067 or approved equal

F. Joint Restraints: Restraint shall be a mechanical restraint for connecting pipe to mechanical joint fittings. Restraint shall be made of ductile iron per ASTM A536 with type 304 stainless steel nuts and bolts and EPDM or Buna-N gaskets. Restraints shall be made with twist off nuts to insure proper actuating of the restraint to the type of pipe for

which it is being used (i.e. ductile iron, PVC or HDPE). Restraints shall be manufactured by EBBA Iron, model Megalug, Mueller, model Aquagrip, or equal.

G. Repair Coupling:

1. Pipes 10" and Larger (transmission mains): Coupling shall be a mechanical joint repair coupling (restrained) for connecting two straight sections of water mains. Sleeve shall be fusion bonded epoxy coated carbon steel per ASTM A283 or ductile iron with 18-8 type 304 stainless steel bolts and nuts. Glands/followers shall be coated ductile iron. Gaskets shall be SBR per AWWA C111. Coupling shall be rated for a minimum 150 psi working pressure. Coupling shall be EBBA 3800, Smith-Blair 470, or equal.
2. Pipes 4" thru 8" (distribution mains): Coupling shall be as required for transmission mains. Except when axial restraint is not deemed necessary then coupling may be Hymax 2000, Ford Coupling, Smith-Blair 411, or equal.
3. Pipes 3" and smaller (service lines): Coupling shall be made of brass with pack joint by pack joint for end connections for CTS HDPE water service pipe. Each coupling shall be provided with two stainless steel inserts. Couplings shall be Ford Pack Joint Coupling, Mueller, or equal.

H. Bell Joint Leak Clamp may be used when a joint is leaking but there is no axial restraint necessary to keep the bell and spigot from separating. Clamp rings (bell and spigot ends) shall be split ring type for installation on existing pipe and made of ductile iron per ASTM 536 with a fusion bonded epoxy coating. Gaskets shall be a "kee-lok" type for installation on existing water main and made of Buna-N NSF61 approved. All nuts and bolts shall be stainless steel. Clamp shall be Smith-Blair model 274 or equal.

I. Repair Clamp: Clamp shall be a full circle repair clamp. Band, bolts, nuts, and lugs shall be 304 Stainless Steel. Clamp gasket shall be virgin SBR or Buna-N for water service and be provide full 360 degree pipe coverage for the entire length of the clamp. Clamp shall be rated for 150 psi working pressure Clamp shall be Ford FS series or equal for water mains and Smith and Blair 247 Redi-Clamp, Mueller 230 Mini-Band, or equal for water service pipe.

J. Tapping Sleeve: Band, lugs, flange, and bolts and nuts shall be 304 Stainless Steel with flanged joint outlet for connection of a tapping valve. Nuts shall be coated to prevent galling. Sleeve shall have three quarter (3/4) inch test plug to ensure proper sealing before tapping of main. Sleeve gasket shall be virgin SBR or Buna-N for water service and provide full 360 degree pipe coverage for the full length of the sleeve. Tapping valve shall have flanged and mechanical joint connections. Sleeve shall be rated for 150 psi working pressure. Sleeve shall be Mueller H-304, Ford FTSS, or equal. Connection to water main shall require written approval from the Authority.

PART 3 – EXECUTION

3.01 Installation

A. Install all valves and appurtenances in accordance with manufacturer's instructions.

B. Install suitable corporation stops at all points shown and required where air binding of pipe lines might occur.

C. Install all valves so that operating wrenches may be conveniently turned from ground level but without interfering with access. Install extensions on operators that are more than 24" below ground.

D. Unless otherwise approved install all valves plumb and level. Valves shall be installed free from distortion and strain caused by misaligned piping, equipment or other causes.

E. Valve boxes shall be set plumb, and centered with the bodies directly over the valves. Earth fill shall be carefully tamped around each valve box to a distance of 4 feet on all sides of the box, or to the undisturbed trench face, if less than 4 feet.

F. Hydrants and connecting pipe shall have at least the same depth of cover as the distributing pipe. The hydrants shall be set upon a slab of concrete not less than 4 inches thick and 15 inches square. Where restrained hydrants are not used the side of hydrant opposite the pipe connections shall be firmly blocked against the vertical face of the trench with a concrete thrust block. Not less than 2 cubic yard of washed gravel shall be placed around the base of the hydrant at the location of the drain holes.

3.02 Field Test and Adjustments

A. Adjust all parts and components as required correct operation.

B. Conduct functional field test of each valve in presence of AUTHORITY'S REPRESENTATIVE to demonstrate that each part and all components together function correctly. All testing equipment required shall be provided.

*** * END OF SECTION * ***

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SECTION 0300
SANITARY SEWER PIPE

JACKSON COUNTY UTILITY AUTHORITY
WATER AND SEWER STANDARD SPECIFICATIONS

PART 1 – GENERAL

1.01 Description

These Specifications shall govern the furnishing and installing of sanitary sewer mains and fittings for the Authority. The pipe and accessories shall be installed in accordance with the requirements of these specifications at the locations and depths indicated on the plans approved by this Authority and the governing regulatory agencies. The pipe and accessories shall be of the classes, sizes, and dimensions shown thereon.

1.02 Quality Assurance

A. Source Quality Control: Obtain pipe and fittings from no more than one manufacturer.

B. Reference Standards: The work, materials and related activities shall be in accordance with the latest standards of the American Water Works Association (AWWA), American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM), Uni-Bell Pipe Association, Mississippi Department of Health, Mississippi Department of Environmental Quality, and any other related State or Federal standards or requirements.

1.01 Related Work Specified Elsewhere

A. Section 0120 – Excavation and Backfill

B. Section 0160 – Pipe Installation

C. Section 0170 – Regulatory and Design Requirements

PART 2 – MATERIALS

2.01 General

Markings: Pipe shall be marked at a maximum of 5 ft. intervals and shall include nominal size, schedule, SDR designation, or pressure class, AWWA designation, National Sanitation Foundation (where applicable), material cell classification (where applicable), and Manufacturer's name and code. All pipe shall be green to denote for use as sanitary sewer. Ductile iron pipe and fittings shall have green polyethylene encasement.

2.02 Gravity Sanitary Sewer Mains

A. General: Pipe shall be either PVC or Ductile Iron meeting the specifications below. Pipes shall be considered a Main if the nominal diameter is eight (8) inches or larger. Sanitary sewer service connections shall connect to the main with a "wye" or "tee" fitting and be installed during the installation of the main. Installation of flexible tap saddles shall not be permitted unless approved in writing by the Authority.

B. Ductile Iron Pipe: Pipe shall be non-flanged centrifugally cast in metal or sand lined molds manufactured in accordance with the latest edition of ANSI A21.51 (AWWA C151). Pipe shall have a minimum pressure rating of 350 psi for 12" and smaller diameters and 250 psi for 14" and larger diameters in accordance with ANSI A21.50 (AWWA C150). Joints shall be push-on type in accordance with ANSI A21.11 (AWWA C111). Pipe shall be coated with a factory applied bituminous coating approximately one (1) mil thick and lined with a forty (40) mil ceramic epoxy liner as manufactured by Induron, Protecto 401 or equal. Pipe shall be wrapped in a polyethylene encasement in accordance with ANSI A21.5 (AWWA C105) and installed in accordance with DIPRA Method A. Polyethylene encasement shall have a minimum thickness of 8 mils. Joint lubricant shall be as recommended by the pipe manufacturer.

C. Polyvinyl Chloride (PVC) Pipe: PVC pipe shall conform to ASTM D1784, ASTM D3034 and ASTM F679 for all dimensional, chemical, and physical requirements. Pipe shall be made of type 1, grade 1 class 12454-B material in accordance with ASTM D 1784. Pipe shall be SDR 26 and not exceed the bury depths as recommended by the manufacturer. Joints shall be integral bell and spigot type with elastomeric flexible seals in accordance with ASTM F-477. Joint lubricant shall be as recommended by the pipe manufacturer.

2.03 Buried Pressure Sanitary Sewer Mains

A. Ductile Iron Pipe: Pipe shall be non-flanged centrifugally cast in metal or sand lined molds manufactured in accordance with the latest edition of ANSI A21.51 (AWWA C151). Pipe shall have a minimum pressure rating of 350 psi for 12" and smaller diameters and 250 psi for 14" and larger diameters in accordance with ANSI A21.50 (AWWA C150). Joints shall be mechanical or push-on type in accordance with ANSI A21.11 (AWWA C111). Pipe shall be coated with a factory applied bituminous coating approximately one (1) mil thick and lined with a forty (40) mil ceramic epoxy liner as manufactured by Induron, Protecto 401 or equal. Pipe shall be wrapped in a polyethylene encasement in accordance with ANSI A21.5 (AWWA C105) and installed in accordance with DIPRA Method A. Polyethylene encasement shall have a minimum thickness of 8 mils. Where joint restraints are necessary they shall be a boltless type locking gasket meeting the requirements of ANSI A21.11 (AWWA C111). Joint lubricant shall be as recommended by the pipe manufacturer.

B. Ductile Iron Fittings: Fittings shall conform to the latest edition of ANSI A21.10 (AWWA C110) or ANSI A21.53 (AWWA C153) for compact fittings. Fittings shall have a minimum pressure rating of 350 psi for 12" and smaller diameters and 250 psi for 14" and larger diameters in accordance with ANSI A21.50 (AWWA C150). All joints for fittings, valves, and specials shall be mechanical type in accordance with ANSI A21.11 (AWWA C111). Mechanical joints shall have plain rubber gaskets with stainless steel bolts and nuts. Fittings shall be coated with a factory applied bituminous coating approximately one (1) mil thick and lined with a forty (40) mil ceramic epoxy liner as manufactured by Induron, Protecto 401 or equal. All fittings shall be wrapped in a polyethylene encasement in accordance with ANSI A21.5 (AWWA C105). Polyethylene encasement shall have a minimum thickness of 8 mils. **No "special" fitting will be allowed without written approval.**

C. Polyvinyl Chloride (PVC) Pipe
   1. (Sizes 4" and larger): PVC pipe and fittings shall comply with the requirements for PVC Water Distribution Pipe. Pipe shall have a minimum pressure rating of 235 psi (DR 18) for pipe complying with AWWA C900 and 235 psi (DR 18) for

pipe complying with AWWA C905.

2. (Sizes 3" and smaller): PVC pipe and fittings shall be pressure rated polyvinyl chloride in accordance with ASTM D2241 and ASTM D1784. Pipe shall be manufactured with an integral bell to utilize gaskets for sealing and conforming too ASTM F477. Pipe shall be a minimum of DR21 rated for 200 psi in pressure sewer applications. Pipe shall have outside diameter dimension of IPS (Iron Pipe Size).

D. High Density Polyethylene (HDPE) Pipe: HDPE pipe and fittings shall comply with the requirements for HDPE Water Distribution Pipe.

1. (Sizes 4" and larger): Pipe material shall be a high density PE 3608/3408 cell classification 345464C per ASTM D3035. Pipe shall conform to AWWA C901. Pipe shall be pressure rated 160 psi (SDR11). For pipes 4" and larger, outside diameter shall be controlled by ductile iron pipe size (DIPS). Pipe shall conform to ASTM D2737 or D3035 as applicable depending on size. Pipe shall conform to NSF Standard 14/61.
2. (Sizes 3" and smaller): Pipe material shall be high density PE 3608/3408 cell classification 345464C per ASTM D3035. Pipe shall conform to AWWA C901. Pipe shall be pressure rated 160 psi (SDR11). For pipe sizes ¾" through 3" pipe outside diameter shall be controlled by iron pipe size (IPS). Pipe shall conform to ASTM D2737 or D3035 as applicable depending on size. Pipe shall conform to NSF Standard 14/61.

2.04 Exposed Pressure Sanitary Sewer Mains

Exposed pressure sanitary sewer mains shall be Ductile Iron Pipe and Fittings and will only be accepted with written approval from the Authority prior to installation. Exposed mains shall meet the requirements of section 2.03 A and B except where modified herein. Pipe and fitting joints shall be flanged in accordance with ANSI A21.15 (AWWA C115) and include 1/8 inch thick red rubber full faced gaskets. Bolts and nuts shall be type 304, stainless steel. Pipe and fittings shall be coated with 2 coat of epoxy primer for 2.0-4.0 dry mils per coat, 1 coat of intermediate coating, high build epoxy, for 3.0-4.0 dry mils, and 2 coats of finish coating, aliphatic acrylic polyurethane, for 2.0-3.0 dry mils per coat.

2.05 Sanitary Service Pipe

A. Gravity Sewer Service Pipe: Shall comply with the requirements of section 2.02 C. Only one structure shall be connected to each gravity sewer service. Gravity sewer services shall be capped watertight three (3) feet below ground and marked with a 4" square wood post painted green. Post shall extend a minimum of two (2) feet above ground. Capped service shall have metal cap for detection with metal detector and survey coordinates shall be listed on record documents.

B. Pressure Sewer Service Pipe (sizes 2" and smaller):

1. PVC: Pipe material shall be Sch. 40. Fitting shall be brass when threaded.
2. HDPE: Pipe material shall comply with Section 2.03 D.2. Fittings shall be brass.

PART 3 – EXECUTION

Comply with Section 0160, Pipe Installation.

*** * END OF SECTION * ***

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SECTION 0310
PRECAST CONCRETE MANHOLES AND WETWELLS

JACKSON COUNTY UTILITY AUTHORITY
WATER AND SEWER STANDARD SPECIFICATIONS

PART 1 – GENERAL

1.01 Description

These Specifications shall govern the furnishing and installing of precast concrete sections for the Authority. The pipe and accessories shall be installed in accordance with the requirements of these specifications at the locations and depths indicated on the plans approved by this Authority and the governing regulatory agencies. The precast sections used for manholes and wetwells shall be of the shapes, sizes, and dimensions shown thereon.

1.02 General

A. Inverts shall conform accurately to the size and elevation of the adjoining pipes. Side inverts shall be curved and main inverts, where direction changes, shall be laid out in smooth curves of the longest possible radius which is tangent to the centerlines of adjoining pipelines.

B. Related Work Specified Elsewhere:
1. Section 0120, Excavation and Backfill.
2. Section 0130, Concrete.
3. Section 0150, Castings
4. Section 0160, Pipe Installation.

1.02 Quality Assurance

A. Source Quality Control: Obtain precast concrete sections from no more than one manufacturer.

B. Reference Standards: The work, materials and related activities shall be in accordance with the latest standards of the American Water Works Association (AWWA), American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM), Uni-Bell Pipe Association, Mississippi Department of Health, Mississippi Department of Environmental Quality, and any other related State or Federal standards or requirements.

PART 2 – PRODUCTS

2.01 Precast Concrete Sections

A. Precast sections shall conform to the standard details attached herein. Base sections may be precast unless cast-in-place is required and approved by the Authority.

B. Except where otherwise specified, sections shall conform to ASTM C 478.

C. Precast sections shall be of approved design and of sufficient strength to withstand the loads to be imposed upon them. All sections shall be capable of withstanding a minimum of HS-20 traffic load after installation. An approved joint shall be provided to receive the sections forming the barrel.

D. Mark date of manufacture and name or trademark of manufacturer on inside of barrel.

E. Unless a larger size is recommended by the manufacturer based on pipe sizes or required by the Authority, the barrel of precast manholes shall be constructed of 48-inch diameter standard reinforced concrete manhole sections. The barrel shall be constructed of various lengths of pipe in combination to provide the correct height with the fewest joints. No section shall be longer than four (4) feet unless approved by the Authority. Wall sections shall not be less than five inches thick. Precast wetwell sections shall be constructed of the diameter recommended by the pump manufacturer to house the number of pumps being installed.

F. All joints shall be tongue and groove with preformed mastic joint compound or rubber and concrete using O-ring gaskets conforming with ASTM C-443. For rubber ring joints, the base of the bell shall be buttered with cement mortar to provide a uniform bearing for the spigot of the entering pipe.

G. A precast or cast-in-place slab or precast eccentric cone, as shown or approved, shall be provided at the top of the manhole barrel to receive the cast iron frame and cover. The slab or cone shall be of acceptable design and of sufficient strength to safely support an H-20 loading. Concrete slabs shall be not less than 8 inches thick. A concrete slab shall be provided at the top of the wetwell barrel. Top slab shall receive an aluminum hatch with stainless steel hardware and hinges sized large enough to remove pumps via rail system.

H. Sections shall contain manhole steps, uniformly spaced, 12 inches minimum, 16 inches maximum on centers, accurately positioned and embedded in the concrete. Steps are specified under Section 0150.

2.02 Coatings, Lining, and Admixtures:

A. Precast Sections - Admixture: All precast sections shall contain a cementitous crystalline type admixture that chemically controls and permanently fixes a non-soluble crystalline structure throughout the capillary voids of the concrete. Admixture shall be Xypex Admix C-100-T, containing red dye to ensure detection, or equal. The admixture dosage shall be 3.5% by weight of cement or as recommended by the manufacturer. Concrete shall be cured in accordance with ACI 308. After the sections are installed all grouted surfaces shall be properly prepared for application of two (2) coats of Xypex Concentrate, or equal, at a rate of 1.5 lbs. per square yard of surface area.

B. Manhole Sections - Linings: All manhole sections shall be lined with an approved coal tar epoxy coating. Lining shall be applied in a total of three (3) coats, a primer coat and two (2) coats of surface for a minimum dry thickness of 24 mils. Epoxy coating shall be applied in strict accordance with manufacturer's requirements. Epoxy coating shall be applied at the concrete casting facilities. All concrete surfaces receiving an epoxy coating shall contain no greater than 10 percent moisture as determined by measurement with a suitable moisture meter. No manhole sections shall be shipped until coating is approved by the AUTHORITY ENGINEER. Field touch-up and repair shall be performed in strict accordance with manufacturer's requirements.

C. Wetwell Sections - Linings: Shall receive a monolithic interior surfacing system. Epoxy coating shall be installed in the field once wetwell is installed to insure monolithic coating across joints and connections. System shall have a total thickness of 60 mils minimum and be installed in three applications and in conformance with manufacturer's recommendations. When cured, the system shall form a continuous, tight-fitting, hard, impermeable surface suitable for a sanitary sewer service and be chemically resistant to any chemicals, bacteria, or vapors found in domestic sewage.

System manufacturers shall be Warren Environmental System, 100% Solids Epoxy, Tnemec Series 436 Perma Shield FR, Polyspec, or equivalent.

2.03 Miscellaneous Metals

A. Metal frames, covers, steps, toe pockets and similar required items shall be provided as shown and in accordance with Section 0150 for metal fabrications.

B. Wetwell hatch shall be lockable aluminum hatch and frame with 316 stainless steel hardware. Hatch shall incorporate a hold arm with release handle and recessed lifting handle. Hatch shall be rated for 300 lbs per square foot loading. Hatch shall be manufactured by Halliday Products or equal.

2.04 Mortar

Portland Cement Mortar shall consist of one (1) part Portland Cement, complying with ASTM C150, type 1, and three (3) parts mortar sand. Mix with sufficient water to mix mortar to proper consistency.

2.05 Drop Inlet Connections

Drop inlet connections for manholes shall conform to the design and details shown. Pipe and fittings shall be cast or ductile iron, or reinforced concrete as shown or otherwise approved for drop connections outside of the manhole. For internal drop connections (8" and smaller pipes only) the connection shall be strapped to the manhole wall using 11 gauge stainless steel (304) brackets and 18-8 bolts, nuts and anchors by RELINER or equal. A minimum of two (2) brackets are required for all connections. The top and bottom brackets shall be no more than two (2) ft from the top and bottom. Additional brackets shall be installed so that no spacing is more than six (6) ft between brackets. The connection shall be topped with an inside drop bowl by RELINER or equal.

2.06 Flexible Connectors

A. Gravity Sewer Connections to Precast Concrete Structures: Flexible connections complying with ASTM C923 shall be employed in the connection of each sewer pipe with outside diameter less than 59 inches to precast section. Connector will consist of rubber EPDM and elastomers designed to resist ozone, acids, alkalis, oils and petroleum products. Banding mechanism shall be totally non-magnetic, 304 stainless steel and torqued for 60-70 inch/lbs. Connectors shall be as manufactured by Kor-N-Seal or equal.

B. Pressure Sewer and Discharge Pipe Connections to Precast Concrete Structures: Connection shall be flexible. Connection shall mechanical seal by Link-Seal or equal.

PART 3 – EXECUTION

3.01 Plastering

The outside of grading rings shall be neatly plastered with 2 inches of cement mortar as the work progresses.

3.02 Base Sections

Precast bases shall be set on a concrete foundation or compacted granular material as shown. Precast bases shall be set at the proper grade and carefully leveled and aligned.

3.03 Precast Sections

Set sections vertical with steps and sections in true alignment. Install sections, joints and gaskets in accordance with manufacturer's recommendations. Lifting holes shall be sealed tight with a solid rubber plug driven into hole and the remaining void filled with cement-sand mortar.

3.04 Manhole Inverts

For straight through flow, inverts shall be formed of concrete and shall be given a hard trowel finish. Where side inverts and curved sections occur, the inverts within the manholes shall be formed of concrete and shall be given a hard trowel finish. Manhole inverts shall be coated with coal tar epoxy per this section.

3.05 Grading Rings

Grading rings shall be used for all precast manholes where required. Stacks shall be a maximum of 12 inches in height, constructed on the roof slab or cone section on which the manhole frame and cover shall be placed. The height of the stack shall be such as is necessary to bring the manhole frame to the proper grade.

3.06 Grading around Structures

All structures in unpaved areas shall be built as shown or directed to an elevation higher than the surrounding ground. The ground surface shall be graded to drain away from the manhole or wetwell. Fill shall be placed around them to the level shown on the plans, and the surface evenly graded on a 1 to 5 slope to the existing surrounding ground unless otherwise shown. The slope shall be covered with 4-inches of top soil, seeded and maintained until a satisfactory growth of grass is obtained.

3.07 Coatings

All surfaces shall be smooth and suitable for application of coatings and linings, including benches, inverts, joints, lifting holes, and walls. All active flow shall be plugged or diverted to ensure the liquid flow is below the surface being coated. Contractor shall adhere to coating manufacturer's recommendations for surface preparation, application, and testing of final product.

3.08 Watertightness

A. All sections shall be free of visible leakage.

B. All manholes and wetwells shall be tested for leakage by applying a vacuum of at least 10 inches of mercury to each assembled structure. Manhole vacuum test shall be considered acceptable if the time required for a one inch drop in mercury is greater than the times shown in the table below:

Structure Diameter	Minimum Hold Time (sec./vert. foot)
48"	5.0
60"	6.5
72"	8.0
84"	9.5
96"	11.0
108"	12.5

C. The test shall be conducted with the frame secured to each structure. All pipes entering the manhole shall be plugged and braced.

D. Each section shall be tested for leaks and inspected, and all leaks shall be repaired in a manner subject to AUTHORITY's approval.

E. Structures shall be tested after coating and lining systems have been applied.

F. All pipes entering the structures shall be plugged for vacuum test.

G. Contractor shall make repairs and re-test structure if it fails the initial vacuum test. Re-testing shall occur until a satisfactory test is obtained.

H. Contractor shall notify the Authority prior to test and not conduct the test without a representative of the Authority present during the testing. Contractor shall complete a written tabulated report of each test and submit to the Authority with the record documents.

3.09 Flexible Pipe Connector and Waterstop

An approved flexible connector or waterstop shall be provided between each pipe entering and exiting precast concrete sections. The joint into the section shall be completely watertight. All penetrations shall be precast at the concrete plant or core drilled.

**** END OF SECTION ****

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SECTION 0311
FIBERGLASS MANHOLES AND WETWELLS

JACKSON COUNTY UTILITY AUTHORITY
WATER AND SEWER STANDARD SPECIFICATIONS

PART 1 – GENERAL

1.01 Description

These Specifications shall govern the furnishing and installing of fiberglass wetwells and manholes for the Authority. The structures and accessories shall be installed in accordance with the requirements of these specifications at the locations and depths indicated on the plans approved by this Authority and the governing regulatory agencies. The structures used for manholes and wetwells shall be of the shapes, sizes, and dimensions shown thereon. No fiberglass structure shall be approved that is located within the right-of-way of a roadway.

1.02 General

A. Inverts shall conform accurately to the size and elevation of the adjoining pipes. Side inverts shall be curved and main inverts, where direction changes, shall be laid out in smooth curves of the longest possible radius which is tangent to the centerlines of adjoining pipelines.

B. Fiberglass structures may be approved for by the Authority when:
   1. manholes are not located within the road right-of-way and a the diameter is sixty (60) inches or less.
   2. pump stations with a design capacity of 500 gpm or less with a wetwell diameter of ninty-six (96) inches or less.

C. Related Work Specified Elsewhere:
   1. Section 0120, Excavation and Backfill.
   2. Section 0130, Concrete.
   3. Section 0150, Castings
   4. Section 0160, Pipe Installation.

1.02 Quality Assurance

A. Source Quality Control: Obtain structures from no more than one manufacturer.

B. The structure shall be designed and constructed to withstand or exceed wall collapse and buckling with a minimum of a 3:1 safety factor, based on the field geotechnical report, sealed by a licensed geotechnical engineer in the State of Mississippi, of the specific soil conditions of the site. No assumptions of generic soil conditions shall be made for the design of the structures. All structures shall be capable of withstanding a traffic load (HS-20) adjacent to the structure for safety.

C. Reference Standards: The work, materials and related activities shall be in accordance with the latest standards of the American Water Works Association (AWWA), American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM), Uni-Bell Pipe Association, Mississippi Department of Health, Mississippi Department of Environmental Quality, and any other related State or Federal standards or requirements.

PART 2 – PRODUCTS

2.01 Fiberglass Structures

A. Wetwells and manholes shall be **one-piece** units manufactured to meet or exceed all applicable sections of ASTM D3753.

B. Structures shall be suitable for continuous immersion in raw municipal sewage. This shall include concentrations of H^2S found in municipal sewer systems and sulfuric acid.

C. Structures shall be manufactured of 100% premium resin and chopped glass. The structures shall be tested by the manufacturer to a minimum of 80% of the resin manufacturer's specific hardness for fully cured resin in accordance with Barcol Hardness.

D. Materials used for construction of the structure shall have the following average material properties:
   1. Tensile Modulus – 900,000 psi
   2. Flexural Modulus – 900,000 psi
   3. Tensile Strength – 10,000 psi
   4. Compressive Strength – 20,000 psi
   5. Poisson's Ratio – 0.33

2.02 Miscellaneous

A. Metal manhole frames, covers, steps, toe pockets and similar required items shall be provided as shown and in accordance with Section 0150 for metal fabrications.

B. Wetwell hatch, frame, and cover shall be aluminum. Hatch shall be lockable with 316 stainless steel hardware. Hatch shall incorporate a hold arm with release handle and recessed lifting handle. Hatch shall be rated for 300 lbs per square foot loading.

C. Anti-flotation flange shall be incorporated in the bottom of each structure. The flange shall extend a minimum of six (6) inches beyond the outside wall of the structure.

D. Wetwell structures shall incorporate a mounting base for the pump discharge flange in the bottom. The base shall be made of 300 series stainless steel.

E. Invert or bench of manholes shall be factory installed and composed of the same material as the structure.

2.03 Mortar

Portland Cement Mortar shall consist of one (1) part Portland Cement, complying with ASTM C150, type 1, and three (3) parts mortar sand. Mix with sufficient water to mix mortar to proper consistency.

2.04 Grading Rings

Concrete grading rings shall be used for all manholes where required. Stacks shall be a maximum of 18 inches in height, constructed on the roof slab or cone section on which the manhole frame and cover shall be placed. The height of the stack shall be such as is necessary to bring the manhole frame to the proper grade.

2.05 Drop Inlet Connections

Drop inlet connections for manholes shall conform to the design and details shown. Pipe and fittings shall be cast or ductile iron or reinforced concrete as shown or otherwise approved.

2.06 Flexible Connectors

Structures shall incorporate preformed pipe sleeves for connection of influent and effluent pipes or a flexible rubber boot. Sleeved connections shall utilize mechanical connections (Link-Seal or equal) for securing the pipes to the sleeve. All connections shall be watertight, approved for municipal wastewater, and flexible.

PART 3 – EXECUTION

3.01 Handling

Loading and unloading of structures shall be in accordance with the manufacturer's recommendations. Lifting lugs shall be installed during the manufacturing process to provide for installation.

3.02 Backfill and Bedding

Structure shall be set on a six (6) inch minimum thick concrete foundation or compacted granular material foundation as recommended by the manufacturer. Structures shall be set at the proper grade and carefully leveled and aligned. Backfill shall be select backfill or crushed stone per the manufacturer recommendations. Each layer of backfill shall be compacted.

3.03 Grading around Structures

All structures in unpaved areas shall be built as shown or directed to an elevation higher than the surrounding ground. The ground surface shall be graded to drain away from the manhole or wetwell. Fill shall be placed around them to the level shown on the plans, and the surface evenly graded on a 1 to 5 slope to the existing surrounding ground unless otherwise shown. The slope shall be covered with 4-inches of top soil, seeded and maintained until a satisfactory growth of grass is obtained.

3.04 Watertightness

A. The structure shall be free of visible leakage.

B. Contractor shall complete hydrostatic test of all structures per the manufacturer's recommendations. Structure shall be filled with clean potable water to within three (3) inches of the top of the structure once all influent and effluent pipes are plugged and structure has been backfilled. Water shall be allowed to stand for a minimum of three (3) hours. Then water level shall be checked to see if any leakage occurred.

C. Contractor shall make repairs and re-test structure if it fails the initial test. Re-testing shall occur until a satisfactory test is obtained.

D. Contractor shall notify the Authority prior to test and not conduct the test without a representative of the Authority present during the testing. Contractor shall complete a written tabulated report of each test and submit to the Authority with the record documents.

**** END OF SECTION ****

PART 1 — GENERAL

1.01 Description

These Specifications shall govern the furnishing and installing of a submersible pump station for the Authority. The pumps, controls, piping, and accessories shall be installed in accordance with the requirements of these specifications at the locations and depths indicated on the plans approved by this Authority and the governing regulatory agencies. The equipment and accessories shall be of the classes, dimensions, and sizes shown thereon.

1.02 Quality Assurance

A. Obtain all pumps from no more than one manufacturer.

B. Factory Testing:

1. Pump casings shall be hydrostatically tested to twice the discharge head or 1-1/2 times the shutoff head, whichever is greater.
2. Have pump manufacturer factory test pumps to detect any defects and demonstrate that they will function satisfactorily under all conditions specified under each specific scenario.
3. Running Test: Test one pump as follows: The pump shall be operated from zero to maximum capacity as shown on the approved curve. The actual motor to be furnished with the pump shall be used to conduct the running test. Results of the test shall be shown in a plot of test curves showing head, flow, horsepower, efficiency, and current. Readings shall be taken at a minimum of ten evenly spaced capacity points including shutoff, design point and minimum head for which the pump is designed to operate. The running test shall include determination of the actual wire-to-water efficiency of the pump system (pump and motor) for the design condition as specified under each specific scenario.
4. Pump supplier shall warranty pump, controls, and equipment for two (2) years from date of start-up of pump station.
5. Have pump manufacturer also perform the following inspections and tests on each pump before shipment from factory:
    a. Check impeller, motor rating and electrical connections for compliance to these specifications.
    b. Test for motor and cable insulation moisture content or insulation defects.
    c. Prior to submergence, run pump dry to establish correct rotation and mechanical integrity.
    d. Run the pump for 30 minutes submerged, a minimum of 6 feet under water.
    e. After operational test (subparagraph d), perform the insulation test (subparagraph b) again.

C. Operation and Maintenance Data:

1. Submit complete instruction for operation and maintenance of pumps and power transmission components.
2. Include the following data:
    a. Alignment, adjustment, and repair instructions.
    b. Guide to troubleshooting.
    c. Lubrication instructions.
    d. Seal adjustment and replacement instructions.
    e. Recommended spare parts list and predicted life of parts subject to wear.

D. Factory Test Report:
Submit to the Authority within 30 days of test completion and with record documents.

PART 2 — PRODUCTS

2.01 Manufacturer's Requirements

Pumps shall be manufactured by Myers for sizes under 25 horsepower and Flygt Corporation for 25 horsepower and larger or equal.

2.02 Pump Design

A. General:
1. Electrically driven non-clog submersible pump and motor.
2. Suitable for pumping raw unscreened sludge without clogging.
3. The pumping units shall automatically and positively mate with its discharge piping permanently when lowered into place.
4. Pump shall be removable for inspection or service requiring no bolts, nuts or fastening devices to be disconnected.
5. All fasteners exposed to pumped fluids shall be stainless steel.

B. Service Conditions: Raw unscreened sewage, capable of passing three (3) inch sphere.

C. Operating Conditions: Shall be capable of meeting all required design flow rates at the subsequent head/pressure requirements, depending on force main size, and be capable of meeting the performance requirement listed below.

D. Motor rating shall be as required to meet the operating conditions and the performance conditions stated within this specification. Voltage requirements and availability shall be verified with local agency providing the utility.

E. Discharge piping shall be sized to produce three (3) feet per second minimum velocity through the discharge piping and two (2) feet per section minimum velocity through the force main.

F. Performance Requirements:
1. Capable of meeting operating conditions.
2. Continually decreasing head-capacity curve between shut-off and maximum capacity.
3. Capable of operating continuously at all points on head-capacity curve between minimum and maximum capacity without vibration, noise, cavitation, or overheating.

4. Capable of continuous submergence underwater without loss of watertight integrity to a depth of 65 feet.
5. Motors capable of meeting maximum pump brake horsepower requirements at all points on head-capacity curves without exceeding name plate ratings of motors and without taking service factor into account.

2.01 Motors

A. General:

1. Submersible, suitable for operation on available power. If available pumps shall be designed for three phase power.
2. Motors shall be in accordance with all current applicable standards of NEMA, IEEE, AFBMA, NEC, and ANSI.
3. Motors shall be normal starting torque, normal starting kva/hp, normal slip, premium efficiency, NEMA Design B, squirrel cage induction type.
4. Provide Class F insulation. Motors shall be capable of carrying nameplate full load current plus service factor continuously without injurious temperature rise in an ambient temperature of 40 C.
5. Motors shall be provided with a service factor of 1.15.
6. Motors shall be of sufficient size so that there will be no overload on the motor above rated nameplate horsepower under any condition of operation imposed by the driven equipment.
7. Motor thrust bearings, if required, shall be adequate to carry continuous thrust loads under all conditions of operation imposed by the driven equipment.
8. Locked rotor currents shall be as specified in NEMA standards for Design B induction motors.
9. Design motors for "across-the-line" starting of at least 10 starts per hour.
10. Stator dipped and baked three times with Class F varnish.
11. Stator shall be equipped with three thermal switches embedded in the end coils of the stator winding (one switch in each stator phase).
12. Provide a moisture sensing switch integrally mounted inside the pump for motor interlocking and alarm functions.
13. Cooling fins integral with stator housing.
14. Air-filled watertight enclosure.
15. Junction chamber containing terminal board sealed from motor with O-ring.
16. Connections between the cable conductors and the stator leads and monitoring equipment leads made with threaded compressed type binding posts permanently affixed to the terminal board.
17. Cable entry seal comprised of single cylindrical elastomer grommet, flanked by washers, all sized to fit cable with close tolerance, and compressed when installed; also provide strain relief function.
18. Epoxy or silicone cable sealing systems not acceptable.
19. Power and Control Cables:
    a. Submersible hypalon jacketed type SPC cables.
    b. Conductors sized per NEC standards.
    c. Continuous unspliced run from pump to control panel.

B. Motor Data:
Furnish a certified motor data sheet for the actual motor or for a previously manufactured electrically duplicate motor which was tested. Provide the following minimum data:
1. Starting torque.
2. Efficiency at 1/2, 3/4 and full load.
3. Power factor at 1/2, 3/4 and full load.
4. Percent slip at 1/2, 3/4 and full load.
5. Running light, full load and locked rotor current.
6. Current balance check.
7. Vibration check.
8. Temperature rise and results of dielectric tests.
9. Motor type and frame size.
10. Bearing type and lubrication medium.
11. Insulation and enclosure type.

C. Complete motor and cable assembly approved for Class I, Division 1, hazardous locations.

2.02 Accessories

A. All pump stations shall be fenced with minimum of six (6) foot tall galvanized fence with three strands of barbed wire. Fence shall be accessed via a double leaf eight (8) foot gate for a total open width of no less than sixteen (16) feet. Fence fabric shall be a minimum of 9 gauge. Corner post shall be 2.875 inch diameter and 5.79 pounds per linear foot. Gate post shall be four (4) inch diameter and 9.10 pounds per linear foot. Line post shall not exceed ten (10) feet separation on center and 2.375 and 3.65 pounds per linear foot. Corner and gate post shall be braced in the middle with rail meeting the specifications of top rails. An additional 3/8 inch all thread rod with turnbuckle shall be used on the diagonal for support. Top rails shall be 1.66 inch diameter and 2.27 pounds per linear foot. Tension wire shall be seven (7) gauge and located at the bottom of the fabric. Barbed wire shall be fifteen (15) gauge with barbs on foot centers. Fabric stretcher bars shall be the full length of the fabric at each post.

B. Discharge piping shall be flanged ductile iron pipe in accordance with Specification 0300 for exposed pipe.

C. Stationary Support and Connection Fitting: A stationary support and connection fitting shall be permanently installed in the wetwell along with the discharge piping for each pump. Pumps shall automatically connect to the discharge fitting when lowered in to place and shall be easily removed for inspection and service. The pump shall seal to the discharge fitting by the linear downward motion of the pump. The pump shall have a sliding guide or bracket as an integral part of the pump to slide down the stainless steel guide rails to the discharge fitting. The entire weight of the pump unit shall be guided by no less than two guide rails and pressed tightly against the discharge fitting with metal to metal contact. All guide rails and brackets shall be supplied by the pump manufacturer and constructed of stainless steel. No support legs shall be used where a blockage or obstruction of the pump intake can occur.

D. Lifting Cable and Chain:
1. Provide for each pump a stainless steel lifting cable of adequate length and strength to permit raising and lowering the pumps.
2. Provide one of the following:

a. a short length of stainless steel lifting chain attached between the end of the lifting cable and the pump.
b. a lifting bell that is capable of supporting the dead load lifting weight of the pump

3. If a lifting chain is provided, provide a grip eye which when attached to the hoist cable will slide down the lifting cable and automatically connect to the lifting chain to permit pump removal. Pump installation shall be accomplished using the same grip eye which will automatically disconnect from the lifting chain once the pump has been fully seated on the discharge connection.

E. By-pass Pumping Assembly:

1. Provide by-pass pumping assembly for each pump station as directed by the Authority. Attach by-pass pumping assembly on pump station discharge piping within 10' of pump station.
2. Provide a flanged ductile iron fitting for connection of bypass pump with above ground check valve and gate valve with handwheel operator, size depends on pump station capacity for each pump station and approval from the Authority.

2.03 Controls

A. General:

1. Provide power and control cables and motor protective control devices as specified in Part 2.04.A above.
2. Coordinate interfacing of the control system with electrical work specified in Division 16 and as shown on the drawings.
3. Provide manual transfer switch (double pole safety switch) and receptacle, by Appleton or equal, as required for Authority to connect generator to pump station control panel and power pump station when needed. Coordinate with Authority as needed to provide equipment for specific application.
4. Control panel and communication equipment shall require the installation of a ground grid to ground the electrical service. Ground rods shall be a minimum of 5/8" diameter copper-encased steel and at least 10 ft. in length. Ground conductors shall be THWN insulated conductors sized by licensed electrician. Connection between conductors and rod shall be exothermic weld using cable to rod connection. Measure ground resistance from system neutral connection at service entrance to convenient ground reference point using suitable testing equipment. Resistance shall not exceed 5 ohms. If it exceeds 5 ohms additional ground rods shall be driven. Top of all rods shall be a minimum of 2 ft. finished grade.

B. Panels and Control Devices: Provide a control panel as indicated on Drawings with the following equipment and all other components required to perform functions described. Control Panels are NEMA 4X (Stainless Steel) Type I unless indicated otherwise.

1. Front of box mounted power on-off switch for incoming power.
2. Control power transformer with primary fuse.
3. Terminal blocks for all external power and control wiring connections.
4. Hand switches, (H-O-A, ON/OFF, and selectors as required) indicating light, and motor monitor.
5. Local flashing alarm light for high level alarm.
6. Lightning arrestor, single phase and under voltage protection relay.
7. Moisture sensing seal failure relays for each motor.
8. Duplex Pump Control Panel.

9. Exterior alarm light with red lexan lens. The exterior alarm light shall burn dimly during normal conditions to indicate power on and lamp good, and shall flash brightly during high water level, pump failure or seal failure.
10. Elapsed time/hour meter for each pump motor.
11. One duplex GFI receptacle.
12. Panel shall have a deadfront for mounting switches, indicators, meters, etc.

C. Component Specifications:

1. Lightning Arrestor (Service Entrance Type): Arrestor shall be solid state construction utilizing bipolar nonlinear voltage dependent resistors with two ohmic electrodes. Clamping time shall be 50 nanoseconds or less. Operating temperatures shall be -25 degrees C to 85 degrees C and current drain shall be 1 ma or less. The unit shall have no significant discharge lag in the protection of one phase over another. The suppressor shall not allow hold over current or condition to ground after the surge ends. Unit to have instant recovery, long life and be failsafe (short) and be fused with a neon light indicating failure. Maximum clamping voltage with 300A (8 X 20 USEC) pulse shall be 1130 VAC energy (10 X 1,000 USEC) pulse 550 joules and unit withstand of 25,000 AMPS (8 X 20 MSEC pulse). Maximum leakage current shall be 1 ma.
2. Phase Failure Phase Unbalance and Phase Reversal Relay: Relay shall be of the negative sequence filter type. The filter shall have a high internal impedance for accurate voltage following. The unit shall be of the voltage comparative type with preset point that will turn off or de-energize the output relay after 5 seconds.
3. Level Control:
   a. Provide a submersible level transducer installed inside a pvc stilling well with stainless steel mounting hardware for primary operation of the pumping station. A backup float system shall also be installed for all pumping stations. The floats shall be connected to a stainless steel chain. The chain shall incorporate an anchor to hold floats in position and shall be located so that it can be removed for maintenance from the access hatch. Controller shall provide connections for both systems. If the transducer fails the controller shall automatically begin using float switches for operation and notify the Maintenance Department via SCADA.
   b. Submersible Level Transducer: The level control system shall utilize a submersible transducer. It shall be a strain gauge transducer with a pressure sensor housed in a 316 SST or Titanium case designed to extend into the wet well. The pressure transducer shall provide a proportional signal for distribution to the display and electronic comparators of the electronic pressure switch, and remainder of the level control system. Sensor range shall be 0 12 ft. W.C. minimum with an over-pressure rating 3 times full scale. The transducer shall have output capability of 1.5-7.5VDC or 4-20mA. The transducer's polyurethane jacketed shielded cable shall be of suitable length for proper installation into the wet well without splicing. Transducer shall be Siemens A1000i or approved equal.
   c. Float Switch: The float switch shall be a direct acting switch and contain a single pole mercury switch which actuates when the longitudinal axis of the float is horizontal and de-actuates when the liquid level falls 1" below the actuation elevation. The float shall have a chemical resistant polypropylene casing with a firmly bonded electrical cable protruding. One end of the cable shall be permanently connected to the enclosed

mercury switch and the entire assembly shall be capsulated to form a completely water tight and impact resistance unit. Float shall include a stainless steel bracket for support pipe mounting. Switches shall be provided for pump(s) off, lead on, lag on, low water level, and high water level.

4. Duplex Pump Control Panel: Provide a duplex pump control panel including the following control functions and auxiliaries:
   a. MANUAL-OFF-AUTOMATIC selector switch, green running pilot light, red failure pilot light, and red seal failure pilot light for each pump.
   b. A Pump No. 1 Lead-Alternate-Pump no. 2 lead sequence selector switch to select either pump as lead pump or to select that the pumps alternate as lead pump on each call for cycle.
   c. Level inputs for: stop, lead pump start, lag pump start and high and low water alarm. The power applied to the level sensors shall be a maximum of 24 VAC with a current of less than 30 ma for intrinsic safety and shall be optically isolated.
   d. Pilot light indicators for each level input.
   e. A field adjustable failure time delay for each pump. Controls to start the lag pump at the lead pump start level if the lead pump fails or if the lead pump selector switch is placed in the off position. If a pump fails, the remaining functional pump shall remain the lead pump on future cycles. The failed pump shall only be called to operate at the lag pump operating level. Normal pump alternation shall resume when failure condition is corrected and pump has been reset.
   f. Soft stop feature to require the pumps to stop three seconds apart during the condition that both pumps are running when signaled to stop. Soft start feature to require the pumps to start three seconds apart during conditions that the lead and lag pumps are called for simultaneously. Soft starts shall be required when recommended by the power supply company or on any motors larger than 20 Hp. If soft starts are required the panel shall include a bypass contactor for emergency use.
   g. Individual field adjustable time controls to delay starting each pump in the automatic mode after power failure or during initial startup.
   h. Pump failure, pump seal failure and high water alarm red pilot lights shall flash when activated.
   i. Provide input indicator and test module with improper input sequence indicator and controls. The following controls and equipment shall be supplied:
      (1) Deadfront panel mounted level input pilot light indicators (Qty. 4)
      (2) Deadfront panel mounted pushbuttons to test each level input (Qty. 4)
      (3) Automatic input sequence monitoring on rising liquid level, such that if the inputs do not occur in proper order (stop, lead start, lag start and high level alarm), a red pilot light indicator shall be activated.
      (4) If stop input fails, followed by lead input activation, lead pump shall operate and continue until lead pump input is removed and a field adjustable time delay has expired.
      (5) If stop input fails, followed by lead and lag input activation, both pumps shall operate and continue until their respective input is removed and an individual field adjustable time delay for each pump has expired.

(6) If stop and lead input fails, followed by lag input activation, both pumps shall operate and continue until the lag input is removed and the lag input field adjustable time delay has expired.

(7) If stop, lead and lag inputs fail, followed by high level input activation, both pumps shall operate and continue until the high level input is removed and a high level input field adjustable time delay has expired.

(8) Improper sequence activation shall also activate common external alarm.

(9) Improper sequence alarm shall require reset button activation to remove alarm light.

j. The controller shall be telemetry ready providing dry contact closures for the following signals:

(1) Pump running (Qty. 2)
(2) Pump failure (Qty. 2)
(3) Pump seal failure (Qty. 2)
(4) Station high level alarm
(5) Transducer Signal Failure
(6) Improper sequence

k. Duplex Controller shall be solid state and easily replaceable. Conventional relay and timer construction or PLC control is not acceptable.

5. Communication Equipment: Control panel shall include SCADA communication equipment including necessary antenna for connection to the Authority's existing Mission Communication System. System shall communicate at a minimum high and low level alarms, pump failure (quantity 2), power failure, improper pump sequence, pump run time (quantity 2), pump status RUN/OFF (quantity 2), submersible level transducer signal failure, and wetwell level. System shall have a battery backup for a minimum of 72 hours of operation during a power failure.

2.04 Factory Assembly and Painting

A. Shop Assembly:

1. Preassemble items in the shop to the greatest extent possible, so as to minimize field splicing and assembly of units at the Project site.
2. Disassemble units only to the extent necessary for shipping and handling limitations.
3. Clearly mark units for reassembly and coordinated installation.

B. Shop Painting:

1. Surface Preparation: SSPC-10 Near White Blast.
2. Product and Manufacturer:
   a. Tnemec:
      (1) Primer: 13-1211 Chloroline Primer — 2 coats, 2.0 dry mils per coat, 290 square feet per gallon per coat.
      (2) Finish: Series 14 Hi-Build Chloroline — 2 coats, 5.0 dry mils per coat, 100 square feet per gallon.
   b. Or equal.

2.05 Spare Parts

Provide the following spare parts for each size pump:

1. One impeller.
2. One impeller screw.
3. One impeller washer.
4. Two impeller O-rings.
5. One upper roller bearing.
6. One lower roller bearing.
7. One set of wear rings.
8. One set of adjusting shims.
9. One set of mechanical seals.

PART 3 — EXECUTION

3.01 Installation

A. Install pumps and accessories in accordance with the manufacturer's installation instructions.

B. Align, adjust, and lubricate in accordance with the manufacturer's instructions and leave in proper working condition.

C. Perform any required touch-up painting in accordance with recommendations of paint system manufacturer.

D. Panel shall be mounted a minimum of 1 ft above 100 yr floodplain as determined by FEMA FIRM, latest edition. Panel should include a concrete slab and metal awning to allow operator ability to access during inclement weather. Site shall be constructed to provide a platform or slab that locates the panel at eye level to operator.

3.02 Field Quality Control

A. Required Manufacturer Services: Retain a qualified representative of the manufacturer to perform the following services:

1. Equipment Installation:
   a. Oversee installation of the equipment and accessories specified herein.
   b. Inspect the completed installation and note deficiencies.
   c. Be present and assist CONTRACTOR during the start-up, adjusting, and field testing of completed installation.
2. The manufacturer's representative shall revisit the job site as often as necessary until all trouble is corrected and the installation is entirely satisfactory to the AUTHORITY.

B. Field Testing:

1. Follow testing procedures recommended by the manufacturer.
2. Seal the pump cable end with a high quality protective covering to make it impervious to moisture or water seepage prior to electrical installation.
3. Conduct a wet well drawdown test to ascertain the pumping capacity of single pump and dual pump operation. Provide the results in the Installation Report.

B. Instruction of AUTHORITY'S Operating Personnel:

1. Initial Instruction Course: After equipment is fully operational, and before AUTHORITY will assume responsibility for the operation of the equipment, the equipment manufacturer's operating specialist shall instruct the AUTHORITY'S operating personnel in the care, maintenance and proper operation of the equipment.
2. Formal Instruction Course: After continuous operation of the equipment for a period of 30 consecutive calendar days, retain a qualified representative of the manufacturer for a minimum period of 8 hours to instruct AUTHORITY'S personnel in the fundamentals, operation, troubleshooting and maintenance of the equipment and accessories.

C. Manufacturer's Installation Report:
1. Prepare manufacturer's installation reports and submit them within 30 days after completion of field testing and operation instruction. Include the following information:
   a. Field testing reports.
   b. Description of installation deficiencies not resolved to the AUTHORITY'S satisfaction.
   c. Description of problems or potential problems.
   d. Names of AUTHORITY's personnel who attended the operations and maintenance training sessions.
   e. Record copy of materials used for the training sessions including an outline summary of the course.

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SECTION 0330
GRINDER PUMP STATIONS

JACKSON COUNTY UTILITY AUTHORITY
WATER AND SEWER STANDARD SPECIFICATIONS

PART 1 - GENERAL

1.01 Description

These Specifications shall govern the furnishing and installation of grinder pump stations for the Authority. The stations shall be installed in accordance with the requirements of these specifications, at the locations and depths indicated on the plans approved by the Authority and the governing regulatory agencies. The stations shall be of the class, size, and dimension shown thereon.

1.02 General

A. All systems for each project shall be by a single source so as to ensure compatibility of controls and ensure system responsibility.

B. Units shall contain grinder pump(s), discharge piping, controls, and all other necessary parts and equipment required to provide an operating simplex grinder pump station, and shall include the equipment being installed a fiberglass reinforced, corrosion resistant polyester tanks for outside installations. All equipment shall be factory installed, except for externally mounted control panel, gravity sewer inlet hubs and pump assembly, which are to be installed in the field.

C. Simplex units shall be installed in single family residential applications and include a single pump and controls necessary for operation of a single pump, unless a duplex station is required by the Authority. Duplex units shall be installed in multi-family residential, commercial, and light industrial applications when approved by the Authority. Duplex units shall include two pumps and controls necessary for operation of a duplex pump station.

D. All equipment and materials provided for this project shall be warranted against defects in materials and workmanship for a period of five (5) years from the date the system is tested and accepted. The manufacturer will provide and install new parts free of charge for the duration of the warranty; remanufactured parts will not be accepted.

E. Grinder Pump Manufacturer shall be required to maintain an authorized warranty and repair service center within a fifty (50) mile radius of the project site.

F. Provide electrical power to units as required to meet the testing requirements specified within these specifications. If power is not readily available it will be the responsibility of the person(s) installing the equipment to provide power by whatever means necessary (i.e. generator) to power the equipment for testing.

G. Related Work Sections:
1. Section 0130, Concrete
2. Section 0120, Excavation and Backfill
3. Section 0170, Regulatory and Design Requirements

PART 2 - PRODUCTS

2.01 Description

System shall consist of sewage grinder pump(s), level control switches, discharge piping, and stainless steel lifting chain, for each pump, to be installed in factory built basin. A NEMA 4X fiberglass weatherproof control box shall be supplied for mounting at the sump site or remote from the basin as required.

2.02 Operating Conditions

A. Simplex Stations:
   1. Operating Conditions:
      a. Standard System: Pump shall be capable of producing a minimum flow of ten (10) gallons per minute at a total head (static and dynamic) of 90 feet and be capable of pumping at a total head as low as 20 feet at a maximum flow of fifty (50) gallons per minute. Shutoff head shall be 100 feet minimum.
      b. High Head System: Pump shall be capable of producing a minimum flow of ten (10) gallons per minute at a total head (static and dynamic) of 110 feet and be capable of pumping at a total head as low as 20 feet at a maximum flow of fifty (50) gallons per minute. Shutoff head shall be 125 feet minimum.
   2. Motor Rating: 2 HP, 230 volts, single phase, 60 Hz, 3450 RPM. The full load current shall not exceed 13 amps.
   3. Pump shall be a submersible centrifugal grinder pump, positive deplacement pumps shall not be considered, manufactured by Myers, model WGL20 Series or approved equivalent.

B. Duplex Stations: Operating conditions will vary depending on application. Motor rating will vary depending on application, rating shall be recommended for certain application and operating conditions by manufacturer. Pumps shall be manufactured be Myers, model WGL20 Series or approved equivalent.

2.03 Design

The pump volute, motor and seal housing shall be cast iron, ASTM A-48, Class 30, and integrally built. Pump shall be designed for pumping normal domestic and commercial sewage including a reasonable amount of foreign objects such as small wood, sticks, plastic, thin rubber, sanitary napkins, disposable diapers, and the like to a fine slurry that will freely pass through the pump and the 1¼" discharge piping. All external mating parts shall be sealed with Buna-N rubber O-Rings on rabbet joints. Gaskets shall not be acceptable. All fasteners exposed to the pumped liquids shall be 300 series stainless steel.

2.04 Electrical Power Cord

A. Electrical power cord shall be water resistant, UL and/or CSA-approved and size according to amp draw for the application, minimum of 14 gauge, 5 lead SOOW. Single cord shall incorporate the power and seal sensor leads. Cords shall be furnished by manufacturer and shall be a minimum of 30 feet in length.

B. The power cable entry into the pump/motor unit of the system shall be designed to prevent water contamination to gain entry even in the event of wicking or capillary attraction. Seal shall be a compression fitting with Buna-N sealing ring in the gland.

2.05 Motors

A. Each pump shall be driven by a Submersible Electric Motor. The motor shall be oil filled. Motor shall be NEC Code D for continuous duty, capable of sustaining 10 starts per hour. The pump and motor shall be produced by one manufacturer and shall be of submersible design.

B. The stator, rotor and bearings shall be mounted in a sealed submersible frame. The stator winding shall be of the open type with Class F insulation, (155° C or 311° F), NEMA L design (single phase) or NEMA B design (three phase). Single phase motors shall be capacitor start, capacitor run type for high start torque.

C. Pump shall be equipped with thermal sensors imbedded in phase of the winding to protect the motor from overheating. Switch(s) shall open at a temperature recommended by the manufacturer and turn the pump off and automatically reset when it cools to a temperature recommended by the manufacturer.

D. No special tools shall be required for pump and motor disassembly. The stator must be capable of being repaired or rewound by a local motor service center. Pump must be capable of being serviced in the field.

E. The pump and motor shall be specifically designed so that they may be operated partially or completely submerged in the liquid being pumped without compromise. The pump shall not require cooling water jackets.

2.06 Bearings and Shaft

A. Motor shall have an upper single row ball radial bearing and a lower single row ball thrust bearing. Ball bearings shall be designed for 50,000 hours B-10 life.

B. The common motor pump and grinder shaft shall be machined from solid 400 series stainless steel and be designed for minimum shaft overhang.

C. The shaft shall be threaded to mount the pump impeller and grinder impeller.

2.07 Seals

Motor shall be protected by two seal. Seal face shall be carbon, when rotating, or ceramic, when stationary. All hardware is to be 300 series stainless steel and sealing elastomers are to be Buna-N Rubber. Sealed housings shall contain moisture sensing probes that shall activate a warning light in the control panel if moisture enters the sealed area.

2.08 Impeller

Shall be bronze or cast iron construction and non-overloading. Impeller shall be multi-vane, centrifugal type, semi-open design. Impeller shall be hydraulically and statically balanced.

2.09 Grinder Cutters

Grinder cutters shall be in combination with the pump impeller and attached to the common motor and pump shaft. Grinder shall consist of a grinder impeller and shredding ring. The grinder cutters shall be on the suction side of the pump impeller and discharge directly into the impeller inlet. Grinder cutters shall be capable of grinding all materials found in domestic, including plastic, rubber, sanitary napkins, disposable diapers and wooden articles into a slurry of fine ground

particles with dimensions no greater than ¼ inch in any direction. Grinder cutters and shredding shall be hardened 400 series stainless steel with a minimum hardness of 55 Rockwell C.

2.10 Painting/Coating

The pump shall have a High Build Epoxy protective coating on all outside surfaces.

2.11 Testing

Commercial testing at the factory shall be required and include the following:

A. The pump shall be visually inspected to confirm that it is built in accordance with the specification as to HP, voltage, phase, and hertz.

B. The stator motor leads shall be tested for integrity using a megohmeter at the highest setting.

C. Pump shall be allowed to run dry to check for proper rotation.

D. Discharge piping shall be attached; the pump submerged in water and amp readings shall be taken in each leg to check for an imbalanced stator winding. If there is a significant difference in readings, the stator windings shall be checked with a bridge to determine if an unbalanced resistance exists. If so, the stator will be replaced.

2.12 Basin

A. Basin – The diameter shall be a minimum 24 inch and depth shall be a minimum 5 foot deep for simplex units. Depth may increase depending on location of basin and gravity inlet pipe. Duplex units shall be sized depending on the application and shall meet the manufacturer's recommendations.

B. Basin Materials – Molded Fiberglass Reinforced Polyester Resin: System shall be suitable for atmospheres containing hydrogen sulfide and dilute sulfuric acid as well as other gases associated with wastewater collection systems. Basins shall have a minimum thickness of ¼", or as required to meet the requirements below for depth required for project. Reinforcing materials shall be commercial grade "E" mat, continuous roving, chopped roving, roving fabric, or a combination.

C. Inner and Outer Surfaces – All surfaces shall be smooth and resin rich, free of cracks and porosity, with uniform molded in color and thickness. Air bubbles will not be acceptable. Fiber-reinforced polyester basin shall not have any blisters larger than ½ inch in diameter. Surface pits shall be less than ¾ inch in diameter and 1/16 inch in depth Wrinkles on interior surfaces shall be less than 1/8 inch in depth. Both exterior and interior surfaces shall be smooth with no sharp projections or exposed fibers.

D. Tank Wall – Wall thickness shall provide the aggregate strength necessary to meet the tensile and flexural physical properties requirements. The basin wall must be designed to withstand wall collapse or buckling based on:
   1. Minimum dynamic-load rating 16,000 ft-lbs. Rating shall be established by basin not leaking, cracking or suffering any other damage when load tested at 40,000 ft-lbs and shall not deflect vertically downward more than ¼ inch at the point of load application when loaded to 24,000 lbs.
   2. Conditions: Hydrostatic Pressure of 62.4 lbs/sf, Saturated Soil Weight 120 lbs/cf, and Soil Modulus of 700 lbs/sf
   3. Test shall be as specified in ASTM D3753, latest edition, Section 6.

4. Tank wall must be constructed to withstand or exceed (2) two times the actual imposed loading on any depth of basin.

E. Tank Bottom – The basin bottom shall be of sufficient thickness to withstand applicable hydrostatic uplift pressure. In saturated conditions, the center deflection of the empty basin bottom shall be less than 3/8" (elastic deflection) and shall not interfere with bottom pump mounting requirements. Any mounting studs, plates, cap screws into tank bottom should be stainless steel and resin covered except for threads. Any inserts should be stainless steel or brass and resin covered except for threads.

F. Tank Collar (Anti-Flotation) – A means to counteract buoyancy forces shall be provided on the tank bottom in the form of a ring, and shall extend a minimum of 2" beyond the O. D. of the basin wall. Wall and collar should be blended with a radius not to exceed 1 ½" beyond wall O.D.

G. Venting – Tank shall be vented to the atmosphere via non-degradable integrated venting screen at the ground level with at least 10 square inches of perforated surface area.

H. Capacity – Tanks with a nominal outer diameter of 24" shall be capable of holding at least 45 gallons of water in the bottom 16" (antifloat region), and a minimum of 28 gallons of water per vertical foot above the antifloat region.

2.13 Basin Cover

A. A one piece, solid polypropylene, fiber-reinforced polyester, or aluminum (24" or 30" dia. basins) cover or aluminum (36" and larger dia. Basins) cover shall be provided for each installation. The cover shall be constructed for a 250 PSF load. Hatch shall be attached to the basin.

B. The cover shall be grass green in color if polypropylene or fiber-reinforced polyester. The cover surface shall have a non-skid design, and shall be water-tight. Cover shall be bolted to the basin with stainless steel cap screws for "light duty" loading. Design of cover shall allow for basin to be mounted flush with ground.

C. Aluminum covers shall include a single leaf hatch of minimum size to access all valves and remove the pump(s) from the basin without having to remove the cover. Hatch shall be equipped with stainless steel hinges and automatic hold open arms and a padlock hasps.

D. Provide a 2" mushroom vent for cover. Note: If inlet pipe is connected to vent stack in house, vent on basin cover is not required.

2.14 Piping and Appurtenances

A. Pump Discharge:
1. Simplex units shall consist of a stainless steel or schedule 80 PVC discharge piping which is connected to a check valve, shutoff valve, and hydraulic cast iron seal flange or stainless steel quick disconnect that connects the discharge piping to the force main via a flex hose. Gate valve shall remain attached to force main when pump, check valve, and discharge piping are removed from the basin for maintenance.
2. Duplex units shall consist of stainless steel or schedule 80 PVC discharge piping, shutoff valves, check valves, discharge elbow, and stainless steel guide rail(s).

B. Check valve shall be sch. 80 pvc, coated cast iron, stainless steel, or brass construction

and of either swing or ball type design to provide unobstructed flow through the valve body when the pump is pumping flow and close when the pump shuts off preventing flow from entering the basin from the system. The ball type valves shall incorporate a clean-out port that does not require the body of the valve to be removed. Check valve shall be rated for 150 psi pressure minimum.

C. Ball type shutoff valve: Handle shall be near the top of basin, within reach for service personnel. Shutoff valve shall be rated for 150 psi pressure minimum. Valve shall be sch. 80 PVC, coated cast iron, stainless steel, or brass.

D. Seal flange or quick disconnect shall be capable of being disconnected without entrance into the basin by personnel. Seal flange shall automatically seal pump if a discharge elbow is provided or be an integral part of the discharge piping or check valve allowing access from the top of the basin by maintenance personnel. Quick disconnect shall be located as to allow access from the top of the basin by maintenance personnel.

E. An adequate length stainless steel chain or nylon rope shall be supplied for removing the pump. The chain/rope shall be of sufficient length and strength for easy removal. It shall not be required to lift on the discharge piping to remove the pump.

F. Inlet Flange: One-piece, flexible basin inlet fitting for 4" SCH 40 plastic pipe for residential or 6" SCH 40 plastic pipe for commercial or as required by the Authority shall be shipped loose for field installation.

G. No male threaded PVC fittings shall be allowed. Couplings to convert from PVC piping to threaded connections shall be brass.

2.15 Junction Box

A. A U.L. listed, NEMA Type 6 submersible rated junction box shall be provided. Junction box shall be formed from corrosion resistant, flame retardant thermoplastic. The enclosure shall be of adequate thickness and properly reinforced to provide good mechanical strength. The junction box shall have a fully gasketed, hinged cover that is held in place by stainless steel screws.

B. An adequate number of sealing-type cord grips shall be supplied for incoming pump and level control cords. The cord grips shall be made of non-corrosive material such as PVC or nylon, and shall make an effective seal around the wire jacket.

C. The junction box shall have a PVC solvent weld socket with an integral 1½" NPT pipe for attaching basin conduit hub. The hub shall be made of a corrosion resistant material and shall be of adequate size to accommodate the number of wires required for pump and level control operation.

D. The incoming wires shall be sealed by external means so that condensation from the conduit or groundwater will not enter the enclosure. The interior of the enclosure shall be of adequate size to accommodate the wires and connections for pump and level control operation.

E. The wires running between the control panel and the junction box shall be color-coded and fastened to the pump and level controls by means of adequately sized and insulated twist lock or crimp connectors.

2.16 Electical Control Panel and Appurtenences

A. Control Panel Model / General Construction

1. Control Panel – shall be supplied by pump manufacturer with Float Switch Operation. Panel shall include a Hand-Off-Automatic switch for each pump.
2. Simplex or Duplex – Weather Proof Controller with Alarm meeting U.L. Standard 508.

B. General Operation / Construction

1. A complete wiring diagram and installation instructions shall be provided. The control panel assembly shall be completely factory tested and shall be “UL” 508A listed and labeled. Enclousre shall have nameplate with model number, voltage, phase, hertz, ampere rating and horsepower rating.
2. Run lights, failure lights, test/silence push button and hand on-off-automatic switch shall be provided. The test/silence button shall output alarm for a test and silence the alarm when alarm is already activated for a failure or other situation. Switch and lights shall be properly labeled as to the function of each. Duplex pumps shall also provide switch to manually run one or both pumps independently of the other.
3. Motor Contactors. The motor contactor shall be a heavy duty definite purpose rated contactor sized to meet NEC requirements. It shall provide the electrical start / stop control for each pump along with an integral overload protection and have 120 volt operating coil. Contactors shall be Culter Hammer or approved equal.
4. The features shall be integrated on a single control board with scope for future expansion. The compactness of the control board shall eliminate the need for several discrete components resulting in ease of serviceability, reduction in probability of failure and lower heat generation. The plug-ins feature of the control board shall enhance ease of serviceability by eliminating the need for all manual wiring. The control board shall operate on a low voltage DC.

2.17 Control Panel/Testing

A. Factory Tests – Each control panel shall receive a factory test to ensure proper operation prior to shipment. Factory Tests shall include at a minimum:

1. All control logic functions, including: turn on, turn off, alarms,etc.
2. All fuses and circuit breakers
3. All indicator lights and switches
4. Audible and visual alarm indicators (when provided).
5. Power transfer circuit to pump motor
6. Float switch input circuits (for float operated models)
7. Pressure level operation (for pressure transducer operated models)
8. The panel shall be connected to a representative test pump. The panel shall be tested for proper motor starting and running operation

B. Enclosure

1. Durable NEMA 4X Enclosure, made from a poly carbonate material and intended for indoor or outdoor use primarily to provide a degree of protection against corrosion, windblown dust and rain, splashing water, and hose directed water; undamaged by the formation of ice on the enclosure. The resin system also shall include a flame retardant to obtain a flammability rating which meets U.L. 94V-O. Heat distortion temperature shall be 350 degrees Fahrenheit. The resin system shall be resistant to ultraviolet light.
2. Removable non-metallic hinged door with standard lockable stainless steel latches, for safe operation indoor and outdoor.

3. Non-Conductive Standard Molded Sub-Door (Dead Front). The sub-door will isolate the user from energized components and line voltage.
4. Non-Conductive Injected Molding Back Panel The back panel shall have a raised platform for mounting circuit breakers, a heavy-duty parallel ground lug, housing for motor contractors and elevated terminal strip.
5. Inside Sub-Door Quick disconnect circuit board for easy replacement and troubleshooting. Spare fuses for Alarm and Control fuse replacement. The inner door shall include a screwdriver for ease of field service.

C. Alarms / Indicators
1. Visual Alarm Circuitry– A top mounted high intensity flashing red light with various flashing modes depending on alarm condition. The panel will have an individual alarm circuit fuse.
2. Audible Alarm Cicuitry – Audible piezo alarm, +/- 95 dB within 2 feet, with a side mounted touch to silence pad and circuitry feature.
3. Individual Control and Alarm Fuses with fail indicator lights. Each fuse shall have an individual fuse "blown" indicator light for simple troubleshooting.
4. Control, Alarm, Pump Run and Float Indicator lights. Pump Run lights shall be provided for each motor and mounted on the sub door, along with a separate control circuit power light and alarm circuit power light. The float operated panels shall have float status indicator lights for both the simplex and duplex models.

D. Circuit Breakers
1. Control Circuit Breakers. The 120 Volt common control circuit shall be protected by an auxiliary single (1) pole circuit breaker. Breaker shall be rated 10,000 Amps interrupt current (10KAIC). The circuit breakers shall be accessible through the sub door.
2. Motor Circuit Breakers. The pump breakers shall be thermal magnetic trip devices and provide for individual motor disconnect and overload / short circuit protection as required by the NEC rating for motor branch circuit protection. Breaker shall be rated 10,000 Amps interrupt current (10KAIC). The voltage rating shall match that of the panel incoming service. All circuit breakers shall be accessible through the sub door.

E. Level Controls
1. Float Switch Control Operation
   a. The control panel shall provide terminal strip inputs for: Simplex: pump off, pump on, and alarm float controls; Duplex: lead pump on, lag pump on, pumps off, and alarm float controls.
   b. The controller shall provide float switch status indicator lights. The indicator LED's shall activate to indicate the closure of each of the float switches. The indicator LED's shall also flash to indicate float switch failure. The out of sequence or float failure indicators shall remain activated until the next pump down sequence after the fault has been corrected. A chirping audible alarm shall also be activated when a float switch failure or out of sequence operation is detected.
2. Float Controls
   a. Simplex control panel operation shall be automatically controlled by 3 (simplex) or 4 (duplex) mercury level controls. Float switches shall control off, on and alarm functions.
   b. Float switch shall be capable of operating at temperatures between 32 and 170° F. Float switches shall activate and deactivate between 5 degrees above horizontal and 5 degrees below horizontal. Float switch shall be constructed with a polypropylene outer shell for durability and

resistance to wastewater environment. Outer shell shall be filled with polyurethane foamed interior to provide best buoyancy, water tight integrity and protect the mercury switch.

c. Float switches shall be of normally open type.

d. Float switch cables shall be made of chlorinated polyethylene, type SJOOW, 18 AWG, 2-wire type. Float switch contacts and shall be capable of handling 10 amps at 115 VAC or 3 amps at 240 VAC.

e. Float switch shall be third party safety listed by UL, US and shall be capable of operating intrinsic safe relays.

f. Float switches shall have an external zinc plated cast iron weight. Weight shall be of the split design and shall be easily adjustable for tether length. Float switch weights made of heavy metals which may contaminate the waste flow stream shall not be acceptable.

2.18 Spare Parts

The following spare pumping equipment items shall be provided to the Authority at the rate of one (1) for every twenty (20) simplex or duplex units installed in a project, a minimum of one of each of the items shall be provided for all projects where five (5) or more units is installed:

1. Grinder pumps
2. Liquid level controls
3. Control panels
4. Check valves
5. Shut-off valves

PART 3 - EXECUTION

3.1 Installation

A. Install pumps and accessories in accordance with the manufacturer’s recommendations, and Authority.

B. Align, adjust, and lubricate in accordance with the manufacturer's instructions and leave in proper working condition.

C. Perform any required touch-up painting in accordance with recommendations of paint system or coating manufacturer.

3.2 Field Quality Control

A. General: Retain a qualified representative of the manufacturer to perform the following services if multiple pumping units are installed or use a manufacturer approved contractor for installation and testing, as required by the Authority.

B. Required Manufacturer Services:

1. Equipment Installation:
   a. Oversee installation of the equipment and accessories specified herein.
   b. Inspect the completed installation and note deficiencies.
   c. Be present and assist CONTRACTOR during the start-up, adjusting, and field testing of completed installation.
2. Furnish test forms and procedures for field testing.
3. The manufacturer's representative shall revisit the job site as often as necessary until all trouble is corrected and the installation is entirely satisfactory to the Authority.
4. Manufacturer's Installation Report:

a. Prepare manufacturer's installation reports and submit them within 30 days after completion of field testing and operation instruction.
b. Include the following information:
(1) Field testing reports.
(2) Description of installation deficiencies not resolved to the Authority's satisfaction.
(3) Description of problems or potential problems.

C. Field Testing:
1. Field test and calibrate equipment to demonstrate to the Authority that all equipment will satisfactorily perform the functions and criteria specified in Part 2.
2. Provide all test apparatus required at no cost to Authority. Testing shall include providing calibrated/certified instruments to verify results.
3. Follow testing procedures recommended by the manufacturer and approved by the Authority.
4. Motor Field Tests:
a. Assembly details, motor-rating, and electrical connections, etc., shall be checked for compliance with design.
b. A motor and cable insulation test for moisture content or insulation defects shall be made.
c. Prior to submergence, the unit shall be run dry to establish correct rotation and mechanical integrity.
d. The pump shall be run for 10 minutes submerged.
e. After operational test (subparagraph d), stop motor and leave the motor submerged for 30 minutes. Then, run the insulation test (subparagraph b) again with the motor still submerged.
5. Seal the pump cable end with a high quality protective covering to make it impervious to moisture or water seepage prior to electrical installation.
6. Start up and testing of grinder pump shall be completed before warranty period begins. Water for testing can be either potable water paid for by contractor or sewage if permitted by the Authority.

**** END OF SECTION ****

SECTION 0340
SEWER VALVES AND APPURTENANCES

JACKSON COUNTY UTILITY AUTHORITY
WATER AND SEWER STANDARD SPECIFICATIONS

PART 1 – GENERAL

1.01 Related Work Specified Elsewhere

A. Section 0100, Excavation and Backfill

B. Section 0200, Water Distribution Pipe

1.02 Quality Assurance

A. Reference Standards: Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.
   1. AWWA C500, Gate Valves 3 Inch Through 48 Inch For Water and Other Liquids.
   2. AWWA C508, Swing Check Valves for Ordinary Waterworks Service.
   3. ANSI B16.1, Cast-Iron Pipe Flanges and Flanged Fittings.
   4. ANSI B16.4, Cast-Iron Screwed Fittings.
   5. ASTM A 307, Carbon Steel Externally and Internally Threaded Standard Fasteners.
   6. ASTM A 354, Quenched and Tempered Alloy Steel Bolts, Studs and Other Externally Threaded Fasteners.
   7. ASTM D 1784, Rigid Polyvinyl Chloride Compounds and Chlorinated Polyvinyl Chloride Compounds.
   8. ASTM D 2464, Threaded-Type Schedule 80 PVC Pressure Fittings.
   9. ASTM D 2467, Socket-Type Schedule 80 PVC Pressure Fittings.
   10. MSS SP-80, Bronze Gate, Globe, Angle and Check Valves.
   11. Standards of National Electrical Manufacturer's Association.

B. Operation and Maintenance Data:
   1. Submit a detailed operation and maintenance manual for all valves and appurtenances provided under this Section including the following information:
      a. Product name and number.
      b. Name, address and telephone number of manufacturer and local distributor.
      c. Instruction bulletins for operation, maintenance and recalibration.
      d. Complete parts and recommended spare parts lists.

PART 2 – PRODUCTS

2.01 Materials

A. General:
   1. All valves shall have manufacturer's name and working pressure cast in raised letters on valve body.
   2. All manual valve operators shall turn right to close unless otherwise specified. Valves shall indicate the direction of operation.
   3. Unless otherwise specified all flanged valves shall have ends conforming to ANSI B16.1, Class 125.
   4. All buried valves shall be provided with adjustable three piece valve boxes and provided with extension stems, operating nuts and covers unless otherwise

shown or specified.

5. All bolts, nuts and studs on or required to connect buried or submerged valves shall be stainless steel.
6. All bolts and studs embedded in concrete required to connect wall pipes to valves and appurtenances specified herein shall be stainless steel.
7. All other bolts, nuts and studs shall, unless otherwise approved, conform to ASTM A 307, Grade B cadmium plated, hot dipped galvanized or stainless steel.
8. Bolts and nuts shall have hexagon heads and nuts.
9. Gasket material and installation shall conform to manufacturer's recommendations.

B. Service Connection to Pressure Sewer Main:

1. Connection Materials
   a. Service Saddle:
      (1) Required for connection to PVC water mains, when saddle used a brass corporation stop shall be included meeting the Specification 0210.
      (2) Straps: double stainless steel straps
      (3) Saddle: brass
      (4) Manufacturer and Model
         (a) Ford Meter Box Company, Inc. Style 202BS
         (b) Or approved equal.
   b. Tapping Tee:
      (1) Electrofusion Type
      (2) Manufacturer: Frialen DAA High Pressure Tapping Tee or approved equal.
2. Service Connection Box:
   a. Location: within 5’ of connection of pressure sewer service line and main pressure sewer transmission mains. Required for all grinder pump and STEP tank effluent pump connections to force mains.
   b. Service Connections shall incorporate an assembly consisting of a check valve, threaded PVC nipple, and shutoff ball valve.
      (1) Shutoff ball valve shall be PVC type 1, ASTM D 1784 with EPDM O-rings. Valve shall have “T” type stem with polypropylene handle and be pressure rated for 150 psi minimum (schedule 80). Valve shall be manufactured by Spears, Utility Ball Valves or approved equivalent. End connections shall be threaded.
      (2) Check valve shall be ball type. Material shall be PVC type 1, ASTM D 1784 with Nitrile Rubber check ball and seal at the clean-out port. Valve shall be marked with external flow direction arrow and note “this side up” for correct installation and incorporate a clean-out port as not to require the valve body to be removed to service the valve. Valves shall be pressure rated to 100 psi. Valves shall be manufactured by Flomatic, Series 208 or approved equivalent. End Connections shall be threaded.
      (3) Service Connection shall have PVC or HDPE adapter on each end. Adapter shall incorporate compression connection (pack joint) and male IP threaded connection to allow valves to be removed from box for replacement or maintenance. All couplings shall be brass.
   c. Sewer Service Connection Box shall be sized to provide access to couplings, adapters, shutoff valve and check valve. Box shall be NDS type 1200 meter box meeting the requirements of Section 0210, Paragraph 2.02.C, with GREEN colored cover.

C. Combination Sewage Air Valve:
   1. Type: Single Body, Automatic Float Operated Valve. Designed to release accumulated air from pipeline (force main) during system operation and designed to allow large quantities of air to exhaust the pipeline during filling and admit air during draining. Valve must be designed for use with wastewater applications.
   2. Working Pressure: capable of working at a pressure range of 3 to 250 psi and pressure tested to 350 psi.
   3. Construction:
      a. Body and Cover shall be Cast Iron Class B with epoxy coating
      b. Float and all internal parts shall be stainless steel.
   4. Location: At high points along pressure sewer main, or any location where air may become trapped during operation. Valve shall be installed in a vault meeting the requirements of precast manhole sections and be traffic rated.
   5. Manufacturer shall be ARI D-020, D-025 or D-023, size shall be as required for air release and intake.
   6. Required Accessories:
      a. Backflushing Attachments for flushing as recommended by manufacturer with valves at connection points.
      b. Isolation valve and tapping saddle for connection to pressure sewer main. Tapping saddle shall be stainless steel band with brass saddle and buna-n rubber gasket by Ford Meter Box or equal. Isolation valve shall be 2-piece bronze full port ball valve with brass, chrome platted ball and brass stem. Manual lever operator shall be stainless steel. All nipples shall be brass.

D. Gate Valve:
   1. Standard: AWWA C509.
   2. Type: Non-Rising Stem. Capable of passing a 3” Solid, unless otherwise approved for grinder sewer pump applications by the Authority.
   3. Construction:
      a. Body and Bonnet: Cast iron.
      b. Wedges and Trim: Resilient Seat.
      c. Packing: O-ring.
   4. End Connections:
      a. Exposed Valves: Flanged, conforming to ANSI B16.1, Class 125, unless otherwise shown.
      b. Buried Valves: Mechanical joint, conforming to ANSI B21.11.
   5. Operation: Handwheel for exposed valves in vault and 2” operating nut for buried valves.
   6. Manufacturer:
      a. M&H Style 4067.
      b. Or equal.

E. Swing Check Valve:
   1. Type: Counter-weighted swing check. Capable of passing a 3” solid.
   2. Construction:
      a. Body, Cover, Disk and Levers: Cast Iron
      b. Counterweight Arm: Cast iron
      c. Shaft: 18-8 Stainless Steel
      d. Body Seat: Bronze
      e. Seat Ring: Rubber
      f. Shaft Gland Packing: Compression Type
   3. Location: Valve vault adjacent to pump station for solids handling pumps. Vault shall be precast concrete section.

4. Coating: Valve shall be epoxy coated.
5. Manufacturer: Clow F-5382, American Flow Control 50SC or equal.

F. Tapping Sleeve
1. To be used on all hot-tap line connections.
2. Construction
   a. Cast Iron
   b. Split end gaskets
3. End Connection: Mechanical Joint
4. Manufacturer and Model:
   a. M & H Styles 1174 & 1274
   b. Or equal.

2.02 Appurtenances

A. Extension Stems, Stem Guides, Wrenches and Keys:
1. Extension stem shall be at least as large as the stem of the valve it operates.
2. Extensions shall be placed on any operator that is more than 24" below ground. Intermediate stem guide shall be installed for extensions more than 10 feet long.
3. Stem brackets and guides shall be made of cast iron and have fully adjustable bronzed bushed guide block. Fasten brackets to walls with approved expansion bolts.
4. Operating nuts about 2 inches square shall be included with extension stem.
5. Provide operating key or wrench of suitable length and size for each valve that is not readily accessible to direct operation.

B. Extension Bonnets: Shall be provided for all of the filter's isolation valves, filter-to-waste valves, and air scour valves. Extension shall be of adequate length to place top of bonnet as shown on the drawings.

C. Valve Boxes:
1. Location: Provide for all buried valves.
2. Construction:
   a. Heavy pattern cast iron box.
   b. Type: Three-piece adjustable, telescoping.
   c. Inside Diameter: 4-1/2 inches minimum.
   d. Cover: Heavy-duty cast iron marked "JCUA SEWER"
   e. Direction to Open Arrow: Cast in cover.
3. Provide extension stem and operating nut.
4. Operating nut and stuffing box enclosed by lower section which rests on bonnet.

PART 3 – EXECUTION

3.01 Installation

A. Install all valves and appurtenances in accordance with manufacturer's instructions.

B. Install suitable corporation stops at all points shown and required where air binding of pipe lines might occur.

C. Install all valves so that operating handwheels or wrenches may be conveniently turned from operating floor but without interfering with access.

D. Unless otherwise approved install all valves plumb and level. Valves shall be installed free from distortion and strain caused by misaligned piping, equipment or other causes.

E. Valve boxes shall be set plumb, and centered with the bodies directly over the valves. Earth fill shall be carefully tamped around each valve box to a distance of 4 feet on all sides of the box, or to the undisturbed trench face, if less than 4 feet.

3.02 Field Test and Adjustments

A. Adjust all parts and components as required correct operation.

Conduct functional field test of each valve in presence of AUTHORITY'S REPRESENTATIVE to demonstrate that each part and all components together function correctly. All testing equipment required shall be provided.

*** * END OF SECTION * ***

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SECTION 0400
SANITARY SEWER PIPE, VALVES AND APPURTENANCES

JACKSON COUNTY UTILITY AUTHORITY
WATER AND SEWER STANDARD SPECIFICATIONS

PART 1 – GENERAL

1.01 General

De-centralized sanitary sewer pipe, valves, and appurtenances shall meet the requirements for pressure sewer applications (pipe, valves, and system appurtenances) as specified in the Sanitary Sewer Centralized Collection System sections of these specifications.

1.02 Related Work Specified Elsewhere

A. Section 0140 – Excavation and Backfill

B. Section 0150 – Pipe Installation

C. Section 0160 – Regulatory and Design Requirements

PART 2 – PRODUCTS

2.01 Pipe:

Section 0300 – Sanitary Sewer Pipe

2.02 Valves and Appurtenances:

Section 0340 – Sanitary Sewer Valves and Appurtenances

PART 3 – EXECUTION

Comply with Section 0160, Pipe Installation.

*** * END OF SECTION * ***

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SECTION 0410
INTERCEPTOR TANK AND EFFLUENT PUMP SYSTEM

PART 1 – GENERAL

1.01 Scope

These Specifications shall govern the furnishing and installing of an interceptor tank and effluent pump system for the Authority. The pumps, controls, piping, tank, and accessories shall be in accordance with the requirements of these specifications at the locations and depths indicated on the plans approved by the Authority and governing regulatory agencies. The equipment shall be of the classes, dimensions and sizes shown hereon.

1.02 Quality Assurance

A. Interceptor tanks and effluent pump systems shall meet the requirements of the Mississippi State Department of Public Health, Department of Environmental Quality, and these specifications.

B. Obtain all pumps and tanks from no more than one manufacturer. This shall insure compatibility of the controls and ensure system responsibility.

C. All systems shall be field tested when installed. Provide electrical power to each pumping unit for testing. If power is not readily available then a generator should be provided and used to test the equipment by the system installer.

D. Residential systems shall include a minimum of 1000 gallon interceptor tank and simplex effluent pump. Commercial systems include a minimum of 1500 gallon interceptor tank and simplex effluent pump. Smaller systems may be utilized for commercial applications when approved by the Authority. All commercial systems shall be sized by an Engineer registered in the State of Mississippi and approved by the Authority. All connections that include a commercial kitchen that produce food with the intent to distribute to the public shall include a grease trap. Existing Grease Traps shall be evaluated by the Authority Engineer and submitted to the JCUA Executive Director for approval.

1.03 Related Work Specified Elsewhere

A. Section 0120, Excavation and Backfill.

B. Section 0150, Concrete

PART 2 – PRODUCTS

2.01 Description

A STEP system shall consist of an effluent pump, filter, and discharge piping for installation in factory built pump vault. The system shall include a NEMA 4X fiberglass weatherproof control panel and interceptor tank.

2.02 Operating Conditions

A. Residential Systems:

1. The pump shall be capable of producing a minimum flow of five (5) gallons per minute at a total head (static and dynamic) of 200 feet and be capable up pumping twelve (12) gallons per minute at a total head of 150 feet. The pump shall not be capable of pumping more than twenty (20) gallons per minute at any point on the pump curve. The pump shall be capable of pumping at a total head condition of as low as fifty (50) feet without requiring a flow control device. Shutoff head shall be greater than 215 feet.
2. The pump shall be ½ horsepower, 115 volt, single phase, 60 Hz, 3450 RPM. The full load current shall not exceed 13 amps.
3. The pump shall be designed for pumping filtered effluent wastewater in high head applications. The pump shall be no more than four (4) inches in diameter for installation in a pump vault. The standard pump shall be manufactured by Myers, model 2NFL51-12EP-01, or equal.

B. Commercial Systems: Operating conditions may vary depending on application. Motor rating will vary depending on application, rating shall be recommended for the proposed application and operating conditions by the manufacturer and Engineer registered in the State of Mississippi. Pumps shall be manufactured by Myers, model 2NFL51-12EP-01 or equal for standard flow conditions (design flow rate 12 gpm) or Myers, model J1025BE for high flow conditions (design flow rate 25 gpm). Pumps shall not be capable of exceeding the shutoff head conditions of other pumps on the system as they may negatively impact the performance of existing systems. In certain systems duplex pumps may be required.

2.03 Interceptor Tanks

A. General

1. Construction
   a. Tanks shall have two (2) risers to provide access to equipment for maintenance and simplifying pumping of the primary screened effluent.
   b. Tanks shall be guaranteed for a period of twelve (12) months from date of installation.
   c. Tanks shall include at least one (1) baffle wall to protect the pump unit and filters from the solids that will build up over time.
   d. Tanks shall successfully withstand an above-ground static hydraulic test with zero leakage.
   e. The influent pipe shall be connected to a pvc tee fitting. A piece of pvc pipe shall be connected from the bottom of the tee to a point at least six (6) inches below the design low water level inside the tank. Thus the influent flow shall be deposited below any scum line that may form in the tank. The top of the tee shall be exposed to atmosphere to allow discharge of sewer in the event of a clog in the lower section.
   f. Connection points shall include flexible boots for influent and effluent sewer pipe connection points. And provide for water-tight connections.
   g. Minimum Design and Loading Criteria:
      (1) Designed for burial with a maximum cover of four (4) feet below finished grade. Design shall account for all hydrostatic and soil loading assuming the water table is at finished grade.
      (2) Designed for a minimum cover of twelve (12) inches with a concentrated wheel load.
      (3) Design Conditions:
         (a) 4 feet of bury with full hydrostatic load

(b) 4 feet of bury with full hydrostatic load and concentrated wheel load
(c) 1 foot of bury with concentrated wheel load
(d) Tank full of water and unsupported by soil

(4) Design shall be based on the following criteria and sealed by an Engineer Registered in the State of MS:
(a) Saturated Soil 140 lbs/cf and unsaturated soil 127 lbs/cf no less than 500 lbs/sf
(b) Lateral loading 62.4 lbs/cf determined from ground surface
(c) Concentrated wheel load of 2500 lbs.
(d) Allowable soil bearing value 1500 lbs/sf.

2. Risers and Lids
a. All risers shall be watertight.
b. Risers shall extent three inches above finished grade to allow for settlement and to provide positive drainage away from access points.
c. Risers for inspection ports shall be a minimum of eighteen inches in diameter. Risers containing pumping assembles or electrical splice boxes shall be a minimum of twenty-four (24) inches in diameter (simplex pumping applications), thirty inches (30) in diameter (duplex pumping applications), or larger as to provide sufficient space to remove internal vaults without removing splice boxes. Risers shall be a minimum of thirty (30) inches in diameter if tank's depth of bury is thirty-six inches (36) or greater.
d. Adhesive to adhere PVC or fiberglass risers to tanks shall be two-component, self-leveling, methacrylate adhesive. Risers with diameters of twenty-four (24) inch nominal diameters shall be attached using one pint of a two part epoxy manufactured by Orenco ADHP10 or ADHQ10 (concrete tanks) / SS115 (fiberglass tanks), Delta ISI 1500 Sealant, or approved equal. Thirty (30) inch risers shall require one (1) quart or the adhesive.
e. Risers shall be factory equipped with electrical and discharge grommets. Grommets shall be Delta or Polylok grommets and installed by the tank manufacturer to ensure water tightness.
f. One (1) lid shall be furnished for each riser.
g. Non-traffic lids shall be Polylok, or approved equal for concrete and polyethylene tanks. Lids shall be fiberglass with green non-skid finish and provide stainless steel bolts and wrench. Riser and lid shall be gasketed and able to support a 2500 lb. wheel load (this does not imply that PVC risers are intended for traffic loads).
h. Traffic bearing lids shall be cast iron frame and cover, Sather Manufacturing Co. Model 6024, 3060, 4036, or approved equal. Lids shall be cast with "JCUA SEWER" into it.

B. Concrete Tanks (<1500 Gallons)
1. Walls and bottom slabs shall be required to be poured monolithically-constructed with a separate top slab. The top slab may be poured with a portion of the side walls for a two (2) piece tank. Two (2) piece concrete tanks may be installed but must meet the same requirements as the one (1) piece tanks: rebar, sealant, etc., and be watertight. Sections shall be sealed water-tight with a preformed mastic or butyl gasket. Sections shall include a tongue and groove design for insuring the two sections are properly aligned. Reinforcement for the tank shall be designed spanning the shortest dimension using one-way slab analysis. Stresses in each face are determined by analyzing the tank cross-section as a continuous fixed frame. Casting the top in place with the bottom and sides of the

tank is required.

2. Concrete shall have a compressive strength of 4000 psi at 28 days. Concrete mix design will depend on the aggregate gradation and be determined by a professional engineer licensed in the State of Mississippi. Maximum aggregate size of ¾ inch. Mix shall provide for a cement content of 6.5 sacks per cubic yard of concrete. Water to cement ratio of approximately 0.35 shall be maintained. Fiber additives may be used to enhance water-tightness by controlling concrete shrinkage.
3. Reinforcing steel shall be grade 60, yield strength 60,000 psi. Reinforcement size and spacing per structural engineer based upon specific installation. Wire fabric is not acceptable.
4. Tank molds shall have attached vibrators to ensure adequate flow of concrete down the walls and across the bottom. Excess vibration will, however, cause aggregate to segregate. Proper curing techniques are necessary to ensure watertight tanks. Tanks shall not be moved until they have cured for seven days or have reached two-thirds of the design strength. Form release shall be Nox-Crete or equal. Diesel or other petroleum products are not acceptable.
5. Waterproofing of the concrete shall be included, such as Rheomac 300D (Integral Waterproofing Admixture) shall be mixed with the concrete. The admixture shall include red-pigmentation to insure proper mixture. Manufacturer's recommendations shall be strictly adhered to at all times. Any alternative sealants must be approved by the Authority prior to use.
6. The interior of the tank shall be sealed with a coal tar epoxy coating such as Ruff Stuff by Induron or equal. The coating shall be a minimum of 20 dry mils or as recommended by the manufacturer to protect the concrete and steel from the sewer gases. The coating shall be applied in accordance with the manufacturer's recommendations.
7. Test cylinders shall be taken from each batch of concrete and tested until minimum compression has been obtained.
8. Outlet risers shall be PVC as per ASTM D 1784 and tested in accordance with AASHTO M304M-89. PVC risers shall be installed by attaching riser to a tank adapter that is cast into the concrete tank mold. Adapter shall be Delta Model AD24, Polylok 3009-AR-C, or an approved equal. Structural adhesives such as Orenco's of Delta's single or 2 component adhesive may be used to attach the riser to the adapter. Any alternative adhesives must be approved by the Authority prior to use.
9. Tanks shall have a minimum wall thickness of four (4) inches and a minimum top and bottom slab thickness of six (6) inches.

C. Fiberglass Tanks (>1500 Gallons)

1. Tanks shall have sufficient structural integrity to withstand being pumped dry after installation and backfill without incurring structural deformation.
2. All fasteners shall be stainless steel.
3. Tanks shall have a minimum weight to volume ration of 0.35 lbs per total gallon capacity. Ratio to be calculated by dividing the net weight of the tank only (without lids, risers, compartment walls, t-baffles, etc.) by the total capacity of the tank. Total capacity of the tank shall be defined as the volume in gallons of the tank when completely filled without airspace.
4. Materials Properties
   a. Tensile Modulus – 1,000,000 psi
   b. Ultimate Tensile Strength – 10,000 psi
   c. Ultimate Compressive Strength – 21,000 psi
   d. Ultimate Flexural Strength – 18,000 psi
5. The wall and baffle thickness shall be as determined by the manufacturer to meet the performance standards required herein and shall be a minimum of 3/16 inch.

6. Provide one quart of resin to apply to all cut or ground edges that could be caused by field installed option. Resin shall be necessary to insure that no glass fibers are exposed and all voids are filled.
7. Tanks shall be manufactured by Xerxes or equal.

2.04 Effluent Pump System

A. High Head Effluent Pump

1. Pumps shall be rated for continues duty and up to 300 starts in a 24 hour period for standard residential and commercial applications. High flow situation that require one (1) horsepower pumps shall be rated for a minimum of 100 starts per hour.
2. Pumps shall have a 1¼ inch discharge standard or a 2" maximum of larger (high flow) applications.
3. Suction bowl and discharge bowl shall be chemically resistant reinforced nylon for standard applications and brass for high flow applications.
4. Pump shall have an integral check valve built-in.
5. Pump fasteners and shell shall be 300 series stainless steel.
6. Pump shall include a replaceable 10' 14-3 jacketed SJOW-A power cord.
7. Pump shall include built-in overload and surge arrestor.
8. Pumps shall be UL and CSA listed as an effluent pump.
9. Pumps shall be provided with a non-prorated five (5) year warranty

B. Pump Vault

Pump vault shall be screened with a filter with a minimum effective screen area of 16.8 square feet (NOTE: Commercial and multiple-user tanks may require a larger or duplex pump vault, sizes of these shall be individually determined and submitted to the Authority for approval). The screened pump vault shall consist of a twelve (12) to eighteen (18) inch diameter, fifty-four (54) inch deep PVC vault with eight (8) – one and three eight (1 3/8) inch diameter holes evenly spaced around the perimeter, located approximately to allow for maximum sludge and scum accumulation before requiring pumping. Holes shall be at approximately 80% of the minimum liquid level. Housed inside the PVC vault shall be the filter assembly. Attached to the vault is a four (4) inch diameter flow inducer to accept the high head effluent pump. Pump vault shall be Eco Filter DEPV-57-20-1 as manufactured by Delta Environmental or equal.

C. Pump Discharge Piping

1. Piping shall be schedule 40 PVC pipe with a minimum diameter of one (1) inch.
2. Piping shall include an anti-siphon ball valve and check valve made of PVC with a pressure rating of 150 psi minimum.
3. PVC flex hose shall be included with a working pressure of 100 psi minimum.
4. Flow controller shall be available to limit flow to six (6) gallons per minute. Flow controller shall not be required for operation when head conditions exceed 50 feet.
5. Discharge Piping shall be DEPPM-1 as manufactured by Delta Environmental or equal.

D. Electrical and Controls

1. Electrical splice box shall be approved for wet locations, equipped with four (4) electrical cord grips and a ¾ inch outlet fitting. Box shall include UL listed waterproof butt splice connectors. Boxes shall be NEMA 4X rated.
2. Float switch assembly shall include three switch floats mounted on a PVC stem attached to the filter cartridge. Floats shall be adjustable and removable without removing the pump vault. Each float lead shall be secured with a nylon strain relief bushing at the splice box. Float shall be UL or CSA listed and shall be rated for a minimum of 5.0A @ 120 VAC. The high and low level alarms and on/off functions shall be preset as recommended by the pump manufacturer to allow for adequate cycle times or as preset by engineered plans. Floats shall be manufactured by Delta Model FSNO25 or equal.

3. Controls and Alarms:
   a. General:
      (1) All components shall be listed per UL 508
      (2) Panels shall be repairable in the field without the use of soldering irons or substantial disassembly.
      (3) Panels shall be manufactured by Gulf Coat Pump Model PS2E-11 or approved equal.
   b. Standard Panel Components:
      (1) Motor Start Contactor:
         (a) 115 VAC: 14 FLA, ¾ hp, 60 Hz; 2.5 million cycles at FLA (10 million as 50% of FLA)
         (b) 230 VAC; 14 FLA, 2 hp, 60 Hz; 2.5 million cycles at FLA (10 million as 50% of FLA)
      (2) Toggle Switch: Single pole, double-throw HOA switch, 20 amps, 1 hp.
      (3) Intrinsically Safe Control Relays: 115 VAC. Listed per UL 913, for Class 1 Div. 1, Groups A, B, C, D hazardous locations. Larger enclosure required.
      (4) Controls Circuit Breaker: 10 amps, OFF/ON switch. Single-pole 115 VAC. DIN rail mounting with thermal magnetic tripping characteristics.
      (5) Pump Circuit Breaker: 20 amps, OFF/ON switch. Single-pole 115 VAC, double-pole 230 VAC. DIN rail mounting with thermal magnetic tripping characteristics.
      (6) Audio Alarm: 80 dB at 24", warble-tone sound.
      (7) Visual Alarm: 7/8" diameter red lens, "Push-to-Silence". NEMA 4, 1-watt bulb, 115 VAC.
      (8) Panel Enclosure: Measures 11.52" high x 9.31" wide x 5.43" deep. NEMA 4X rated, constructed of UV-resistant fiberglass; hinges and latch are stainless steel. Conduit couplings provided.
      (9) S1RO Panel Ratings: 115 VAC, 3/4 hp, 14 amps, single phase, 60 Hz.
      (10) S2RO Panel Ratings: 230 VAC, 2 hp, 14 amps, single phase, 60 Hz.
      (11) Event Counter: 115 VAC, 6-digit, non-resettable.
      (12) Elapsed Time Meter: 115 VAC, 7-digit, non-resettable. Limit of 99,999 hours; accurate to 0.01 hours.

PART 3 – EXECUTION

3.01 Installation

A. All pumping system components shall be installed in accordance with the manufacturer's recommendations, the Engineered Plans, and all state and local regulations.

B. The pump control panel shall be mounted on an exterior wall nearest the tank and pump if possible. If not mounted to a garage or outbuilding where the sound of the motor contactor engaging will not be noticed, installation should include use of sound-deadening insulation. Post and panel mounting assemblies are also available where specifically called for. The control panel shall be located within 50 feet and in sight of the pump motor or shall be provided with a lockable disconnect switch. The panel, when possible, shall be mounted in the shade and protected from the weather. The panel shall be located about 42" above the ground and where it will be accessible for maintenance.

3.02 Testing

A. Follow the following test procedures to ensure water-tightness. Every tank should be tested at the factory and a certification form shall be attached at the time of delivery.

B. Fill the tank to its brim with water and let it stand for 24 hours. To expedite larger orders a vacuum test may be substituted at the factory, and again after the tanks have been delivered to the job site. A vacuum test may not, however, take the place of the final installed static water test.

C. Measure the water loss. If there is no water loss during these first 24 hours, the tank is acceptable for installation. Some water absorption, however, may occur during this first time period. If so, refill the tank and determine any ex-filtration by measuring the water loss over the next two (2) hours. Any water loss is cause for rejection.

D. For field testing, install the tank and repeat steps 1 and 2. Test the seal between the riser and the tank top for water-tightness by filling the riser with water to a level 4" above the top brim of the tank. To prevent hydrostatic uplift damage to the top joint of the tank, do not allow the level of water in the riser to exceed the level of the backfill.

E. Jackson County Utility Authority reserves the right to conduct tests in the field, and should the tank not meet the test requirements, the tank will be repaired or replaced by the certified installer.

*** * END OF SECTION ****

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