

**TECHNICAL SPECIFICATIONS  
FOR  
HUEY P. LONG BRIDGE WIDENING  
WATER AND SEWER RELOCATION  
EAST BANK JEFFERSON PARISH, LOUISIANA**

**WATER MAIN, PUMP STATION,  
GRAVITY SEWER, AND SEWER FORCE MAIN**

**LDOTD PROJECT NO. 006-01-0021**

**PROPOSAL NO. \_\_\_\_\_**



**SEPTEMBER 2007**

**PREPARED BY**

**DIGITAL ENGINEERING AND IMAGING INC.  
527 W. ESPLANADE AVENUE, SUITE 300  
KENNER, LA 70065**

**HARTMAN ENGINEERING, INC.  
527 W. ESPLANADE AVENUE, SUITE 300  
KENNER, LA 70065**

**FOR INFORMATION ONLY**

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FOR  
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WEST BANK JEFFERSON PARISH, LOUISIANA**

**WATER MAIN, PUMP STATION,  
GRAVITY SEWER, AND SEWER FORCE MAIN**

**LDOTD PROJECT NO. 005-10-0037**

**PROPOSAL NO. \_\_\_\_\_**



**SEPTEMBER 2007**

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Appendix B	Jefferson Parish Department of Engineering Gravity Sanitary Sewer System General Standard Notes (on green paper)

SECTION 01030  
SPECIAL PROJECT PROCEDURES

PART 1 - GENERAL

The Contractor shall be required to follow a schedule as described in this section, which will include submittal of excavation and dewatering plans.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

There are certain schedule requirements of the project that will be strictly enforced. Non-compliance with any of these requirements will subject the Contractor to assessment of Liquidated Damages, in addition to any other contractual obligations specified elsewhere in these documents. These requirements are as follows:

- A. The Contractor shall submit plans of excavation and dewatering (for all sites) to the Engineer for review within 7 days after date of Notice to Proceed or partial Notice to Proceed (for submittal). A 7-day period will be allocated for a re-submittal if needed.
- B. The above milestone schedules include, where applicable, a 10-day allowance for review of the excavation and dewatering plans, and a 10-day allowance for review of any resubmittal required by the Engineer. If these review time requirements exceed the above allowances, through no fault of the contractor, the time frame for the above completion shall be adjusted accordingly. These 10-day and 10-day periods shall be measured from date of delivery to Engineer until date of return to the Contractor. Any such delays shall not be cause for additional compensation. These review periods supersede that stated in the section pertaining to "Shop Drawings, Product Data and Samples", and only apply to the excavation and dewatering plans.

One re-submittal for each excavation and dewatering plan will be allowed in the above referenced time allowance. Any additional time required as a result of additional or incomplete submittals by the Contractor, shall not be a cause for any time extension.

- C. Contractor shall not commence any work prior to the submittal and completion of the Owner/Engineer review of the excavation and dewatering plans.
- D. The Contractor shall be subject to liquidated damages should any of these above time limits exceed the prescribed time.

- E. Any delay on one site shall not be a cause for time extension unless it is demonstrated that the activity is on critical path and completion of the entire project is delayed thereby. Otherwise any justifiable delays will result in an extension of required completion date only for the site directly affected.
- F. Contractor is advised that the various stations in this project are to operate with each other and other stations in the System. Contractor shall plan his sequencing of construction and putting the stations in service as to not cause overloading of downstream system or interrupt service. The Contractor shall coordinate any change in the existing system in advance with Sewerage Department operational personnel.
- G. Sequence of Construction. The Contractor shall construct the proposed sewer improvements in the sequence as listed on the project drawings.

END OF SECTION

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SECTION 01045  
CUTTING AND PATCHING

PART 1 - GENERAL

- 1.01 As provided in the General Conditions and herein, Contractor shall perform all cutting and patching required for the Work, and as may be necessary in connection with uncovering Work for inspection or for the correction of defective Work.
- 1.02 Contractor shall perform all cutting and patching required for the installation of improperly timed Work, to remove samples of installed materials for testing, and to provide for alteration of existing facilities or the installation of new Work in existing construction.
- 1.03 Contractor shall submit to the Engineer enough photographs of the existing roadway so that the Engineer can establish the existing condition of the roadway prior to beginning any work.
- 1.04 Except when the cutting or removal of existing construction is specified or indicated, Contractor shall not undertake any cutting or demolition, which may affect the structural stability of the Work or existing facilities.
  - A. Contractor shall provide all shoring, bracing, supports, and protective devices necessary to safeguard all Work and existing facilities during cutting and patching operations.
- 1.05 Materials shall be cut and removed to the extent indicated on the drawings or as required to complete the Work. Materials shall be removed in a careful manner with no damage to adjacent facilities or materials. Materials that are not salvageable shall be removed from the site by Contractor.
- 1.06 All Work and existing facilities affected by cutting operations shall be restored with new materials, or with salvaged materials acceptable to Engineer, to obtain a finished installation with the strength, appearance, and functional capacity required. If necessary, entire surfaces shall be patched and refinished.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

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SECTION 01050  
SITE CONDITIONS SURVEY

PART 1 - GENERAL

- 1.01 Prior to the start of construction on the Contract, the Contractor shall furnish to the Engineer audio-video tapes of the construction areas. The tapes will remain available for viewing by the Contractor and may be reviewed by him for any assistance that the tapes may provide in resolving disputes that arise with the property owners claiming improper restoration of their properties. The tapes will also be used as a guide by the Engineer, prior to issuance of final payments, in determining the adequacy of restoration and the extent of damages attributable to the Contractor's work. As a supplement to the pre-construction video coverage tapes, the Contractor shall also perform a survey that documents the elevations and locations of public and private property within the construction zone-of-influence. All survey notes and records shall be submitted to the Engineer for approval and shall become the property of the Owner.
- 1.02 The Contractor shall furnish to the Engineer two sets of audio-video tapes and elevation survey notes showing in detail the construction areas prior to start of construction of the construction contract. The Engineer, after reviewing them, will forward one set of each to the Owner within 10 days of receipt. The tape(s) and written records shall become the property of the Owner.
- 1.03 SPECIFICATIONS DEVIATIONS

Any deviation from these specifications must have the written approval of the Owner/Engineer.

PART 2 - PRODUCTS

2.01 TECHNICAL REQUIREMENTS

- A. The total audio-video recording system and the procedures employed in its use shall be such as to produce a finished product that will fulfill the technical requirements of the project, as well as those more subjective requirements of high-quality audio and video production. The video portion of the recording shall reproduce bright, sharp, clear pictures with accurate colors and shall be free from distortion, tearing, rolls or any other form of picture imperfection. The audio portion of the recording shall reproduce precise and concise explanatory notes by the camera operator with proper volume, clarity and freedom from distortion. The supplemental elevation data submitted in the elevation survey notes shall be referenced to the video coverage by project stations.
1. Recorder. The recorder shall record the color signal with a minimum horizontal resolution of 240 lines. The recorder shall be of the 1/2-inch VHS format or approved equal.
  2. Camera. When taping areas accessible to conventional wheeled vehicles, the

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color video camera shall have a horizontal resolution of at least 550 lines at center (e.g. JVC KY 1900 or equivalent). When taping areas not accessible to conventional vehicles, the color video camera shall have a horizontal resolution of at least 300 lines at center.

## 2.02 OPERATOR EXPERIENCE

The video survey shall be conducted by an independent company experienced in this field. The operator in charge of the video recording must have had previous experience video documenting a minimum of fifty miles of preconstruction work. Any apprentice operators must be continuously supervised by an above-described experienced operator. The elevation survey must be performed by independent surveyor(s) experienced in this field.

## PART 3 - EXECUTION

### 3.01 GENERAL

- A. Coverage. The video recording and elevation survey shall include coverage of all surface features located within the construction zone-of-influence. This zone shall be defined as (1) the area within the permanent and temporary easements and areas adjacent to these easements that may be affected by routine construction operations, (2) road right-of-way, (3) areas directed by the Owner. The surface features within the construction zone shall include, but not be limited to, all roadways, pavements, curbs, driveways, sidewalks, culverts, drainage ditches, canals, pipelines, pipeline markers, pipeline canal crossings, embankments, headwalls, retaining walls, buildings, landscaping, shrubbery and fences. Of particular concern shall be the existence, or non-existence, of any faults, fractures or defects. Elevations on abutting drives and walks shall be taken at approximately 20-foot intervals and at the point of juncture with any structure to which they are attached. In addition, elevations shall be taken of all house slabs along the route.

The video survey must cover the exterior of all properties in the zone of influence.

- B. Identification Summary. At the start of production, and at the beginning of a new street or easement, an identification summary shall be read into the record while, at the same time, a wide-angle view with numeric displays shall be provided for a visual record. This summary will include (1) tape number, (2) job title, (3) job location, (4) positional location at job start, (5) date and time, (6) weather and (7) any other notable conditions.
- C. Character Printout. All video recordings must, by electronic means, display continuously and simultaneously, generated transparent digital information to include (1) the date and the time of the recording, (2) the Engineering stationing corresponding to the stationing on the plans, or as directed by the Engineer, (3) the name of the street, easement or building being documented, (4) the project name, and (5) the direction of travel and the viewing side. The time and date shall appear linearly in the bottom left hand corner (e.g. 7-20-2007 8:30:15).

Plan stationing shall be expressed in engineering symbols and shall appear directly beneath the time and date information (e.g. 87 + 03). The remainder of the printed information shall appear at the bottom of the viewing screen (e.g. N on First St. V/E Maybury Twp.). To maximize viewing area no more than twenty-four rasters shall be used to express the transparent digital information.

- D. Visibility. No recording SHALL be done during periods of significant precipitation, mist or fog. The recording shall only illuminate the subjects of recording.
- E. Rate of Travel. The vehicle's rate of travel shall be indirectly proportional to the number, size and value of the surface features within that construction area's zone-of-influence. The average rate of travel shall not exceed forty-eight feet per minute.
- F. Camera Elevation. To ensure proper perspective and to capture optimal detail, the distance from the camera lens to the ground shall not be less than twelve feet when conventional wheeled vehicles are employed.

### 3.02 RECORDING SCHEDULE

The preconstruction video recording shall be performed prior to the placement of any construction materials or equipment on the proposed construction site, but not more than seven weeks prior to the placement of materials or equipment.

### 3.03 TAPE INDEXING

All audio-video tapes and their storage cases shall be properly identified by audio-video tape index number, project title and general project location. Displayed on the storage case of each audio-video tape shall be a log of that tape's contents. That log shall describe (1) the various segments contained on that tape in terms of the names and the sides of the streets or easements, (2) coverage start, direction and endpoints, with corresponding video tape player counter numbers. A cumulative index correlating the various segments of coverage to their corresponding tapes shall be typed and supplied to the Owner.

### 3.04 UNACCEPTABLE DOCUMENTATION

The Engineer/Owner shall have the authority to reject all or any portion of the audio-video tape documentation and survey notes not conforming to the specifications. Those rejected portions shall be retaped or resurveyed at no additional cost to the Owner.

END OF SECTION

SECTION 01070  
ABBREVIATIONS, SYMBOLS, TRADE NAMES, AND MATERIALS

PART 1 - GENERAL

1.01 DESCRIPTION

This Section of the Specifications lists many of the trade associations and general standards that are referenced repeatedly in the Specifications, along with the abbreviations commonly used for these references. This also specifies certain general requirements for the Work, in relation with standards, and with trade associations and their published recommendations. Refer to individual Specification Sections for names and abbreviations of other trade associations and standards that are referenced less repeatedly.

1.02 ABBREVIATIONS AND NAMES

The following abbreviations as referenced in the Contract Document are defined to mean the associated names.

AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AGA	American Gas Association
AGMA	American Gear Manufacturers Association
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
ANSI	American National Standards Institute
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating, and Air Conditioning Engineers
ASTM	American Society for Testing and Materials
ASME	American Society of Mechanical Engineers
AWPA	American Wood Preservers Association
AWS	American Welding Society
AWWA	American Water Works Association
CIPRA	Cast Iron Pipe Research Association
CRSI	Concrete Reinforcing Steel Institute
Fed. Spec.	Federal Specification
IEEE	Institute of Electrical and Electronic Engineers
IES	Illuminating Engineering Society
LDOTD	Louisiana Department of Transportation and Development
NEC	National Electric Code

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NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
OSHA	Occupational Safety and Health Administration
SAE	Society of Automotive Engineers
SHBI	Steel Heating Boiler Institute
UL	Underwriters Laboratories, Inc.

### 1.03 QUALITY ASSURANCE

- A. General Applicability Standards. Except where more explicit or more stringent requirements are specified or are required by governing regulations, applicable standards of the construction industry have the same force and effect for the Work; and are made a part of the Contract Documents by reference, as if copied directly into the Contract Documents, or as if published copies were bound herewith.
- B. Referenced Standards. Referenced standards shall have precedence over non-referenced standards, which are intended by the manufacturer for application to work similar to that required on the Project.
- C. Non-referenced Standards. Industry standards not specifically referenced for applicability to the Work, including standards listed in this Section but not referenced elsewhere, have no particular applicability to the work, except as a general measurement of whether the performed work complies with standards of construction industry.
- D. Comply with the standard that was in effect at the date of bidding except where specifically indicated to comply with a publication of another date.
- E. Copies of Standards. In general, copies of applicable standards have not been bound with the Contract Documents. Where copies of standards are needed for proper performance of the Work, the Contractor is required to obtain such copies directly from the publication source.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

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SECTION 01390  
EXCAVATION PLAN

PART 1 - GENERAL

1.01 RELATED ITEMS SPECIFIED ELSEWHERE.

Special Project Procedures  
Dewatering and Pressure Relief  
Subsurface (Geotechnical) Investigations

1.02 SUBMITTALS

Prior to commencing any work, the Contractor shall submit to the Engineer for review his excavation and dewatering plans. Such review is to demonstrate that the Contractor has fulfilled the requirements of this section. Separate submittals shall be made for each site and for force main and gravity sewer trenching as applicable. Any subsequent deviation from the approved plan or amendments thereto must have the prior approval of the Engineer.

The excavation and dewatering plans shall be stamped and certified by a professional Engineer(s) registered in the State. Said Engineer(s) shall have demonstrated experience in groundwater hydraulics and steel sheet pile cofferdam design, respectively, and as applicable.

The Engineer(s) designing the excavation and dewatering plans shall have professional liability insurance of not less than \$500,000.00. Proof of insurance shall be submitted with the plans in the name of the Engineer performing such designs. The submitted insurance certificate shall name Jefferson Parish, and Hartman Engineering, Inc. as holders of the insurance certificate.

Should the design of the Contractor's dewatering plan and the cofferdams not be performed by the same Engineer, such Engineers shall coordinate their designs. Acknowledgement of the design coordination must be submitted with their design by both Engineers.

Any Engineers utilized for the design of the dewatering plan and the cofferdam design shall conform to all of the above requirements.

1.03 SAFETY REQUIREMENTS

The methods and operation outlined in the excavation plan shall comply with all local codes and laws, and authorities having jurisdiction.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

Information furnished and/or available to the Contractor contains the results of soil borings and laboratory test on samples taken from those borings and the results of analyses based on subjective interpretation of the borings and laboratory test data. The Contractor shall provide engineering

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analyses based on independent interpretation of the borings and laboratory test data provided. Inclusion of soil data and availability of the results of design analyses should not be construed as relieving the Contractor of providing data evaluation and design analyses appropriate to the proper design of a cofferdam and pressure relief system. These include, as a minimum, elevations to determine aquifer coefficients, design analyses to determine total flow and flow to individual wells, the determination of the constituents of individual wells and well filters, and the potential affects of prolonged pumping operations on adjacent structures.

For each site, the Contractor shall submit his proposed method of construction which shall include the methods for excavating, protection of existing utilities, dewatering and pressure relief, sheeting, shoring and bracing, and backfilling which he plans on using to perform the work included in the contract documents. The plan shall include but not be limited to:

- a. Type of major excavation equipment and type of equipment and method of driving sheeting
- b. Sheeting, shoring and bracing plan per Section 02160
- c. Dewatering and pressure relief plan per Section 02140
- d. Hauling equipment, and proposed excavation quantities
- e. Proposed haul routes of excavation and material supply equipment
- f. Handling and storage of materials on site
- g. Provisions for compliance with permits and regulations

The Contractor shall include in his plan a section describing aspects of the project where a modification of the proposed plan will occur due to field conditions. This shall include a detailed explanation of the methods of construction, which he plans to use in specific areas or as required by the Engineer. The Contractor shall have the excavation plan stamped and certified by a Professional Engineer registered in the State as previously specified.

The Contractor's design for the excavation, sheeting, shoring, bracing and dewatering and pressure relief for force main and gravity sewer trenching and installation must also be submitted as well.

The Contractor shall revise his plan when the Contractor's construction operation being used on the project changes materially from the original submittal or as required by the Engineer.

END OF SECTION

## SECTION 01600 MATERIAL AND EQUIPMENT

### PART 1 - GENERAL

#### 1.01 REQUIREMENTS

All materials and equipment furnished and installed under this contract shall conform to the general stipulations set forth in this section except as otherwise specified in other sections of the specifications.

#### 1.02 WORKMANSHIP AND MATERIALS

Contractor shall guarantee all equipment against faulty or inadequate design, improper assembly or erection, defective workmanship or materials, and leakage, breakage or other failure. Materials shall be suitable for service conditions.

All equipment shall be designed, fabricated, and assembled in accordance with the best modern engineering and shop practice. Individual parts shall be manufactured to standard sizes and gauges so that repair parts furnished at any time, can be installed in the field. Like parts of duplicate units shall be interchangeable. Equipment shall not have been in service at any time prior to delivery, except as required by tests.

Except where otherwise specified, structural and miscellaneous fabricated steel used in equipment shall conform to AISC standards. All structural members shall be designed for shock or vibratory loads. Unless otherwise specified, all steel which will be submerged, all or in part, during normal operation of the equipment shall be at least 1/4 inch thick.

#### 1.03 RESPONSIBILITY FOR MATERIALS AND EQUIPMENT

Contractor shall be fully responsible for all materials and equipment, which he has furnished, and shall furnish necessary replacements at any time prior to expiration of the Correction Period.

The Contractor shall stock additional supplies of material and equipment, as the Contractor deems necessary for timely and efficient execution of this contract.

### PART 2 - PRODUCTS (NOT USED)

### PART 3 - EXECUTION (NOT USED)

END OF SECTION

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SECTION 01610  
TRANSPORTATION AND HANDLING

PART 1 - GENERAL

All materials shall be suitably packaged to facilitate handling and protection against impact, abrasion, discoloration, and other damage. All painted surfaces that are damaged prior to acceptance of equipment shall be repainted to the satisfaction of Engineer.

Each item, package, or bundle of material shall be tagged or marked as identified in the delivery schedule or on the Shop Drawings. Complete packing lists and bills of material shall be included with each shipment.

The Contractor is responsible for transporting all Owner-furnished items from their stored locations to the appropriate jobsite.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

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## SECTION 01620 STORAGE AND PROTECTION

### PART 1 - GENERAL

#### 1.01 STORAGE

Contractor shall be responsible for providing off-site storage arrangements. This work shall be considered a subsidiary obligation of the Contractor and all costs in connection therewith shall be included in the unit price or lump sum price items bid. Off-site storage arrangements shall be acceptable to Owner for all materials and equipment not incorporated into the work but included in Applications for Payment. Such off-site storage arrangements shall be presented in writing, and shall afford adequate and satisfactory security and protection. Off-site storage facilities shall be accessible to Engineer.

Contractor will be permitted to use available land belonging to Owner (upon written permission), on or near the site of the Work, for construction purposes and for the storage of materials and equipment. The location and extent of the areas so used shall be as indicated on the Drawings or as directed by the Engineer.

#### 1.02 SHOP PAINTING

All steel and iron surfaces shall be protected by suitable paint or coatings applied in the shop as specified in the special coating section. Surfaces, which will be inaccessible after assembly, shall be protected for the life of the equipment. Exposed surfaces shall be finished smooth, thoroughly cleaned, and filled as necessary to provide a smooth uniform base for painting. Surfaces to be painted after installation shall be shop painted with at least two coats of a primer that will adequately protect the equipment until finish coats are applied. Electric motors, speed reducers, starters, and other self-contained or enclosed components shall be shop finished with a high-grade oil-resistant enamel as long as it does not interfere with operation of the component parts. Coatings shall be suitable for the environment where the equipment is installed.

#### 1.03 LUBRICATION

Equipment shall be adequately lubricated by systems that require attention no more frequently than weekly during continuous operation. Lubrication systems shall not require attention during startup or shutdown and shall not waste lubricants.

Lubricants of the type recommended by the equipment manufacturer shall be provided in sufficient quantity to fill all lubricant reservoirs and to replace all consumption during testing, startup, and operation prior to acceptance of equipment by Owner.

Lubrication facilities shall be convenient and accessible.

#### 1.04 BOLTS

Equipment suppliers shall furnish suitable bolts for each item of equipment. Anchor bolts if required together with templates or setting drawings, shall be delivered sufficiently early to permit setting the anchor bolts when the structural concrete is placed. Bolts shall comply with the requirements specified in other sections.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

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SECTION 01625  
START-UP

PART 1 - GENERAL

1.01 GENERAL

- A. All equipment shall be tested and approved by the Parish prior to placing the facilities into operation.
- B. All lubricants, fuel, water and power necessary for start-up, initial operation and tests shall be furnished by the Contractor. After the testing phase has been completed and accepted by the Parish, all equipment, machines, etc., shall be topped out with the respective oil, gas, lubricants, etc., as recommended by the manufacturers.
- C. In addition to furnishing, delivering, installing, and testing equipment, the Contractor shall provide the services competent manufacturing representatives for the periods indicated in other sections of these Specifications. Such representative shall assist the Parish's personnel in start-up by instructing the operating personnel of the Parish in the maintenance and operation of the equipment, conducting tests, and making recommendations for producing the most efficient results. These services shall be made during the initial operation of the completed facilities and be over and above any services necessary during erection or to correct defective materials or workmanship during the guarantee period. These representatives shall be specially trained and qualified for installation, adjustment, start-up, and testing work and shall not be sales representatives only. The cost of such representation, including subsistence and travel, shall be included under this contract.
- D. It is the intent that all pumping, electrical, instrumentation and process equipment be fully tested, both individually and as complete process/system units, both manually and in the fully automatic mode, through the simulation or actual occurrence of all required or Engineer directed operating and sequencing conditions.
- E. In the event of failure to demonstrate satisfactory performance of equipment of any facility on the first or any subsequent attempt, all necessary alterations, adjustments, repairs and replacements shall be made at the Contractor's expense. When the equipment or facility is again ready for operation, it shall be brought on-line and a new test shall be started. This procedure shall be repeated as often as necessary until the equipment or facility has operated continuously to the satisfaction of the Parish and Engineer, for the specified duration.

- F. Do not, at any time during start-up, allow any equipment or facility to be operated in a manner which subjects equipment to conditions that are more severe than the maximum allowable operating conditions for which the equipment was designed.
- G. Comply with federal, state and local codes and regulations and utility company requirements.
- H. Comply with Parish Health Department regulations, Louisiana Department of Environmental Quality regulations and Louisiana Department of Health and Hospitals regulations.
- I. Prior to requesting issuance of the Certificate of Substantial Completion, start-up will be completed as specified herein and in other sections of these specifications.

## PART 2 - MATERIALS (NOT USED)

## PART 3 – EXECUTION

### 3.01 PRELIMINARY MATTERS

- A. General Requirements:
  - 1. Successfully execute the step-by-step procedure of start-up and performance demonstration specified hereinafter.
  - 2. The start-up and performance demonstration shall be successfully executed prior to substantial completion and acceptance by the Parish.
  - 3. Field acceptance tests shall be witnessed by the Parish and Engineer. At least thirty (30) calendar days prior to scheduled testing. Contractor shall submit details of all test procedures to the Engineer for review and approval.
  - 4. All performance tests and inspections shall be scheduled at least ten (10) Working Days in advance of as otherwise specified with the Parish and Engineer. All performance tests and inspections shall be conducted during the normal workweek of Monday through Friday, unless otherwise specified.
  - 5. The Contractor shall fully responsible for the proper operation of equipment during tests and instruction periods and shall neither have nor make any claim for damage, which may occur to equipment prior to the time, when the Parish officially takes over the operation thereof.
- B. Preparation for Start-Up:

1. Upon completion of construction the entire system shall be filled and flushed with reclaimed water and hydraulically checked for leaks, cracks, and defects in accordance with the section pertaining to “Pipeline and Sewer Pressure and Leakage Testing” of these specifications.
  2. All mechanical and electrical equipment shall be checked to ensure that it is in good working order and properly connected. Preliminary run-ins of equipment shall be made. All systems shall be purged as required. All pipelines, which are hydraulically checked, shall be drained and returned to their original conditions once the water testing is complete.
  3. The Contractor shall furnish all equipment, meters, gauges, etc., required for start-up and testing. All instruments and controls shall be calibrated through their full range. Any other adjustments required for proper operation of all instrumentation and control equipment shall be made.
  4. The Contractor shall perform all other tasks needed for preparing and conditioning all process equipment and utilities necessary to operate all processes within the plant.
  5. No testing or equipment operation shall take place until it has been verified by the Engineer that all specified safety equipment has been installed and is in good working order.
  6. No testing or equipment operation shall take place until it has been verified by the Engineer that all lubricants, tools, maintenance equipment, spare parts, and approved equipment operation and maintenance data manuals have been furnished as specified.
- C. Submit Start-up Work Plans to the Engineer in accordance with Section 01340 or as directed by the Engineer. The Start-up Work Plan shall contain at least the following:
1. Contractor’s schedule for testing and start-up of all pumping, electrical, instrumentation and process equipment.
  2. Schedule of visits by factory representatives for equipment testing and start-up and operator training.
  3. Outline of how the Contractor proposed to conduct the start-up operation on a process-by-process, unit-by-unit basis.

### 3.02 FIELD TESTS

- A. Field tests shall be made to confirm compliance with contract and to establish compliance with technical provisions. The tests shall be performed by the Contractor as herein specified, if required. All gravity sewers, force mains, potable water lines, pressure piping, and equipment shall be tested in the field in the presence of the Engineer or Parish or his authorized representative, in the manner prescribed in the Sections of these Specifications pertaining to such installation.
- B. Hydrostatic and Leakage Tests-Potable Water Lines and PVC, HDPE and ductile iron pressure lines and force mains:
1. Pressure and leakage tests of PVC and ductile iron shall be performed in accordance with the applicable sections of the American Water Works Association Standard for Installation of Cast Iron/Ductile Iron Water Mains, AWWA C-500, except as herein modified.
  2. High density polyethylene pipe shall be tested in accordance with Technical Report TR-30 prepared by the Plastic Pipe Institute.
  3. After completion of all work and before final acceptance, a hydrostatic and leakage test shall be conducted. Potable water shall be used to flush and test the water mains, and all other piping. Air shall not be used for testing.
  4. A hydrostatic test of the completed pipelines shall be performed under a static water pressure of 50 percent above the working pressure but not less than the following tabulation for pressure/reclaimed/reuse water pipelines and 200 percent above the working pressure but not less than the following tabulation for new gravity treatment process pipelines and 125 percent for existing process pipelines. The duration of each test shall be for two (2) hours.

Water pipelines 2-inch through 12-inch	100 psi
Water pipelines 13-inch and larger	150 psi
Sewer pressure mains – all sizes	100 psi
Plant Water (NPW) Pipelines	150 psi
Treatment plant gravity process pipelines	40 psi
Other pipelines	100 psi
  5. The test pump, pipe connection, test gauges, meters, plugs, caps, tape into the pipelines, and all necessary apparatus, including personnel to accomplish the test shall be furnished by the Contractor.

6. All exposed pipes, fittings, valves, hydrants, and joints will be carefully examined during the test, and all joints showing a visible leakage shall be made tight. All defective pipe, fittings, valves, hydrants, and accessories shall be removed from the line and replaced by the Contractor.
7. The Contractor may backfill the trench before he tests the line if he so desires, but he shall open up the trench at his own expense to repair the leaks.
8. A leakage test shall be conducted after the pressure test has been satisfactorily completed. The Contractor will furnish the gauge for this leakage test. All visible leaks shall be corrected regardless of the total leakage as shown by the test. All lines which fail to meet these tests shall be repaired and retested as necessary, until test requirements are complied with. The duration of each leakage test shall be two (2) hours.
9. The installation will not be accepted until the leakage is less than the number of gallons per hour as determined by the formula:

$$L = \frac{SD(P)^{0.5}}{133,200}$$

in which "L" equals the allowable leakage, in gallons per hour; "S" is the length of the pipe tested, in feet; "D" is the nominal pipe diameter, in inches; and "P" is the average test pressure during the leakage test, in pounds per square inch gauge.

- a. The allowable leakage per 1000 linear feet of pipeline tested is tabulated as follows:

Allowable Leakage per 1000 Feet of Pipeline  
(gallons per hour)

Nominal Pipe Diameter (Inches)

Test Pressure (psi)	2	4	6	8	12	16	20	24	30
100	0.2	0.3	0.5	0.6	0.9	1.2	1.5	1.8	2.1
150	0.3	0.4	0.6	0.7	1.1	1.5	1.8	2.2	2.6



- b. Leakage has been determined as the allowable leakage for water mains (including all pressure and reclaimed water mains) permitted by Section 4.1 of AWWA/ANSI C600.

Valves in the section under test shall be operated through several complete cycles of closing and opening. In addition, each valve shall be closed and the test pressure applied to one end of the valve only. Each end of the valve shall be tested in this manner. There shall be no visible leakage through the valves, and the valves shall not show any evidence of movement or structural distress.

- c. All restrained pipe sections and thrust blocks shall be completely backfilled before testing.

- 10. All tests shall be made under supervision of the Engineer and a representative of the Parish. No additional compensation will be paid to the Contractor for making the above tests; the cost of all labor, materials, lubricants, fuels, power, necessary appliances, and the coordination for testing purposes shall be included in the unit price or prices bid or the various items of work.
- 11. The Contractor shall give the Engineer 48 hours advance notice of the time when the installation is ready for hydrostatic and leakage tests. Tests and inspection shall be made as soon thereafter as practicable.

### 3.03 AS-BUILT DRAWINGS SUBMITTAL

- A. Prior to final acceptance of treatment plant improvements, the Contractor shall furnish Record Drawings, as specified, of all Work to the Parish/Engineer. No construction or improvements will be accepted for final payment without approved Record Drawings.

### 3.04 INITIAL OPERATION TESTS

- A. Upon approval of the Start-up Commissioning Work Plan, and with the written approval of the Parish and the Engineer, the start-up activities may commence.
- B. The start-up activities shall follow the approved Work Plan.

- C. If adequate wastewater flows are unavailable during the start-up period to fully simulate and test all operating conditions, clean water may be used upon approval from the Parish/Engineer; or with the approval of the Engineer and the Parish, flows may be held in the collection system to create the desired high flow conditions required for proper testing.
- D. Upon completion of all structural work, installation and adjustment of equipment and pipe work, in a manner satisfactory to the Engineer and in compliance with the completion dates as described in the Contract Documents, the Contractor shall designate a day for initial testing of the facilities. Prior to such completion date, the Contractor shall give the Parish seven (7) Calendar Days notice thereof in writing and the Parish will then appoint the personnel who will operate the equipment, and on the test day designated, the Contractor shall make the initial test to determine performance using the personnel designated by the Parish and such other personnel of his own as is specified or as he deems necessary to complete the tests. The field tests required will be as described in the applicable Sections of these Specifications and modified as required to test the installed equipment specified by the Parish/Engineer.
- E. The initial tests shall be for a period of 24 hours duration, or shorter if approved by the Parish/Engineer, and during this time the mechanical and electrical/instrumentation performance of all equipment shall be tested and demonstrated by the Contractor. If the demonstration and tests indicate satisfactory mechanical performance in the operation of the equipment, the Contractor will then be given a three (3) day notice by the Engineer to make a final guarantee test of the equipment under normal operation. After initial tests and the three (3) day period between the initial tests and the final test, the Contractor's personnel shall supervise the operation of the equipment and then schedule training the Parish's operating personnel in their duties. Experts on equipment installation and operation as specified or necessary, as well as, complete, written detailed erection, operation and maintenance instructions shall be furnished by the Contractor to insure proper training and instruction of the Parish's personnel.
- F. All performance tests and inspections shall be conducted during the normal workweek of Monday through Friday, unless otherwise specified.
- G. The Contractor shall be fully responsible for the proper operation and maintenance of equipment and facilities during tests and instruction periods and shall neither have nor make any claims for damage, which may occur to equipment prior to the time, when the Parish officially takes over the operation thereof.
- H. The final guarantee tests shall be for a period of 96 continuous hours duration of continuous successful operation, as a prerequisite of Substantial Completion and acceptance, and shall be made at the conclusion of the three (3) day period of

operation and training. These tests shall be made under normal operating conditions under the supervision of the Contractor's personnel. This test is for the purpose of demonstrating that all performance and efficiency guarantees of the equipment and other requirements in compliance with these Specifications have been met, that the operation of all equipment is coordinated, and that all controls operate satisfactorily in accordance with the equipment installed.

- I. In the event the initial or final guarantee testing and demonstration of equipment and controls does not meet the guarantee conditions or is not demonstrated to the satisfaction of the Engineer, the Contractor shall, at his own expense, make such changes and adjustments in the equipment which is deemed necessary and shall conduct further tests until full satisfaction is received thereof.
- J. The Contractor will pay the salaries of the personnel selected by the Parish for operation of the equipment. Payment of all other salaries, public utility services, and operating expenses shall be borne by the Contractor for the test period and any additional test period required.
- K. Start-up of the facilities with raw wastewater and the final guarantee testing and demonstration shall not begin until all facilities and equipment have been tested as specified and ready for operation. The Parish must receive spare parts, safety equipment, tools and maintenance equipment, lubricants, approved operation and maintenance data, and the specified operation and maintenance instruction prior to the start-up with raw wastewater. All valve tagging as specified in the specifications shall also be complete prior to this start-up.

END OF SECTION

SECTION 01630  
PRODUCT OPTIONS AND SUBSTITUTIONS

PART 1 - GENERAL

In accordance with applicable state Contractor Statutes, these Contract Documents include provisions for use of equivalent materials and equipment. Requests for review of equivalency shall be submitted in accordance with the Supplemental Conditions, General Conditions and the submittals section.

Other manufacturer's products will be accepted provided sufficient information is submitted to allow Engineer to determine that the products proposed are equivalent to those named. Such items shall be submitted for review by the procedures set forth in the submittals section.

Whenever the names of proprietary products or the names of particular manufacturer's or vendors are used, it shall be understood that the words "or equal" following the enumeration, if not specifically stated, are implied.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

01630-1

FOR INFORMATION ONLY

SECTION 01660  
EQUIPMENT TESTING AND STATION START-UP

PART 1 - GENERAL

1.01 SCOPE

Equipment testing and pumping station start-up are requisite to satisfactory completion of the contract and, therefore, shall be completed within the contract time.

1.02 STATION START-UP

- A. It is not the intent of the Engineer to instruct the Contractor in the start-up of the pumping station; however, the Engineer will be available prior to and during start-up to provide technical support to the Contractor.
- B. The Contractor shall be required to start-up the pumping station, in the presence of the Owner and Engineer, and operate it for a continuous 3-day (24 hours per day) period at a flow rate determined by the Engineer unless directed otherwise by Engineer. A factory-trained representative shall be present to perform initial start-up operations and testing and recheck the station at each 24-hour interval. The factory representative shall also be available 24 hours a day during the 3-day period to address any problems with equipment or operation. The manufacturer's representative shall be qualified and authorized to perform start-up operations. The Contractor shall give the Engineer 48 hours advance notice prior to the scheduled start-up.
- C. The Contractor shall provide operating personnel for the duration of the start-up. Additionally, the Contractor shall provide all water, power, chemicals, and other consumables required for the test.
- D. The start-up shall not be commenced until all required leakage tests, and equipment tests have been completed to the satisfaction of the Engineer.
- E. All defects in materials or workmanship that appear during this test period shall be immediately corrected by the Contractor.
- F. During the start-up, the Contractor shall provide the services of authorized representatives of the equipment manufacturers and suppliers, as necessary, to correct faulty equipment operation.
- G. During the start-up, the Contractor shall keep records of the operations, in accordance with the instructions of the Engineer.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION  
FOR INFORMATION ONLY

SECTION 01730  
OPERATION AND MAINTENANCE DATA AND MANUALS

PART 1 - GENERAL

- 1.01 Adequate operations and maintenance information shall be supplied for all equipment requiring maintenance or other attention. The equipment supplier shall prepare an operation and maintenance manual for each type of equipment listed on the equipment schedule as specified in other sections of these specifications. Parts lists and operating and maintenance instructions shall be furnished for other equipment not listed in the equipment schedule.

Operation and maintenance manuals shall include the following:

1. Equipment function, normal operating characteristics, and limiting conditions.
  2. Assembly, installation, alignment, adjustment, and checking instructions.
  3. Operating instructions for startup, routine and normal operation, regulation and control, shutdown, and emergency conditions.
  4. Lubrication and maintenance instructions.
  5. Guide to "troubleshooting".
  6. Parts lists and current pricing information. (Also provide the predicted life of parts subject to wear.)
  7. Outline, cross section, and assembly drawings; engineering data; and wiring diagrams.
  8. Test data and performance curves, where applicable.
  9. List of spare parts furnished.
  10. A completed copy of the Pump Station and Equipment Information Form found in this section.
- 1.02 The operation and maintenance manuals shall be in addition to any instructions or parts lists packed with or attached to the equipment when delivered, or which may be required by Contractor.

## PART 2 - PRODUCTS

Manuals and other data shall be printed on heavy, first quality paper, 8-1/2 by 11 inch size with standard 3-hole pole punching. Drawings and diagrams shall be reduced to 8-1/2 by 11 inches or 11 by 17 inches. Where reduction is not practicable, larger drawings shall be folded separately and placed in envelopes that are bound into the manuals. Each envelope shall bear suitable identification on the outside.

## PART 3 - EXECUTION

- 3.01 Four preliminary copies of each manual for each site, temporarily bound in heavy paper covers bearing suitable identification, shall be submitted to Engineer prior to the date of shipment of the equipment. After review by Engineer, four final copies of each operation and maintenance manual be prepared and delivered to Engineer not later than 30 days prior to placing the equipment in operation. Final manuals and all parts lists and information shall be assembled in substantial, permanent, three-ring or three-post binders. As much as possible, material shall be assembled and bound in the same order as specified, and each volume shall have a table of contents and suitable index tabs.
- 3.02 All material shall be marked with Project identification, and inapplicable information shall be marked out or deleted.
- 3.03 Shipment of equipment will not be considered complete until all required manuals and data have been received.

END OF SECTION

01730-2

FOR INFORMATION ONLY

SECTION 01740  
WARRANTIES AND BONDS

PART 1 - GENERAL

- 1.01 Contractor shall maintain and keep in good repair the improvements covered by these Drawings and Specifications during the life of the Contract.
- 1.02 Contractor shall indemnify the Owner against any repairs which may become necessary to any part of the work performed and to items of equipment and systems procured for or furnished under this Contract, arising from defective workmanship or materials used therein, for a period of one (1) year from the date of final acceptance of the Work by the Owner.
- 1.03 The Contractor shall, at his own expense, furnish all labor, materials, tools and equipment required and shall make such repairs and removals or shall perform such work or reconstruction as may be made necessary by structural or functional defect or failure resulting from neglect, faulty workmanship or faulty materials, in any part of the Work performed by him.
- 1.04 Except as noted on the Drawings or as specified, return structures such as embankments and fences to their original condition prior to the completion of the Contract. Repair damage to facilities not designated for removal, resulting from the Contractor's operations, at no cost to the Owner.
- 1.05 The Contractor shall be responsible for all road, entrance and driveway reconstruction and repairs and maintenance of same for a period of one year from the date of such reconstruction. In the event the repairs and maintenance are not made immediately and it becomes necessary for the Owner of the road to make such repairs, the Contractor shall reimburse the Owner of the road for the cost of such repairs.
- 1.06 In the event the Contractor fails to proceed to remedy the defects of which he has been notified within 15 days of the date of such notice, the Owner reserves the right to cause the required materials to be procured and the work to be done, as described in the Drawings and Specifications, and to hold the Contractor and the sureties on his bond liable for the cost and expense thereof.
- 1.07 All warranties, bonds, insurance, etc. shall provide for 30-day advance notice to the Owner prior to cancellation or renewal date. No payment will be made to the Contractor for any work without insurance and bonds being in effect.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

FOR INFORMATION ONLY



SECTION 02140  
DEWATERING AND PRESSURE RELIEF

PART 1 - GENERAL

1.01 SCOPE

This section shall include supplying materials, equipment, services, and labor necessary to prevent surface water and subsurface or groundwater from flowing into excavations and from flooding project site and surrounding area. The Contractor shall dewater and dispose of the water so as not to cause injury to public or private property, or to cause a nuisance or a menace to the public. It shall be the sole responsibility of the Contractor to have adequate equipment and personnel at the site at all times to comply with these requirements.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 01390: Excavation Plan.
- B. Section 02221: Excavation, Backfilling for trenches, paving and structures

1.03 SUBMITTALS

Prior to beginning dewatering operations, and as a part of the excavation plan, the Contractor shall submit, in writing to the Engineer, his proposed plan to comply with the requirements of this section. Submittal shall contain proposed equipment, methods of conveyance, and discharge point for water removed from excavations. Dewatering calculations in the dewatering plan shall be prepared and stamped by a Professional Engineer registered in the State of Louisiana. Engineering calculations to be submitted by the Contractor shall include, among other calculations, radius of influence and drawdown curves.

Settlement adjacent to the excavation should be expected to occur if pressure relief or dewatering lowers the ground water below its current level. Estimates of settlement are highly dependent upon the quality and duration of dewatering and pressure relief. They are also dependent on the depth of excavation and pressure relief requirements as necessitated by site conditions. For these reasons, actual settlement estimates should be made once actual methods are developed. The actual settlement from dewatering and pressure relief should be monitored by elevation control stations during construction.

1.04 EXISTING INFORMATION

Logs of soil borings that are contained in THESE SPECIFICATIONS briefly address ground water levels. These soil borings were taken for design purposes and should not be considered adequate for construction purposes.

## PART 2 - PRODUCTS (NOT USED)

## PART 3 - EXECUTION

### 3.01 INSTALLATION

- A. The Contractor shall install all equipment necessary for dewatering. He shall have on hand, at all times, sufficient pumping equipment and machinery in good working condition and shall have available, at all times, competent workmen for the operation of the pumping equipment. Adequate standby equipment shall be kept available at all times to insure efficient dewatering and maintenance of dewatering operation during power failures.
- B. As a minimum, the Contractor should be aware that the need for wells or wellpoints can be expected. The Contractor is responsible for providing whatever equipment is necessary to adequately dewater the sites in accordance with the requirements of this section, should that equipment be wells, wellpoints, sump pumps or other operations.

### 3.02 PERFORMANCE

The control of groundwater shall be such that softening of the bottom of excavations or formation of unstable conditions during excavation shall be prevented. Dewatering systems shall be designed and operated to prevent erosion of the natural soils. Care shall be taken to prevent disturbance, due to the method of dewatering, of pipe bedding already in place in the trench. The Contractor is fully responsible for maintaining the integrity of previously placed pipe and bedding during dewatering and the release of groundwater.

During excavation, construction of structures, installation of pipelines and sewers, placement of the structure and trench backfill, and the placing and setting of concrete, excavations shall be kept free of water. The Contractor shall control surface runoff to prevent entry or collection of water in excavations. The static water level shall be controlled in the vicinity of the excavation to maintain the undisturbed state of the foundation soils and allow the placement of any fill or backfill to the required density. The dewatering system shall be installed and operated so that the groundwater level outside the excavation is not altered to an extent that would damage or endanger adjacent structures or property.

### 3.03 RELEASE OF GROUNDWATER

The release of groundwater to its static level shall be performed in such a manner as to maintain the undisturbed state of the natural foundation soils, prevent disturbance of compacted backfill and prevent flotation or movement of structures, pipelines, and sewers.

### 3.04 PAYMENT

All work in this section shall be considered a subsidiary obligation of the Contractor and all costs in connection therewith shall be included in the unit price or lump-sum price items bid.

END OF SECTION

SECTION 02160  
SHEETING, SHORING, AND BRACING

PART 1 - GENERAL

1.01 SCOPE

This section shall include supplying materials, services, and labor necessary to provide sheeting, shoring, and bracing or supports as required to provide a safe working condition for Contractor's personnel and to provide for protection of utilities, buildings, and structures. It shall be the sole responsibility of the Contractor to comply with these requirements.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 01390: Excavation Plan
- B. Section 02140: Dewatering
- C. Section 02221: Excavation and Backfilling for Trenches, Pavement and Structures.

1.03 SUBMITTALS

Prior to beginning sheeting and shoring operations, and as a part of the excavation plan, the Contractor shall submit, in writing to the Engineer, his proposed plan to comply with the requirements of this Section. The plan is to be prepared and stamped by a qualified Louisiana licensed engineer. The Contractor is solely responsible to design, provide, install and maintain support systems required to complete the work in a continuous safe manner. No excavation work shall be allowed to commence until the Contractor has fulfilled this requirement. Special attention is to be given to the required cofferdam containing the water wells and dry well.

1.04 SAFETY REQUIREMENTS

All sheeting, shoring, and bracing of excavations shall conform to requirements necessary to comply with local codes and authorities having jurisdiction. Impact pile driving and sheet pile installations will cause vibrations that may affect existing residences or underground utilities in the vicinity of the proposed force main. Peak particle velocities due to pile driving should be monitored at critical locations with a seismograph during the installation of test piles, job piles and sheet piles. The record of peak particle velocities will provide information in assessing the need for changes in driving operations and the types of changes best suited for the project requirements. Monitoring will be performed by an independent testing lab retained by the Owner.

PART 2 - PRODUCTS

2.01 WOOD SHEETING

Wood for shoring and sheeting shall be green, rough cut hardwood (i.e. oak or hickory). Planking for sheeting and foundation lumber shall have a minimum thickness of 2 inches.

FOR INFORMATION ONLY

## 2.02 STEEL SHEETING

Steel sheet piling shall be a continuous interlock design. The sheet piling must be in good condition and shall provide a tight interlocking connection, which will retard the infiltration of ground water. Cofferdams shall be provided when constructing wet wells at pump station sites. The Contractor shall be responsible for the design and installation of all cofferdams. Steel sheeting for wet wells shall be left in place and be cut off at 3 feet below final grade.

## PART 3 - EXECUTION

### 3.01 PERFORMANCE

The planning, installation and removal of all sheeting, shoring, bracing, and sheet piling shall be accomplished in such a manner as to maintain the required trench or excavated cross section and to maintain the undisturbed state of the soils adjacent to the trench and below the excavated bottom. All trenches and structural excavations shall be properly sheeted, shored and braced.

The use of horizontal strutting below the barrel of a pipe or structure or the use of a pipe as support for trench bracing will not be permitted.

Wood sheeting shall be left in place in permanent servitudes and the upper part of the sheeting shall be cut off 3 feet below the finished ground surface after backfilling. All bracing above this level shall also be removed. Lower bracing shall be left in place.

The right of the Engineer to order sheeting and bracing left in place in location other than at the sewer force main trench shall not be construed as creating any obligation on his part to issue such orders, and his failure to exercise his right to do so shall not relieve the Contractor from liability for damages to persons or property occurring from or upon the work occasioned by negligence or otherwise, growing out of a failure on the part of the Contractor to leave in place in the trench sufficient sheeting and bracing to prevent any caving or moving of the ground adjacent to the sides of the trench. If the Engineer orders the sheeting to be left in place in locations other than at the sewer force main trench the Contractor shall be paid the invoice cost of materials only.

If the contractor selects to open cut the trench for the gravity sewer line under the New Orleans Public Belt Railroad, permanent steel sheeting will be installed as per the plans. Coordination with NOPBRR will be required of the Contractor.

Steel sheeting or piling which are withdrawn shall be extracted in a manner so as to prevent subsequent settlement of the pipe or produce additional loadings to the structure and to maintain the undisturbed state of the soil adjacent to the trench or in the immediate area.

No sheeting, shoring or bracing shall be left in place in temporary servitudes without approval from the Engineer.

END OF SECTION

FOR INFORMATION ONLY

## SECTION 02210 GRADING

### PART 1 - GENERAL

This section includes all grading work required for the construction of the sewerage facilities shown on the Drawings within the project area. Grading operations shall include rough and finish grading as indicated on the Drawings to provide adequate drainage for the project area.

### PART 2 - PRODUCTS (NOT USED)

### PART 3 - EXECUTION

- 3.01 Site shall be graded to meet existing contours on adjacent properties to the construction site so as to provide positive drainage into existing ditches, culverts, catch basins or other drainage structures.
- 3.02 Finish grading shall include furnishing and placing topsoil, 4 inches thick, using stockpiled excavated material or additional approved topsoil as required to cover entire site to an elevation appropriate for the placing of seed as required elsewhere in these specifications.

END OF SECTION

SECTION 02221  
EXCAVATION, BACKFILLING FOR TRENCHES, PAVEMENT AND STRUCTURES

PART 1 - GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

- A. Site Preparation
- B. Dewatering (02140)
- C. Sheet piling, Shoring and Bracing (02160)
- D. Regulatory Requirements
- E. Subsurface (Geotechnical) Investigation (02010)

1.02 DESCRIPTION

The Contractor shall furnish all materials, labor and equipment necessary to remove all earth, rock, water, debris and other materials to the extent required for the construction of the improvements shown on the Drawings. Also included is the preparation of the subgrade or sub-base for the foundation of the improvements and the backfilling and compaction around the improvements to the lines and grades established on the Drawings.

1.03 EXTENT OF WORK

Excavation shall extend to the width and depth shown on the Drawings or as specified, or where not specified, Contractor shall confine his excavation to the least width practicable and shall provide suitable room for installing pipe and appurtenances.

1.04 BEDDING AND BACKFILLING

The Contractor shall furnish and place all sheet piling, bracing, and supports for the installation of the force main. Contractor shall backfill trenches with pumped river sand or select excavated material, as indicated on the Drawings. The bottom of the excavation shall be firm, dry, and in all respects, acceptable. The Contractor shall be required to deposit crushed limestone, for pipe bedding in accordance with the Drawings or crushed limestone refill for excavation below grade, directly on the bottom of the trench immediately after excavation has reached the proper depth and before the bottom of the trench has become softened or disturbed by any cause whatsoever.

PART 2 - PRODUCTS

2.01 GRANULAR MATERIAL (BACKFILL)

Granular material known locally as "river sand" shall be used as backfill material for all trench and pit excavations within paved areas and shall be free of roots, shells, or any other foreign matter, AASHTO A-4 material or better.

2.02 CRUSHED LIMESTONE

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Limestone used as bedding material shall be from a source approved by the LDOTD. Materials shall conform to the requirements of Section 1003.03(d) of the Louisiana Standard Specifications for Roads and Bridges, latest edition.

#### 2.03 GEOTEXTILE FABRIC.

The Contractor shall furnish and install geotextile fabric as shown on the plans. Geotextile fabric shall conform to Section 1019 (Type "C") of the Louisiana Standard Specifications for Roads and Bridges, latest edition.

#### 2.04 SELECT EXCAVATED MATERIAL (BACKFILL)

Good sound earth free from waste, rubbish, objectionable organic matter, large rocks, waste concrete, or other unstable or unsuitable material. This material shall be used outside paved areas or structures.

### PART 3 - EXECUTION

#### 3.01 EXCAVATION

- A. Excavation shall be open cuts with vertical sides using sheeting and bracing as required. All sheeting and bracing for excavations shall be in accordance with OSHA regulations.
- B. In case the excavation for any pipeline is carried below the required depth as shown in the bedding details due to an error by the Contractor not for the purpose of removing stumps, roots, logs, etc., the Contractor shall fill and compact the bottom of the excavation up to grade with bedding material in a manner acceptable to the Engineer, without additional compensation for the materials, excavation or the backfilling.
- C. All material excavated shall be placed so as to minimize interference with public travel and to permit proper access for inspection of the work.

#### 3.02 DISPOSAL OF MATERIALS

- A. Excavated material shall be stocked without excessive surcharge on the trench bank or obstructing free access to hydrants and valves. Inconvenience to traffic and abutters will not be allowed. Site drainage shall be maintained at all times.
- B. All excess excavated material shall be removed from the site of the work by the Contractor and disposed of at a legally approved off-site area at no cost to the Owner.

#### 3.03 OVER-EXCAVATION TO REMOVE STUMPS, ROOTS, LOGS



- A. Stumps, roots, and logs, which are encountered within the trench area, shall be cut to a depth of one (1) foot below the bottom of the trench. The Contractor shall fill this excavated space with compacted bedding material as described in paragraph 3.06.
- B. When so required by the Engineer, the Contractor shall probe one (1) foot below the established bottom of the trench. If any stump, roots, logs, etc., are discovered by this probing, the Contractor shall cut them out just as if they had been visible in the trench.
- C. Blasting will not be allowed for the removal of stumps.

### 3.04 TEST PITS

Test pits for the purpose of locating underground utilities or structures in advance of the construction shall be excavated by the Contractor. Test pits shall be backfilled with compacted river sand immediately after the desired information has been obtained.

### 3.05 PIPE INSTALLATION

- A. Proper implements, tools and facilities shall be provided and used by the Contractor for the safe and convenient prosecution of the work. All pipe, fittings, valves, and appurtenances shall be carefully lowered into the trench piece by piece by means of a derrick, ropes or other suitable tools or equipment in such a manner as to prevent damage to materials and protective coatings and linings. Under no circumstances shall materials be dropped or dumped into the trenches.
- B. All pipe, fittings, and appurtenances shall be inspected for defects and cracks prior to being lowered into the trench.
- C. The outside of the spigot, the inside of the bell, and any couplings used shall be brushed and wiped clean and dry and free from all foreign matter before the pipe is joined.
- D. Every precaution shall be taken to prevent foreign material from entering the pipe while it is being placed in the line. During the laying operations, no debris, tools, clothing or other material shall be placed in the pipe.
- E. After placing a length of pipe in the trench, the spigot end shall be centered in the bell and the pipe forced home and brought to correct line and grade. The pipe shall be secured in place with approved backfill material tamped under it as herein specified. Precautions shall be taken to prevent dirt from entering the joint space.
- F. At times when pipe laying is not in progress, the open ends of pipe shall be closed by a watertight plug or other means approved by the Engineer. This provision shall apply during the noon hour as well as overnight. If water is in the trench, the seal shall remain in place until the trench is pumped completely dry.

- G. Cutting of pipes for inserting fittings or closure pieces shall be done in a neat and workmanlike manner in accordance with instructions of the pipe manufacturer and without damage to the pipe.

### 3.06 BACKFILLING AND BEDDING

- A. As soon as practicable after the pipe has been laid, jointed, and tested, backfilling shall begin and thereafter be prosecuted expeditiously. Bedding shall conform to the details on the Drawings or as established in the specifications. When laying pipe, the groove for the pipe and bell hole must be accurately shaped, and the bedding must be closely packed under and around the pipe.
- B. Bedding material shall be crushed limestone or crushed concrete placed and compacted as shown on the Drawings. The compaction of the bedding shall consist of the placement of the bedding in lifts not exceeding 8 inches and compacted to a minimum of 95% of the maximum dry density in accordance with ASTM D 698. The bedding and pipe shall be enclosed in a geotextile fabric. Geotextile fabrics shall be installed in accordance with the manufacturer's recommendations. All foundation lumber (i.e. planking, sills, and stringers in the trench bottom) shall be No. 2 Common Southern Pine. Installation of foundation lumber and piling shall be in accordance with the Drawings.
- C. The remainder of the trench above the bedding shall be backfilled with river sand at locations where open cutting is permitted across roadways. Select excavated backfill material will be allowed for trenches outside pavement areas.

Sand backfill beneath paved areas where indicated on the Drawings shall be placed in layers up to the bottom of the pavement base course and thoroughly compacted by flooding or by mechanical compaction equipment to 97% of maximum dry density in accordance with ASTM D-698. Maximum lifts will be no greater than 8 inches. The 12 inches directly beneath the pavement shall be placed in two lifts and compacted to a minimum of 97% of the maximum dry density determined in accordance with ASTM D 698.

Under non-paved areas, native backfill material shall be placed in layers not exceeding 8 inches deep and compacted to 90% of the maximum dry density determined in accordance with ASTM D 698.

- D. Backfill around manholes shall be treated as in paragraph C above.
- E. Broken paving shall not be placed in backfill.

### 3.07 RESTORING TRENCH SURFACE

- A. Where the trench occurs adjacent to paved streets, in shoulders, sidewalks, or in cross-country areas, the Contractor shall thoroughly compact the backfill and shall maintain the surface as the work progresses. If settlement takes place, he shall immediately deposit additional fill to restore the level of the ground.
- B. The surface of any driveway or any other area which is disturbed by the trench excavation and which is not a part of the paved street shall be restored by the Contractor to a condition at least equal to that existing before work began.
- C. In sections where the pipeline passes through grassed areas, the Contractor shall regrade and seed all disturbed areas as specified in other sections or as directed by the Engineer.

END OF SECTION

SECTION 02345  
BORING AND JACKING

PART 1 - GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 02140: Dewatering
- B. Section 02160: Sheet piling, Shoring and Bracing
- C. Section 02221: Excavation and backfilling for trenches, pavement and structures
- D. Section 02615: Ductile Iron Pipe and Fittings

1.02 DESCRIPTION

- A. Boring and jacking shall consist of the furnishing and installation of pipe or casing by boring with special equipment and jacking the pipe or casing into place.
- B. These items include furnishing and transporting material, excavation, installation, bracing, dewatering, sealing or grouting, backfill and surface cleanup. Also included is the construction of pits, paving the invert as required, and the installation of carrier pipe inside the casing, all in accordance with the specifications and in conformity with the line and grade shown on the plans or established by the Engineer.

1.03 PERMIT REQUIREMENTS

- A. Installation of pipe casings under Parish or State roadways by jacking or boring methods shall conform to all requirements of Section 728 of the latest edition of the Louisiana Department of Transportation and Development Standard Specifications for Roads and Bridges.

Subsection 728.03a, third and fourth paragraph shall be superseded by the following requirements:

Excavation shall not exceed beyond the forward end, under or above the pipe and all material shall be removed through the pipe. A pilot hole will be required. The Contractor shall use a sand shield or set back the cutting edge at least two (2') feet from the forward end of the pipe. Lubrication shall be in conformance with Section 728.

Installation of pipe casings under railroad tracks or on property controlled, leased or owned by Railroad Companies by jacking or boring methods shall conform to all provisions and requirements of the "American Railway Engineering Association Manual - Part 5 - Pipelines."

## 1.04 SUBMITTALS

The Contractor shall be required to secure all bonds required by LDOTD for the jack and bore under the state highway and meet all LDOTD requirements. No separate payment will be made for securing all bonds.

- A. The Contractor shall submit for review and acceptance details of the following to the Engineer:
  - 1. Subcontractor
  - 2. Jacking pit bracing
  - 3. Steel casing mill certificates and jacking head.
  - 4. Experience of Contractor or Subcontractor in jacking or boring in the area.
  - 5. Welders certification.
  - 6. Equipment planned.

## PART 2 - PRODUCTS

### 2.01 MATERIALS

- A. Steel casing to be jacked and within which pipe is to be installed shall be steel pipe conforming to ASTM: A139, Grade B, No Hydro, minimum yield strength 35,000 psi, rolled and welded steel pipe from new and unused plate, mid welds allowed, bare. Unless otherwise required the wall thickness of the casing shall be as a minimum as shown on the plans. However, the Contractor is fully responsible for the sufficiency of the casing provided.

## PART 3 - EXECUTION

### 3.01 PIT CONSTRUCTION

The method used to construct the pits shall be determined by the Contractor and submitted to the Engineer for review. The method of securing bore pit wall, whether using shoring and sheeting, tightly placed timber, shores, bracing, steel sheeting or other devices shall be adequate to resist the pressures surrounding the excavation and shall conform to Section 02160, Sheeting, Shoring and Bracing, of these Specifications. Subsurface soil information is available with Section 02010 of these Specifications for the Contractor's information. All applicable OSHA requirements shall be satisfied for pit construction. If steel sheeting is used at the pits and remains in place, the Contractor shall cut the steel sheeting 3' below ground surface.

### 3.02 DEWATERING

The Contractor shall be responsible for determining and implementing the method of dewatering used to maintain dry working conditions, to stabilize the floor of the pit, and not to endanger existing structures.

### 3.03 BORING

- A. Where force mains are permitted to be bored, the force main shall be installed by means of a boring machine or auger and hydraulic jacks, or by other means satisfactory to the Engineer. In the event subsurface operations result in damage to the pavement, or the surface is otherwise disturbed or broken due to the Contractor's operations, the Contractor shall repair or replace same at his own expense without further compensation.
- B. The diameter of the bored hole shall not be greater than 1" more than the outside diameter of the casing pipe.

### 3.04 JACKING PIPE

- A. Except as otherwise specified, the methods and equipment used in jacking the casing shall be optional with the Contractor, provided that the proposed method is first approved by the Engineer. Such approval, however, shall in no way relieve the Contractor of the responsibility for making a satisfactory installation meeting the criteria set forth herein.
- B. The Contractor may expect stumps and/or wood pilings in the path of each jacked casing. The Contractor may have to stop operations to remove obstacles and no additional compensation will be given for these stoppages.
- C. The leading section of casing may be equipped with a jacking head. This jacking head must be secured to the casing to prevent wobbling which may cause the alignment to vary beyond the tolerances mentioned below. Excavation shall be carried out entirely within the jacking head or pipe. Excavated material shall be removed from conduit as excavation progresses, and no accumulation of such material within the casing will be permitted.
- D. Upon completion of the jacking operations, all voids created around the jacked casing shall be filled by pressure grouting. Fully operational pressure grouting equipment and material shall be on site prior to any commencement of pipe jacking. The grout or soil cement, which is used to plug and fill voids, shall be a mixture of three parts Portland cement and one part high grade bentonite as manufactured by Baroid Co. or approved equal.

- E. The alignment shall be the responsibility of the Contractor. Variation beyond 1' per 100' from the planned alignment must be approved by the Engineer in writing prior to acceptance of the finished bore. If a casing alignment is observed as being a potential danger to a roadway or railroad the casing should be abandoned and a new casing location should be chosen by the Engineer and the Contractor. Any abandoned casings should be filled with 2000 psi concrete.
- F. Each connection between the segments of the casing shall be a full penetration butt weld performed by certified welders of steel pipe.
- G. No over cutting of the outside diameter of the casing will be allowed. Casing lubricants may be applied on the outside surface of the casing to reduce friction forces. Lubricants shall be applied in such a manner as to avoid the creation of voids and crevices between the casing pipe and soil. Squaring the ends of the casing and the bearing surface will be allowed provided no voids or cavities around the outside of the casing are created.
- H. On completion, both ends of each casing conduit shall be packed to prevent entrance of earth and excessive flow of ground water, but to allow some drainage. Each end of the casing shall be closed in by brick and mortar as detailed on the Plans.
- I. Following the installation of the casing, the pipe shall be assembled and jacked or pulled through the casing.
- J. Carrier pipe shall be permanently secured in position in the steel casing pipe at the proper line and grade and clearance as indicated on the drawings. Other methods, besides the use of wood skids, to facilitate the installation of the carrier pipe shall be allowed provided the conditions of the Specifications are met. Carrier pipe shall be secured in such a manner so as to prevent flotation or any subsequent change in line and grade. Except for gravity sewers, all carrier pipe shall have restrained joints throughout the length of the casing pipe and the joints shall be restrained as specified.

### 3.05 BACKFILLING

Excavated materials may be used to backfill the pits in unpaved areas only. The excavated material should be placed in layers not to exceed 12 inches in thickness and shall be compacted with power tamper to a density equal to that to the surrounding natural ground.

END OF SECTION

SECTION 02350  
STONE BASE COURSE

PART 1 - GENERAL

This material shall meet the requirements of Sections 1003.02, 1003.01 and 1003.03(d) (stone or crushed stone) of the latest edition of the Louisiana Department of Transportation and Development Standard Specifications for Roads and Bridges. It shall be compacted to 95% of ASTM D-698. This material shall be used as base course and as temporary street and drainage maintenance.

PART 2 - PRODUCT (NOT USED)

PART 3 - EXECUTION

Contractor is to compact the subgrade to the appropriate density of adjacent ground. He is to install a layer of compacted stone/crushed stone to the thickness, lines and grades shown on the drawings or as directed by the Engineer.

END OF SECTION



SECTION 02500  
ROADWAY, DRIVEWAY, AND SIDEWALK

PART 1 - GENERAL

1.01 DESCRIPTION

This section shall include the construction or reconstruction of all paved and unpaved roadway, driveway, and sidewalk areas encountered on the project. This work will include replacement of pavements, sidewalks, shell surfaces, base courses, curbs, gutters and other improvements removed or damaged by the Contractor during the course of his contract.

All construction materials and procedures shall conform to the Louisiana Standard Specifications for Roads and Bridges (DOTD), 2000 Edition and revisions to date, unless otherwise specified.

Also, drawings included in these contract documents reflect "typical roadway restoration details."

Concrete roadway directly affected during construction or damaged as the result of the Contractor's operation shall be removed and replaced from joint to joint unless otherwise directed by the Engineer.

Bituminous pavement sections replaced shall be saw cut at the limits for removal.

All pavement or other surfacing of sidewalks and driveways, which are damaged by the construction activities, shall be replaced as shown on the Plans to its preconstruction condition or better.

NOTICE: The Contractor is responsible for notifying the Engineer and the Jefferson Parish Department of Public Works, at least 24 hours in advance, of any placement of concrete or asphalt on Parish roadways.

1.02 SUBMITTALS

The Contractor shall make submittals, for approval by the Engineer, on the following items:

1. Base course material.
2. Asphalt mix design.
3. Concrete mix design.
4. Load transfer devices.
5. Joint material.

## PART 2 – MATERIALS

### 2.01 BASE COURSE

This work consists of furnishing and placing granular material for the roadway base as per plan details and paving schedules, and in accordance with Section 723, 301, and 302 of the Louisiana Standard Specifications for Roads and Bridges, 2000 Edition, unless otherwise specified.

Density tests will be taken on the roadway base materials. The Contractor shall not be allowed to restore the roadway until backfill material in the trench area meets or exceeds the following:

#### Density Requirements (Standard Proctor)

- |    |                     |       |
|----|---------------------|-------|
| a. | Base Course (sand)  | - 95% |
| b. | Base Course (stone) | - 95% |
| c. | Subbase (sand)      | - 97% |

It will be the Contractor's responsibility to fill void areas in the existing road base material with compacted sand to establish a level uniform surface. This cost shall be included in the unit price for pavement work.

### 2.02 ASPHALT CONCRETE PAVING

All materials and construction under this section shall conform to Section 501 of the Louisiana Specifications for Roads and Bridges, 2000 Edition, unless otherwise specified. The gradation of the mix shall be Type 3, AC-30 for the Wearing Course and Binder Course, Type 5A, AC-30 for the Base Course as specified in Table 1 of the referenced section. The thickness of each course is as shown in the paving schedule.

Saw cutting will be required along the entire limits of the removed asphalt areas.

### 2.03 CONCRETE PAVEMENT

All materials and construction under this section shall conform to Section 601 of the Louisiana Standard Specifications for Roads and Bridges, 2000 Edition, unless otherwise specified.

All existing concrete curb, walks, and driveways shall be replaced with concrete to the line and grade as directed by the Engineer and to a thickness as indicated on the typical details shown on the plans. Prior to construction in an area, the Contractor shall adequately reference the existing curb and other pavement elevations to establish the preconstruction elevation. These pavement elevations shall be submitted to the Engineer for review and possible modification to improve drainage.

The restored paving elevations shall correspond to the elevations established prior to construction in the area, or as modified by the Engineer, to allow for positive drainage of the area.

Curbs and sidewalks shall be sawcut and removed to the nearest joint scorings. All concrete streets

shall be removed from joint to joint. Driveways shall be removed from joint to joint or as shown on the drawings.

Portland Cement Concrete Requirements for roadway pavements and curbs:

- a. Seven (7) sacks of cement per cubic yard
- b. 2" to 4" slump range
- c. The use of Fly Ash in the mix will not be permissible.
- d. Compressive Strength at 3 days of 3,000 psi (min.).
- e. The use of high early strength concrete is required.
- f. Compressive strength @ 28 days of 4,000 psi (min.).

The pavement shall not be opened to traffic until a compressive strength of 4,000 psi is attained and in no case shall the pavement be opened to traffic within a three (3) day period after the concrete has been placed.

The final roadway surface finish shall be a "Drag Finish" as defined in the Louisiana Standard Specifications for Roads and Bridges, 2000 Edition, or as otherwise directed by the Department of Public Works.

Portland Cement Concrete Requirements for sidewalks and driveways:

- a. 545 lbs of cement per cubic yard
- b. 2" to 5" slump range
- c. The use of Fly Ash in the mix will not be permissible.
- d. Compressive Strength at 28 days of 3,000 psi.

Sidewalks shall not be opened to the public within a three (3) day period after the concrete is placed. The final sidewalk surface shall be a light broom finish.

## 2.04 GENERAL

Unless otherwise approved by the Engineer, the kind of pavement to be constructed in replacement work shall correspond with the kind removed from the area. The respective kind of concrete (asphalt or portland cement) shall be placed, shaped, compacted, and finished to establish grade and cross section by practicable means which will result in a dense, uniform-textured pavement. Abutting edges of old pavement shall be trimmed of all loose fragments and shall be painted with asphalt or thoroughly moistened with water, as appropriate, to provide good bond between the old and new pavement.

All manholes within the pavement area shall be isolated (boxed out) by means of an approved circular ring (joint) around them, square or rectangular sections using flexible joint material.

Transverse (expansion or contraction), longitudinal and construction joints shall all be installed in accordance with the standard details included in the contract documents.

In cases where a section of roadway to be restored abuts an existing roadway, all transverse or longitudinal joints shall line up and be of the same type as the existing (expansion, contractions, etc.).

## 2.05 SPECIAL PAVING REQUIREMENTS

To provide for the comfort and safety of the traveling public, it is the Contractor's responsibility to backfill, with base course (stone) material, up to the top of the adjacent pavement and maintain it at that elevation until the roadway is closed to traffic during the street restoration work.

Maintenance shall consist of regrading a temporary base course surface material and of restoring said surface to proper grade and cross section daily or more frequently, as directed by the Engineer, together with wetting as required for dust abatement.

At the time of placing the pavement, excess foundation material shall be removed and shall be disposed of in a satisfactory manner. Paving of any area shall be completed on the day it is started, and the area shall be placed in service at the earliest practicable time. The Contractor is responsible for maintaining access to the residents of the area and shall inconvenience the affected property owners as little as possible.

At no time shall pavement material be placed in water or on saturated base material.

All work to be performed under this section shall be conducted with regard for public safety and maintaining traffic flow.

## 2.06 CUTTING OF PAVEMENT FOR TRENCH PATCHES

Concrete pavement sections shall be removed joint to joint for trench work. Asphalt pavement structures shall be cut with a concrete saw along each edge of the area to be removed with the area being limited in width as shown in the plans.

Cuts shall be clean, vertical cuts made true to lines parallel to or at right angles of any existing curb line. Depths of the cuts shall be sufficient to permit the removal of pavement between or alongside them without damage to pavement or structures to be left in place. Any pavement damaged by the Contractor's operation shall be replaced at the Contractor's expense.

## 2.07 SHELL, STONE OR GRAVEL ROADS, DRIVEWAYS, AND WALKS

All existing shell, stone, or gravel roads, driveways, walks, and shoulders removed shall be replaced to the same lines and grades with base course material to a compacted thickness of 12" or the thickness of the removed surfacing, whichever is greater.

## 2.08 CURBS, GUTTERS, AND MISCELLANEOUS

Replacement of curbs, gutters, walks, dikes, and other like structures shall consist of similar and matching construction to that of adjoining undisturbed structures, which construction shall be at least equal in all respects to that of the structures or parts of structures removed in the work and as shown on the plans.

## 2.09 TESTING REQUIREMENTS

### A. Asphalt Roadways

1. One base thickness verification per 600 square yards or fraction thereof.
2. One density test on the subbase (if applicable) and base material per 600 square yards or fraction thereof.
3. One pavement core for thickness verification per 600 square yards of pavement or fraction thereof.

### B. Concrete Roadways

1. One slump test minimum per 100 cubic yards of concrete or fraction thereof.
2. Four (4) cylinders minimum per 100 cubic yards of concrete or fraction thereof.
3. Independent densities, slumps, cylinders, cores, etc., will be required for isolated areas.
4. All requirements of 2.09A above shall also apply to concrete roadways.

### C. Concrete Sidewalks and Driveways

1. One slump test minimum per 200 cubic yards of concrete or fraction thereof.
2. Four (4) cylinders minimum per 200 cubic yards of concrete or fraction thereof.
3. Independent densities, slumps, cylinders, cores, etc., will be required for isolated areas.

D. All initial testing shall be performed by the Owner's testing laboratory and at the Owner's expense. All costs for testing to determine compliance after the initial tests shall be borne by the Contractor and credit made to the Owner under change order to the contract.

E. There shall be no adjustment in bid prices for pavement thickness deficiencies. If the concrete core is less than specified, two additional cores on the same slab within a 5' radius must be taken. If one of these cores is less than specified, then the entire panel (joint to joint) must be removed and additional cores on other adjacent panels within the core range (600 square yards) must be taken and the same procedure followed.

F. Joint Sealer: All joints in roadway surface shall be cleaned and sealed with approved joint sealant.

## 2.10 CLEANING FOR ACCEPTANCE OF STREET

Prior to acceptance, the Contractor shall be required to clean up any street that is dirtied as a result of construction activity, as directed by the Project Engineer.

END OF SECTION

SECTION 02615  
DUCTILE IRON PIPE AND FITTINGS

PART 1 - GENERAL

1.01 SCOPE OF WORK

Furnish all labor, materials, equipment and incidentals required and install ductile iron pipe, and ductile iron fittings for buried piping complete as shown on the drawings and as specified herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 02221: Excavation and Backfilling for trenches, pavement and structures.

1.03 GOVERNING STANDARDS

- A. Except as modified or otherwise provided herein, AWWA C151, latest revision, shall govern the manufacture of ductile iron pipe.
- B. All pipe manufacturers to be considered shall be experienced in producing pipe of the type, size and quality specified herein, with a minimum of at least five (5) years successful performance.

1.04 SUBMITTALS

- A. The Contractor shall submit to the Engineer, within ten days after signing of the contract, a list of materials to be furnished, the names of the suppliers and the date of delivery of materials to the site.
- B. The Contractor shall submit for approval, as provided in the General Conditions, complete, detailed working drawings of all ductile iron pipe and fittings.
- C. Design calculations shall be submitted which ascertains conformance of pipe, fittings and joints with the referenced standards and these Specifications.
- D. Line laying schedule and marking diagrams, which indicate the specific number of each pipe, and fitting and the location of each pipe and the direction of each fitting in the completed line. In addition, the laying schedule shall include: the pipe station and invert elevation at all changes in grade or horizontal alignment; all elements of curves and bends, both in horizontal and vertical alignment; and the limits of each reach of restrained joints.
- E. The Contractor shall submit and shall comply with the recommendations of the pipe

manufacturer for handling, storing, and installing pipe and fittings.

- F. Manufacturer will furnish Owner notarized certificates that pipe has been manufactured, tested and inspected in accordance with applicable specifications.
- G. Mill Certificates. Certified mill certificates shall be furnished to the Engineer by the manufacturer for all pipe and fittings at least 10 days prior to shipment of pipe and fittings to jobsite.

## 1.05 QUALITY ASSURANCE

- A. Inspection: All pipe shall be subject to inspection at the place of manufacture. The Contractor shall notify the Engineer in writing of the manufacturing starting date not less than 14 calendar days prior to the start of any phase of the pipe manufacture.
- B. During the manufacture of the pipe, the Engineer shall be given access to all areas where manufacturing is in process and shall be permitted to make all inspections necessary to confirm compliance with the Specifications.
- C. Tests: Except as modified herein, all materials used in the manufacture of the pipe shall be tested in accordance with the requirements of AWWA C151, as applicable.
- D. The Contractor shall perform said material tests at no additional cost to the Owner. The Engineer shall have the right to witness all testing conducted by the Contractor; provided, that the Contractor's schedule is not delayed for the convenience of the Engineer.

## PART 2 - PRODUCTS

### 2.01 MATERIALS

- A. Ductile iron pipe shall be designed and manufactured in accordance with ANSI/AWWA C150/A21.50 and ANSI/AWWA C151/A21.51, Latest Revision subject to the following supplemental requirements. All pipe and fittings shall be designed for a 100 psi working pressure, 100 psi surge pressure and 150 psi test pressure. External loading for design shall be an earth cover of nine (9) feet with an AASHTO H-20 truck live load on unpaved road. The external loading shall be based on a soil density of 120 pounds per cubic foot and bedding Type 4. Pipe shall be manufactured by American Ductile Iron Pipe, U.S. Pipe, or approved equal.



- B. Each pipe shall be subjected to a hydrostatic pressure test at the point of manufacture to a minimum of 75% of the yield strength for 18" and larger pipe.
- C. All non-restrained pipe shall be furnished with push-on type joints such as American's "Fastite" joint, U.S. Pipe's "Tyton" joint, or approved equal. Joints shall be in accordance with the latest revision of ANSI/AWWA C111/A21.11 and shall be furnished complete with all necessary accessories.
- D. Where restrained pipe is required, self-restrained joints "TR-Flex" as manufactured by U.S. Pipe, or approved equal shall be used. The length of restrained pipe shall be as tabulated or noted on the plans. Restrained joints shall be rated for a working pressure of 250 psi minimum. The manufacturer shall furnish test results showing that restrained joints in the sizes specified have been successfully tested to at least twice the specified pressure rating of the joint without leakage or failure. Tests shall be performed on pipe with metal thickness less than or equal to that specified for the project.
- E. Ductile iron fittings shall conform to the latest revisions of ANSI/AWWA C110/A21.10. Lining and coating for fittings shall be the same as specified for ductile-iron pipe. All fittings shall be ductile iron.
- F. All pipe, fittings, and accessories shall be installed and tested in accordance with the latest revision of AWWA C600.
- G. Welded outlets may be provided in lieu of tees and crosses and at locations shown on the drawings. Outlets shall be fabricated from centrifugally cast ductile iron pipe, manufactured and tested in accordance with ANSI/AWWA C151/A21.51, using a high nickel content weld such as NI-Rod 55. Welding shall be performed in the pipe manufacturer's shop only. Outlets shall not be more than 70% of the size of the parent pipe. Minimum walls for parent and outlet pipes shall be as published by the manufacturer.
- H. Unless approved by the Engineer, the maximum pipe laying length shall be 20 feet.
- I. All pipe and fittings shall be manufactured in the United States.
- J. All ductile iron pipe utilized for water distribution systems shall conform to ANSI/AWWA A21.51/C151, ANSI/AWWA A21.50/C150 and shall be thickness Class 51 or greater. Ductile iron pipe shall have a factory cement mortar lining as per ANSI/AWWA A21.4/C104, and factory asphaltic exterior coating. All ductile iron water line shall also be encased within a polyethylene encasement in accordance with ANSI/AWWA C105/A21.5.

## 2.02 COATING

- A. All ductile iron pipe and fittings shall have an asphaltic coating on the exterior in accordance with ANSI/AWWA C151/A21.51.
- B. All ductile iron pipe and fittings for sewer usage shall have a high build protective lining on the interior consisting of a polyethylene or ceramic epoxy material. The material used for lining the pipe and fittings must have been in general use for a minimum of 10 years for protecting pipelines in sewer service.
- C. All surface areas to be lined must be blast cleaned. Prior to abrasive blasting, the entire areas, which will receive the protective compound, shall be inspected for oil, grease, etc. Any areas where oil, grease or any substance, which can be removed by solvent, is present shall be solvent cleaned using the guidelines outlined in SSPC-1 Solvent Cleaning. After the surface has been made free of grease, oil or other substances, all areas to receive the protective compounds shall be abrasive blasted using compressed air nozzles with sand or grit abrasive media. The entire surface to be lined shall be struck with the blast media so that all rust, loose oxides, etc., are removed from the surface. Only slight stains and tightly adhering annealing oxide may be left on the surface. Any area where rust reappears before coating must be reblasted to remove all rust.
- D. The interior of pipe and fittings shall receive a minimum 40 mils dry film thickness of the protective lining. The lining must cover the inner surface of the pipe and fittings extending from the spigot end to the gasket socket. The spigot and socket surfaces exposed to the sewer effluent must be coated with a non-coal tar, non-toxic epoxy to a nominal dry film thickness of 8 mils.
- E. The interior barrel of all pipe must be thoroughly tested after lining for holidays using a high voltage spark tester as per ASTM G-62 Method B. The holiday test must be witnessed at the factory by an independent third party inspector. The minimum voltage must be at least 8000 volts as calculated by the formula described in ASTM G-62 Method B using a nominal thickness of 40 mils. Pinholes located with this test must be repaired. Random spark tests shall also be performed at the site and all pinholes must be repaired in the field.

## 2.03 POLYETHYLENE ENCASEMENT

All buried ductile iron pipe and fittings shall be encased in polyethylene encasement and shall be installed prior to the pipes' installation in accordance with ANSI/AWWA C150/A21.5-93, "Polyethylene Encasement for Ductile Iron Pipe Systems".

## 2.04 IDENTIFICATION

Each length of pipe and each fitting shall be marked with the name of manufacturer, size and class. All gaskets shall be marked with the name of manufacturer, size, and proper insertion direction.

## 2.05 CLOSURE PIECE

- A. The Contractor shall install closure piece assemblies onto the ends of force main pipe installed under this contract where adjacent force main contracts have been constructed and the pipes can be connected. The Contractor shall remove the bulkhead from the adjacent pipe projects (where completed) and install an entire closure piece assembly.
- B. The Contractor shall be responsible for matching the centerline elevation and alignment of the force main in this contract to the adjacent force main. The design of the assembly and the details of the connection should be submitted to the Engineer for approval and should be evidence enough to insure proper type fit and connection from existing pipe to the new force main. All joints of the completed assembly should be a restrained or harnessed type. The Contractor is responsible to make the tie-in to the Force Main provided for in the Force Main Contracts by use of these closure pieces.

## 2.06 BULKHEADS

- A. Permanent bulkheads shall be installed at the ends of the pipe where called for on the Plans under this contract. Permanent bulkheads shall be designed and reinforced as required to maintain the specified test pressure. The design of permanent bulkheads and the details of connection to the force main shall be submitted to the Engineer for review before installation. Temporary bulkheads used for conducting tests of the pipeline at the specified test pressure to be provided at the option of the Contractor.

## PART 3 - EXECUTION

### 3.01 LAYING DUCTILE IRON PIPE AND FITTINGS

- A. All buried piping shall be installed in accordance with recommendations of the pipe manufacturer and as specified herein. Polyethylene encasement shall be installed on the pipe prior to its' placement in the trench and shall meet the requirements of Section 2.03 above.
- B. Care shall be taken in handling, storage, and installation of pipe and fittings to prevent injury to the pipe or coatings. All pipe and fittings shall be examined before laying, and no piece shall be installed which is found to be defective. All damage to

the pipe coatings shall be repaired according to the manufacturer's recommendations.

- C. All pipe and fittings shall be kept clean and shall be thoroughly cleaned before laying.
- D. Pipe shall be laid to lines and grades shown on the drawings with bedding and backfill as shown on the drawings. Blocking under the pipe will not be permitted.
- E. Under no circumstances shall the pipe or accessories be dropped into the trench.
- F. Bell holes shall be formed at the ends of the pipe to prevent point loading at the bells and to facilitate installation. Excavation shall be made as needed outside the normal trench section at field joints to permit adequate access for the joints for connection operations and for application of coating on field joints.
- G. Each section of pipe shall be laid in the order and position shown on the laying schedule. In laying pipe, it shall be laid to the setline and grade, within approximately one inch plus or minus. On grades of zero slope, the intent is to lay to grade.
- H. Where necessary to raise or lower the pipe due to unforeseen obstructions or other causes, the Engineer may change the alignment and/or the grades. Such change shall be made by the deflection of joints, by the use of bevel adapters, or by the use of additional fittings. However, in no case shall the deflection in the joint exceed the maximum deflection recommended by pipe manufacturer. No joint shall be misfit any amount that will be detrimental to the strength and water tightness of the finished joint.

### 3.02 INSTALLING POLYETHYLENE ENCASEMENT

- A. Remove all lumps of clay, mud, cinders, etc., on pipe surface prior to installation of polyethylene encasement. Prevent soil or embedment material from becoming trapped between pipe and polyethylene.
- B. Fit polyethylene film to contour of pipe to affect a snug, but not tight fit, encase with minimum space between polyethylene and pipe. Provide sufficient slack in contouring to prevent stretching polyethylene where it bridges irregular surfaces, such as bell-spigot interfaces, bolted joints, or fittings, and to prevent damage to polyethylene due to backfilling operations. Secure overlaps and ends with adhesive tape to hold polyethylene encasement in place until backfilling operations are complete.
- C. Cover bends, reducers, offsets, valves, fittings and other pipe-shaped appurtenances

with polyethylene in same manner as pipe.

- D. Repair any cuts, tears, punctures, or damage to polyethylene with adhesive tape or with short length of polyethylene sheet wrapped around pipe to cover damaged area and secure in place.

### 3.03 TESTING

- A. All force mains shall be field tested. The Contractor shall supply all labor, equipment, material, gages, pumps, and incidentals required for testing.
- B. The test pressure shall be 100 psig unless noted otherwise. The test pressure shall be measured at the highest point along the test section.
- C. Testing shall be conducted after backfilling has been completed and before placement of permanent surface.
- D. Testing procedure shall be as follows:
  - 1) Fill line slowly with water. Maintain flow velocity less than two feet (2') per second.
  - 2) Expel air completely from the line during filling and again before applying test pressure. Air shall be expelled by means of taps at points of highest elevation.
  - 3) Apply test pressure. Measure the quantity of water that must be pumped into the line to maintain pressure within 5 psi of the test pressure for a period of two (2) hours. This quantity is defined as leakage.
  - 4) Carefully examine any exposed pipe, fittings, and joints during the test.
- E. Allowable leakage: No pipe installation will be accepted if the leakage is greater than that determined by the following formula:

$$L = \frac{S D P^{1/2}}{133200}$$

L = Loss Gal/hr.

S = Length of pipe tested, in feet

D = Nominal diameter in inches

P = Average test pressure

Notes: The following shall be determined at the discretion of the Engineer.

- 1) Test pressure of 100 psig unless otherwise noted.
- 2) Test duration shall be a minimum of two hours.
- 3) All visible leaks are to be repaired regardless of the amount of leakage.

F. If any test of pipe laid discloses leakage greater than that allowed, the Contractor shall, at his own expense, locate and repair the cause of leakage and retest the line. Method of repair shall be approved by the Engineer.

G. All visible leaks are to be repaired regardless of the amount of leakage.

### 3.04 CLEANING

At the conclusion of the work, the Contractor shall thoroughly clean all of the new pipelines by flushing with water or other means to remove all dirt, stones, pieces of wood, or other material that may have entered during the construction period. Debris cleaned from the lines shall be removed from the job site. If, after this cleaning, any obstructions remain, they shall be removed.

END OF SECTION

SECTION 02622  
POLYVINYL CHLORIDE PIPE

PART 1 - GENERAL

1.01 RELATED WORK

- A. SECTION 15100 – VALVES FOR SEWER FORCE MAINS
- B. SECTION 15107 – VALVES FOR WATER SERVICE

1.02 DESCRIPTION

- A. The Contractor shall furnish and install the polyvinyl chloride (PVC) pipe along with labor, materials and equipment necessary for installation in accordance with the Plans and Specifications.

1.03 REFERENCES

- A. ASTM D1784
- B. ASTM D1785
- C. ASTM F441
- D. Uni-Bell B-11 (latest revision)
- E. AWWA C-900

1.04 SUBMITTALS

- A. Certified mill tests shall be furnished the Engineer by the manufacturer for all pipe and fittings at least 10 days prior to shipment of material to the job site.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Pipe:
  - 1. All polyvinyl chloride (PVC) pipe shall be extruded from PVC meeting the requirements of cell classification 12454-B as defined in ASTM 1784.
  - 2. All polyvinyl chloride (PVC) pressure pipe 4 inches through 12 inches in diameter shall meet AWWA specification C-900, DR18. PVC pipe 14

inches and larger in diameter shall meet AWWA specification -905, DR25.

3. All polyvinyl chloride (PVC) pipe used to transport raw sewage, treated sewage, sludge, etc., by gravity shall be SDR 26 PVC pipe. Polyvinyl chloride (PVC) pipe in diameters of 4 inches through 12 inches shall meet all requirements of AWWA C-900 specifications. Polyvinyl chloride (PVC) pipe in diameters of 14 inches through 36 inches shall meet all requirements of Uni-Bell B-11 latest revision or approved equal.
4. All polyvinyl chloride (PVC) pipe used to transport raw sewage, treated sewage, sludge, etc., under pressure shall have a SDR rating of 26 for diameters up to and including 16 inches. The pipe shall have a minimum pressure rating of 165 psi, and compatible for use with cast iron joints and fittings. Polyvinyl chloride (PVC) pipe used to transport raw sewage, treated sewage, sludge, etc., in diameters of 18 inches through 36 inches shall have a SDR rating of 26. Polyvinyl chloride (PVC) pipe in diameters of 4 inches through 12 inches shall meet all requirements of AWWA C-900 specifications. Polyvinyl chloride (PVC) pipe in diameters of 14 inches through 36 inches shall meet all requirements for AWWA C-905. Polyvinyl chloride (PVC) pipe in diameters of 14 inches through 36 inches shall meet all requirements of Uni-Bell latest revision or approved equal.

B. Fitting and Specials:

1. The polyvinyl chloride fitting used in conjunction with Schedule 80 and SDR 26 polyvinyl chloride (PVC) pipe shall be in accordance with all applicable sections of ASTM Specifications.
2. PVC fittings in chlorine solution service shall be Schedule 80, suitable for outdoor installation.
3. The strength class of the fitting shall be not less than the strength of any adjoining pipe.
4. No polyvinyl chloride (PVC) pipe fitting will be allowed on PVC pipe used to transport raw sewage, treated sewage, sludge, etc., under pressure. All bends shall be ductile iron fittings meeting the requirements of Section 02615.

C. Joints:

1. The pipe will have integral bell elastomeric, gasketed joints in accordance with ASTM F477. The gaskets shall be inserted into the pipe bell at the



factory prior to shipment.

2. All "O" rings furnished as part of any fitting, union, etc., conveying chloride solution shall be suitable for chlorine solution service.

D. Protective Coatings:

1. No protective coating will be required on polyvinyl chloride (PVC) pipe.

E. Restrained Joints:

1. Polyvinyl chloride (PVC) pipe shall be restrained using the Series 1100 PV or 1100 HV MEGALUG mechanical joint thrust restraint as manufactured by EBAA Iron, Inc. or approved equal.
2. The EBAA Iron Series 1100 PV or 1100 HV MEGALUG assembly shall be cast completely of closely controlled ductile iron conforming to ASTM A536, latest revision, and furnished with silicone bronze IFI 140 Grade 655 bolts. All glands and bolts shall be coated with two (2) coats of coal tar epoxy, Koppers 300-M Bitumastic or approved equal, with a minimum dry film thickness of eight (8) mils per coat.
3. Both types of restraining glands shall be wrapped with an eight (8) mil thick polyethylene tube for additional protection. The polyethylene wrap shall extend a minimum of two (2') feet in either direction from the gland and secured on the end with circumferential turns of tape.
4. All restrained joints shall be inspected at the job site after installation. Field touch-up and repair if needed shall be made by the Contractor under the supervision and inspection of a representative of the coating supplier.

## PART 3 - EXECUTION

### 3.01 TESTING AND INSPECTION

- A. All pipe and fittings shall be subjected to a rigid inspection after delivery to the site and before being placed in the work. Any piece found defective by such field inspection will be rejected and shall be immediately removed from the premises.
- B. SFM lines shall be tested to 100 psi.

END OF SECTION

02622-4  
FOR INFORMATION ONLY

SECTION 02623  
HIGH DENSITY POLYETHYLENE PIPE AND FITTINGS

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor, materials, equipment and incidentals required and install high density polyethylene (HDPE) pipe and fittings complete as shown on the Drawings and as specified herein.

1.02 RELATED WORK

- A. Trenching, Backfill, and Compaction are included in Section 02221.
- B. Ductile Iron Pipe and Fittings are included in Section 02615.

1.03 SUBMITTALS

- A. Submit to the Engineer, in accordance with contract documents, the following information:
  - 1. List of materials to be furnished, the names of the suppliers and the date of delivery of materials to the site.
  - 2. The origin of the resin to be used in the manufacturing of the pipe including the supplier's name and production plant, as well as brand name and number.
  - 3. Documentation from the resin's manufacturer showing results of the following tests for resin identification:
    - a. Melt Flow Index – ASTM D1238
    - b. Density – ASTM D1505
  - 4. Manufacturer quality control manual describing implementation of quality control procedures during pipe manufacturing process.
  - 5. Pipe manufacturer's certification of compliance with this Section.
  - 6. One complete, detailed shop drawing of all polyethylene pipe, including the location of all fittings, joints and connections to structures.
  - 7. Manufacturer's recommendations for handling, storing and installing pipe and fittings.

8. For each shipment of pipe of manufacturer's certification that the pipe was manufactured from the same resins identified in Paragraph 1.03A2 above.
9. Name, address and telephone number for manufacturer and distributor.

#### 1.04 REFERENCE STANDARDS

##### A. American Society for Testing and Materials (ASTM)

1. ASTM D1238 – Standard Method for Flow Rates Thermoplastics by Extrusion Plastometer.
2. ASTM D1248 – Standard Specification for Polyethylene Plastic Molding and Extrusion Materials.
3. ASTM D1505 – Standard Test Method for Density of Plastics by the Density-Gradient Technique.
4. ASTM D1603 – Standard Test Method for Carbon Black in Olefin Plastics.
5. ASTM D2657 – Standard Practice for Heat-Joining Polyolefin Pipe and Fittings.
6. ASTM D2837 – Standard Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials.
7. ASTM D3350 – Standard Specifications for Polyethylene Plastic Pipe and Fittings Materials.
8. ASTM F714 – Standard Specifications for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter.

##### B. American National Standards Institute (ANSI)

1. ANSI B16.1 – Cast Iron Fittings and Flanged Fittings.
2. ANSI B16.21 – Non-Metallic Flat Gaskets for Pipe Flanges.

##### C. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

#### 1.05 QUALITY ASSURANCE

- ##### A.
- All HDPE pipe and fittings shall be manufactured by a single manufacturer who is fully experienced, reputable and qualified in the manufacture of the polyethylene pipe to be furnished. All HDPE pipe and fittings shall be supplied by a single

distributor who is fully experienced, reputable, and qualified with the distribution of the pipe to be furnished. The pipe shall be designed, constructed, and installed in accordance with the best practices and methods and shall comply with these specifications.

- B. All HDPE pipe to be installed under this Contract may be inspected at the factory for compliance with this Section by an independent testing laboratory provided by the Owner. The manufacturer's cooperation shall be required in these inspections. The cost of these plant inspections of all pipe approved for this Contract, plus the cost of inspection of a reasonable amount of disapproved pipe, will be borne by the Owner.
- C. Inspection of the pipe may also be made by the Engineer or other representatives of the Owner after delivery. The pipe shall be subject to rejection at any time on account of failure to meet any of the specified requirements, even though pipes may have been accepted as satisfactory at the place of manufacture. Pipe rejected after delivery shall be marked for identification and shall immediately be removed from the job.
- D. Resin Evaluation
  - 1. All incoming resin shall be sampled for conformance testing against test results supplied by the resin manufacturer. Samples shall be taken from the top and bottom of each compartment from every hopper car received. The following conformance tests shall be performed on the sample:
    - a. Melt Flow Index – ASTM D1238
    - b. Density – ASTM D1505
    - c. The results of these tests shall become part of the manufacturer's permanent quality control records.
- E. Finished Product Evaluation
  - 1. Each length of pipe produced shall be checked by production staff for the items listed below. The results of all measurements shall be recorded on production sheets that become part of the manufacturer's permanent records.
    - a. Pipe in process shall be checked visually, inside and out for cosmetic defects, (grooves, pits, hollows, etc.).
    - b. Pipe outside diameter shall be measured using a suitable periphery tape to ensure conformation with ASTM P714.
    - c. Pipe wall thickness shall be measured at 12 equally spaced locations around the circumference at both ends of the pipe to ensure

conformance with ASTM F714.

- d. Pipe length shall be measured.
- e. Pipe marking shall be examined and checked for accuracy.
- f. Pipe ends shall be checked to ensure they are out square and clean.
- g. Subject inside surface to a “reverse and test” to ensure the pipe is free of oxidation (brittleness).

F. Stress Regression Testing

- 1. The polyethylene pipe manufacturer shall provide certification that stress regression testing has been performed on the specific polyethylene resin being utilized in the manufacture of this product. This stress regression testing shall have been done in accordance with ASTM D2837 and the manufacturer shall provide a product supplying a minimum Hydrostatic Design Basis (HDB) of 1600 psi as determined in accordance with ASTM D2837.

1.06 WARRANTY

- A. The pipe manufacturer shall provide a warranty against manufacturing defects of material and workmanship for a period of ten years after the final acceptance of the project by the Owner. The manufacturer shall replace, at no additional cost to the Owner, any defective pipe material within the warranty period.

PART 2 - PRODUCT

2.01 MATERIALS

- A. Pipe
  - 1. HDPE pipe is a flexible conduit and shall be designed to transfer imposed loads to the surrounding embedment medium. The pipe and fittings shall be free from all defects including indentations, delaminations, cracks, bubbles, pinholes, inclusions or occlusions which, due to their nature, degree, or extent, detrimentally affect the strength and serviceability of the pipe. Any pipe or fittings with such defects that, in the judgment of the Engineer, will affect the strength and serviceability shall be repaired or rejected.
  - 2. HDPE pipe resins shall be high molecular weight, high-density polyethylene with a cell classification number of 345444C in accordance with ASTM D3350. Pipe materials shall meet the requirements of Type III, Class C, Category 5, Grade P34 as defined in ASTM D1248, with a standard grade

rating of 1600 psi at 73 degrees F and have a PPI recommended designation of PE 3408. Clean rework material generated by the manufacturer's own production may be used so long as the pipe or fittings produced meet all the requirements of this Section.

3. Polyethylene pipe shall be as manufactured by Chevron Phillips Chemical Company LP Performance Pipe; CSR Polypipe; US Fusion LLC or equal.
4. The polyethylene compound shall be suitably protected against degradation by ultraviolet light as required by ASTM D1603.
5. The pipe shall have the nominal dimensions shown on the Drawings and shall conform to the dimension requirements of the ductile iron pipe sizing system. The pipe shall meet the dimension requirements of Standard Dimension Ratio (SDR) 11.
6. All polyethylene pipe shall meet the requirements of ASTM F714.
7. The pipe shall be joined with burr, heat fusion joints. All joints shall be made in strict compliance with the manufacturer's recommendations.
8. Pipe shall be furnished in standard laying lengths not exceeding 50-ft.
9. All high-density polyethylene pipe and fittings shall be made from the same resin.
10. Fittings shall be fully pressure rated to match the pipe SDR pressure rating. All fittings shall be molded or fabricated by the manufacturer.

**B. TRACING WIRE**

1. All non-metallic pipe shall be marked with an electronic tracer wire and a detector tape. Tracer wire shall be laid directly over the pipe and shall terminate in valve boxes or pipeline markers. Detector tape shall be placed in the trench during backfilling and shall be placed about 12 inches from the top of the ground.
2. Tracer wire used with PVC or PE pipe shall be 14-gauge single strand copper with THWN coating for buried service. Splices in the tracer wire shall be made using a waterproof mechanical splice kit specifically designated for underground connections to electrical or telephone wiring. Splice connection methods shall be approved by the Engineer prior to use.
3. Detector tape shall be color coded, foil backed and printed with the marking "WARNING/CAUTION WASTEWATER LINE BURIED BELOW."

Detector tape shall be laid in the trench while backfilling, and shall be placed about 12 inches from the top of the ground.

## 2.02 PIPE IDENTIFICATION

- A. The following shall be continuously indent printed on the pipe or spaced at intervals not exceeding 5-ft:
  - 1. Name and/or trademark of the pipe manufacturer.
  - 2. Nominal pipe size.
  - 3. Dimension ratio.
  - 4. The letters PE followed by the polyethylene grade in accordance with ASTM D1248, followed by the hydrostatic design basis in 100's of psi, e.g., PE 3408.
  - 5. Manufacturing standard reference, e.g., ASTM F714.
  - 6. A production code from which the date and place of manufacture can be determined.

## PART 3 – EXECUTION

### 3.01 HANDLING

- A. Handling and laying of pipe and fittings shall be in accordance with the manufacturer's instruction and as specified herein.
- B. Pipes shall be stored on clean level ground, preferably turf or sand, free of sharp objects that could damage the pipe. Stacking of the polyethylene pipe shall be limited to a height that will not cause excessive deformation of the bottom layers of pipes under anticipated temperature conditions. Where necessary, due to ground conditions, the pipe shall be stored on wooden sleepers, spaced suitably and of such width as not to allow deformation of the pipe at the point of contact with the sleeper or between supports.
- C. Care shall be taken in loading, transporting, and unloading to prevent injury to the pipe. The handling of the pipe shall be in such a manner that the pipe is not damaged by dragging it over sharp and cutting objects. Ropes, fabric or rubber protected slings and straps shall be used when handling pipes. Chains, cables or hooks inserted into the pipe ends shall not be used. Two slings spread apart shall be used for lifting each length of pipe. Slings shall not be positioned at butt-fused joints. Pipe or fittings shall not be dropped.



- D. All pipe or fittings shall be examined before laying and no piece shall be installed which is found to be defective. The maximum allowable depths of cuts, scratches or gouges on the exterior of the pipe are 10 percent of wall thickness. The interior pipe surface shall be free of cuts, gouges or scratches. Any damage to the pipe shall be repaired as directed by the Engineer. If any defective pipe section is discovered after it has been laid, it shall be removed completely and the ends of the pipeline rejoined, at the Contractor's expense.

### 3.02 LAYING PIPE AND FITTINGS

- A. All pipe and fittings shall be thoroughly cleaned before laying, shall be kept clean until they are used in the work and when laid, shall conform to the lines and grades shown on the Drawings.
- B. All pipe shall be sound and clean before laying (or hanging). Good alignment shall be preserved in laying. The deflection shall not exceed that recommended by manufacturer.
- C. When laying is not in progress, including during lunchtime, the open ends of the pipe shall be closed by watertight plugs or other approved means. All plugs shall be OD fitting plugs. No plugs will be allowed that require insertion of the plug into the pipe.
- D. When cutting pipe is required, the cutting shall be done by machine, leaving a smooth cut at right angles to the axis of the pipe.
- E. The pipe shall be joined by the method of thermal butt fusion, as outlined in ASTM D2657. All joints shall be made in strict compliance with the manufacturer's recommendations by a factory qualified joining technician as designated by the pipe manufacturer with a minimum of three years experience with the fusion equipment to be used.
- F. Fittings shall be connected to HDPE pipe in accordance with manufacturer's recommendations.
- G. Flanged connections shall consist of the following:
  - 1. A high density polyethylene flange adapter, made by the manufacturer from the same resin as the pipe, and fully pressure rated to match the pipe SDR pressure rating, thermally butt-fused to the stub end of the pipe.
  - 2. A stainless steel back-up ring (conforming to ANSI B16.1) fitted to the polyethylene flange adapter and shaped as necessary to suit the outside dimension of the pipe.
  - 3. A full-face neoprene gasket, conforming to ANSI B16.21.

4. Corrosion resistant bolts and nuts of Type 316 stainless steel as specified in ASTM A726 and ASTM A307. Bolts shall be tightened alternatively and evenly to the manufacturer's specified torques. After installation a bitumastic coating shall be applied to bolts and nuts.
  5. Contractor shall refer to pipe manufacturer's requirements for appropriate bolting procedure.
- H. Where polyethylene pipe is connected to high performance, water-type butterfly valves, where the inside pipe diameter is smaller than the diameter of the valve disk, HDPE valve spacers shall be placed between the flanges of the valve and pipe. Valve spacers shall be manufactured by the HDPE pipe manufacturer and shall meet the same requirements as the HDPE pipe and fittings. Valve spacers shall be installed as recommended by the manufacturer. Care shall be taken to ensure that the valve disk can turn easily without coming into contact with valve spacers or pipe wall, and to ensure that no leakage will occur at the spacer.
- I. Mechanical connections of HDPE pipe to Ductile Iron or PVC piping, mechanical joint fittings, or valves shall be through a self-restraining, fusible mechanical joint adaptor with an integral, internal stainless steel insert. Mechanical joint adaptor shall be of the same SDR rating as the pipe. A separate, loose insert will not be allowed.

### 3.03 TESTING

- A. Contractor shall supply all labor, equipment, material, gauges, pumps, meters and incidentals required for testing. Pressure test each non-potable water force main upon completion of hanging the pipe. Testing procedures shall be as specified Section 01625. SFM lines shall be tested to 100 psi.

### 3.04 CLEANING

- A. At the conclusion of the work, the Contractor shall thoroughly clean all new pipelines by flushing with water to remove any foreign material, which may have entered during the construction period. Debris cleaned from the lines shall be removed from the job site.

END OF SECTION

SECTION 02700  
SEWER FORCE MAINS

PART 1 - GENERAL

1.01 RELATED ITEMS SPECIFIED ELSEWHERE

- A. Excavation and Backfill for Trenches, Pavement and Structures (02221)
- B. Ductile and Cast Iron Pipe and Fittings (02615)
- C. Polyvinyl Chloride (PVC) Pipe (02622)
- D. High density Polyethylene Pipe (02623)

1.02 DESCRIPTION

Under this section of the specifications, the Contractor shall furnish all labor, materials, tools and equipment necessary to install the force main and restrained force main indicated on the Drawings. Other items also contained in this section of the specifications include joint restrainers, casing pipe and PVC and HDPE pipe. All work is to be done in accordance with the project Drawings and Specifications and in accordance with manufacturers' recommendations.

1.03 PRODUCT DELIVERY, HANDLING AND STORAGE

The equipment specified herein shall be packaged and shipped in a manner that shall adequately protect the equipment from damage. Upon receipt of the equipment by the Contractor, the equipment shall be stored in a location within the Contractor's staging area remote from possible damage. If any equipment is damaged, lost or stolen at any time prior to acceptance of the project, it shall be replaced at the Contractor's expense.

1.04 AS-BUILT SURVEY

Also as part of the Work under this section of the Specifications, the Contractor shall conduct an "as-built" survey showing the exact location of the installed force main with ties to the project baseline and additional ties to existing structures (i.e., piers, back of curbs, buildings, streets, etc.). All fittings shall be located at the station installed and the offset from the baseline.

PART 2 - PRODUCTS

2.01 DUCTILE IRON PIPE AND FITTINGS

Ductile iron pipe and fittings shall be as specified in other sections of these Specifications.

## 2.02 POLYVINYL CHLORIDE (PVC) PIPE

PVC pipe shall be as specified in other sections of these Specifications.

## 2.03 HIGH DENSITY POLYETHYLENE (HDPE) PIPE

HDPE pipe shall be as specified in other sections of these Specifications.

## 2.04 JOINT RESTRAINERS

Joint restrainers for ductile iron fittings shall be as specified in other sections of these specifications.

# PART 3 - EXECUTION

## 3.01 GENERAL

### A. Excavation and Backfill

Excavation, backfill and compaction required for the installation of the force main shall comply with the requirements of other sections of these Specifications.

### B. Advance Trench Excavation

The Contractor shall excavate the sewer force main trench adequately in advance of any pipe installation as to uncover potential conflicts with the sewer force main. Should conflicts arise the Contractor shall deflect the force main above or below the conflicting utility or house connection.

Where the length of force main being installed is less than 50', the Contractor shall excavate the entire length of the trench. In the event of a conflict, the Contractor shall deflect the force main above or below the conflicting utility or house connection or install a vertical offset in the force main.

The Contractor, prior to the end of each working day, shall backfill the open trench to grade. In addition, the contractor is to block the end of the open pipe to prevent from access to the interior of the pipe of varmints, animals, etc.

### C. Restrained Joints

The force mains shall be restrained as shown on the plans. The encased force main installations shall be fully restrained. Restraining shall be accomplished by use of ductile iron restrainer glands as required in the section pertaining to "Ductile and

Cast Iron Pipe and Fittings" or UNI-FLANGE Series 1360 or approved equal. Thrust block restraints shall not be allowed unless indicated on the Plans.

D. Pipe Installation and Testing

All laying and jointing and all testing for defects and for leakage shall be performed in the presence of the Engineer, and shall be subject to its approval before acceptance. All materials found during the progress to have defects will be rejected and the Contractor shall promptly remove such defective material from the site of the work.

3.02 PIPE INSTALLATION (FORCE MAIN)

- A. The installation of force main pipe shall be strictly in accordance with the manufacturer's technical data and instructions. Proper implements, tools and facilities shall be provided and used by the Contractor for the safe and convenient prosecution of the work. All pipe, fittings and appurtenances shall be carefully lowered into the trench piece by piece by means of a derrick, ropes or other suitable tools or equipment in such a manner as to prevent damage to materials and protective coatings and linings. Under no circumstances shall materials be dropped or dumped into the trenches.
- B. All pipe, fittings, and appurtenance shall be inspected for defects and cracks prior to being lowered into the trench.
- C. The outside of the spigot, the inside of the bell, and any couplings used shall be brushed and wiped clean and dry and free from all foreign matter before the pipe is joined.
- D. Every precaution shall be taken to prevent foreign material from entering the pipe while it is being placed in the line. If the pipe laying crew cannot put the pipe into the trench and in place without getting earth into it, a heavy, tightly woven canvas bag of suitable size shall be placed over each end and left there until the connection is to be made to the adjacent pipe. During the laying operations, no debris, tools, clothing or other material shall be placed in the pipe.
- E. After placing a length of pipe in the trench, the spigot end shall be centered in the bell and the pipe forced home and brought to correct line and grade. Bedding and backfill material and compaction requirements shall comply with the section "Excavating, Backfilling and Compacting for Utilities and Pavement" of these specifications. Precautions shall be taken to prevent dirt from entering the joint space.

- F. At times when pipe laying is not in progress, the open ends of pipe shall be closed by a watertight plug or other means approved by the Engineer. This provision shall apply during the noon hour as well as overnight. If water is in the trench, the seal shall remain in place until the trench is pumped completely dry.
- G. Cutting of pipes for inserting fittings or closure pieces shall be done in a neat and workmanlike manner in accordance with instructions of the pipe manufacturer and without damage to the pipe.
- H. The Contractor shall install restrained ductile iron fittings (mechanical joint with retainer glands) at locations where piping alignment adjustments (vertical and horizontal) are required as shown or indicated on the drawings and specifications. Restrained ductile iron fittings shall conform to the section pertaining to "Ductile and Cast Iron Pipe and Fittings" of these specifications.
- I. The sewer force main shall be pressure tested in accordance with the section pertaining to "Pipeline and Sewer Pressure and Leakage Testing" of these specifications.

### 3.03 AS-BUILT SURVEY

During the progress of Work, the Contractor shall conduct an "as-built" survey pinpointing the exact location of the installed force main. The survey shall include ties to the established project baseline and ties to existing structures.

END OF SECTION

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FOR INFORMATION ONLY

SECTION 02760  
DIRECTIONAL DRILLING

PART 1 – GENERAL

1.01 SCOPE OF WORK

- A. The work covered by this section of the Specifications consists of plant, labor, equipment, and materials, and of performing all operations in connection with the installation of high-density polyethylene pipe by the use of the horizontal directional drilling method complete. The work shall be done in strict accordance with this and other applicable sections of the Specifications, all applicable drawings, and subject to the terms and conditions of the contract.

1.02 QUALITY ASSURANCE

- A. Polyethylene pipe jointing shall be performed by personnel trained in the use of joint fusion recommended methods for pipe liner connections. Personnel directly involved with installing the pipe shall receive training in the proper methods for handling, inserting, trimming and finishing the pipe.

1.03 SUBMITTALS

- A. The Contractors shall develop a proposed profile drawing and drilling procedure for the installation by directional drilling. The Contractor's proposed profile drawing shall be subject to review and written approval by Owner. The profile drawing and drilling procedure shall be submitted to the Engineer at least fourteen (14) days prior to start the construction. It will be the Contractor's responsibility to determine the entry pilot hole and exit location within the permitted locations shown on the drawings approved by the Engineer.
- B. Shop drawings, catalog data and manufacturer's technical data showing complete information on material composition, physical properties and dimensions of pipe fittings shall be submitted. Include manufacturer's recommendation for handling, storage and repair of pipe fittings if damaged.
- C. Contractor shall submit calculations showing design of pipe wall strength based on amount of pull back required for the pipe installation. The pull back force shall not exceed 50% of the pipe tensile strength. The radius of bending shall not exceed 100 times the pipe I.D. The pipe shall be designed for a minimum of 1.25 times the specified pressure.

PART 2 - PRODUCTS

2.01 POLYETHYLENE PIPE

- A. The wall thickness shall be designed by the Contractor, and approved by the Engineer.
- B. The wall thickness of the pipe shall be in accordance with A above, but in no case less than wall thickness Class DR11.

### PART 3 – EXECUTION

#### 3.01 LAUNCHING AND RECEIVING PITS

- A. The approximate locations of all expected launching and receiving pits are shown on the Drawings. The actual number and location of the pits shall be decided by the Contractor and approved by the Engineer prior to excavation.
- B. Launching and receiving pits shall be backfilled and the surrounding area restored in accordance with the appropriate sections of these specifications.

#### 3.02 UTILITY COORDINATOR

- A. Before any excavation is done for any purpose, it will be the responsibility of the Contractor to check with the various utility companies and determine the location of their facilities. Any necessary temporary construction easements and/or right-of-way areas will be arranged by the Contractor at no cost to the Owner.

#### 3.03 DIRECTIONAL DRILLED REQUIREMENTS

- A. The pilot hole shall be drilled along the path shown on the plan and profile drawing. The pilot hole tolerances are as follows:
  - 1. Elevation: +0 feet, -5 feet
  - 2. Alignment: + or – 5 feet
  - 3. Curve Radius: The pilot hole shall be drilled at a radius of no less than 1,000 feet.
  - 4. Entry Point Location: The pilot hole shall initially penetrate the ground surface area at the exact location shown on the drawings or approved by the Engineer.
  - 5. Exit Point Location: The pilot hole shall finally penetrate the ground surface within + or – 5 feet of the alignment shown on the drawing and with +15 feet and –0 feet of the length shown on the drawings.



- B. The Contractor shall at all times provide and maintain instrumentation which will accurately locate the pilot hole (both horizontal and vertical displacement points), measure drill string axial and torsional loads, and measure drilling fluid discharge rate and pressure. The Engineer will have access to these instruments and their readings at all times during the drilling and pull back operations. A final "as built" plan and profile shall be submitted to the Engineer within five (5) days after completing the pull back. The Contractor shall also furnish a copy of the drilling at this time.
- C. Pre-reaming operations shall be conducted at the discretion of the Contractor. All provisions of these specifications relating to simultaneous reaming and pulling back operations shall also pertain to pre-reaming operations.
- D. The maximum allowable tensile load imposed on the pull section shall not exceed 90% of the product of the specified minimum yield strength of the pipe and the area of the pipe section, or the requirements of Article 1.03, C.
- E. A swivel shall be used to connect the pull section to the assembly to minimize torsional stress imposed on the section.
- F. The pull back section of the pipeline shall be supported as it proceeds during pull back so that it moves freely and the pipe is not damaged.
- G. The pull back section shall be installed in the reamed hole in such a manner that external pressures are minimized. Any damage to the pipe resulting from external pressure during installation shall be the responsibility of the Contractor.
- H. Buoyancy modification shall be used at the discretion of the Contractor. Any buoyancy modification procedure proposed for use shall be submitted to the Engineer for approval. No procedure shall be used that has not been approved by the Engineer. The Contractor is responsible for any damage to the pull section resulting from buoyancy modification.

#### 3.04 DRILLING FLUIDS AND WATER

- A. All drilling fluids, mud or other chemicals used by Contractor must be submitted to Engineer for approval. No fluid will be approved or utilized that does not comply with permit requirements and environmental regulations.

#### 3.05 TESTING

- A. Pipe shall be tested both before and after installation in accordance with Section 01625.

END OF SECTION

FOR INFORMATION ONLY

## SECTION 02831 FENCING

### PART 1 - GENERAL

#### 1.01 DESCRIPTION

This Section covers material and installation requirements for fencing specifically designated on the drawings or as may be otherwise indicated. The type of fence designated shall be erected at the locations and to the lines shown on the drawings. Fence shall be 6 ft. in height.

### PART 2 - PRODUCTS

#### 2.01 CHAIN LINK FENCE

Install new materials only.

#### 2.02 CHAIN LINK FABRIC

Steel hot dip galvanized-after-weaving chain link wire woven in a 2-inch mesh-fabric.

#### 2.03 CHAIN LINK FABRIC COATINGS

To be hot dip galvanized-after-weaving, as specified. Zinc coating to be not less in weight than 2.0 oz./sq. ft. of bare wire surface and shall conform to ASTM specification No. A392, latest revision, Class 2. Galvanized coating to withstand 12 one-minute immersions under the copper sulphate dip test (Preece Test) performed in accordance with ASTM specification No. A239, latest revision.

#### 2.04 CORNER POSTS

Hot dip galvanized 2 7/8" schedule 40 pipe equipped with No. 6-gauge hot dip galvanized clips on 14-inch centers.

#### 2.05 TOP RAIL AND BRACE RAIL

1 5/8" nom. (Schedule 40) hot dip galvanized pipe 2.27 lbs. per ft. with outside sleeve type couplings at least 7-inches long, one coupling in every five to have a heavy spring to take up expansion and contraction of rail. The fabric shall be tied to top rail every 24-inches with No. 9-gauge aluminum tie wires.

#### 2.06 BOTTOM TENSION WIRE

No. 7-gauge galvanized-coated spring coil tension wire fastened to chain link fabric with No. 11-gauge hot dip galvanized hog rings in 24-inch centers.

#### 2.07 TERMINAL POSTS

FOR INFORMATION ONLY

End or corner posts to be 2 7/8-inch (3 1/2-inch for 10' fence) nom. (Schedule 40) - 5.79 lbs. per ft. - hot dip galvanized steel pipe. All fittings to be hot dip galvanized heavy cold rolled steel or malleable iron. No aluminum or pot metal permitted. Top rail and truss bands shall be a minimum of 1-inch wide, tension bands a minimum of 1-inch wide. All bands and connections to be securely fastened with 3/8-inch diameter hot dip galvanized carriage bolts and nuts. All tension bars for fastening fabric to the terminal posts shall be a minimum of 3/16-inches x 3/4 inches hot dip galvanized steel bar. Hot dip galvanized ball caps shall be supplied on all corner or terminal posts.

## 2.08 FENCE POSTS

Hot dip galvanized or use 2 3/8-inch O.D. schedule 40 pipe, 3.65 lbs per ft.

## 2.09 GATE POSTS

Hot dip galvanized 4" O.D. schedule 40 pipe, 5.79 lbs per lb.

## 2.10 GATE FRAMES

Hot dip galvanized 1-7/8" O.D. schedule 40 pipe, 2.72 lbs per ft.

## 2.11 GATES

Swing gates and personnel access gates with a width as shown on the drawings (gate post to gate post). Gate shall be 6 ft. height.

# PART 3 - EXECUTION

## 3.01 CHAIN LINK FENCE

All fences shall be installed with a top rail and bottom tension wire. Posts shall be spaced no more than 10 feet apart, on center. The fabric shall be placed on the outside face of the posts, stretched taut and securely fastened to the top rail, posts and the bottom tension wire. The top edge of the fabric shall be placed flush with top rail and the bottom edge of the fabric shall be located approximately two inches above the ground surface. High points in the ground between posts shall be excavated so that the tension wire maintains a straight alignment. Filling of depressions will not be allowed.

Corner posts shall be installed wherever changes in line or grade exceed a deflection angle of 30.

END OF SECTION

SECTION 03100  
CONCRETE FORMWORK

PART 1 - GENERAL

1.01 SECTION INCLUDES

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

1.02 PRODUCTS INSTALLED BUT NOT FURNISHED UNDER THIS SECTION

- A. Section 03300 - Cast-In-Place Concrete: Supply of concrete accessories for placement by this Section.
- B. Section 05500 - Miscellaneous Metal: Supply of metal fabrications for placement by this Section.

1.03 RELATED SECTIONS

- A. Section 02221 - Excavation, Backfilling for Trenches, Pavements, and Structures.
- B. Section 03200 - Concrete Reinforcement.
- C. Section 03300 - Cast-in-Place Concrete.

1.04 REFERENCES

- A. ACI 347 - Recommended Practice For Concrete Formwork.
- B. PS-1 - Construction and Industrial Plywood.

1.05 DESIGN REQUIREMENTS

- A. Design, engineer, and construct formwork, shoring and bracing to conform to design and code requirements; resultant concrete to conform to required shape, line and dimension.

1.06 SUBMITTALS

03100-1

FOR INFORMATION ONLY

- A. Submit under provisions of the contract documents.
- B. Shop Drawings: Submit diagram of proposed construction joints not shown on Drawings.
- C. Product Data: Provide data on form release agent, void form materials and installation requirements.

1.07 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 347, 301, and 318.
- B. Maintain one copy of each document on site.

1.08 QUALIFICATIONS

- A. Design, engineer and construct forms, shores, bracing and other temporary supports to support loads imposed during construction in accordance with ACI 347. Design formwork under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State of Louisiana.

1.09 REGULATORY REQUIREMENTS

- A. Conform to applicable code for design, fabrication, erection and removal of formwork.

1.10 FIELD SAMPLES

- A. Provide under provisions of the contract documents. Coordinate with requirements stated in Section 03300.

1.11 DELIVERY, STORAGE, AND HANDLING

- A. Delivery, storage, and handing of products shall be in accordance with provisions of Section 01600.
- B. Deliver void forms and installation instructions in manufacturer's packaging.
- C. Store materials off ground in ventilated and protected manner to prevent deterioration from moisture.

## 1.12 COORDINATION

- A. Coordinate work under provisions of the contract documents.
- B. Coordinate this Section with other Sections of work that require attachment of components to formwork.

## PART 2 - PRODUCTS

### 2.01 WOOD FORM MATERIALS

- A. Plywood: New, waterproof, synthetic resin bonded, exterior type Douglas Fir or Southern Pine plywood manufactured especially for concrete formwork and shall conform to the requirements of PS 1 for concrete forms, Class I, and shall be edge sealed. Face adjacent to concrete Grade B or better.
- B. Lumber: Southern Pine species; No. 2 grade; with grade stamp clearly visible.

### 2.02 MANUFACTURERS - RELEASE AGENTS

- A. Richmand Screw Anchor Co.
- B. Superior Concrete Accessories, Inc.; Strip-eez Form Release.
- C. Preco Industries, LTD; Preco Slip-Off.
- D. Substitutions: Under provisions of Section 01600.

### 2.03 PREFABRICATED FORMS

- A. Preformed Steel Forms: Minimum 16 gage matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.
- B. Glass Fiber Fabric Reinforced Plastic Forms: Matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished concrete surfaces.
- C. Void Forms: Moisture resistant treated paper faces, biodegradable, structurally sufficient to support weight of wet concrete mix until initial set; 4 inches thick.

## 2.04 FORMWORK ACCESSORIES

- A. Form Release Agent: Colorless liquids which will not stain concrete, or absorb moisture, or impair natural bonding or color characteristics of coating intended for use on concrete.
- B. Corners: Chamfered rigid plastic or wood strip type; 1/2 x 1/2 inch size unless noted otherwise; maximum possible lengths.
- C. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.
- D. Joint Filler: Performed type, 1/2 inch thick, unless shown otherwise.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

- A. Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with Drawings.

### 3.02 EARTH FORMS

- A. Hand trim sides and bottom of earth forms. Remove loose soil and prior to placing concrete cover earth with 6-mil polyethylene vapor barrier.

### 3.03 ERECTION - FORMWORK

- A. Erect formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI 301.
- B. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to overstressing by construction loads.
- C. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.
- D. Align joints and make watertight. Keep form joints to a minimum.
- E. Obtain approval before framing openings in structural members that are not indicated on Drawings.
- F. Install void forms in accordance with manufacturer's recommendations. Protect forms from moisture or crushing.

### 3.04 APPLICATION - FORM RELEASE AGENT

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FOR INFORMATION ONLY

- A. Apply form release agent on formwork in accordance with manufacturer's recommendations.
- B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.
- C. Do not apply form release agent where concrete surfaces will receive special finishes or applied coverings that are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces soaked prior to placement of concrete.

### 3.05 INSERTS, EMBEDDED PARTS, AND OPENINGS

- A. Provide formed openings where required for items to be embedded in or passing through concrete work.
- B. Locate and set in place items which will be cast directly into concrete.
- C. Coordinate work of other Sections in forming and placing openings, slots, recesses, chases, sleeves, bolts, anchors, and other inserts.
- D. Install accessories in accordance with manufacturer's instructions, straight, level, and plumb. Ensure items are not disturbed during concrete placement.

### 3.06 FORM CLEANING

- A. Clean and remove foreign matter within forms as erection proceeds.
- B. Clean formed cavities of debris prior to placing concrete.
- C. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.
- D. During cold weather, remove ice and snow from within forms. Do not use de-icing salts or water to clean out forms. Use compressed air or other means to remove foreign matter.

### 3.07 FORMWORK TOLERANCES

- A. Construct formwork to maintain tolerances required by ACI 301.



### 3.08 FIELD QUALITY CONTROL

- A. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and that supports, fastenings, wedges, ties, and items are secure.
- B. Do not reuse wood formwork more than 3 times for concrete surfaces to be exposed to view. Do not patch formwork.

### 3.09 FORM REMOVAL

- A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.
- B. Minimum Curing Period Prior to Form Removal:
  - 1. Air Temperature: Above 60°F: 3 days.
  - 2. Air Temperature: 50°F to 60°F: 5 days.
  - 3. Air Temperature: 40°F to 50°F: 7 days.
  - 4. Air Temperature: Less than 40°F: When temperature below 40°F prevails, leave forms until concrete reaches 75% of 28-day design strength.
- C. Observance of minimum curing periods listed above does not relieve Contractor of responsibility for safety of structure during construction.
- D. Remove wood forms from under floors, ramps, steps, and similar places (through temporary openings if necessary) so no material will be left to rot or to be infested by termites.
- E. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.
- F. Store removed forms in manner that surfaces to be in contact with fresh concrete will not be damaged. Discard damaged forms.

END OF SECTION

SECTION 03200  
CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Reinforcing steel bars, wire fabric and accessories for cast-in-place concrete.

1.02 RELATED SECTIONS

- A. Section 03100 - Concrete Formwork.
- B. Section 03300 - Cast-in-Place Concrete.

1.03 REFERENCES

- A. ACI 301 - Structural Concrete for Buildings.
- B. ACI 315 - Details and Detailing for Concrete Reinforcement.
- C. ACI 318 - Building Code Requirements For Reinforced Concrete.
- D. ACI SP-66 - American Concrete Institute - Detailing Manual.
- E. ANSI/ASTM A82 - Cold Drawn Steel Wire for Concrete Reinforcement.
- F. ANSI/ASTM A185 - Welded Steel Wire Fabric for Concrete Reinforcement.
- G. ANSI/ASTM A496 - Deformed Steel Wire Fabric for Concrete Reinforcement.
- H. ANSI/ASTM A497 - Welded Deformed Steel Wire Fabric for Concrete Reinforcement.
- I. ASTM A615 - Deformed and Plain Billet Steel Bars for Concrete Reinforcement.
- J. CRSI - Concrete Reinforcing Steel Institute Manual of Practice.
- K. CRSI 63 - Recommended Practice For Placing Reinforcing Bars.
- L. CRSI 65 - Recommended Practice For Placing Bar Supports, Specifications and Nomenclature.
- M. AWS D 1.4 - Structural Welding Code Reinforcing Steel.

1.04 SUBMITTALS

03200-1

FOR INFORMATION ONLY

- A. Submit under provisions of contract documents.
- B. Shop Drawings: Indicate bar sizes, spacings, locations, and quantities of reinforcing steel and wire fabric, bending and cutting schedules, and supporting and spacing devices. Comply with Part B, Chapter 3 of ACI 315 for preparation of shop drawings.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

#### 1.05 QUALITY ASSURANCE

- A. Perform Work in accordance with CRSI 63, 65 and Manual of Practice ACI 301, ACI SP-66 and ACI 318.
- B. Maintain one copy of each document on site.
- C. Submit certified copies of mill test report of reinforcement materials analysis.

#### 1.06 COORDINATION

- A. Coordinate work under provisions of contract documents.
- B. Coordinate with placement of formwork, formed openings and other Work.

### PART 2 - PRODUCTS

#### 2.01 REINFORCEMENT

- A. Reinforcing Steel: ASTM A615, 60 ksi yield grade; deformed billet steel bars, plain finish.
- B. Welded Steel Wire Fabric: ASTM A185 Plain Type in flat sheets; plain finish.

#### 2.02 ACCESSORY MATERIALS

- A. Tie Wire: Minimum 16 gage annealed type.
- B. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for strength and support of reinforcement during concrete placement conditions including load bearing pad on bottom to prevent vapor barrier puncture.
- C. Special Chairs, Bolsters, Bar Supports, and Spacers Adjacent to Weather Exposed Concrete Surfaces: Plastic coated steel type; size and shape as required.

#### 2.03 FABRICATION

- A. Fabricate concrete reinforcing in accordance with CRSI Manual of Practice, ACI SP-66

and ACI 318.

- B. Welded reinforcement (AWS D 1.4): Do not weld reinforcement in the shop or field unless approved in writing by the Engineer.
- C. Locate reinforcing splices not indicated on Drawings, at point of minimum stress. Review location of splices with Engineer.

## PART 3 - EXECUTION

### 3.01 PLACEMENT

- A. Perform concrete reinforcement work in accordance with CRSI Manual of Standard Practice and Documents 63 and 65.
- B. Place, support and secure reinforcement against displacement. Do not deviate from required position.
- C. Do not displace or damage vapor barrier.
- D. Accommodate placement of formed openings.
- E. Conform to applicable code for concrete cover over reinforcement.

### 3.02 FIELD QUALITY CONTROL

- A. Field inspection will be performed under provisions of contract documents.

END OF SECTION

SECTION 03300  
CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Cast-in-place concrete including bents and equipment pads.
- B. Slabs on grade.
- C. Control, and expansion and contraction joint devices associated with concrete work.
- D. Equipment pads, drainage structures, thrust blocks, and mechanical supports.

1.02 RELATED SECTIONS

- A. Section 03100 - Concrete Formwork: Formwork and accessories.
- B. Section 03200 - Concrete Reinforcement.

1.03 REFERENCES

- A. ACI 212 - Chemical Admixtures for Concrete.
- B. ACI 301 - Structural Concrete for Buildings.
- C. ACI 302 - Guide for Concrete Floor and Slab Construction.
- D. ACI 304 - Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.
- E. ACI 305R - Hot Weather Concreting.
- F. ACI 306R - Cold Weather Concreting.
- G. ACI 308 - Standard Practice for Curing Concrete.
- H. ACI 309R - Guide for Consolidation of Concrete.
- I. ACI 318 Building Code Requirements for Reinforced Concrete.
- J. ANSI/ASTM D994 - Preformed Expansion Joint Filler for Concrete (Bituminous Type).

- K. ANSI/ASTM D1751 - Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
- L. ASTM C31 - Standard Method of Making and Curing Concrete Test Specimen in the field.
- M. ASTM C33 - Concrete Aggregates.
- N. ASTM C39 - Compressive Strength of Cylindrical Concrete Specimens.
- O. ASTM C94 - Ready-Mixed Concrete.
- P. ASTM C109 - Standard Test Method for Hydraulic Cement Mortars.
- Q. ASTM C138 - Standard Test Method for Unit Weight, Yield, and Air Content (Gravimetric) of Concrete.
- R. ASTM C143 - Test for Slump of Portland Cement Concrete.
- S. ASTM C150 - Portland Cement.
- T. ASTM C171 - Sheet Materials for Curing Concrete.
- U. ASTM C172 - Compressive Strength of Cylindrical Concrete Specimens.
- V. ASTM C173 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
- W. ASTM C231 - Test Method for Air Content of Freshly Mixed Concrete by Volumetric Method.
- X. ASTM C260 - Air Entraining Admixtures for Concrete.
- Y. ASTM C309 - Liquid Membrane - Forming Compounds for Curing Concrete.
- Z. ASTM C494 - Chemical Admixtures for Concrete.
- AA. ASTM C618 - Fly Ash and Raw or Calcinated Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete.

#### 1.04 SUBMITTALS

- A. Submit under provisions of contract documents.

- B. Product Data: Provide data on joint devices, attachment accessories, and proposed admixtures.
- C. Concrete Manufacturer shall perform and submit the following:
  - 1. Mix Design - In advance of concrete operations, materials proposed for use in concrete will be sampled and tested to determine their compliance with these specifications. Mix proportions shall be reviewed by the laboratory for each strength and type of concrete required and reports submitted to the Engineer for approval, showing the mix designs. Submit mix design in accordance with ACI 301.
  - 2. Include the following information in concrete mix design:
    - a. Proportions of cement, fine and coarse aggregate, and water.
    - b. Water-cement ratio, 28-day compressive and design strength, slump, and air content.
    - c. Type of cement and aggregate.
    - d. Aggregate gradation.
    - e. Type and dosage of admixtures.
    - f. Special requirements for pumping.
    - g. Range of ambient temperature and humidity for which design is valid.
    - h. Special characteristics of mix which require precautions in mixing, placing, or finishing techniques to achieve finished product specified.

#### 1.05 TESTS

- A. Required testing will be performed in accordance with ACI 301 by Testing Laboratory employed and paid by Owner.
  - 1. Provide free access to Work and cooperate with appointed firm.
  - 2. Submit proposed mix design of each class of concrete to testing firm for review prior to commencement of Work. Tests of cement and aggregates may be performed to ensure conformance with specified requirements.
  - 3. Notify Testing Laboratory 24 hours prior to proposed concrete pour. Testing Laboratory shall be present at every concrete pour.
- B. Testing firm will:
  - 1. Review the Contractor's proposed materials and mix design.
  - 2. Conduct strength tests:
    - a. Secure composite samples (ASTM C172).

- b. Mold, cure specimens from each sample (ASTM C31). A minimum of four concrete test cylinders shall be taken for every 100 or less cu. yds. of each class of concrete placed each day and not less than once for each 5000 sq. ft. of surface area for slabs.
  - c. Test cylinders in accordance with ASTM C39. Two specimens will be tested at 28 days for acceptance and one will be tested at 7 days for information. One specimen will be retained in reserve for later testing if required.
- 3. Conduct slump tests: At least one slump test will be taken for each set of four test cylinders taken (ASTM C143).
  - 4. Conduct air content tests: At least one air content test will be made when slump test is taken in accordance with either ASTM C231, ASTM C173, or ASTM C138.
  - 5. Conduct temperature tests: Determine temperature of concrete sample for each strength test.

#### 1.06 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of contract documents.
- B. Accurately record actual locations of embedded utilities and components which are concealed from view.

#### 1.07 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 301 and ACI 304.
- B. Maintain one copy of each document on site.
- C. Acquire cement and aggregate from same source for all work.
- D. Conform to ACI 305R when concreting during hot weather.
- E. Conform to ACI 306R when concreting during cold weather.

#### 1.08 COORDINATION

- A. Coordinate work under provisions of contract documents.
- B. Coordinate the placement of joint devices with erection of concrete formwork and placement of form accessories.



## PART 2 - PRODUCTS

### 2.01 CONCRETE MATERIALS

- A. Cement: ASTM C150, Type II.
- B. Fine and Coarse Aggregates: ASTM C33.
- C. Water: Clean potable water.

### 2.02 ADMIXTURES

- A. Air Entrainment: ASTM C260.
- B. Chemical: Admixtures for normal weight concrete may be used at providing the requirements of ACI 212 are met and written approval from the Engineer is obtained by the Contractor.

### 2.03 ACCESSORIES

- A. Bonding Agent: Two component modified epoxy resin; n-solvent two component polysulphide epoxy manufactured by Sika Chemical Corporation.
- B. Vapor Barrier: 6-mil thick clear polyethylene film type recommended for below grade application.
- C. Non-Shrink Grout: Premixed, non-shrinking, high strength grout compound consisting of non-metallic aggregate, cement, water reducing, plasticizing agents and free of gypsum; compressive strength of 5,000 psi in 28 days.
- D. Epoxy Bonding Agent: ASTM C881
  - 1. Concessive 1001 LPL by Adhesive Engineering Co.
  - 2. Uniweld by Permagine.
  - 3. EVA-POX HI MOD GEL #23 by E-Poxy Industries, Inc.

### 2.04 CURING COMPOUNDS

- A. Membrane Curing Compound ASTM C309 Type 1.
- B. Manufacturers -
  - 1. Curecrete Chemical Company; Ashford Formula
  - 2. Sonneburn-Contech; Kure-N-Seal
  - 3. W. R. Grace; Clear Seal 150
  - 4. L & M Construction Chemicals; Seal Hard
  - 5. Gifford-Hill; Sealco.
- C. Substitutions: Under provisions of Section 01630.

D. Water: Potable and not detrimental to concrete.

## 2.05 CONCRETE MIX

A. Mix and deliver concrete in accordance with ACI 304 and ASTM C94.

B. Provide concrete to the following criteria:

1. For concrete exposed to freeze-thaw:
  - a. Compressive Strength:
    - 1) 28 Days: 4,000 psi for all concrete except sidewalks, and driveways.
  - b. Air Content: 5 1/2%, plus or minus 1%
  - c. Slump: Not to exceed 4 inches maximum.
  - d. Maximum Water-Cement Ratio: 0.45
  - e. Minimum Cement Content: 517 lbs per cu. yd.
  - f. Slabs-on-Grade shall be 4,000 psi @ 28 days (unless otherwise noted)
  - g. Portland Cement Compressive strength for driveways shall be 3,000 psi (min.) @ 3 days and a minimum of 4,000 psi @ 28 days.
  - h. Portland Cement Compressive strength for sidewalks shall be 3,000 psi (min.) @ 28 days.

C. Use accelerating admixtures in cold weather only when approved by Engineer. Use of admixtures will not relax cold weather placement requirements.

D. Use calcium chloride only when approved by Engineer.

E. Use set retarding admixtures during hot weather only when approved by Engineer.

F. Admixtures:

1. Air Entraining Admixtures: ASTM C260. Add to concrete mix for concrete work subject's freeze-thaw cycling. Air Content: See above.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

A. Verify existing site conditions.

B. Verify requirements for concrete cover over reinforcement.

- C. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not cause hardship in placing concrete.

### 3.02 PREPARATION

- A. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent in accordance with manufacturer's instructions.
- B. In locations where new concrete is dowelled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout in accordance with manufacturer's instructions.

### 3.03 PLACING CONCRETE

- A. Place concrete in accordance with ACI 304, ACI 301, ACI 350 and ACI 318.
- B. Notify Engineer minimum 24 hours prior to commencement of operations.
- C. Ensure reinforcement, inserts, embedded parts, formed joint fillers, and joint devices are not disturbed during concrete placement.
- D. Install vapor barrier under slabs on grade. Lap joints minimum 6 inches and seal watertight by sealant applied between overlapping edges and ends taping edges and ends.
- E. Repair vapor barrier damaged during placement of concrete reinforcing. Repair with vapor barrier material; lap over damaged areas minimum 6 inches and seal watertight.
- F. Install joint fillers in accordance with manufacturer's instructions.
- G. Separate slabs on grade from vertical surfaces with 1/2 inch thick joint filler.
- H. Extend joint filler from bottom of slab to within 1/2 inch of finished slab surface.
- I. Install joint devices in accordance with manufacturer's instructions.
- J. Install joint covers in longest practical length, when adjacent construction activity is complete.
- K. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.

- L. Place concrete continuously between predetermined expansion, control, and construction joints.
- M. Do not interrupt successive placement; do not permit cold joints to occur.
- N. Vibration: As soon as concrete is deposited, thoroughly agitate with mechanical vibrators and suitable hand tools to work mixture into corners of forms and around reinforcing and embedded items. Use mechanical vibrators with minimum frequency of 9000 revolutions/minute. Do not over vibrate or use vibrators to transport concrete within forms. Insert and withdraw vibrators at approximately 18 inches apart. At each insertion, vibrate generally 5-15 seconds, sufficient to consolidate concrete but not long enough to cause segregation. Keep spare vibrator on job site during concrete placement operations. Do not insert vibrator into lower courses that have begun to set.
- O. Saw cut joints within 24 hours after placing. Using 3/16-inch thick blade, cut into 1/4 depth of slab thickness.
- P. Screed floors and slabs on grade level, maintaining surface flatness of maximum 1/8 inch in 12 feet.

#### 3.04 CONCRETE FINISHING

- A. Finish concrete surfaces to requirements ACI 301.
- B. Provide formed concrete surfaces to be left exposed with smooth rubbed finish.
- C. Provide exterior, exposed concrete slabs with broomed finish.

#### 3.05 FORMED SURFACES

- A. Forms shall not be stripped before the concrete has attained a strength of at least 30 percent of the ultimate design strength. This is equivalent of approximately "100 day-degrees" of moist curing.
- B. Care shall be exercised to prevent damaging edges or obliterating the lines of chambers or corners when removing the forms or doing any work or work adjacent thereto.
- C. Clean all exposed concrete surfaces and adjoining work stained by leakage of concrete, to the satisfaction of the Engineer.
- D. Smooth Rubbed finish. Fins and other projections shall be removed as approved.

### 3.06 CURING AND PROTECTION

- A. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
- B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
- C. Cure concrete floor surfaces to requirements ACI 308.
- D. Horizontal Surfaces
  - 1. Spraying: Fog spray water over floor slab areas and maintain wet for 7 days.
  - 2. Membrane Curing Compound: Apply curing compound in accordance with manufacturer's instructions in 2 coats with second coat at right angles to first.
- E. Vertical Surfaces
  - 1. Spraying: Spray water over surfaces and maintain wet for 7 days.
  - 2. Membrane Curing Compound: Apply curing compound in accordance with manufacturer's instructions in 2 coats with second coat at right angles to first.

### 3.07 PATCHING

- A. Allow Engineer to inspect concrete surfaces immediately upon removal of forms.
- B. Excessive honeycomb or embedded debris in concrete is not acceptable. Notify Engineer upon discovery.
- C. Patch imperfections in accordance with ACI 301.

### 3.08 DEFECTIVE CONCRETE

- A. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.
- B. Repair or replacement of defective concrete will be determined by the Engineer.
- C. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express written direction of Engineer for each individual area.

END OF SECTION

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FOR INFORMATION ONLY

SECTION 03455  
MANHOLES

PART 1 -GENERAL

1.01 SCOPE OF WORK

- A. The Contractor shall furnish all materials, labor, and equipment and construct manholes consisting of precast sections or cast-in-place as shown on the drawings and specified herein.
- B. The Contractor shall construct watertight structures.
- C. All cast-in-place manholes and structures shall meet the requirements of the latest edition of the Louisiana Department of Transportation and Development Standard Specifications for Roads and Bridges Section 702 and the drawings.

1.02 RELATED WORK NOT INCLUDED

- A. Section 02221: Excavation and Backfilling for Trenches, Pavement and Structures.
- B. Section 03300: Cast-in-Place Concrete
- C. Section 05500: Miscellaneous Metal
- D. Section 09800: Special Coatings

1.03 SUBMITTALS

Submit to the Engineer, as provided in the contract documents, shop drawings showing details of construction, reinforcing, and joints.

1.04 INSPECTION

- A. The quality of all materials, the process of manufacture, and the finished sections shall be subject to inspection and approval by the Engineer, or other representatives of the Owner. Such inspection may be made at the place of manufacture, or at the site after delivery, or at both places, and the sections shall be subject to rejection at any time on account of failure to meet any of the specification requirements; even though sample sections may have been accepted as satisfactory at the place of manufacture. Sections rejected after delivery to the job shall be marked for identification and shall be removed from the job at once. All sections, which have been damaged after delivery will be rejected, and if already installed, shall be acceptably repaired, if permitted, or removed and replaced, entirely at the Contractor's expense.

- B. At the time of inspection, the sections will be carefully examined for compliance with the ASTM designation specified below and these specifications, and with the approved manufacturer's drawings. All sections shall be inspected for general appearance, dimension, "scratch-strength", blisters, cracks, roughness, soundness, etc. The surface shall be dense and close-textured.
- C. Imperfections may be repaired, subject to the approval of the Engineer, after demonstration by the manufacturer that strong and permanent repairs result. Repairs shall be carefully inspected before final approval. Cement mortar used for repairs shall have a minimum compressive strength of 4,000 psi at the end of 7 days and 5,000 psi at the end of 28 days, when tested in 3" by 6" cylinders stored in the standard manner. Epoxy mortar may be utilized for repairs subject to the approval of the Engineer.

## PART 2 - PRODUCTS

### 2.01 PRECAST CONCRETE SECTIONS

- A. Precast concrete manhole barrel and eccentric top sections shall conform to the specifications for Precast Reinforced Concrete Manhole sections, ASTM Designation C478, except as otherwise specified below. The method of construction shall conform to the drawings and the following additional requirements.
  - 1. The minimum wall thickness for the various size barrel sections shall be as listed below.
 

<u>Inside Diameter of Barrel</u>	<u>Minimum Wall Thickness (See Section 8 below)</u>
48"	5"
60"	6"
72"	7"
  - 2. Barrel sections shall have tongue and groove joints. Joints shall have round rubber gaskets set in specially provided indentations. The round rubber "O"-ring gasket shall conform to ASTM C443 standard specifications.
  - 3. Type II cement shall be used except as otherwise approved.
  - 4. The date of manufacture and the name or trademark of the manufacturer shall be clearly marked on the inside of each precast section.
  - 5. Sections shall be cured by an approved method and shall not be shipped until at least five (5) days after having been fabricated.

6. Top sections shall be eccentric except that precast concrete slabs shall be used where cover over the top of the pipe is less than four feet (4') for all manholes. Top sections for quick connect coupling manholes shall be concentric as shown on the drawings.
7. Precast concrete slabs over top section, where required, shall be capable of supporting the overburden plus a live load equivalent to AASHTO H-20 loading.
8. The tops of bases shall be suitably shaped to mate the precast barrel section.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

- A. Manholes and other precast structures shall be constructed to the dimensions as shown on the drawings and as specified herein.
- B. The base shall be cast-in-place concrete as shown on the drawings and placed on a thoroughly compacted limestone subbase. The tops of the cast-in-place bases shall be shaped to mate with the precast barrel section, and shall be adjusted in grade so that the top of the dome section is at the approximately correct elevation.
- C. Precast bases, conforming to all requirements of ASTM C478 and above listed requirements for precast sections, may be used.
- D. Precast concrete structure sections shall be set so as to be vertical and with sections in true alignment with a 1/4" maximum tolerance to be allowed. The outside and inside joint shall be "ram-nek" or filled with a comparatively dry mortar (one part cement to two parts sand) and finished flush with the adjoining surfaces. If "ram-nek" is used, inside joint shall still be sealed with mortar. Allow joints to set for 24 hours before backfilling. Backfilling shall be done in a careful manner, bringing the fill up evenly on all sides. If leaks appear in the structures, the inside joints shall be caulked with lead wool to the satisfaction of the Engineer. The Contractor shall install the precast section in a manner that will result in a watertight joint.
- E. Holes in the concrete pipe sections required for handling or other purposes shall be plugged with a non-shrinking grout or by grout in combination with concrete plugs.
- F. Where holes must be cut in the precast sections to accommodate pipes, cutting shall be done prior to setting them in place to prevent any subsequent jarring which may loosen the mortar joints.



- G. Cast iron frames specified and furnished under Section 05500 shall be placed, shimmed, and set in portland cement mortar to the required grade.
- H. Pipe stub outs for all gravity sewer manhole connections shall not exceed 2 feet in length. Caps or plugs shall be furnished where required. Gravity sewer lines shall be connected to the manhole using flexible, resilient rubber connections in the manhole wall.
- I. Gravity sewer manholes shall have an invert channel shaped to correspond with the lower half of the gravity sewer. The top of the shelf shall be at the elevation nearly equal to the pipe diameter and shall be sloped to drain toward the flow-through channel.

### 3.02 PROTECTIVE COATINGS

Interiors and Exteriors of all precast concrete manholes shall be coated as required in Section 09800 of these Specifications.

### 3.03ADJUSTMENT OF FRAMES AND COVERS

All manholes that are to remain and match the proposed grade within concrete paving areas shall be isolated (boxed out) by means of an approved circular, square, or rectangular ring as directed by the Engineer.

The Contractor shall raise and adjust all manholes to the finished elevation of the new pavement. All raised appurtenances shall be grouted with concrete or otherwise as approved by the Engineer to firmly support them flush with the surface of the new pavement.

END OF SECTION

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## SECTION 04200 BRICKWORK

### PART 1 - GENERAL

#### 1.01 SCOPE OF WORK

The Contractor shall furnish all labor, materials, equipment and incidentals necessary to complete all brickwork as shown on the drawings and/or specified herein, including, but not limited to, brick manholes, brick manhole repair, formed inverts in manholes and adjusting grade for manhole frames and covers and any miscellaneous uses as directed by the Engineer.

### PART 2 - MATERIALS

- A. Cement shall be domestic portland cement conforming to ASTM Designation C-150, Type II.
- B. Lime for mortar shall be hydrated, conforming to ASTM Designation C-207 Type S.
- C. Sand shall be clean, hard, sharp, durable particles, preferably siliceous, and with not more than 5% in volume of loam, mica, clay, or other deleterious substances, and free from injurious amounts of organic matter. The sand shall be graded from fine to coarse so that, when tested dry, it will conform to the limits of ASTM Specification for Aggregate for Masonry mortar C-144. Sand for grout shall be of such that when dry, 100% shall pass a No. 200 sieve, and not over 5% by weight shall be retained on a No. 100 sieve.
- D. Water shall be free from injurious amounts of oils, acids, alkalis or organic matter, and shall be clean and fresh.
- E. Brick shall be sound, hard and uniformly burned, regular, or standard sewer brick size, and uniform in shape and size, of compact texture and satisfactory to the Engineer. Bricks shall comply with the ASTM Specification C-32, Grade SM or MS.

### PART 3 - EXECUTION

#### 3.01 INSTALLATION

- A. Mortar shall consist of 1 part cement, 3 parts sand and hydrated lime not to exceed 10% of the weight of cement used, and shall be mixed only in such quantity as may be required for immediate use and shall be used before the initial set has taken place. Mortar shall not be retained for more than 1-1/2 hours and shall be constantly worked over with hoe or shovel until used. Prepared mortar shall not be allowed to stand in

beds during the noon hour or overnight. It must be mixed in the exact proportions specified herein and approximate measurement of quantities will not be permitted.

- B. Anti-freeze mixtures will not be allowed in the mortar.
- C. Bricks shall be cleaned and thoroughly wetted shortly before they are put into the work, and each brick shall be laid in a full bed and joint of mortar without requiring subsequent grouting, flushing or filling. Joints between bricks shall not exceed 1/2" and shall be pointed. Bricks forming the shaped inverts in manholes shall be laid on edge or as shown on the details.

END OF SECTION

SECTION 05500  
MISCELLANEOUS METAL

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor, materials, equipment and incidentals required and install covers, grates, frames, manhole rungs, catch basin castings, and other miscellaneous metal as shown on the drawings and specified herein. The miscellaneous metal items include, but are not limited to, the following:
  - 1. Anchors or anchor bolts except those specified to be furnished with all equipment.
  - 2. Cast iron frames, covers, grates, and valve boxes.
  - 3. Steel plates, angle frames, plates, and miscellaneous angles and channels as shown on the drawings.

1.02 RELATED WORK

- A. Section 03455 - Manholes.
- B. Anchor bolts for equipment are included in the respective sections of Divisions 11 and 15.
- C. Pipe sleeves, wall sleeves, and wall castings are included in Section 15100.

1.03 COORDINATION

- A. The work of this section shall be completely coordinated with the work of other sections. Verify at the site both the dimensions and work of other trades adjoining items of work in this section before fabrication and installation of items herein specified.
- B. Furnish to the pertinent trades all items included under this section that are to be built into the work of other sections.

1.04 SHOP DRAWINGS

Detail drawings, as provided for in the contract documents, showing sizes of members, method of assembly, anchorage, and connection to other members shall be submitted to the Engineer for approval before fabrication.

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## 1.05 FIELD MEASUREMENTS

Field measurements shall be taken at the site to verify or supplement indicated dimensions and to insure proper fitting of all items.

## 1.06 REFERENCE SPECIFICATIONS

Unless otherwise specified, materials shall conform to the following:

Structural Steel	ASTM A36
Welded and Seamless Steel Pipe	ASTM A53
Gray Iron Castings	ASTM A48, Class 30
Galvanizing, general	ASTM A123
Galvanizing, hardware	ASTM A153
Galvanizing, assemblies	ASTM A386
Aluminum (extruded shapes)	ASTM B209, 6063 T5 (Alum. alloy)
Aluminum (extruded pipe)	ASTM B209, 6063 T6 (Alum. alloy)
Aluminum Sheet and Plate	ASTM B209, 6061 T6 (Alum. alloy)
Bolts and Nuts	ASTM A307
Stainless Steel Bolts, Bars, Shapes	AISI, Type 302
Stainless Steel Plate and Sheet	AISI, Type 304
Welding Rods for Steel	AWS Spec. for Arc Welding

## PART 2 - PRODUCTS

### 2.01 ANCHORS, BOLTS, AND FASTENING DEVICES

- A. Anchors, bolts, etc., shall be furnished as necessary for installation of the work of this section.
- B. The bolts used to attach the various members to the anchors shall be the sizes shown or required.
- C. For structural purposes, unless otherwise noted, expansion bolts shall be Wej-it "Ankr-Tite", Phillips Drill Co. "Wedge Anchors", or Hilti "Kwik-Bolt". When length of bolt is not called for on the drawings, the length of bolt provided shall be sufficient to place the wedge portion of the bolt a minimum of one inch (1") behind the reinforcing steel within the concrete. Material shall be as noted on the drawings. If not listed, galvanized steel.

## 2.02 STEEL ITEMS

- A. Galvanized steel grating shall be fabricated as shown. Angle frames for hatches, beams, grates, etc., shall be furnished complete with welded strap anchors attached. Furnish all miscellaneous aluminum shown but not otherwise detailed.
- B. Sleeves shall be steel or cast iron pipe in walls and floors with end joints as shown on the drawings. All pipe sleeves shall have center anchor around circumference as shown.
- C. Miscellaneous steel pipe for sleeves and lifting attachments and other uses as required shall be Schedule 40 pipe fabricated according to the details as shown on the drawings.
- D. Miscellaneous steel shall be fabricated and installed in accordance with the drawings and shall include; angles, support brackets, splice plates, anchor bolts (except for equipment furnished in Divisions 11 and 15); and any other miscellaneous steel called for on the drawings and not otherwise specified.

## 2.03 CAST IRON FRAMES AND COVERS

- A. Frames, covers, and grates for manholes shall be of a good quality, strong, tough even grained cast iron except as otherwise specified below. Castings shall be as manufactured by the Vulcan Foundry, Inc., Neenah Foundry, Mechanics Iron Foundry, or equal. Sizes shall be as shown on the drawings. Covers to have letters "SEWER" or "DRAIN" embossed on top, as required.
- B. Manhole frames and covers shall be 2'-0" in diameter, unless otherwise shown on the Drawings.
- C. Valve Boxes

Valve boxes shall be of strong, tough even-grained cast iron. Valve boxes shall be two-part screw type adjustable with covers having the word "SEWER" or "WATER" embossed on top as applicable. Valve boxes shall be Series No. 6850 as manufactured by Vulcan Foundry, Inc., Tyler Pipe, Type 4905 as manufactured by Opelika Foundry, or equal, unless otherwise specified.

- D. Water Meter Boxes

All water meter boxes shall be in accordance with Jefferson Parish Water Standards.

## PART 3 - EXECUTION

### 3.01 FABRICATION

- A. All miscellaneous metal work shall be formed true to detail, with clean, straight, sharply defined profiles and smooth surfaces of uniform color and texture and free from defects impairing strength or durability.
- B. Connections and accessories shall be of sufficient strength to safely withstand stresses and strains to which they will be subjected. Steel accessories and connections to steel or cast iron shall be steel, unless otherwise specified. Threaded connections shall be made so that the threads are concealed by fitting.
- C. Welded joints shall be rigid and continuously welded or spot welded as specified or shown. The face of welds shall be dressed flush and smooth. Exposed joints shall be close fitting and jointed where least conspicuous.
- D. Welding of parts shall be in accordance with the Standard Code for Arc and Gas Welding in Building Construction of the AWS and shall only be done where shown, specified, or permitted by the Engineer. All welding shall be done only by welders certified as to their ability to perform welding in accordance with the requirements of the AWS Code. Component parts of built-up members to be welded shall be adequately supported and clamped or held by other adequate means to hold the parts in proper relation for welding.
- E. Welding of aluminum shall conform to the applicable provisions of the AA-30 for aluminum structures. The general recommendations and regulations of AWS D1.1 as applicable shall apply to welded aluminum.
- F. Castings shall be of good quality, strong, tough, even-grained, smooth, free from scale, lumps, blisters, sand holes, and defects of any kind which render them unfit for the service for which they are intended. Castings shall be thoroughly cleaned and will be subjected to a hammer inspection in the field by the Engineer. All finished surfaces shown on the drawings and/or specified shall be machined to a true plane surface and shall be true and seat at all points without rocking. Allowances shall be made in the patterns so that the thickness specified or shown shall not be reduced in obtaining finished surfaces. Castings will not be acceptable if the actual weight is less than 95 percent of the theoretical weight computed from the dimensions shown. The Contractor shall provide facilities for weighing castings in the presence of the Engineer showing true weights, certified by the supplier.
- G. All steel finish work shall be thoroughly cleaned, by effective means, of all loose mill scale, rust, and foreign matter before shipment and shall be given one shop coat of

primer compatible with finish coats specified in Painting Section after fabrication but before shipping. Paint shall be applied to dry surfaces and shall be thoroughly and evenly spread and well worked into joints and other open spaces. Abrasions in the field shall be touched up with primer immediately after erection.

- H. Galvanizing, where required, shall be the hot-dip zinc process after fabrication. Following all manufacturing operations, all items to be galvanized shall be thoroughly cleaned, pickled, fluxed, and completely immersed in a bath of molten zinc. The resulting coating shall be adherent and shall be the normal coating to be obtained by immersing the items in a bath of molten zinc and allowing them to remain in the batch until their temperature becomes the same as the bath. Coating shall be not less than 2 oz. per sq. ft. of surface.

### 3.02 INSTALLATION

- A. Install all items furnished except items to be imbedded in concrete that shall be installed under Division 3. Items to be attached to concrete after such work is completed shall be installed in accordance with the details shown. All dimensions shall be verified at the site before fabrication is started.
- B. All steel surfaces to come in contact with exposed concrete shall receive a protective coating of an approved heavy bitumastic troweling mastic applied in accordance with the manufacturer's instructions prior to installation.
- C. Where aluminum contacts a dissimilar metal, apply a heavy brush coat of zinc-chromate primer followed by two coats of aluminum metal and masonry paint to the dis-similar metal.
- D. Where aluminum contacts concrete, apply a heavy coat of approved alkali resistant paint to the concrete.

END OF SECTION

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SECTION 06610  
BELOW GROUND FIBERGLASS STRUCTURES FOR WET WELLS,  
PUMP ENCLOSURES AND VALVE PITS

PART 1 – GENERAL

1.01 SCOPE OF WORK

- A. The CONTRACTOR shall furnish all materials, labor and equipment and construct manholes, wet wells, valve pits, recessed enclosures and accessory items, consisting of fiberglass reinforced plastic (FRP) and concrete sections as shown on the Contract Plans, and as specified herein.
- B. The wet wells, pump enclosures, and valve pits are underground vertical vessels described as “fiberglass cylinders” and include poured in-place reinforced concrete bases and reinforced concrete tops, unless otherwise specified. The fiberglass cylinders will have piping penetration sleeves passing through the cylinder’s walls. Unless otherwise specified, the piping sleeves shall be factory installed.
- C. These specifications are intended to give a general description of what is required, but do not purport to cover all the structural design details which will vary in accordance with the requirements of the equipment as offered. It is however, intended to cover the furnishing, shop testing, delivery, and complete installation of all fiberglass reinforced plastic and concrete structures whether specifically mentioned in these specifications or not.
- D. The supplier of the fiberglass reinforced plastic wet wells, pump enclosures, valve pits, and accessory items shall coordinate his work with that of the CONTRACTOR to the end that the unit will be delivered and installed in the excavation provided by the CONTRACTOR, in accordance with the CONTRACTOR’s construction schedule.
- E. The CONTRACTOR will ensure coordination of the FRP structures installation with the equipment supplied to achieve the proper structural top slab openings, spacings, and related dimensions for the selected equipment frames and covers. The top slabs, frames, covers, and subsurface FRP structures shall be capable of supporting the overburden plus live load equivalent to AASHTO H-20 loading.
- F. All FRP 144-inch diameter wet wells shall be manufactured at an existing plant. The manufacturer of the wet wells must submit for approval by the ENGINEER a record of his work for the last five years to substantiate that he has successfully manufactured FRP 144-inch diameter wet wells and not just underground tanks and that he is capable of and has the

organization and plant facilities for performing the work and of maintaining the production output required.

- G. One manufacturer will supply all FRP wet wells, manholes, enclosures and FRP elements required and as shown on the Plans.
- H. Included in the work of this Section:
  - 1. Wet well, enclosures and valve pit structures shown on the plans or similar.
  - 2. All concrete slabs, covers structures, and members shown on plans associated with FRP members.
  - 3. All bearing plates, and/or pads, inserts, FRP pipe sleeves, inserts, bolts, and all other required accessories which are cast into the FRP or concrete members.
  - 4. Furnishing and placing all anchor bolts, inserts and other accessories in cast-in-place concrete and FRP members as required for installation of the work under this Section.
  - 5. Erection including all necessary shimming, welding and removal of lifting blocks.
- I. The forms, dimensions, concrete and construction methods shall be approved by the engineer prior to construction.
- J. Resin replacing fillers such as sand shall not be used in wet wells or valve pit construction.
- K. Wet wells and valve pits shall be of consistent thickness from top to bottom. Tapered sidewall construction shall not be acceptable.

## 1.02 SUBMITTALS

- A. Submit to the ENGINEER, as provided in the contract documents, shop drawings showing details of construction, reinforcing and joints.
- B. Shop Drawings.
  - 1. The fiberglass reinforced plastic (FRP) manufacturer shall furnish and submit for approval complete shop drawings and design calculations for all structures. Fabrication of structure shall not proceed until shop drawings are approved by the ENGINEER and CONTRACTOR.

2. All inserts, pipe sleeves, blockouts, and other accessories required by various trades or as indicated, located and detailed on the final approved drawings will be cast as such and any omission or changes in location or details by the CONTRACTOR or the various trades shall be done at the expense of the CONTRACTOR.
- C. Manufacturer's Literature: Manufacturer's recommended installation instructions.
  - D. Manufacturer's certificate of material conformance with specifications.
  - E. The cylinder's manufacturer shall design, fabricate and certify that the fiberglass cylinders conform to the requirements of this specification.

#### 1.03 TESTS

- A. All testing of FRP shall be done by an outside testing laboratory selected by the OWNER and shall be done at the expense of the OWNER; except test of specimens for strength at transfer shall be made by the Fabricator and observed by the laboratory if so desired.

#### 1.04 INSPECTION

- A. The quality of all materials, the process of manufacture, and the finished sections shall be subject to inspection and approval by the ENGINEER, or other representatives of the OWNER. Such inspection may be made at the place of manufacture, or at the site after delivery, or at both places, and the sections shall be subject to rejection at any time on account of failure to meet any of the specifications requirements; even though sample sections may have been accepted as satisfactory at the place of manufacture. Sections rejected after delivery to the job shall be marked for identification and shall be removed from the job at once. All sections which have been damaged after delivery will be rejected, and if already installed, shall be acceptably repaired, if permitted, or removed and replaced, entirely at the CONTRACTOR's expense.
- B. At the time of inspection, the sections will be examined for compliance with the criteria of these Specifications, and with the approved manufacturer's drawings. All sections shall be inspected for general appearance, dimensions, blisters, cracks, roughness, soundness, etc.
- C. Imperfections may be repaired, subject to the approval of the ENGINEER, after demonstration by the manufacturer that strong and permanent repairs result. Repairs shall be inspected before final approval.

## PART 2 - PRODUCTS

### 2.01 FIBERGLASS REINFORCED PLASTIC WET WELLS, ENCLOSURES AND VALVE PITS

#### A. General Description

FRP wet wells in the diameters shown on the drawings shall be cylinders made of composite laminate. The laminate shall consist of thermo-setting chemical resistant polyester resin, fiberglass reinforcement, and additions as required. Structures shall be sized on the plans for the applicable stations. Wet wells and valve pits shall be as manufactured by Xerxes Corporation or approved equal.

#### B. Applicable Specifications

The following specifications are applicable for materials, workmanship, and reference:

ASTM D 3753          Glass Fiber Reinforced Polyester Manholes

ASTM C 950          Glass Fiber Reinforced Thermosetting  
Resin Pressure Pipe

#### C. Design Criteria

1. The wet wells, valve pits, and recessed enclosures shall be suitable for use in corrosive environments including storm, industrial, and sanitary sewers with a temperature range of -40°F to 150°F.
2. Cylinders shall be designed and fabricated to provide sufficient strength for the following loading conditions.
  - a. Resistant to lateral earth pressure and to the hydrostatic pressure from ground water when cylinder is empty.
  - b. The union of the cylinder and the foundation slab shall be designed to resist the external hydrostatic pressure assuming the ground water is at grade elevation with an empty cylinder, as well as the internal hydrostatic pressure of a full cylinder without backfill.
3. The FRP wet wells, valve pits, and recessed enclosures shall be manufactured to the diameters and heights shown on the plans. They shall be designed by the manufacturer to perform as underground structures at the depths required and to withstand the

necessary lateral pressure with a minimum factor of safety of 3. The FRP structures shall be capable of supporting the top slab covers, frames, soil overburden plus a live load equivalent to AASHTO H-20 loading.

4. All cutouts shown in the plans for each FRP wells, valve pits and recessed enclosures shall be capable of maintaining the units structural integrity with up to a maximum single cutout diameter of 45” and a maximum sum of the diameters of all cut-outs of 100”.

D. Material Properties

1. The nominal design properties for structural layer of standard FRP wall shall be as a minimum described below. Single checks may be 90 percent of nominal (avg.).

a) wet wells/valve pits

Conroe Laminated	<u>Circumferential (PSI)</u>	<u>Axial (PSI)</u>
Ultimate Tensile	9,700	8,900
Tensile Modulus	$0.95 \times 10^6$	$0.92 \times 10^6$
Ultimate Flexural Strength	9,700	8,900
Flexural Modulus	$1.07 \times 10^6$	$0.93 \times 10^6$
Ultimate Compressive Strength	18,000	17,700
Compressive Modulus	$0.89 \times 10^6$	$0.90 \times 10^6$
Huntingdon Laminate		
Ultimate Tensile Strength	11,800	10,500
Flexural Modulus	$0.92 \times 10^6$	$0.76 \times 10^6$
Ultimate Compressive Strength	16,800	16,300
Compressive Modulus	$0.65 \times 10^6$	$0.63 \times 10^6$

2. The appropriate axial coefficient of thermal expansion of the FRP wet wells and valve pits shall be  $12 \text{ to } 18 \times 10^6 \text{ In/in/}^\circ\text{F}$ .
3. The FRP tanks properties shall adhere to the following pipe characteristics:

<u>Property</u>	<u>Specification</u>
Inside Dia. (In.)	$\pm 1/2''$
Laying Length	All lengths = $\pm 3''$
Roundness	Pipe shall be round within $\pm 1\%$
Deviation (Deflection due to self wgt. Not included)	
End Squareness End Planeness	Ends shall be both square to the axis of pipe and plane within $\pm 1/2\%$ of I.D. of $1/4''$ whichever is greater.
Thickness 1	Tol. Ave. $t = +25\% - 0\%$ Single Pts. $= 30\% - 10\%$

4. The exterior surface of FRP wet wells/valve pits and their joins shall be commercially free of the following defects.

<u>Defect</u>	<u>Definition</u>
Fuzz	Glass fibers loosely adhering to the pipe which are not wet out with resin.
Protruding Fibers	Glass fibers sticking out from pipe surface that are wet out with resin.
Resin Runs	Runs of resin on surface of pipe.

Dry Area	Area in laminate with glass not wet out with resin.
Cleanliness	Dirt and black marks on the exterior surface.

5. The FRP structures shall adhere to the following visual limits.

<u>Defect</u>	<u>Definition</u>	Allowable Limits	
		<u>External Surface</u>	<u>Internal Surface</u>
Delamination	Separation in The laminate	None	None
Blisters	Light (straw) Colored resulting From too hot a cure	None to exceed 1/2" in diameter	None to exceed 1/8" dia. Or more Than 4 per Sq. ft.
Craze	Crack on inner Surface usually Star shaped, Caused by sharp impact	N/A	None
Surfacing Pits And Voids	Small air pockets on the 1/16" Surface or directly Beneath is solid. Surface mat can be Broken by finger Nail.	N/A	None greater than dia. Or more than two 3/8" dia. In sq. ft.
Haystacks	Accumulations of Of glass and resin On exterior surface	None greater than 1" diameter	N/A
Torn Edges, Ends	Tears and rips in the edges of cuts	None greater than 1/2" Circumferential	None greater than 1/2" axial or 1"

Ground Area	Area around layup which has been abraded by layup does not cover or has not been coated.	Permitted	None
Hand Layup Ragged Edges	Areas at the edge of hand layup that are not rolled down properly and that are rough.	None	None
Stenciling Smeared or Misaligned	Letters on stencil not readable	None	None
Label or Logo	Label or Logo	±1"	N/A
Tilted	not aligned with centerline		
Rib to Wall Bond Breaks	Points where the rib to wall bond is not cont.	None	None
Ragged Rib Foot	Material beneath the filament winding is not flat against the pipe wall.	Maximum 3/8" from pipe wall	Height
Out of Place Removing Windings (crown or foot)	Crown ends on side of rib or missing foot ends missing	No Greater than 25% missing	

## 2.02 CONCRETE SECTION

- A. Concrete and reinforcing steel for foundation slabs, top slabs, valve pits and other concrete sections shall comply with all applicable sections of these specifications.
- B. The top slab sections shall be fitted with frames, covers or hatches as specified in Section 05500. The frames and covers will be sized for the openings shown on the Drawings and will be coordinated with the equipment supplied by the CONTRACTOR.



## PART 3 - EXECUTION

### 3.01 INSTALLATION

- A. Sitework and Earthwork for Structure are specified under Section 02200, but are to be done as part of the work under this Section, including and necessary sheeting and bracing. The CONTRACTOR shall be responsible for handling groundwater to provide a firm, dry subgrade for the structure, shall prevent water rising on new poured in place concrete or grouted joint sections within 24 hours after placing, and shall guard against flotation or other damage resulting from groundwater or flooding.
- B. Backfill material around the wet wells, recessed enclosures, or valve pits and piping shall be selected as specified in Section 02221.
- C. The station base foundation shall not be cast into the excavation until the installation procedure and excavation have been approved by the ENGINEER.
- D. The base of cast-in-place concrete, as specified in Section 03300, shall be placed on a compacted stone base course as indicated on the drawings. The bottoms of the FRP sections shall be cast-in-place a minimum of 4 inches and shall be adjusted in grade so that the top slab section is at the approximate correct elevation.
- E. The selected FRP manufacturer's specifications must be adhered to in installation to assure the wet well will perform as designed.
- F. The FRP wet wells and recessed enclosures may not be lifted with any concrete slabs attached.
- G. Cutouts may be made in the FRP wet well/valve pit using a circular saw, sabar saw or similar equipment with a masonry-type blade. Axes, hammers, chisels or similar impact type of tools may not be used.
- H. All FRP wall inserts and FRP sleeves for pipe shall be made as shown on the drawings and in accordance with manufacturer's FRP specifications for installation.
- I. Backfilling: Do not backfill until concrete base has hardened sufficiently to provide rigid support for both the wet well and backfill. Add lifts of sand backfill evenly all around wet well to avoid uneven backfill loads. 95% compaction of sand backfill is required to prevent settlement of connecting pipes and to provide sidewall support to the wet well.

A flexible joint in any connecting pipe is required within one-to-two pipe diameters of wet well to relieve any differential settlement. Backfill should be brought to elevation of each connecting pipe, connection made and backfilling continued. Material used for backfill must be sand. Insure that no foreign objects such as large stones, concrete, lumps, etc., larger than 2" are in contact with the wet well. Crushed stone is not permitted. Prevent large surges of backfill from displacing wet well.

### 3.02 HANDLING AND STORAGE REQUIREMENTS

- A. FRP wet wells may be lifted by the installation of a minimum of three lifting lugs and as specified by the manufacturer on the outside surface near the tope or by a sling or "choker" connection around the center. Use of chains or cables in contact with the wet well surface is prohibited. Wet wells may be lifted horizontally using one support point.
- B. FRP wet wells may be stored upright or horizontally. When stored and stacked horizontally the wet well vertical deflection should not exceed 4 percent of the diameter. The wet well shall not be dropped or impacted.
- C. Additional handling and installation instructions shall be in accordance with the FRP manufacturer's instructions.
- D. Each FRP section manufactured in accordance with the Drawings shall be clearly marked to indicate the intended pump station installation location. The CONTRACTOR shall be responsible for the installation of the correct FRP sections in their designed pump station locations.

END OF SECTION

SECTION 06620  
GLASS-FIBER REINFORCED POLYESTER (FRP) MANHOLES

PART 1 – GENERAL

1.01 SCOPE OF WORK

This specification shall govern furnishing of fiberglass reinforced plastic manholes, but shall not purport to cover all of the structural design details. It is intended to give a general description of the equipment required and the materials to be used, type of manufacture, physical and chemical properties and the testing requirements. Glass-Fiber Reinforced Polyester Manholes shall be a one-piece monolithic designed unit constructed of glass-fiber reinforced, unsaturated isophthalic polyester resin containing no fillers such as sand or other materials. FRP manholes shall be manufactured in strict accordance with ASTM D-3753 “Standard Specification for Glass-Fiber Reinforced Polyester Manholes”, as manufactured by Xerxes Corporation or approved equal. These manholes will be installed with valves on the proposed sewer force near the required tap to the existing 36” Ø SFM and may be installed on the gravity sewer line where shown on the drawings.

1.02 GENERAL DESCRIPTION

- A. Dimensions: The manhole shall be a circular cylinder, reduced at the top, by an eccentric cone, to a circular manway not smaller than 22 ½” inside diameter. Manholes shall be produced in whole foot increments of length +/-2 in. Normal inside diameters shall be 48 inches; tolerance on the inside diameter shall be +/-1%. The minimum wall thickness for all FRP manholes at all depths shall be 0.50”.
- B. Configuration: The eccentric Manway reducer must provide a bearing surface on which a standard ring and cover may be supported and adjusted to grade. The eccentric reducer shall provide a vertical manhole entrance. It shall be joined to the barrel section at the factory with resin and glass fiber reinforcement, thus providing required monolithic design to prevent infiltration and/or exfiltration through the manhole.
- C. Class: The manhole shall be manufactured in one class of load rating. This class shall be H-20 wheel load (minimum 16,000 pounds dynamic wheel load).
- D. Stub Outs and Connections: Pipe stub outs for all gravity sewer manhole connections shall not exceed 2 feet in length. Caps or plugs shall be furnished where required. Gravity sewer lines shall be connected to the manhole using flexible, resilient rubber connections in the manhole wall.
- E. Manhole Bottoms: The manholes installed with valves on the sewer force main will have no bottom. The walls shall be factory cut to allow sewer

force main piping as shown on the drawings. The manholes installed on the gravity sewer line will have a poured concrete base at least 6 ft. x 6 ft. x 8 in. thick. The gravity sewer manholes shall have an invert channel shaped to correspond with the lower half of the gravity sewer. The top of the shelf shall be at the elevation nearly equal to the pipe diameter and shall be sloped to drain toward the flow-through channel.

- F. Chemical Resistance: FRP manholes shall be manufactured in accordance with ASTM C-581 "Practice for Determining Chemical Resistance of Chemical Thermosetting Resins Used in Glass-Fiber Reinforced Structures Intended for Liquid Service."

#### 1.03 RELATED WORK NOT INCLUDED

- A. Section 02221: Excavation and Backfilling for Trenches, Pavement and Structures.
- B. Section 03300: Cast-in-Place Concrete
- C. Section 05500: Miscellaneous Metal
- D. Section 09800: Special Coatings

#### 1.04 MATERIALS

- A. Resin: The resins used shall be unsaturated, isophthalic polyester resins.
- B. Reinforced Materials: The reinforcing materials shall be commercial grade "E" type glass in the form of mat, continuous roving, chopped roving, roving fabric, or both.
- C. Surfacing Material: If reinforcing material is used on the surface exposed to the contained substance, it shall be a commercial grade chemical-resistant glass or organic surfacing mat having a coupling agent that will provide a suitable bond with resin.
- D. Fillers and Additives: Additives, such as thixotropic agents, catalysts, promoters, etc., may be added as required by the specific manufacturing process to be used to meet the requirements of this standard. However, calcium carbonate, sand or other filler materials, shall not be permitted.
- E. Laminate: The laminate shall consist of multiple layers of glass matting and resin. The surface exposed to the sewer/chemical environment shall be resin rich and shall have no exposed fibers.

## 1.05 MANUFACTURE

### SUBMITTALS

- A. Submit to the Engineer shop drawings showing details of construction, reinforcing, and joints.
- B. Shop Drawings
  - 1. The fiberglass reinforced plastic (FRP) manufacturer shall furnish and submit for approval complete shop drawings and calculations for all structures. Fabrication of structure shall not proceed until shop drawings are approved by the Engineer and General Contractor.
  - 2. All inserts, pipe sleeves, and other accessories required by various trades or as indicated, located on the final approved drawings will be cast as such and any omission or changes in location or details by the Contractor or the various trades shall be done at the expense of Contractor.
- C. Manufacturer's Literature: Manufacturer's recommended installation instructions.
- D. Manufacturer's Certificates of material conformance with specifications.
- E. Test Reports: Reports of tests on concrete.
- F. The cylinders manufacturer shall design, fabricate and certify that the fiberglass cylinders conform to the requirements of this specification.

### TESTS

- A. Test of specimens for strength shall be made by the Fabricator. Owner shall be provided with certificates.

### INSPECTION

- A. The quality of all materials, the process of manufacture, and the finished sections shall be subject to inspection and approval by the Engineer, or other representatives of the Owner. Such inspection may be made at the place of manufacture, or at the site after delivery, or at both places, and the sections shall be subject to rejection at any time on account of failure to meet any of the Specification requirements; even though sample sections may have been accepted as satisfactory at the place of manufacture. Sections rejected after delivery to the job shall be marked for

identification and shall be removed from the job at once. All sections which have been damaged after delivery will be rejected, and if already installed shall be acceptably repaired, if permitted, or removed and replaced, entirely at the Contractor's expense.

## PART 2 – EXECUTION

### 2.01 INSTALLATION

- A. Each excavation and backfill are to be done as part of work under this section, including any necessary sheeting and bracing. The contractor shall be responsible for handling ground water to provide firm, dry subgrade for the structure, shall prevent water from rising on new poured in place concrete within 24 hours after placing, and shall guard against flotation or other damages resulting from ground water or flooding.
- B. A minimum of 24-in layer of aggregate shall be placed as a foundation for the manhole.
- C. Backfilling: Add lifts of sand backfill evenly all around manhole to avoid uneven backfill loads compact sand to densities as shown on the drawings per ASTM D-698.
- D. Manholes shall be handled and installed in accordance with the manufacturer's recommendations.

### 2.02 PROTECTIVE COATINGS

Interior and exterior concrete surfaces of all manholes shall be coated as required in Section 09800 of these Specifications.

END OF SECTION

SECTION 09800  
PROTECTIVE COATINGS

PART 1 - GENERAL

- 1.01 This specification covers preparation of surfaces, performance and completion of painting of all surfaces unless specified otherwise elsewhere in the specifications and the drawings.
- 1.02 All materials delivered to job site shall be in original sealed and labeled containers of the paint manufactured.
- 1.03 Coatings shall be applied during good painting weather. Air and surface temperatures shall be within limits prescribed by the manufacturer for the coating being applied and work areas shall be reasonably free of airborne dust at the time of application and while coating is drying.
- 1.04 Upon completing the installation of the protective coatings, the Contractor must obtain written certification from the manufacturer that all work has been performed within the limits prescribed by the manufacturer.

PART 2 - PRODUCTS

2.01 PAINT MATERIALS

All materials specified herein are manufactured by Tnemec Co., Inc., North Kansas City, Missouri. These products are specified to establish standards of performance and quality and are approved for use on this project.

2.02 SUBSTITUTIONS

- A. Equivalent materials of other manufacturers may be substituted on approval of the Engineer. Requests for substitution shall include Manufacturer's literature for each product giving the name, generic type, descriptive information and evidence of satisfactory past performance. Submittals shall include the following performance data as certified by a qualified testing laboratory:
  - 1. Abrasion - Fed. Test Method Std. No. 141, Method 6192, CS-17 Wheel, 1,000 grams load.
  - 2. Adhesion - Elcometer Adhesion Tester.
  - 3. Exterior Exposure - Exposed at 45 degrees facing ocean (South Florida Marine Exposure).

4. Hardness - ASTM D3363-74
  5. Humidity - ASTM D2247-68
  6. Salt Spray (Fog) - ASTM B117-73
- B. Bidders desiring to use coatings other than those specified shall submit their proposal in writing to the Engineer. Substitutions that decrease the film thickness, the number of coats applied, change the generic type of coating, or fail to meet the performance criteria of the specified materials will not be approved. Prime and finish coats of all surfaces shall be furnished by the same manufacturer.

## 2.03 COLORS

- A. Colors, where not specified, shall be as selected by the Engineer. The Contractor shall furnish color chips for each protective coating system for review and selection.
- B. Safety Color Code for Marking Physical Hazards. The safety color selected for the marking of physical hazards and safety, fire fighting and protection equipment shall be in accordance with OSHA 1910.144.

### 1. Color Selection

Colors shall meet the tests specified in ANSI Z53.1. The colors used shall conform to the color chips identified by numbers specified in Federal Standard 595.

<u>Color</u>	<u>Standard</u>	<u>Color</u>	<u>Standard</u>
Red	11105	Blue	15120
Yellow	13655	Purple	17142
Orange	12246	White	17875
Green	14260	Black	17038

### C. Color Selection

1. The color selection for the items not covered by OSHA Color Standards shall either be in accordance with the Painting Schedule, or to be determined after submittal of color chips by Contractor.
2. Generally, different colors will be selected for pumps, equipment, piping, valves and electrical items, and for interior and exterior locations.



## 2.04 PAINTING SCHEDULE

### A. Metal Surfaces - Exterior Environment

#### Dry Film-Mils

Surface Prep.: SSPC-SP10 Near-White

Blast Cleaning

1st Coat: Epoxy-Polyamide Primer 4.0 - 6.0

2nd Coat: Epoxy-Polyamide 4.0 - 6.0  
8.0 - 12.0

Description: All metal surfaces without factory finish not installed within an enclosed structure including buried piping and fittings, couplings, adaptors, valves, vaults, control panel enclosures, etc.

### B. Metal Surfaces - Interior Environment

#### Dry Film-Mils

Surface Prep.: SSPC-SP10 Near-White

Blast Cleaning

1st Coat: Epoxy-Amine 6.0 - 8.0

2nd Coat: Epoxy-Amine 6.0 - 8.0  
12.0 - 16.0

Description: Metal surfaces exposed in lift station, wet well, manholes or similar locations including piping and fittings, valves, pumps, brackets, supports, etc.

### C. Exterior of Concrete Structures - Below Grade

#### Dry Film-Mils

Surface Prep.: Brush-Off Blast Cleaning\*

One Coat: High-Build Coal Tar Epoxy 14.0 - 20.0

- \* Where high water table and subsequent hydrostatic pressure might exist, a void- and pinhole-free coating system is required. Fill all minor voids by spray applying and backrolling epoxy polyamide filler then fill all large voids with 100% filler/surfacer prior to coal tar epoxy application.

Description: Concrete structures such as valve boxes, manholes, junction boxes, and foundation walls, only buried below grade.

### D. Interior of concrete structures that hold liquids

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FOR INFORMATION ONLY

1. Tnemec Vinester Coating

		<u>Dry Film-Mils</u>
Surface Prep.: Brush-Off Blast Cleaning		
1 <sup>st</sup> Coat:	Tnemec Series 120-5002	12.0 - 18.0
	Vinester Beige Primer	
2 <sup>nd</sup> Coat:	Tnemec Series 120-5003	
	Vinester F&S	
Finish Coats:		
1 <sup>st</sup> Coat:	Tnemec Series 120-5002	12.0 - 18.0
	Vinester Beige Primer	
2 <sup>nd</sup> Coat:	Tnemec Series 120-5001	12.0 - 18.0
	Gray Finish	

Description: Buried concrete or brick structures holding liquids such as wet wells and manholes. To be used on all new concrete manholes and wet wells, concrete surfaces of new fiberglass wet wells, and rehabilitation of existing concrete wet wells or manholes at locations indicated on the drawings.

5. Interior of concrete structures without interior liquid

		<u>Dry Film-Mils</u>
Surface Prep.: Brush-off Blast Cleaning		
1 <sup>st</sup> Coat:	Tnemec No. 66 H.S.	2.0 - 3.0
2 <sup>nd</sup> Coat:	Tnemec No. 66 H.S.	3.0 - 5.0

Description: Buried concrete structures without interior liquid. To be used on all new concrete valve pits and dry pits (pump chambers) and concrete surfaces of all new fiberglass valve pits and dry pits (pump chambers).

2.05 PERFORMANCE REQUIREMENTS

A. Epoxy-Polyamide

1. Minimum solids by volume\*: 56.0 + 1.0% (Mixed).
2. Weight per gallon\*: 12.50 + 0.20 lbs. (Mixed).
3. Abrasion: No more than 130 mg. loss after 1,000 cycles (Federal Test Method Std. No. 141, Method 6192, CS-17 Wheel, 1,000 grams load).

4. Adhesion

- a. Not less than 900 psi pull average of three trials (Elcometer Adhesion Tester 0 to 1,000 psi).
- b. Not less than a rating of 5, average of three trials, (ASTM D 3359, Method B).
- c. Adhesion to galvanized steel. Not less than 600 psi pull average of three trials (Elcometer Adhesion Tester 0 to 1000 psi).

5. Exterior Exposure

No blistering, cracking or delamination of the film. No more than 1/32 inch rust creepage at scribe or no more than two percent rusting at edges after sixty months exposure.

6. Fresh Water Immersion

No blistering, cracking, softening or delamination of the film after eighteen months immersion in 77 F. tap water.

7. Hardness

Must pass 3H (ASTM D 3363-74).

8. Humidity

No blistering, cracking, softening or delamination of the film. No more than 1/16 inch rust creepage at scribe and no more than two percent rusting at edges after 1,000 hours exposure (ASTM B117-73).

10. The epoxy-polyamide shall contain no lead or soluble chromates.

11. Epoxy-polyamide shall be able to weather sixty (60) days prior to topcoating with itself or aliphatic urethanes. Scarify surface before topcoating if exposed to sunlight for 60 days or longer.

\* Values may vary with color.

B. High-Solids Catalyzed Epoxy - Amine

1. Minimum solids by volume\*: 82.0 + 2.0% (Mixed).

2. Weight per gallon\*: 14.70 + 0.25 lbs. (Mixed).

3. Abrasion

No more than 120 mg. loss after 1,000 cycles (Federal Test Method Std. No. 141, Method 6192, CS-17 Wheel, 1,000 grams load).

4. Chemical Resistance

No blistering, cracking, softening or delamination of the film after seven days exposure at 75°F. Reagents used to qualify the coating for splash, spillage and fumes are as follows:

10% Chromic Acid	10% Nitric Acid
40% Sodium Hydroxide	10% Lactic Acid
10% Ammonium Hydroxide	10% Oxalic Acid
10% Hydrochloric Acid	Glycol
10% Sulfuric Acid	Xylene
10% Phosphoric Acid	Aliphatic Hydrocar
5% Sodium Chloride	Skydrol

5. Fresh Water

No blistering, cracking, softening or delamination of the film after one-year exposure.

6. Salt Spray Resistance

No blistering, cracking, softening or delamination of the film. No more than 1/32 inch rust creepage at scribe and no more than one percent rusting at edges after 1,400 hours exposure (ASTM B 117-73).

\* Values may vary with color.

C. Coal Tar-Epoxy

1. Minimum solids by volume

75.0 + 2.0% (Mixed).

2. Weight per gallon

11.60 + 0.25 lbs. (Mixed).

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3. Abrasion

No more than 170 mg. loss after 1,000 cycles (Federal Test Method Std.) No. 141, Method 6192, CS-17 Wheel, 1,000 grams load).

4. Adhesion

(Steel) - Not less than 800 psi, average of three trials.

(Concrete) - Not less than 350 psi, average of three trials.

All Tests - Elcometer Adhesion Tester 0 to 1,000 psi.

5. Impact

Not less than 40 inch/lbs. average (ASTM G 14-72, forward impact).

6. Salt Spray Resistance

No blistering, cracking, softening or delamination of the film. No more than 1/16 inch rust creepage at scribe and no more than two percent rusting at edges after 1,500 hours exposure (ASTM B 117-73).

7. Hot Water Immersion

No blistering, cracking, softening or delamination of the film after sixty days exposure. (Coating applied to sandblasted still panels. Cured outdoors for seven days at 70°F. to 100°F. and immersed in 185°F. tap water).

8. Minimum of 68% epoxy resin and 32% coal tar pitch.

9. 2.73 lbs. VOC after thinning.

D. Vinyl Ester Coating

1. Minimum solids by volume\*

92.0 (mixed)

2. Weight per gallon

10.91  $\pm$  0.25 lbs. (mixed).

3. Abrasion

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No more than 50.8 mg loss (average) per 1000 cycles, for 10,000 cycles test.

4. Adhesion

Not less than 350-psi pull, average of three tests.

5. Humidity

No blistering, cracking, spot rusting or delamination of film. No more than 1/16 in. rust creepage at scribe and no more than 2 percent rusting at edges after 1000 hours exposure.

6. Impact

No less than 30 in/lbs. average, forward impact.

7. Salt Spray Resistance

No blistering, cracking, spot rusting or delamination of film. No more than 1/16 in. rust creepage at scribe and no more than 2 percent rusting at edges after 2500 hours exposure.

8. Heat Resistance

No cracking, delamination or loss of adhesion of film when subjected to temperatures up to 500 F for 16 hours.

\* Theoretical, may vary depending upon temperatures and air movement.

## PART 3 - EXECUTION

### 3.01 GENERAL

- A. All surface preparation, coating and painting shall conform to applicable standards of the Steel Structures Painting Council (SSPC), and the manufacturer's printed instructions. Material applied prior to approval of the surface by the Engineer shall be removed and reapplied to the satisfaction of the Engineer at the expense of the Contractor.
- B. All work shall be performed by skilled craftsmen qualified to perform the required work in a manner comparable with the best standards of practice. Continuity of personnel shall be maintained and transfers of key personnel shall be coordinated with the Engineer.

- C. The Contractor shall provide a supervisor at the work site during cleaning and application operation. The supervisor shall have the authority to sign change orders, coordinate work and make decisions pertaining to the fulfillment of the contract.
- D. Dust, dirt, oil, grease or any foreign matter that will affect the adhesion or durability of the finish must be removed by washing with clean rags dipped in an approved cleaning solvent and wiped dry with clean rags as per SSPC SP1.
- E. Coating and painting systems include surface preparations, prime coating and finish coatings. Any off-site work that does not conform to this specification is subject to rejection by the Engineer.
- F. Shop applied prime coatings, which are damaged during transportation, construction or installation shall be thoroughly cleaned and touched up in the field as directed by the Engineer. The Contractor shall use repair procedures that insure the complete protection of all adjacent primer. The specified repair method and equipment may include wirebrushing, hand, or power tool cleaning or dry air blast cleaning. In order to prevent injury to surrounding painted areas, blast cleaning may require use of lower air pressure, small nozzle and abrasive particle sizes, short blast nozzle, distance from surface, shielding and masking. If damage is too extensive or uneconomical to tough-up, then the item shall be re-cleaned and coated or painted as directed by the Engineer.
- G. The Contractor's coating and painting equipment shall be designed for application of materials specified and shall be maintained in first class working condition. Compressors shall have suitable traps and filters to remove water and oils from the air. Contractor's equipment shall be subject to approval of the Engineer.
- H. Application of the first coat shall follow immediately after surface preparation and cleaning and within an eight-hour working day. Any cleaned areas not receiving first coat within eight-hour period shall be re-cleaned prior to application of first coat.
- I. Prior to assembly, all surfaces made inaccessible after assembly shall be prepared as specified herein and shall receive the coating or paint system specified.

### 3.02 SURFACE PREPARATION

- A. The latest revision of the following surface preparation specifications of the Steel Structures Painting Council (SSPC) shall form a part of this specification.
  - 1. Solvent Cleaning (SSPC SP): Removal of oil, grease soil and other contaminants by use of solvents, emulsions, cleaning compounds, steam

cleaning or similar materials and methods which involve a solvent or cleaning action.

2. Hand Tool Cleaning (SSPC SP2): Removal of loose rust, loose mill scale and other detrimental foreign matter to degree specified by hand chipping, scraping, sanding and wirebrushing.
  3. Power Tool Cleaning (SSPC-SP3): Removal of loose rust, loose mill scale and other detrimental foreign matter to degree specified by power wirebrushing, power impact tools or power sanders.
  4. White Metal Blast Cleaning (SSPC-SP5): Blast cleaning to a gray-white uniform metallic color until each element of surface area is free of all visible residues.
  5. Commercial Blast Cleaning (SSPC-SP6): Blast cleaning until at least two thirds of each element of surface area is free of all visible residues.
  6. Brush-Off Blast Cleaning (SSPC-SP7): Blast cleaning to remove loose rust, loose mill scale and other detrimental foreign matter to degree specified.
  7. Near White Blast Cleaning (SSPC-SP10): Blast cleaning to nearly white metal cleanliness, until at least 95 percent of each element of surface area is free of all visible residues.
- B. Slag and weld metal accumulation and spatters not removed by the fabricator, erector or installer shall be removed by chipping and grinding. All sharp edges shall be peened, ground or otherwise blunted as required by the Engineer.
- C. Field blast cleaning for all surfaces shall be by dry method unless otherwise directed.
- D. Particle size of abrasives used in blast cleaning shall be that which will produce a 1 1/2 - 2 mil (37.5 microns - 50.0 microns) surface profile or in accordance with recommendations of the manufacturer of the specified coating or paint system to be applied.
- E. Abrasive used in blast cleaning operations shall be new, washed, graded, and free of contaminants that would interfere with adhesion of coating or paint and shall not be reused unless specifically approved by the Engineer.
- F. Surface preparation will be based upon comparison with: "Pictorial Surface preparation Standards for Painting Steel Surfaces", SSPC-Vis 1 ASTM Designation D220; "Standards Methods of Evaluation Degree of Rusting on Painted Steel



Surfaces", SSPC-Vis-2 ASTM Designation D610; "Visual Standard for Surfaces of New Steel Airblast Cleaned with Sand Abrasive".

- G. During blast cleaning operations, caution shall be exercised to insure that existing coatings or paint are not exposed to abrasion from blast cleaning.
- H. The Contractor shall keep the area of his work in a clean condition and shall not permit blasting materials to accumulate as to constitute a nuisance or hazard to the prosecution of the work or the operation of the existing facilities.
- I. Blast cleaned surfaces shall be cleaned prior to application of specified coatings or paint. No coatings or paint shall be applied over damp or moist surfaces.

### 3.03 APPLICATION

- A. Coating and paint application shall conform to the requirements of the Steel Structures Painting Council Paint Application Specification SSPC-PA latest revision for "Shop Field and Maintenance Painting", and the manufacturer of the coating and paint materials.
- B. Thinning shall be permitted only as recommended by the manufacturer and approved by the Engineer.
- C. Each application of coating or paint shall be applied evenly, free of brush marks, sags, runs, with no evidence of poor workmanship. Care shall be exercised to avoid lapping on glass or hardware. Coatings and paints shall be sharply cut to lines. Finished surfaces shall be free from defects or blemishes.
- D. Protective coverings or drop cloths shall be used to protect floors, fixtures, and equipment. Care shall be exercised to prevent coatings or paints from being splattered onto surfaces that are not to be coated or painted. Surfaces from which materials cannot be removed satisfactorily shall be recoated or repainted as required to produce a finish satisfactory to the Engineer.
- E. When two coats of paint are specified, where possible, the first coat shall contain sufficient approved color additive to act as an indicator of coverage or the two coats must be of contrasting color.
- F. Film thicknesses per coat specified are the minimum required. Contractor shall apply additional coats as necessary to achieve the specified thickness.
- G. No coating or paint shall be applied: When the surrounding air temperature or the temperature of the surface to be coated or painted is below 40 degrees F., too wet or damp surfaces or in rain, snow, fog or mist; when the temperature is less than 5

degrees F. above the dewpoint; when it is expected the air temperature will drop below 40 degrees F. six hours after application of coating and paint. Dewpoint shall be measured by use of an instrument such as a Sling Psychrometer in conjunction with U.S. Department of Commerce Weather Bureau Psychrometric Tables.

- H. If above conditions are prevalent, coating or painting shall be delayed or postponed until conditions are favorable. The day's coating or painting shall be completed in time to permit the film sufficient drying time prior to damage by atmospheric conditions.
- I. All material shall be applied as per manufacturer's recommendations.
- J. All welds and irregular surfaces shall receive a brush coat of the specified product prior to application of the first complete coat.
- K. All parts that can be disassembled such as vents and manhole covers shall be removed and coated inside and out as per applicable coating systems. Upon completion of coating, those parts disassembled shall be reassembled prior to placing in service.

#### 3.04 ACCEPTANCE OF WORK

- A. All surface preparation and repairs shall be approved by the Engineer/Owner before primer is applied.
- B. Request acceptance of each coat before applying next coat.
- C. Correct work that is not acceptable and request reinspection.
- D. Thickness of coatings and or the paint shall be checked with a non-destructive, magnetic type thickness gauge. (Use an instrument such as a Tooke Gauge if a destructive tester is deemed necessary.) Coating integrity of interior coated surfaces shall be tested with approved inspection devices. Holiday detection shall be performed prior to application of aluminum or metallic finish coats. Non-destructive holiday detector shall not exceed 67.5 volts nor shall destructive holiday detector exceed the voltage recommended by the manufacturer of the coating system. For thicknesses between 10 and 20 mils (250 microns and 500 microns) a non-sudsing type setting agent, such as Kodak Photo-Flo, shall be added to the water and detector sponge prior to detector use. All pinholes shall be marked and repaired in accordance with the manufacturer's printed recommendations and retested. No pinholes or other irregularities shall be permitted in the final coating.
- E. The Contractor shall furnish, until final acceptance of coating and painting, inspection devices in good working condition for detection of holidays and

measurement of dry-film thickness of coating and paint. The Contractor shall also furnish U.S. Department of Commerce, National Bureau of Standards certified thickness calibration plates to test accuracy of dry-film thickness gauge and certified instrumentation to test accuracy of holiday detectors.

- F. The coating contractor is to regularly check his work with these devices to make sure that dry-film thickness meet specifications. The Engineer shall at his discretion use the Contractors or his own equipment to perform similar inspections.
- G. Dry-film thickness gauges and holiday detectors shall be made available for the Engineer's use at all times until final acceptance of application. Holiday detection device shall be operated in the presence of the Engineer.
- H. Concrete surfaces in immersion service must have void - and pinhole-free coating application. Inspection of coating system with 5X magnification will provide these assurances.
- I. Warranty inspection shall be conducted during the eleventh month following completion of all coating and painting work. All defective work shall be repaired in accordance with this specification and to the satisfaction of the Engineer/Owner.
- J. In accordance with requirements set forth by regulatory agencies applicable to the construction industry and manufacturer's printed instructions and appropriate technical bulletins and manuals, the Contractor shall provide and require use of personnel protective lifesaving equipment for persons working in, or about the project site.
- K. Equipment shall include protective helmets that shall be worn by all persons while in the vicinity of the work. In addition, workers engaged in or near the work during sandblasting shall wear eye and face protection devices and air purifying, half-mask or mouthpiece respirator with appropriate filter. Barrier creams shall be used on any exposed areas of skin.
- L. Where ventilation is used to control hazardous exposure, all equipment shall be explosion proof. Ventilation shall reduce the concentration of air contaminant to the degree a hazard does not exist. Air circulation and exhausting of solvent vapors shall be continued until coatings have fully cured.
- M. Whenever the occupational noise exposure exceeds maximum allowable sound levels, the Contractor shall provide and require the use of approved ear protective devices.
- N. Adequate illumination shall be provided while work is in progress, including explosion-proof lights and electrical equipment. Whenever required by the Engineer,

the Contractor shall provide additional illumination and necessary supports to cover all areas to be inspected. The level of illumination for inspection purposes shall be determined by the Engineer.

- O. All temporary ladders and scaffolding shall conform to applicable safety requirements. They shall be erected where requested by the Engineer to facilitate inspection and be moved by the Contractor to locations requested by the Engineer.
- P. All coatings and paints shall be stored in enclosed structures to protect them from weather and excessive heat or cold. Flammable coatings or paint must be stored to conform to City, Parish, State, and Federal safety codes for flammable coating or paint materials. At all times, coatings and paints shall be protected from freezing.

### 3.05 CLEAN UP

Upon completion of the work, all staging, scaffolding and containers shall be removed from the site or destroyed in a manner approved by the Engineer. Coating or paint spots and oil or stains upon adjacent surfaces shall be removed and the job site cleaned. All damage to surfaces resulting from the work of painting contractor or subcontractor shall be cleaned, repaired, or refinished to the satisfaction of the Engineer at no cost to the Owner.

END OF SECTION

SECTION 11312  
LIFT STATION H 9-1  
SUBMERSIBLE WASTEWATER PUMPS

1.01 GENERAL

- A. Contractor shall furnish all labor, materials, equipment and incidentals required to provide three (3) non-clog explosion-proof submersible centrifugal sewage pumps as specified herein.
- B. The contractor shall supply a control panel, which contains all necessary components for proper starting and operation of the pump including start capacitor, start relay, and run capacitors for the pumps. This panel shall also provide a circuit that monitors the seal sensors in the pump.
- C. Pump shall be equipped with stainless steel nameplate. The nameplate shall state that the unit is accepted for use in NEC class 1, division 1, group C, D hazardous locations with third party, Factory Mutual, approval.

1.02 RELATED WORK

- A. Field painting is included in Section 09800.
- B. OEM Control Panels shall be as specified in Section 16480.
- C. Mechanical piping, valves, pipe hangers and supports are included in Section 15094.
- D. Electrical work is included in Sections 16050 and 16100.
- E. Section 11315 Guide Rail Station

2.01 OPERATING CONDITIONS

- A. Each pump shall be rated 50 H.P., 460 volts, 3 phase, 60 hertz, 1150 R. P. M. The unit shall produce 2500 gpm at 55 ft TDH, with a minimum pump efficiency of 75% and maximum input kW of 46 kW. The pump shall be capable of handling a 4" spherical solid. The pump shall be non-overloading throughout the entire range of operation without employing service factor.
- B. The pump shall also be capable of operating fully submersed with out damage. The pump shall reserve a minimum service factor of 1.20.
- C. The performance curve submitted for approval shall state in addition to head and capacity performance, the pump efficiency, solid handling capacity, and reflect motor service factor.

FOR INFORMATION ONLY

### 3.01 CONSTRUCTION

- A. The pump shall be a centrifugal, non-clog, solids handling, submersible, wastewater type, model S8LX as manufactured by Hydromatic Pumps or pre-approved equal. The pump volute, motor, and seal housing shall be high quality gray cast iron, ASTM A-48, Class 30. The pump discharge shall be fitted with an 8-inch standard ASA 125-lb. flange, faced, and drilled.
- B. All external mating parts shall be machined and Buna N Rubber O-ring sealed on a beveled edge. Gaskets shall not be acceptable. All fasteners exposed to the pumped liquids shall be 300 series stainless steel.

### 3.02 ELECTRICAL POWER CORD

- A. Electrical power cord shall be STW-A, water resistant 600V, 60°C., UL and CSA approved and applied dependent on amp draw for size.
- B. The pump shall be triple protected with a compression fitting and an epoxy potted areas at the power cord entry to the pump. A separation between the junction box area of the pump and the motor by a stator lead sealing gland or terminal board shall not be acceptable.
- C. The power cable entry into the cord cap assembly shall first be made with a compression fitting. Each individual lead shall be stripped down to bare wire at staggered intervals, and each strand shall be individually separated. This area of the cord cap shall then be filled with an epoxy compound potting which will prevent water contamination to gain entry even in the event of wicking or capillary attraction.
- D. The power cord leads shall then be connected to the motor leads with extra heavy connectors having brass inserts with a screwed wire-to-wire connection, rather than a terminal board that allows for possible leaks.
- E. The connection box wiring shall be separated from the motor housing wiring by stripping each lead down to bare wire, at staggered intervals, and separating each strand. This area shall be filled with an epoxy compound potting. Fiberglass terminal boards which are subject to heat fatigue and cracking, and which may lead to possible leaks shall not be acceptable.
- F. The cord cap assembly where bolted to the connection box assembly and the connection box assembly where bolted to the motor housing shall each be sealed with a Buna N Rubber O-ring on a beveled edge to assure proper sealing.

### 3.03 MOTOR

- A. The stator, rotor and bearings shall be mounted in a sealed submersible type housing. The stator windings shall have Class F insulation, (155°C or 311°F), and a dielectric oil filled motor, NEMA B design (3-phase). Further protection shall be provided by on winding thermal sensors. Because air-filled motors do not dissipate heat as efficiently as oil-filled motors, they shall not be acceptable.
- B. The pump and motor shall be specifically designed so that they may be operated partially or completely submerged in the liquid being pumped. The pump shall not employ the use of cooling water jackets.
- C. Stators shall be securely held in place with a removable end ring and threaded fasteners so they may be easily removed in the field without the use of heat or a press. Stators held by a heat shrink fit shall not be acceptable. Stators must be capable of being repaired or rewound by local motor service station. Units, which require service only by the factory, shall not be acceptable. No special tools shall be required for pump and motor disassembly.
- D. Pump shall be equipped with heat sensors. The heat sensor(s) (two on three phase motors) shall be a low resistance; bi-metal disc that is temperature sensitive. It shall be mounted directly on the stator windings and sized to open at 120°C and automatically reset at 30-35°C differential. The sensors shall be connected in series with motor starter coil so that the pump ceases operation when an over-temperature condition is sensed. The starter shall be equipped with 3-leg overload relay with heaters sized for the pump's full load amps. The pump shall cease operation when the overload is tripped. The overload shall be manually reset.

### 3.04 BEARINGS AND SHAFT

- A. An upper radial bearing and a lower thrust bearing shall be required. These shall be heavy-duty single row ball bearings, which are permanently lubricated by the dielectric oil, which fills the motor housing. Double row, sealed grease packed bearings shall not be acceptable. Bearings, which require lubrication according to a prescribed schedule, shall not be acceptable. The upper radial bearing shall have a minimum B-10 life at the specified condition of 40,000 hours and the lower thrust bearing shall have a minimum B-10 life at the specified condition of 40,000 hours. Bearings shall be locally available.
- B. The shaft shall be machined from a solid 300 series stainless steel forging and is a large diameter design with minimum overhang to reduce shaft deflection and prolong bearing life.

### 3.05 SEALS

- A. The pump shall have two mechanical seals, mounted in tandem, with an oil chamber between the seals. John Crane Type 21, BF1C1, seals shall be used with the rotating seal faces being carbon and the stationary seal faces to be ceramic. The lower seal shall be replaceable without disassembly of the seal chamber and without the use of special tools. Pump-out vanes shall be present on the backside of the impeller to keep contaminants out of the seal area. Units, which require the use of foreign manufactured seals, shall not be acceptable. Seals shall be locally available.
- B. The pump shall be equipped with a seal leak detection probe and warning system. This shall be designed to alert maintenance personnel of lower seal failure without having to take the unit out of service for inspection or requiring access for checking seal chamber oil level and consistency.
- C. There shall be an electric probe or seal failure sensor installed in the seal chamber between the two tandem mechanical seals. If the lower seal fails, contaminants which enter the seal chamber shall be detected by the sensor and send a signal to operate the specified warning device.
- D. Units equipped with opposed mechanical seals shall not be acceptable.

### 3.06 IMPELLER

- A. Impeller shall be of the two-vane, enclosed, non-clogging design and have pump-out vanes on the front and backside of the impeller to prevent grit and other materials from collecting in the seal area. Impeller shall not require coating. Because most impeller coatings do not remain beyond the very early life of the impeller, efficiency and other performance data submitted shall be based on performance with an uncoated impeller. Attempts to improve efficiency by coating impeller shall not be acceptable. The impeller shall be manufactured from ASTM A-48, Class 30 material.



- B. Impellers shall be hydraulically and statically balanced. The tolerance values shall be listed below according to the International Standard Organization grade 6.3 for rotors in rigid frames.

<u>RPM</u>	<u>Tolerance</u>
1750	.02 in. - oz./lb. of impeller weight.
1150	.026 in. - oz./lb. of impeller weight.
870	.03 in. - oz./lb. of impeller weight.

- C. The impeller shall be threaded shaft or tapered shaft and key driven. A300 series stainless steel washer and impeller bolt shall be used to fasten the impeller to the shaft. Straight end shafts for attachment of the impeller shall not be acceptable.

### 3.07 CASING

- A. The casing shall be of the end suction volute type having sufficient strength and thickness to withstand all stress and strain from service at full operating pressure and load. The casing shall be of the centerline discharge type equipped with an automatic pipe coupling arrangement for ease of installation and piping alignment. The design shall be such that the pumps will be automatically connected to the discharge piping when lowered into position with the guide rails. The casing shall be accurately machined and bored for register fits with the suction and casing covers.

### 3.08 PAINTING

- A. The pump shall be painted after assembly, and testing, with a dark green water reducible air-dry enamel. The paint shall be applied in one coat covering all exterior surfaces. The pump shall be air dried after testing and before painting.

### 3.09 SERVICEABILITY

- A. The complete rotating assembly shall be capable of being removed from the volute without disturbing the suction piping, discharge piping, and volute. The motor housing, seal housing with seal plate and impeller still attached to the shaft shall be capable of being lifted out of the volute case from the top as one assembly.

#### 4.01 TESTING

- A. Commercial testing shall be required and include the following:
  - 1. The pump shall be visually inspected to confirm that it is built in accordance with the specification as to HP, voltage, phase and hertz.
  - 2. The stator motor leads shall be tested for integrity using a megohm meter at the highest setting.
  - 3. Pump shall be allowed to run dry to check for proper rotation.
  - 4. Discharge piping shall be attached; the pump submerged in water and amp readings shall be taken in each leg to check for an imbalanced stator winding. If there is a significant difference in readings, the stator windings shall be checked with a bridge to determine if an unbalanced resistance exists. If so, the stator shall be replaced.
  - 5. The pump shall be removed from the water, megohm meter tested again, dried and the motor housing filled with dielectric oil.
- B. In addition to the above commercial testing, a special megohm meter test shall be performed and include the following:
  - 1. The pump shall be submerged in water and allowed to run at maximum load for 30 minutes.
  - 2. A written report on the above shall be prepared by the test engineer, certified and submitted to the engineer.
- C. A hydrostatic test shall also be performed on the pump. The hydrostatic test shall require that the volute and impeller be removed and a fixture installed to hold the spring and lower mechanical seal in place. A double plate, gasket, and through-bolt shall be installed on the pump. A discharge mating flange, gasket and pressure fitting shall be installed. The inlet port, volute, and discharge nozzle shall then be pressurized with water to 150% of the maximum pump shut off pressure. This hydrostatic pressure shall be maintained for at least 5 minutes and the housing checked for leaks and/or loss of pressure.

D. A non-witnessed Hydraulic Institute performance test shall be performed. This shall include the following:

1. The pump shall be tested at the design point as well as at least 4 other points to develop a curve. Data shall be collected to plot the head capacity curve as well as a kW input and amperage curve.
2. In making these tests, no minus tolerance or margin shall be allowed with respect to capacity, total head or efficiency at the specified design condition. Pump shall be held within a tolerance of +10% of rated capacity or at rated capacity with a tolerance of +5% of rated head. The pump shall be tested at shutoff, but not be plotted, and only used as a reference point when plotting the performance curve.
3. Complete records shall be kept of all information relevant to the test, as well as the manufacturer's serial number, type and size of pump, as well as any impeller modifications made to meet the design conditions.
4. A written test report shall be prepared, signed, and dated by the test engineer incorporating 3 curves (head-capacity, kW input, and amperage) along with the pump serial number, test number, date, speed, volts, phase, impeller diameter, and certification number. This report shall be submitted to the engineer.

#### 5.01 WARRANTY

- A. The pump unit or any part thereof shall be warranted against defects in material or workmanship within one year from date of installation and shall be replaced at no charge with a new or manufactured part, F.O.B. factory or authorized warranty service station. The warranty shall not assume responsibility for removal, reinstallation, or freight, nor shall it assume responsibility of incidental damages resulting from the failure of the pump to perform. The warranty shall not apply to damage resulting from accident, alteration, design, misuse, or abuse.

END OF SECTION

FOR INFORMATION ONLY

SECTION 11315  
GUIDE RAIL STATION

1.01 GENERAL

- A. Contractor shall furnish all labor, materials, equipment and incidentals required to provide a complete pumping system as specified herein.
- B. The MTM rail system shall include 3 submersible, non-clog sewage pumps at the project Lift Station, discharge elbow, connecting flange assembly, guide connector, upper guide bracket, lifting cable, assess frame and hatch cover, float mounting bracket, control equipment, 2-inch Stainless Steel guide rails and discharge piping.
- C. Refer to separate specifications for control equipment.

2.01 DISCHARGE BASE ELBOW

- A. The discharge elbow designed to mount directly to the sump floor shall be supplied for each pump. It shall have a standard 125-pound flange faced and drilled on the outlet side, with a machined mating inlet connection. The design shall be such that the pump to discharge connection is made without the need for any nuts, bolts or gaskets. The base elbow shall also anchor and align the two, 2-inch S.S. guide rails.

2.02 CONNECTING FLANGE

- A. A cast iron connecting flange/rail bracket shall be mounted on each pump discharge. It shall have a machined mating flange, which matches the base elbow discharge connection. Sealing of this discharge connection shall be accomplished by a simple linear downward motion of the pump culminating with the entire weight of the pumping unit supported entirely by the base elbow.

2.03 UPPER GUIDE BRACKET

- A. The upper guide bracket shall align and support the two guide rails at the top of the sump. It shall bolt directly to the hatch frame and incorporate an expandable rubber grommet for secure rail installation.

#### 2.04 LIFTING CABLE

- A. Each pumping unit shall be provided with a 316 S.S. lifting cable, and be of sufficient length to extend from the pump to the top of the wet-well and access hatch. The access frame shall provide a hook to attach the cable when not in use. The lifting cable shall be sized to the pump weight.

#### 2.05 ACCESS FRAME AND DOOR

- A. A separate access frame assembly shall be supplied with a separate hinged door for removal of each pump. The frame assembly and door shall be aluminum, with stainless steel hinges and hardware and raised tread plate to provide a skid-proof surface. As a safety precaution, each pump shall be provided with a separate door so as to limit access to the wet-well. Load rating shall be H-20. The frame shall support the float-mounting bracket. A recessed, lockable handle shall be provided with each door, as well as a safety latch to hold the door in an open position.

#### 2.06 FLOAT MOUNTING BRACKET

- A. A S.S. float-mounting bracket shall be provided with strain relief that support and hold the level control cords. Continuous cords shall be provided to run from pumps and level controls to the control panel.

#### 2.07 GUIDE RAIL

- A. Dual rail guide systems shall be provided to keep the pumps in proper alignment with the stationary discharge piping. The guide rails shall be 2-inch stainless steel pipe that bolt directly to the base elbow and to the access frame at the top of the wet-well by a S.S. upper guide rail bracket.

#### 2.08 PIPING

- A. Piping shall include (per pump) swing check valve with outside lever and spring, gate valve and all the necessary gaskets, straight pipe, bracket, elbows, tees, and fittings. All piping should be coated with coal tar epoxy or equal for corrosion resistance. Where piping passes through a wall, a pipe wall seal shall be used to make a watertight joint.

END OF SECTION

SECTION 15094  
PIPE HANGERS AND SUPPORTS

PART 1 - GENERAL

1.01 SCOPE OF WORK

Furnish all labor, materials, equipment, and incidentals and install pipe hangers, supports, concrete inserts, and anchor bolts including all metallic hanging and supporting devices for supporting exposed piping.

1.02 QUALIFICATIONS

- A. Hangers and supports shall be of approved standard design where possible and shall be adequate to maintain the supported load in proper position under all operating conditions. The minimum working factor of safety for pipe supports shall be five (5) times the ultimate tensile strength of the material, assuming 10 feet of waterfilled pipe being supported. Hangers and supports within fiberglass reinforced (FBR) wet wells and dry wells are to meet FBR manufacturer's design standards for use inside and attached to the FBR wells.
- B. All pipe and appurtenances connected to equipment shall be supported in such a manner as to prevent any strain being imposed on the equipment. When manufacturers have indicated requirements that piping loads shall not be transmitted to their equipment, the Contractor shall submit a certification stating that such requirements have been complied with.

1.03 SUBMITTALS

- A. Submit to the Engineer for review, shop drawings of all items to be furnished under this section.
- B. Submit to the Engineer for review, samples of all materials specified herein.

PART 2 - PRODUCTS

2.01 GENERAL

- A. All pipe and tubing shall be supported as required to prevent significant stresses in the pipe or tubing material, valves, and fittings and to support and secure the pipe in the intended position and alignment. All supports shall be designed to adequately secure the pipe against excessive dislocation due to thermal expansion and contraction, internal flow forces, and all probable external forces such as equipment, pipe, and personnel contact. All pipe supports shall be approved prior to installation.

- B. All materials used in manufacturing hanger and supports shall be capable of meeting, the respective ASTM Standard Specifications with regard to tests and physical and chemical properties, and be in accordance with MSS SP-58.
- C. Hangers and supports shall be spaced in accordance with ANSI B31.1.0 except that the maximum unsupported span shall not exceed 10' unless otherwise specified herein.
- D. Unless otherwise specified herein, pipe hangers and supports shall be as manufactured by Grinnell Co., Inc., Carpenter and Patterson, Inc., or equal. Any reference to a specific figure number of a specific manufacturer is for the purpose of establishing a type and quality of product and shall not be considered as proprietary. Any item comparable in type, style, quality, design and performance will be considered for approval.
- E. Hangers and supports shall meet with the approval of FBR wells manufacturer for use with these structures.

## 2.02 PIPE HANGERS AND SUPPORTS FOR METAL PIPE

- A. Suspended single pipes shall be supported by hangers suspended by steel rods from galvanized concrete inserts, beam clamps, or ceiling mounting bolts as follows:

### 1. Hangers

Pipe Size, Inches	Grinnell Fig. No.
Less than 1/2"	138R
1/2" - 1"	97C
1" - 4"	104
6" - 12"	590
14" - 30"	171

- 2. Hanger rods shall be rolled steel machine threaded with load ratings conforming to ASTM Specifications and the strength of the rod shall be based on root diameter. Hanger rods shall have the following minimum diameters.

Pipe Size, Inches	Min. Rod $\phi$ , Inches
Less than 2-1/2"	3/8"
2-1/2" - 4"	1/2"
4"	5/8"
6"	3/4"
8" - 12"	7/8"
14" - 18"	1"
20" - 30"	1-1/4"

3. Where applicable, structural attachments shall be beam clamps. Beam clamps, for rod sizes 1/2" - 3/4" shall be equal to Grinnell Fig. No. 229, and for rod sizes 7/8" - 1-1/4" shall be equal to Grinnell Fig. No. 228, or equal.
4. Concrete inserts for pipe hangers shall be, continuous metal inserts designed to be used in ceilings, walls or floors, spot inserts for individual pipe hangers, or ceiling mounting bolts for individual pipe hangers and shall be as manufactured by Unistruct Corp., Wayne, Michigan, Carpenter and Patterson, Inc., Laconia, New Hampshire or equal and shall be as follows:
  - a. Continuous concrete inserts shall be used where applicable and/or as shown on the drawings and shall be used for hanger rod sizes up to and including 3/4" diameter. Inserts to be used where supports are parallel to the main slab reinforcement shall be Series P3200 by Unistruct Corp., Fig. 1480 Type 21 by Carpenter and Patterson, Inc., or equal. Inserts to be used where supports are perpendicular to the main slab reinforcement shall be Series P3300 by Unistruct Corp., Fig. 1480 Type I by Carpenter and Patterson, Inc., or equal.
  - b. Spot concrete inserts shall be used where applicable and shall be used for hanger sizes up to and including 7/8" diameter. Inserts shall be Fig. 650 by Carpenter and Patterson, Inc. for hanger rod sizes 1/2" through and including 3/4", and Fig. 266 by Carpenter and Patterson, Inc., for 7/8" hanger rods.
  - c. Ceiling mounting bolts shall be used where applicable and be for hanger rod sizes 1" through and including 1-1/4" and shall be Fig. 104M as manufactured by Carpenter and Patterson, Inc., or equal.



5. All pipe hangers shall be capable of vertical adjustment under load and after erection. Turnbuckles, as required and where applied, shall be equal to Grinnell Fig. No. 230.
- B. Wall or column supported pipes shall be supported by welded steel brackets equal to Grinnell Fig. 194, 195 and 199 as required, for pipe sizes up to and including 20" diameter. Additional wall bearing plates shall be provided where required.
1. Where the pipe is located above the bracket, the pipe shall be supported by an anchor chair and U-bolt assembly supported by the bracket for pipes 4" and larger and by a U-bolt for pipes smaller than 4". Anchor chairs shall be equal to Carpenter & Patterson Fig. No. 127. U-bolts shall be equal to Grinnell Fig. 120 and 137.
  2. Wall or column supported pipes 2" and smaller may be supported by hangers equal to Carpenter & Patterson Figures 74, 179, or 237 as required.
- C. Floor supported pipes 3" and larger in diameter shall be supported by either cast-in-place concrete supports or adjustable pipe saddle supports as directed by the Architect/Engineer. In general, concrete supports shall be used when lateral displacement of the pipes is probable (unless lateral support is provided), and adjustable pipe saddle type supports shall be used where lateral displacement of the pipes is not probable.
1. Each concrete support shall conform to the details shown on the drawings. Concrete shall be poured after the pipe is in place with temporary supports. Top edges and vertical corners of each concrete support shall have 1" bevels. Each pipe shall be secured on each concrete support by a wrought iron or steel anchor strap anchored to the concrete with cast-in-place bolts or with expansion bolts. Where directed by the Architect/Engineer, vertical reinforcement bars shall be grouted into drilled holes in the concrete floor to prevent overturning or lateral displacement of the concrete support. Unless otherwise approved by the Architect/Engineer, maximum support height shall be 5'.
  2. Concrete piers used to support base elbows and tees shall be similar to that specified above. Piers may be square or rectangular.
  3. Each adjustable pipe saddle support shall be screwed or welded to the corresponding size 150 lb. companion flanges or slip-on welding flanges, respectively. Supporting pipe shall be of Schedule 40 steel pipe construction. Each flange shall be secured to the concrete floor by a minimum of two expansion bolts per flange. Adjustable saddle supports

shall be equal to Grinnell Fig. No. 264. Where used under base fittings, a suitable flange shall be substituted for the saddle.

4. Floor supported pipes less than 3" shall be supported by fabricated steel supports.

D. Vertical piping shall be supported as follows:

1. Where pipes change from horizontal to vertical, the pipes shall be supported on the horizontal runs within 2' of the change in direction by pipe supports as previously specified herein.
2. For vertical runs exceeding 15', pipes shall be supported by approved pipe collars, clamps, brackets, or wall rests at all points required to insure a rigid installation.
3. Where vertical piping passes through a steel floor sleeve, the pipe shall be supported by a friction type pipe clamp that is supported by the pipe sleeve. Pipe clamps shall be equal to Grinnell Fig. 262.

E. Anchor bolts shall be equal to Kwik-Bolt as manufactured by the McCulloch Industries, Minneapolis, Minnesota, or Wej-it manufactured by Wej-it Expansion Products, Inc., Bloomfield, Colorado.

F. All rods, hangers, inserts, brackets, and components shall be furnished with galvanized finish.

## 2.03 PIPE HANGERS AND SUPPORTS FOR PLASTIC PIPE

- A. Single plastic pipes shall be supported by pipe supports as previously specified herein.
- B. Multiple, suspended, horizontal plastic pipe runs, where possible, and rubber hose shall be supported by ladder type cable trays such as the Electray Ladder by Husky-Burndy, the Globetray by the Metal Products Division of United States Gypsum, or equal. Ladder shall be of mild steel construction. Rung spacing shall be approximately 18" for plastic pipe and 12" for double runs of rubber hose. Ladder type cable trays shall be furnished complete with all hanger rods, rod couplings, concrete inserts, hanger clips, etc. required for a complete support system. Individual plastic pipes shall be secured to the rungs of the cable tray by strap clamps or fasteners equal to Globe Model M-CAC, Husky-Burndy Model SCR or approved equal. Spacing between clamps shall not exceed 9'. The cable trays shall provide continuous support along the length of the pipe.

- C. Individual clamps, hangers, and supports in contact plastic pipe shall provide firm support but not so firm as to prevent longitudinal movement due to thermal expansion and contraction.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

- A. All pipes, horizontal and vertical, shall be rigidly supported from the structure by approved supports. Supports shall be provided at changes in direction and elsewhere as shown in the drawings or specified herein. No piping shall be supported from other piping or from metal stairs, ladders, and walkways, unless is so indicated on the drawings, or specifically directed or authorized by the Engineer.
- B. All pipe supports shall be designed with liberal strength and stiffness to support the respective pipes under the maximum combination of peak loading conditions to include pipe weight, liquid weight, liquid movement, and pressure forces, thermal expansion and contraction, vibrations, and all probable externally applied forces. Prior to installation, all pipe supports shall be approved by the Engineer.
- C. Pipe supports shall be provided to minimize lateral forces through valves, both sides of split type couplings, and sleeve type couplings and to minimize all pipe forces on pump housings. Pump housings shall not be utilized to support connecting pipes.
- D. Pipe supports shall be provide as follows:
  - 1. Ductile iron shall be supported at a maximum support spacing of 10' with a minimum of one support per pipe section at the joints.
  - 2. Individually supported PVC pipes shall be supported as recommended by the manufacturer except that the support spacing shall not exceed 5'.
  - 3. All vertical pipes shall be supported at each floor or at intervals of at least 15' by approved pipe collars, clamps, brackets, or wall rests, and at all points necessary to insure rigid construction.
- E. Pipe supports shall not result in point loadings but shall distribute pipe loads evenly along the pipe circumference.
- F. Effects of thermal expansion and contraction of the pipe shall be accounted for in pipe support selection and installation.

G. Inserts for pipe hangers and supports shall be installed on forms before concrete is poured. Before setting these items, all drawings and figures shall be checked which have a direct bearing on the pipe location. Responsibility for the proper location of pipe supports is included under this section.

H. Continuous metal inserts shall be embedded flush with the concrete surface.

### 3.02 PRIME COATING

A. Prior to prime coating, all pipe hangers and supports shall be thoroughly clean, dry, and free from all mill-scale, rust, grease, dirt, paint, and other foreign substances to the satisfaction of the Architect/Engineer.

B. All submerged pipe supports shall be prime coated with Koppers 654 Epoxy Primer or approved equal. All other pipe supports shall be prime coated with Rustinhibitive Primer No. 621 as manufactured by Koppers Company, Inc., Pittsburgh, PA, or equal.

C. Finish coating shall be compatible with the prime coating used and shall be applied as specified.

END OF SECTION

SECTION 15100  
VALVES FOR SEWER FORCE MAINS

PART 1- GENERAL

1.01 RELATED ITEMS SPECIFIED ELSEWHERE

- A. Ductile and Cast Iron Pipe and Fittings
- B. Polyvinyl Chloride (PVC) Pipe
- C. Shop Drawings, Product Data and Samples
- D. Protective Coatings
- E. Manholes

1.02 DESCRIPTION

Under this section of the specifications, the Contractor shall furnish all labor, material, tools and equipment necessary to install the valves and appurtenances within the project all as indicated on the project plans, as herein specified and as recommended by the manufacturer. All work shall be in accordance with APWA, AWWA, ASTM and other applicable standards.

1.03 QUALITY ASSURANCE

Within the requirements of the section pertaining to "Shop Drawings, Product Data and Samples" of these specifications as well as any other applicable sections of these specifications, the Contractor shall submit shop drawings, product data and other miscellaneous information for all equipment herein specified to the Engineer for approval prior to fabricating or ordering any of the proposed equipment or constructing any item of work which is affected by the particular characteristics of any of the proposed equipment.

1.04 PRODUCT DELIVERY, HANDLING AND STORAGE

The equipment herein specified shall be packaged and shipped in a manner which shall adequately protect the equipment from damage. Upon receipt of the equipment by the Contractor, the equipment shall be stored in a location within the Contractor's staging area remote from possible damage. If any equipment is damaged, lost or stolen at any time prior to acceptance of the project, it shall be replaced at the Contractor's expense.

## PART 2 - PRODUCTS

### 2.01 AIR RELEASE VALVES

The air release valve shall automatically function at full line pressure to release to the atmosphere small amounts of entrained air that may accumulate in the pipeline without spillage or spurt. Once the accumulated air is exhausted, the valve shall shut tightly to prevent wastewater leakage. The valve body and cover shall be cast iron conforming to ASTM A48, Class 35. The float, stem and internal linkage shall be stainless steel conforming to ASTM A240. Valve seal shall be viton. The valve inlet shall be two (2) inch N.P.T. and the outlet shall be one (1) inch N.P.T.

Flush-out accessories shall be furnished and assembled to the valve consisting of an inlet shutoff valve, blow-off valve, clear water inlet valve, six (6) feet of rubber hose and quick disconnect couplings. A plug valve located between the ARV and the force main as shown on the Plans shall be furnished and installed.

Air release valves shall be A.R.I., Sewage Air Release Valve, Model D-025, or approved equal.

### 2.02 ECCENTRIC PLUG VALVES

Valves shall be of the non-lubricated, eccentric type with resilient faced plugs and flanged ends shown on the plans. Port areas shall be at least 90% of full pipe area. Valve bodies shall be of ASTM A126 Class B cast iron in compliance with AWWA Standard C-504. Valves shall be furnished with corrosion resistant seats. The Contractor shall provide protective coatings as specified under the section pertaining to "Protective Coatings". Contractor shall submit painting system for review by Engineer.

Seats shall have a welded-in overlay of high nickel content on all surfaces contacting the plug face. Valves shall have permanently lubricated, stainless steel bearings in the upper and lower plug stem journals. All valves shall be of the bolted bonnet design. All valves shall be designed so that they can be repacked without removing the bonnet and the packing shall be adjustable. Removable shims shall be furnished to protect packing from over tightening. Grit seals shall be furnished in the upper and lower journals to prevent abrasive media from entering the bearing and seal areas. All exposed nuts, bolts, springs and washers shall be galvanized. Flanged valves shall be faced and drilled to ANSI 125/150 pound standard. Flanges of valves shall have face-to-face dimensions of standard gate valves.

The plug shall be of a one piece design with a precision molded resilient facing.

All valves shall be furnished with totally enclosed hand wheel actuators. All valves and actuators shall be Val-Matic Series 5000 or approved equal.

## 2.03 CHECK VALVES

The swing check valve shall be of the full body flanged type, with a domed access cover and only one moving part, the valve disc.

The valve body shall have full flow equal to nominal pipe diameter at any point, through the valve. The seating surface shall be on a 45 degree angle to minimize disc travel. The top access port shall be full size, allowing removal of the disc without removing the valve from the pipeline. The access cover shall be domed in shape, to allow the disc to be fully operational in lines containing a high solids content.

The disc shall be of one piece construction, precision molded with an integral O-ring type sealing surface and contain steel and nylon reinforcements in both the flexible and central disc areas. The flexible portion of the disc shall be warranted for twenty-five years. Non-slam closing characteristic shall be provided through a short 35 degree disc stroke and a flexible disc return action.

Backflow capabilities shall be available by means of an optional screw type backflow actuator. The actuator shall be field installable without modification to the valve, a need for special tools or removal of the valve from line.

The valve body and cover shall be ASTM A126, Class B cast iron. The disc shall be Buna-N (NBR), ASTM D2000-BG.

The valve shall be cycle tested 1,000,000 times with no signs of wear or distortion to the valve disc or seat and shall remain drop tight at both high and low pressures. The tests results shall be independently certified.

The valve shall be series 500 as manufactured by Val-Matic Valve and Manufacturing Corporation or approved equal.

Contractor shall provide protective coatings as specified under the section pertaining to "Protective Coatings". Contractor shall submit painting system for review by Engineer.

## 2.04 GATE VALVES

Gate valves unless otherwise specified or approved, shall be iron body, bronze mounted, solid wedge gate valves with flanged ends and conforming to the AWWA Standard Specification for Gate Valves for Ordinary Water Works Service, Designation C500, insofar as applicable.

Exposed valves shall be outside screw and yoke type and buried valve shall be non-rising stem.

Face to face dimension shall conform to ANSI Standard Face to Face and End to End Dimensions of Ferrous Valves, (ANSI B16.10) for 125-pound cast-iron valves.

Bronze gate rings shall be fitted into grooves of dovetail or similar shape in the gates. For grooves or other shapes, the rings shall be firmly attached to the gates with bronze rivets.

Handwheels or chain wheels shall be turned counterclockwise to open the valves. Handwheels shall be of ample size and shall have an arrow and the word OPEN cast thereon to indicate the direction of opening.

Stuffing box follower bolts shall be of steel and the nuts shall be of bronze.

The design of the valves shall be such as to permit packing the valves without undue leakage while they are wide open and in service. O-ring stuffing boxes may be used.

Where indicated on the Drawings or necessary due to location, size, or inaccessibility, chain wheel operators shall be furnished with the valves. Such operators shall be designed with adequate strength for the valves with which they are supplied and to provide for easy operation of the valve. Chains for valve operators shall be galvanized.

Where required gate valves shall be provided with a box cast in the slab and a box cover. Length of the box shall be slab thickness. Box cover opening shall be for valve stem and nut. Valve wrenches and extension stems shall be provided by the manufacturer by Clow, DeZurik or equal.

## 2.05 METAL SEATED KNIFE GATE VALVES

The Knife Gate Valves shall be bonnetless, wafer type made with a cast iron body, with several support ribs for a strong flanged connection. All sizes shall have a fabricated stainless steel liner. Standard flange holes shall be drilled and tapped, thru bolted flanges shall be an available option except in the chest area where the holes are drilled and tapped. Flange drilling dimensions meet MSS SP-81 and ANSI B16.1/B16.5 Class 125/150 requirements. The valve shall have raised face flanges and meet MSS SP-81 face-to-face dimensions. Valve shall have all wetted parts made of 304 or 316 stainless steel. Stainless steel liner shall extend through the valve chest to the top of packing gland. Both sides of the gate shall be finish ground. The stem shall be stainless steel and have double lead threads. The yoke nut shall be acid-resisting bronze. The valve shall have a raised seat with a relieved area around the seat to prevent jamming. The valve gate shall be suitable for 125 pressure differential. the packing gland shall have 3 layers of fiber packing with a 4th elastomer seal. The valve shall be metal seated with a round port.

## 2.06 NOT USED

## 2.07 VALVE RESTRAINTS

All valves shall be furnished with restrained joints such as mechanical joints with retainer glands for underground installations or flanged joints for installations inside of structures. Force main piping on either side of such valve installations shall be restrained as indicated on the Drawings.



### PART 3 - EXECUTION

Valves shall be installed in the locations shown on the drawings, as herein specified and as per the manufacturer's recommendations. All valve installations shall be installed with appropriate gaskets, suitable for use in sewage wastewater. Air release valves installation shall include a plug valve beneath the ARV as shown on the Plans.

END OF SECTION

## **SECTION 16050**

### **ELECTRICAL WORK**

#### **PART 1 - GENERAL**

##### **1.01 GENERAL**

- A. All provisions or Special Conditions of the General Contract apply to this portion of the specifications.
- B. The electrical drawings shall be considered as part of the specifications.
- C. The Contractor shall furnish and install all electrical material, wiring, conduit, equipment, and devices specified herein as on the electrical drawings.
- D. The Contractor shall install necessary pull boxes, as required to pull cables within code and wire manufacturer's specifications.

##### **1.02 CODES, REGULATIONS AND PERMITS**

- A. The Contractor shall comply with all provisions of the latest revisions of the National Electrical Code, the National Electrical Safety Code, and with all State and local regulations. The Contractor shall pay all permit and inspection fees, and shall furnish the Engineer with applicable certificates of inspection. All work shall be accomplished in accordance with the regulations of the Louisiana State Fire Marshal.
- B. If the drawings indicate equipment, material or methods exceeding Code requirements, the Contractor must comply with such requirements of the drawings or specifications.
- C. Industry standard issued by the following organizations shall apply to material and workmanship:
  - 1. National Electrical Manufacturer's Association (NEMA).
  - 2. Insulated Power Cable Engineers Association (IPCEA).
  - 3. American National Standards Institute (ANSI).
  - 4. The Institute of Electrical and Electronics Engineers (IEEE).
  - 5. Underwriter's Laboratories, Inc. (U.L.).

1.04 SITE CONDITIONS

The Contractor must visit the site and familiarize himself with all existing conditions prior to submitting bid.

1.05 GUARANTEES

The Contractor shall guarantee all equipment and workmanship furnished and installed under this Section against defective material, design and workmanship for a period of one year from date of final acceptance. Lamps which fail during warranty period before normal life is reached are included in this warranty. Upon receipt of notice from Owner or Engineer of failure of any equipment during warranty period, the affected part of parts shall be replaced promptly with new parts by and at expense of Contractor.

1.06 ELECTRICAL DRAWINGS

- A. The electrical drawings indicate the general layout of the complete electrical system and show arrangements of feeders, circuits, outlets, switches, controls, and other work.
- B. The Contractor shall verify all scaled dimensions in the field.
- C. Discrepancies shown on different plans, or between plans and actual field conditions, shall be brought to the attention of the Engineer promptly for resolution.
- D. The Electrical Drawings may be superseded by later revised or detailed drawings or specification addenda prepared by the Engineer, and the Contractor shall conform to all reasonable changes without extra cost to the Owner. All items not specifically mentioned in the specifications or noted on the drawings, but which obviously are required to make the working installation complete, shall be included automatically.
- E. Dimensions for locating wiring devices and other electrical equipment, unless otherwise noted, are to center lines.

**PART 2 - PRODUCTS**

2.01 MATERIALS AND EQUIPMENT

- A. Where materials, equipment, apparatus or other products are specified by manufacturer, brand name or type, or catalog number, such designation is to establish standards of desired quality and style and shall be the basis of the bid. Except where noted, it is implied that "or approved equal" follows all specified items. Approval for substitutions will be granted by the Architect/Engineer to the Electrical Contractor only, through the General

Contractor. Where two or more designations are listed, choice shall be optional with the Contractor.

- B. All materials shall be in accordance with associated specifications and drawings. Where equipment is specified by manufacturer, no substitutions shall be made without prior approval by the Architect/Engineer.
- C. Any bills of materials, conduit and wire schedules, etc., will be used for identification, type, and reference. It shall be the responsibility of the Contractor to determine exact quantities and components required to effect a complete job in accordance with drawings and associated specifications.
- D. Equipment shall be installed in strict accordance with manufacturer's instructions. Contractor shall obtain these instructions and they shall be considered a part of these specifications. Contractor shall furnish instructions, operation, and maintenance instructions.
- E. All materials and equipment must be installed in accordance with the manufacturer's instructions. Unless authorized by the Engineer, any supporting bracketry or structural shape recommended by the manufacturer's must be installed accordingly.

## 2.02 SUPPORTS

- A. Provide proper non-ferrous or stainless steel for outdoor anchoring devices and supports to adequately support all electrical equipment, lighting fixtures, etc. No tie wires shall be used.
- B. To provide support for heavy pieces of equipment, such as control panel, disconnect switch, etc., provide stainless steel, Unistrut P-1000, or equal.
- C. Fasten supports as follows:
  - 1. To wood by means of screws.
  - 2. To masonry by means of threaded metal inserts, metal expansion bolts; or toggle bolts. Power actuated fasteners may be used in concrete.
  - 3. To steel by means of machine screws, bolts or power-actuated fasteners.

## 2.03 CONDUIT AND FITTINGS

- A. All above ground conduit shall be Galvanized Rigid Steel (GRS).

## 2.04 CONDUCTORS

- A. All wire (600 volt circuits and below) shall be copper with 600 volt THW insulation or better, unless otherwise noted, specifically for street light wiring see ATTACHMENT 1. Aluminum wire will not be acceptable.

### **PART 3 - EXECUTION**

#### **3.01 WORKMANSHIP**

Install all materials and equipment in accordance with instructions of manufacturer following the best modern construction practices as approved by Engineer, to conform with the Contract Documents. Workmanship shall be first class, in both effectiveness and appearance, whether finally concealed or exposed and shall be executed by experienced workmen skilled in this type of work.

#### **3.02 EXCAVATION AND BACKFILL**

- A. Perform all excavating and backfilling required for work under this Section. Remove all obstructions encountered or reroute line to clear obstructions. Consult Engineer where problems arise. Backfill in 6" maximum layers and compact.
- B. Remove surplus earth. Return premises to original condition to satisfaction of Engineer.

#### **3.03 CLEANING UP**

Remove all empty cartons, scrap wire, raceways, rubbish, etc., accumulated on project as a result of work performed under this Section.

#### **3.04 PROTECTION**

Contractor shall continuously maintain adequate protection of stored materials and installed work. Fixtures and equipment, whether stored under a roof or outside, shall be tight-covered with sheet polyethylene or waterproof tarpaulin as protection against dirt, rust and moisture. Materials and equipment shall not be stored directly on the ground nor in areas where they will be subject to physical injury from vehicular traffic or construction machinery. Equipment shall not be used by other trades as supports for scaffolds or personnel. At the complete of the work, equipment and fixtures shall be cleaned to the satisfaction of the Engineer. Contractor shall take every precaution to avoid damaging other structures on the property or on adjacent property. Repairs made necessary by damage shall be paid by the Contractor.

#### **3.05 RACEWAYS AND FITTINGS**

- A. Generally, unless otherwise indicated, wiring for all systems as called for in these Specifications and shown on Drawings shall consist of insulated

conductors from box to box, junction or pull box. Raceways will be electrically continuous from point of origin to outlet.

- B. Make square cuts. Ream ends smooth. Threads cut in field shall be same dimensions, taper and lengths as those of factory-cut threads.
- C. Use U.L. approved, raintight and concrete tight couplings and unions. Draw up all joints tight.
- D. Plug the ends of each roughed-in raceway with an approved cap or disc to prevent the entrance of foreign materials during construction. Tight fitting tapered corks may be used for raceways 1" and smaller. Several layers of tape may be securely wrapped over end of raceways 1" and smaller to protect raceway prior to installation of boxes.
- E. Where wire sizes are not indicated on Drawings, base minimum size per National Electrical Code in accordance the number, size, type and insulation of conductors to be installed. Note that Drawings may call for larger size than required by National Electrical Code; install the larger size.
- F. Bend without kinking or destroying the cross sectional contour of the raceway.
- G. **ALL CONDUIT ENTERING THE WETWELL SHALL BE PROVIDED WITH EXPLOSION PROOF SEAL. INSTALL A UNION BETWEEN SEAL AND PANEL.**

### 3.06

#### WIRING METHOD

- A. Do not pull conductors into raceways until raceway system (including all outlets, cabinets, bushings and fittings) is completed and encased in concrete as required. Be sure that all work of other trades which may cause conductor damage is completed. Use only approved cable lubricants when necessary.
- B. On termination at branch circuit outlets, leave a minimum of 8" free conductor for installation of devices or fixtures. After device hook-up, form excess wire neatly to fit into box.
- C. Make all splices and connections in accessible boxes and cabinets only.
- D. For splices and taps No. 10 and smaller, use solderless "Thread-On" connectors having spiral steel spring, insulated with a vinyl cap and skirt.
- E. For splices and taps No. 8 and larger use solderless "Split-Bolt" Type connector.

- F. Underground splices shall be made with approved water proof splices.

### 3.7

#### GROUNDING

- A. Provide a system of grounding in accordance with instructions outlined under this Section of Specifications. Unless otherwise indicated, ground all exposed non-current carrying metallic parts of electrical equipment and ground all raceway systems.
- B. Use bare or green insulated copper conductor run in conduit. Size conductor in accordance with National Electrical Code, Table 250-94(a).
- C. Use grounding type insulated bushings on all raceways entering and leaving equipment.
- D. Bond together all non-current carrying parts.

END OF SECTION

## **SECTION 16480 PUMP STATION CONTROL PANEL**

### **1.0 GENERAL**

#### **1.01 CONTROL PANEL**

Furnish and install all equipment as shown on drawings in a low profile, U.L. 508 listed, weatherproof NEMA 3RX panel with drip shield. Enclosure shall be furnished with hinged dead front interior and exterior doors. Outer enclosure shall be constructed of 12 gauge, 316 stainless steel. Doors shall be equipped with 316 stainless steel polished handles with 3-point roller bearing latches and hasps for owner padlocks. All interior mounting hardware shall be stainless steel. A lightning/surge arrestor shall be furnished to protect the panel equipment from lightning and utility power surges. Provide fluorescent panel light, door switch, GFCI receptacle, PFR power fail relay, strip heater and thermostat. Seal all openings to prevent entrance of insects and rodents. Finish shall be polyester dry powder, electrostatically applied and baked on at 380 degrees Fahrenheit. Interior color including front and back of all swing out doors, separation barriers and mounting backpans shall be white. Exterior color shall be Parish approved "dark olive green". The painting process shall include five stages of metal preparation using dip tanks as follows: 1) Alkaline cleaner, 2) Clear water rinse, 3) Zinc phosphate application, 4) Clear water rinse, and 5) Inhibitive rinse to seal phosphated surfaces. All bussing and wire shall be copper. All wire shall be stranded with locking spade pressure connectors and labeled with clip-on permanent plastic wire markers. All circuit breakers and dead front mounted devices (lights and switches) shall be equipped with engraved phenolic nameplates.

The enclosure shall be compartmentalized such that the programmable pump controller, power and telemetry sections are isolated from each other. The compartments containing the programmable pump controller, power sections and telemetry shall be separated by barriers behind the inner dead front door. If required, space shall be available in the pump control panel for the mounting of existing or new telemetry components (radio, battery and charger). Doors shall be hinged on the same side and shall open to greater than 90 degrees. All dead front latches are 1/4 turn adjustable with 1/8" thick latching dog and knurled knob.

The pump control panel shall house the main circuit breaker, and generator receptacle circuit breaker with approved mechanical interlock to prevent both breakers from being closed concurrently. The main circuit breaker, generator circuit breaker, and all wiring shall be located behind an interior dead front door. Interlocks and circuit breaker operation shall be possible without opening the dead front door. Elapsed time meters, indicating devices and H.O.A. switches, shall be mounted on the inside dead front door. Breaker cut-outs for breaker toggle protrusion, to eliminate exposure to hazardous potentials, shall be supplied. A physical lock-out device shall be supplied on each motor circuit breaker.



Thermostatically controlled heating and cooling systems shall be provided, as approved by the Engineer to maintain suitable climate conditions within the control panel to provide proper operation of the panel and to comply with the contract plans and specifications.

## **1.02 UTILITY METERING**

The electric service meter compartment shall be furnished as an integral part of the pump control panel and shall meet with all requirements of ENTERGY, be pre-approved by ENTERGY and be U/L 508 service entrance labeled. The electric service motor compartment shall be constructed of 12 gauge 316 stainless steel, Nema 3RX with drip shield. The pull section and utility compartments shall be accessible only by the utility company. Finish shall be polyester dry powder, electrostatically applied and baked on at 380 degrees. Fahrenheit. Color shall be white interior doors, exterior color to match pump control panel. The painting process shall include five stages of metal preparation using dip tanks as follows: 1) Alkaline cleaner, 2) Clear water rinse, 3) Zinc phosphate application, 4) Clear water rinse, and 5) Inhibitive rinse to seal phosphated surfaces. All bussing and wire shall be copper.

## **1.03 GENERATOR RECEPTACLE**

The generator receptacle shall be attached to the panel and connected to the generator receptacle circuit breaker. The generator receptacle shall be the "reversed type" such that the plug is a female fitting and the panel mounted device is a male fitting to minimize contact with a possible voltage source. Generator receptacle amperage and voltage shall be per contract documents.

## **1.04 TERMINAL AND DISTRIBUTION BLOCKS**

Distribution blocks shall be furnished and installed as required for "fan-out" of control power and other 120V sources within the enclosure. The blocks shall be rated 300V at a minimum of 20 amperes and sized for the conductors served. Distribution blocks shall be similar to Square D, Connectron NFT, or equal.

## **1.05 CIRCUIT BREAKERS**

All 480 volt circuit breakers shall have interrupting capacities at 14,000 amperes. All 240 volt breakers shall be rated 10,000 amperes interrupting capacity. Circuit breakers shall be of the indicating type, providing ON, OFF and TRIPPED positions of the operating handle. Circuit breakers shall be quick-make, quick-break, with a thermal-magnetic action, except when protecting motor feeders where motor circuit protector (MCP) breakers may be used. Circuit breakers shall be the bolted on type. The use of tandem or dual circuit breakers in a normal single-pole space to provide the number of poles or spaces specified is not acceptable. All multiple-pole circuit breakers shall be

designed so that an overload on one pole automatically causes all poles to open. Circuit breakers shall meet the requirements of UL and NEMA AB 1. Breakers shall be Westinghouse EHD , MCP, or equal. All circuit breakers shall be heavy duty molded case circuit breakers conforming to Federal specification W-C-375B and shall be UL listed. A button shall be provided on the cover for mechanically tripping the breaker.

## **1.06 ENCLOSURE LIGHT**

As a minimum, the panel lights shall be a 15 watt rapid start fluorescent strip type fixture with warm white lamps. A lens or guard shall be furnished and installed over each lamp. The fixture ballast shall be capable of providing reliable starts with ambient temperatures down to 30 degrees. Ballast noise shall not exceed 50 dBA.

## **1.07 MOTOR CONTROL**

Provide each motor with a suitable controller and devices that will perform the functions as specified for their respective motors. Controllers shall conform to the applicable requirements of NEMA ICS, ANSI C19.1, the NEC, and UL. Anticipated horsepower ratings are shown on the contract documents. This information is for guidance only and does not limit the equipment size. When motors furnished differ from the expected ratings indicated, make the necessary adjustments to wiring, conduit, disconnect devices, motor starters, branch circuit protection, and other affected material or equipment to accommodate the motors actually installed, at no additional cost to the Owner.

Each motor control system shall be equipped with a hand-off-auto control switch, indicating lights, elapsed time meter, motor starter, control transformer with primary fuses and secondary control power fuse.

Control switches and indicating lights shall be U.L. listed oil-tight devices rated heavy duty. Provide Allen Bradley, Westinghouse or equal.

Motor starters shall be NEMA rated with an electrically held contractor and a single reset, 3 phase, overload relay with a normally closed holding contact and a normally open isolated contact for overload alarm. Submersible motor overloads shall be CLASS 10 “quick trip” sized to the motors installed. Each overload shall be ambient compensated and shall trip on 600% of full load current in less than 6 seconds. Each overload relay shall have a test trip push-button built-in. There shall be an unbreakable steel operator, with insulated plastic foot (for safety) through the front door for manual reset. Each motor starter Size 3 and larger shall be furnished with a minimum of 4 auxiliary contacts and provisions for adding 2 more. Auxiliary contacts shall be convertible, in the field, from normally open to normally closed. Provide Westinghouse A201, Allen Bradley 100, or equal.

Control power transformers shall be sized as shown on the plans, minimum size shall be 100VA where not designated. Provide Micron, G.E., or equal.

Time on delay relays for staggered start. Time delay relays are to delay the pump motors from starting upon resumption of service power, such that only one motor can be started at a time.

An elapsed running time meter for recording total elapsed running time for each motor shall be furnished. The meter shall be six digit, non-reset, recording in hours and tenths. Meters shall be mounted to dead front with stainless steel machine screws. Sheet metal screws will not be acceptable.

#### **1.08 NAMEPLATES**

Nameplates shall be black phenolic with white lettering. Nameplates shall be stainless steel screw mounted. Glue type will not be acceptable.

#### **1.09 PANELBOARD/TRANSFORMER**

Panelboard shall be circuit breaker type custom constructed to utilize minimum enclosure space with breakers as shown. Circuit breakers shall be bolted on type. The panelboard shall be furnished with phenolic nameplates. The panelboard transformer shall be dry type construction sized as shown on the plans with primary breaker protection. The panelboard transformer shall be a Jefferson 211, G.E., or equal.

#### **1.10 PANEL INDICATORS**

Furnish and install push-to-test lights to indicate status and alarm conditions locally as shown on drawings. Engraved phenolic nameplates shall specify each light's function. Lights shall be wired as shown on drawings. Panel lights shall be full voltage Allen Bradley or equal.

#### **1.11 PUSH-BUTTONS AND SELECTOR SWITCHES**

Push-buttons, and selector switches, for non hazardous indoor dry locations shall be U/L listed oil-tight type, Allen Bradley, Westinghouse or equal. These devices shall have individual, extra large nameplates indicating their specific function.

#### **1.12 RECEPTACLES, DUPLEX**

Receptacles shall be of specification grade and of NEMA configuration and rated 2 pole, 3 wire grounding, 20 amperes, 125 volts, such as Pass & Seymour 5252, Leviton 6898, Bryant 5252, or equal. Contact arrangement shall be such that contact is made on two sides of each inserted blade. Bases shall be of ivory phenolic composition. Wire terminals shall be suitable for 10 AWG wire and shall be screw type. Receptacles shall be UL listed. The receptacles shall have corrosion resistant conducting parts of nickel-plated brass and other metal parts of stainless steel. All external and dead front

receptacles shall be installed on ground fault interrupter circuits "GFCI".

### **1.13 RELAYS, CONTROL**

Control relays shall be Idec Type RR or equal. Two form-C contacts (minimum) shall be provided on each relay. Provide relay energized neon lamp (inside relay case).

### **1.14 RELAYS, POWER FAIL**

The power fail relay shall continuously monitor the three phases for power loss, low voltage, phase loss, phase reversal and have automatic reset. The power fail monitor shall have a drop-out voltage adjustment and a failure indicating LED. Provide Diversified model SLA, or equal.

### **1.15 RELAYS, TIME DELAY**

Time delay relays shall be solid state relays with a timer adjustable over the range 1 to 60 seconds unless other ranges are indicated or required. Provide LED relay energized indicator lamp. Time delay relays shall be IDEC RTE, Agastat STA, or equal.

### **1.16 PROGRAMMABLE PUMP CONTROLLER (PC)**

A. General: The pump controller shall be a microprocessor based unit with capability to: accept digital and analog inputs, produce digital and analog outputs, perform local control and data manipulation functions, transmit measured and calculated values and status/alarm signals to the St. Charles Parish SCADA system central computer system, receive command signals and configuration data from the central computer, and perform all other functions required to meet the specified performance and functional requirements of the integrated system. Each controller shall be furnished with all necessary power supplies, processors, memory, process I/O cards, serial communication ports, modems, features etc. to meet its specified functions, requirements and environmental conditions. The pump controller shall contain all of the hardware devices listed below in a single removable integrated unit, and shall be inherently capable of performing all of the features described herein without the need for any additional hardware. The pump controllers to be furnished under this contract shall be TESCO L2000 as described below. Any proposed pump controller alternates or substitutions will require prior approval. Prior approval will consist of a technical proposal package including a functional programmable controller along with sufficient detailed information specific to this project, for the owners evaluation prior to bid. Owner reserves the right to reject any or all proposals that are not in the owners best interest. Owners decision is final.

The PC shall adhere to the minimum specification requirements. The PC supplier shall submit in detail all information required to establish that the PC meets the minimum requirements set forth in the PC specification. The PC supplier shall be prepared to

demonstrate all functions specified at the Engineers request. PC's that do not meet the minimum requirements will not be acceptable.

The PC components shall employ a solid-state design. All PC processors, power supplies and I/O components shall be contained in plug-in modules. Chassis wired logic is not acceptable. The PC and any associated I/O modules shall be removable without disconnecting the I/O wiring.

The Programmable Controller shall have a low-power shut-down mode suitable for use in solar or other sites where power consumption is critical. The Programmable Controller shall be provided with a complete operations and maintenance manual.

The PC shall have all of the facilities required to implement the control schemes, I/O and data base shown and specified in the Contract Plans and Documents. PCs shall have floating point math and PID controller modulating capability. The PC shall be guaranteed free from defects for a period of 10 years.

at B. Pump Controller Manufacturer: The PC shall be furnished by a manufacturer that has least 10 years experience manufacturing its own PC's and control systems designed specifically for the water and waste water industry. The PC itself and support for the controller shall be available directly from the manufacturer.

C. Warranty: The PC manufacturer shall provide a 10 year warranty with the unit. This warranty shall be available in writing directly from the manufacturer before bid acceptance. The warranty shall provide for direct on-site replacement of the entire PC, complete with the original program and configuration. The replacement controller shall be available within 24 hours, without requiring that the original unit first be removed and returned to the factory.

D. Telephone Support: The Programmable Controller manufacturer shall provide telephone support for questions related to any aspect of the controller, including general use, application-specific issues, programming, and use of the programming software. This support shall be available directly from the manufacturer at no extra charge with the purchase of a controller.

E. Construction: The Programmable Controller should be constructed using a card cage architecture incorporating a 96 pin 3U DIN VME standard backplane interconnection. The printed circuit cards shall be designed to slide into the card rack and interconnect with the VME backplane. A high density I/O card with a mix of I/O types as well as an I/O card for each individual I/O type shall be available. The system shall operate with a minimum of 2 cards and shall be easily expandable to 20 cards.. All field wiring to the I/O cards shall be done at externally mounted terminal blocks with ribbon cable interconnects to the relative I/O card.

F. Operating Conditions: The PC shall operate correctly under an ambient temperature

range of -40 to +200 degrees F without requiring forced air or other special cooling measures. At minimum, each Pump Controller shall be subjected by the manufacturer to a 5 day burn-in procedure at 165 degrees F. Coatings on connectors, component leads, and other materials used in the construction of the PC shall be substantially resistant to atmospheres containing significant amounts of Hydrogen Sulfide gas and Chlorine gas. Each component shall have passed testing and be certified in writing by the manufacturer to be acceptable for use in water treatment and waste water treatment environments.

## **1.17 PROGRAMMABLE CONTROLLER HARDWARE**

A. Processor Card: The Programmable Controller shall be microcontroller-based, using a microcontroller that, at minimum, supports the following:

- 33 MHz clock rate
- Flat (non-segmented) memory addressing
- RISC Communication Co-Processor
- Serial DMA channels
- Dual-ported RAM
- Watchdog timer
- 4 configurable timers with interrupt capability
- 6 serial ports with separate baudrate generators
- Write-protect enable/disable

The Programmable Controller shall use a real-time, preemptive, multitasking operating system, contained in Read Only Memory (ROM). The ROM shall also contain all firmware that is not specific to a particular job or application, such as operator interface and communications firmware. A dedicated TELCO style communications port shall be readily available for maintenance port operations using a laptop computer. Up to five additional communication ports shall be available for telemetry operations.

B. Input/Output Characteristics: The Programmable Controller shall provide built-in digital filtering of analog inputs. The filter constants shall be adjustable from the keyboard and through the communications ports.

C. Field Wiring Terminal Blocks: The terminal blocks shall support the following listed characteristics:

- pull-apart two piece wiring blocks for fast and easy wiring/re-wiring
- separate wiring blocks for each I/O type and each wire point fully labeled
- versatile internal or external analog power source
- digital outputs have LED "ON" indicators and socketed 10A relays
- entire terminal block shall snap on/off standard track mount
- onboard passive circuit protection to protect programmable controller shall be available with a built-in isolated current loop power supply, powered from the 12V DC main power. The current loop power supply shall be capable of producing at least 24V DC and 161 mA.

- three levels of lightning/surge protection

D. Power Supply: The Programmable Controller shall be powered by a 12V/5V DC power supply, with an allowed operating range of at least +/- 10%. A 12V battery backup of the 12V DC shall be available such that the 5V DC is also maintained by the 12V battery.

## 1.18 OPERATOR INTERFACE

A. Operator Interface: The Programmable Controller shall be furnished with an operator interface that is an integral part of the unit.

B. Keyboard: The Programmable Controller shall be available with a keyboard, containing with keys for direct access to functions. The keyboard construction shall be sealed membrane type, using a stainless steel backing plate, and shall be impervious to wash-down environments and atmospheres containing Hydrogen Sulfide and Chlorine gases. The keys shall provide tactile feedback. Keyboard shall provide a menu-based operator interface, allowing the operator to perform at least these functions, without process interruption:

- Examine and change setpoints
- Examine analog input and output registers
- Examine and change timers and counters
- Examine and change analog input filter constants
- Calibrate analog inputs and outputs
- Force digital outputs on and off
- Override analog inputs and outputs
- Examine control program

C. LED Character Display: The Programmable Controller shall be furnished with an alphanumeric LED display capable of displaying at least 8 characters at a time using at least 15 segments per character. The LED character display shall be used for displaying the values of registers, inputs, outputs and other data.

D. LED Annunciators: The Programmable Controller shall be furnished with at least 380 individual LED's arranged in columns, which shall be usable to display the on/off state of digital inputs and outputs (physical or internal). The LED's shall also be usable and individually configurable for bar graph displays.

E. Mode LED's: The Programmable Controller shall be equipped with at least the following mode display LED's:

SBY   lighted when in standby mode

CMD   lighted when in command mode

RUN   lighted when in run mode

MEM   lighted when write-protected memory is open

CAL   lighted when in calibration mode

XMT   lighted when a message is being transmitted via a communications port  
RCV   lighted when a message is received via a communications port  
ERR   lighted when a an error condition is detected by the controller  
The XMT/RCV LED's shall be configurable to selectively show activity on any combination of the communications ports.

F. Bar Graph Displays: The Programmable Controller shall have the ability to display at least 4 bar graphs on the LED annunciators. The bar graphs shall be individually configurable. If the value being monitored by the bar graph should go beyond the defined endpoints (under range or over range), the LED at that end of the bar graph shall flash to indicate the condition.

G. Operating Modes: The Programmable Controller shall have two basic modes of operation as described below:

**RUN:**

Actively controlling, running application-specific control program  
Sensing input signals  
Generating outputs under program control  
Peer-to-peer message initiation is enabled  
Polling is enabled

**STANDBY:**

Not actively controlling  
Continues to sense input signals  
Analog outputs held at current level or set to zero  
Digital outputs go to off state  
Initiation of peer-to-peer messages is disabled  
Polling is disabled

## **1.19 PROGRAMMING**

A. Programming: The Programmable Controller shall be programmable using the IEC 1131-3 “Standard for Automation Programming Languages” which includes a full implementation of the following five languages:

- Sequential Function Chart
- Structured Text
- Instruction List
- Function Block Diagram
- Ladder Diagram

In addition to the above IEC 1131-3 languages the controller shall have the ability to execute compiled C++ source code and also the ability to execute a higher-level BASIC-like programming language which is native to the controller.

B. Registers: The Programmable Controller shall have at least the following

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preformatted register types arranged in a global system database, with the quantity of each register type selectable to at least the numbers given:

- Setpoint (for storing constants, at least 1000)
- Analog input (physical or internal, at least 1000 total)
- Analog output (physical or internal, at least 1000 total)
- Digital input (physical or internal, at least 1000 total)
- Digital output (physical, at least 64)
- Index (for indirection and general purpose use, at least 1000)
- Timer/counter (at least 1000 total)
- Seconds timer (times in seconds with 10 mS or better resolution, up to 497 days)
- Hours timer (times in hours with 2 second or better resolution, up to 272 years)
- HMS timer (hours, minutes, seconds format, with 0.5 second or better resolution, up to 68 years)
- Event counter (integer value register supporting increment/decrement, range 0 - 4,294,967,295)

The Programmable Controller shall support a pulse counting frequency of at least 1 kHz on a single input.

C. PID Function: The Programmable Controller shall provide built-in PID (Proportional/Integral/Derivative) control without requiring any procedural programming or subroutine writing. The Programmable Controller shall support the ability to simultaneously execute at least 16 independent PID control loops.

D. Configuration: The Programmable Controller shall be configurable via a configuration table, which shall be changeable both by downloading through a communication port and through the keyboard. The configuration table shall allow the operator to change virtually all significant operating parameters of the system.

E. Communications: The Programmable Controller shall have the ability to simultaneously support at least 4 serial communication ports. Any of these serial ports shall be usable for both communications of telemetry data and control program/configuration upload/download and support baud rates of 230,400 bps or higher. The ports shall be configurable to support full handshake RS-232 (at least 3 ports must be configurable this way)

F. Protocols: The Programmable Controller shall support serial communications using at least 3 different protocols. These protocols shall be able to coexist simultaneously on the same port. The Programmable Controller shall support **poll/response, polling master, quiescent, report-by-exception and message routing** communications, as described in the following sections. Any of these communications modes shall be usable alone or simultaneously in any combination.

G. Polled Slave Communications: The Programmable Controller shall respond as a slave unit in response to polling messages from a master SCADA system or other unit. In this mode the Programmable Controller shall only respond to requests for data and not initiate

messages on its own.

H. Polling Master Communications: The Programmable Controller shall initiate polls as a master unit and wait for the response from the slave device.

I. Quiescent Communications: Using quiescent (peer-to-peer) communications, the Programmable Controller shall provide the ability to initiate messages transmitting register values under operator definable conditions.

J. Report by Exception Communication: The Programmable Controller shall support a means of report-by-exception communications, where only those registers of interest that have changed since the last reporting are transmitted.

K. Message Routing: The Programmable Controller shall provide the ability to route received messages that are destined for another unit. The routed message can be received and sent in any combination of communication ports and physical media.

The Programmable Controller shall provide a means of enabling/disabling quiescent/polling master message initiation from the keyboard.

L. Engineering Unit Representation: The Programmable Controller shall have the capability to represent all analog input and analog output values directly in engineering units. Engineering units are defined to be "real world" IEEE 754 standard floating point numbers corresponding to physical measurements, such as level, pressure, depth and flow. Telemetry communications shall use engineering unit representation in all messages.

M. Calibration and Multipoint Calibration: A simple menu-driven procedure shall be provided that allows the operator to calibrate an analog input or output to an engineering unit measurement scale. This procedure shall be usable from both the full and minimal keyboards. The calibration information shall be uploadable and downloadable via a communication port.

N. Single and Multi-Point Test Override: The Programmable Controller shall provide the ability to override I/O and register values for test and other purposes. When in override, the operator shall be able to control the register (set any value or on/off state) independent of the control program or physical input. The value seen by the control program shall be the override value. The operator shall also be able to release all override points at once. When any register is in override, there shall be a visible indication to the operator, regardless of what mode the Programmable Controller is in.

O. Alarms: The Programmable Controller shall provide alarm flags to be used to indicate application-specific alarm conditions. The Programmable Controller shall provide a common alarm digital output, that can be configured to be any digital output and can be displayed anywhere on the LED annunciators.

P. Event Logging: The Programmable Controller shall provide a mechanism that reports and logs unusual events and items of interest. The Programmable Controller shall also support viewing of the RAM event log data by transmission via the serial port.

Q. Fault Relay: The Programmable Controller shall contain a normally closed fault relay that under normal operation shall be energized by the Programmable Controller to indicate a non-fault state. The fault relay shall go to a fault condition (non-energized) under the following circumstances:

- 12 V DC power failure
- Memory error or other internal operating error

R. Power Up Self Test: The Programmable Controller shall perform a brief self test upon application of power, including:

- ROM checksum
- RAM write-protection circuit check
- Write-protected RAM CRC check

S. On Going Self Test: During normal operation (run or standby modes) the Programmable Controller shall run an ongoing self test process. The frequency with which the ongoing self test performs these checks shall be configurable by the operator.

T. Diagnostic Functions: The Programmable Controller shall have the capability to perform self-test diagnostic functions under operator control to verify the integrity of the RAM and ROM inside the unit..

U. Activity Monitoring: The Programmable Controller shall provide a mechanism for selectively viewing activity of certain integral subsystems. Text messages indicating activity shall be directable under operator control to the LED or a communication port.

V. Power Fail/Brownout Detector: The Programmable Controller shall have an integral hardware device that detects a brownout or imminent power fail condition. Upon detection of the 12V DC power supply voltage dropping below an adjustable threshold, this device shall generate an immediate interrupt signal to the microcontroller.

W. Watchdog Timer: The Programmable Controller shall contain a hardware watchdog timer circuit that will reset the microcontroller within 1 second of detecting a firmware failure.

X. Security: The Programmable Controller shall be capable of being configured to require password entry before access to functions that would change the control characteristics or basic operating mode (run/standby) of the Programmable Controller. Multiple passwords shall be supported, with at least 100 allowed. If the operator does not operate the keyboard within a selectable time period, the Programmable Controller shall log him out automatically. The Programmable Controller shall also support uploading and downloading of password configuration information via the

communications ports.

Y. Data Archiving: The Programmable Controller shall provide a means of archiving I/O and register values into storage arrays. The Programmable Controller shall also provide direct read access through any communications port to the contents of each data archive. Each sample shall consist of a date and time stamp and the register value. The Programmable Controller shall also provide functions available through the communications port that allow an external SCADA or other system to reset specific archives and obtain other necessary information about the data archives in use.

Z. Remote Control: The Programmable Controller shall have the ability to remotely control other controllers of the same make using any of the communication ports. The operator shall be able to perform at least the following functions on the remote unit by using the local keyboard:

- Examine and change setpoints
- Examine analog input and output registers
- Examine and change timers and counters
- Force digital outputs on and off
- Override analog inputs and outputs
- Change operating mode between Run and Standby

AA. Programming Software: A free copy of the necessary programming software shall be provided with each Programmable Controller purchased. The software shall be produced, provided and supported directly by the Programmable Controller manufacturer. No third party tools are acceptable.

AB. QuickLoad Software: A fast and easy to use software program shall be available free of charge to Upload and Download from a laptop computer to the controller all calibration points, setpoints and control programming. A complete user's manual shall be provided which describes the use of all programming software.

## **1.2 PUMP CONTROLLER I/O CONFIGURATION**

Analog inputs: Inputs shall be provided for wet well level and station pressure (if required). As a minimum, a total of 8 analog inputs shall be provided. All inputs are 4-20 maDC.

Analog outputs: 4 outputs shall be furnished for future use.

Digital Inputs: Inputs shall be provided for primary station power (three phase) failure, wet well back up Reactive Air System, alarm acknowledge and monitoring signals for each pump. As a minimum, a total of 16 digital inputs shall be provided.

Digital Outputs: 115 VAC triac outputs shall be provided for common alarm,

Reactive air purge compressors, Reactive Air purge solenoid valves, and each pump motor starter. As a minimum, 16 - triac outputs shall be furnished.

Alarm LED driver outputs shall be furnished for high and low wet well alarm, Reactive Air redundant back up system, level transducer fail, communications fail, and pump fail (each pump). As a minimum, 32 LED driver outputs shall be furnished.

## 1.21 PUMP CONTROLLER FUNCTIONS

A. Pump Level Control and Alarms: Start and stop of the lift station pumps shall be controlled by the level in the wet well. There shall be an individually adjustable starter setpoint for each pump and a single stop setpoint. The pump start sequence shall be automatically alternated, with alternation on a first on/first off, first off/first on basis. If a pump fails to start, the next pump in sequence is started. High and low wet well alarms and transducer out of range alarms shall also be furnished.

B. Pump Run and Fail: When a pump is called to run, either through the local hand switch or automatic pump control, a pump run signal shall be generated. If flow is not sensed within an adjustable time period, a pump fail alarm shall be generated.

C. Station Flow: Flowsoft Plus program module calculates station flow by monitoring rise/fall rates of the wet well level (volume in gallons) and / or discharge pressure (psi). Selection of the desired "mode" of operation is determined by an operator accessible setpoint via the pump controller operator interface. Level mode calculation (mode 1) is the default if discharge pressure is not available, or the pressure transducer fails. Refer to the following chart for module operating modes.

Station Flow Calculation	
-----	-----
1	Influent Rate = Change of Volume + Pump Flow
2	Influent Rate = Change of Volume + Pump Flow
3	Effluent Rate = Pump Flow

D. Station Flow Mode 1 Operation: Wet well level is sampled by an operator accessible setpoint via the pump controller operator interface. Level variations are averaged over three (3) sample periods, while no pumps are starting, to calculate the inflow rate (gpm) based upon water storage (volume). When a pump "running" is detected, its' flow is calculated based upon the change in volume. This calculation is made every (interval selectable via the pump controller operator interface) second after the respective pump has started, with the resultant value (gpm) being used for "low flow" alarms and "efficiency" test data. The module continues to re-calculate the inflow rate two (2) seconds after a "flow calc" has completed. Station flow (gpm) is calculated by adding the inflow rate and the summed pump flow (pump 1 + 2 + 3) rate.

E. Station Flow Mode 2 Operation: Wet well level is sampled every (operator selectable)

seconds by the pump controller. Level variations are averaged over three (3) sample periods, while no pumps are starting, to calculate the inflow rate (gpm) based upon water storage (volume). When a pump "running" is detected, its' flow is calculated based upon the change in volume. This calculation is made (operator selectable) seconds after the respective pump has started, with the resultant value (gpm) being used for "efficiency" test data. The module continues to re-calculate the inflow rate two (2) seconds after a "flow calc" has completed. Discharge pressure is sampled every (operator selectable) seconds by the pump controller, and converted to feet-of-head to determine a specific pumps' output based upon curve data stored in respective setpoints. After the initial "flow calc" is completed, respective pump flow is continuously calculated based upon discharge pressure. The resultant value (gpm) is multiplied by the "wear offset" setpoint to determine pump flow rate(s) which is also used for "low flow" alarms. Station flow (gpm) is calculated by adding the inflow rate and the summed pump flow (pump 1 + 2 + 3) rate.

F. Station Flow Mode 3 Operation: Discharge pressure is sampled every (operator selectable) seconds by the pump controller operator interface, and converted to feet-of-head to determine a specific pumps' output based upon curve data stored in respective setpoints. When a pump "running" is detected, its' flow is continuously calculated based upon discharge pressure (operator selectable) seconds after the respective pump has started. The resultant value (gpm) is multiplied by the "wear offset" setpoint to determine pump flow rate(s) which is also used for "low flow" alarms and "efficiency" test data. Station flow (gpm) is based upon the summed pump flow (pump 1 + 2 + 3) rate.

G. Pump Efficiency: is calculated by the pump controller based upon an average of five (5) most recent output flow (run-time) to output capacity ratio values.

H. Station Flow Totals: of rates above the "minimum" value (operator selectable) are calculated in one (1) gallon increments by the pump controller at (operator selectable) second intervals. Three separate sets of accumulators are used for daily, monthly and cumulative total summation.

I. Station Flow Rate: is displayed in "bar graph" format via LED's on the pump controller operator interface face plate. The sensitivity (speed) at which the rate is displayed is controlled by a (operator selectable) value. Larger values cause slower reaction, while smaller (2 or less) result in quicker response. Addition selection for station inflow (mode 1 & 2) portion of this display is via the decimal value entered. Values greater than x.3 cause "filtering" of the inflow rate, while those less than x.3 (or 0) result in none. (e.g. 3.5 = inflow filtered)

J. Data Archiving: of the following register(s) will occur when its' respective value changes by the "delta value" specified in the associated (operator selectable) setpoint. Resetting, or clearing, array data is done by setting the "array clear" status on.

K. Reactive Air Purge: The Controller shall automatically purge the reactive bell at an operator adjustable time and duration intervals. A manual purge push-button shall be installed to provide the operator capability to manually purge the level monitoring system. Reactive Air compressor shall carry a written 10 year warranty.

L. SCADA Interface: The (PC) shall be “telemetry ready” to interface directly with the existing Telephone based SCADA System with no other external or peripheral devices. Communications shall be through a 232 port. System components shall be installed in the pump control panel. Signal data, setpoints, etc. shall be stored in standardized registers for access by the SCADA system central software. All modifications to the existing central software to incorporate these sites will be performed by The Parish. Transmitted signals to include:

- system power phase fail/reversal
- pump HOA switch position
- pump running current - analog
- hi level alarm
- pump lead, lag, stop setpoints
- sump level - analog
- pump running/off
- DC power status
- station security
- air compressor run
- dry well flood (if required)

## **1.21 BATTERY BACK UP**

Battery Back Up: Battery back up system shall power the Programmable Controller, radio and I/O system for a minimum of 8 hours. Batteries shall be sealed gel cell type lead acid.

## **1.22 LEVEL MONITOR SYSTEM**

The level monitoring shall be by an submersible level transducer consisting of an level sensor, cable (cable length as specified), and level indicator. The level transducer senses the pressure of water level in the sump. The level sensor shall be manufactured of stainless steel and utilize strength non-corrosive plastics resistance to buildup of foreign material. The level monitoring system manufacture shall be Ametek or approved equal.

## **1.23 PUMP CONTROL PANEL MANUFACTURER**

In order to assume electrical and control system responsibility, the above specified pump control panels shall be furnished completely wired, including all interlocking between motor control, accessory devices, and level systems. In addition to other submitted data,

the successful vendor shall submit complete wiring ladder diagrams for approval. All pump control panels furnished for this project shall be of the same manufacturer.

#### **1.24 WARRANTY**

Pump control panel components shall carry a full one (1) year replacement warranty. Programmable pump controller shall carry a ten (10) year replacement warranty.

#### **1.25 SPARE PARTS**

The pump control panel manufacturer shall furnish a complete set of recommended spare parts necessary for the first five (5) years of operation, which shall include at least the following:

1. 1 - relay for each type required, mounted in the pump control panel
2. 1 - spare set of N.O. contacts on each motor Starter
3. 1 - spare 20A circuit breaker mounted in the pump control panel
4. 1 - contactor coil and one set of power contacts for each size used.
5. 1 - programmable pump controller (per project)

Loose spare parts shall be properly bound and labeled for easy identifications without opening the packaging and suitability protected for long storage.

#### **1.26. ANTENNA:** Antennas shall be either of two types with masts/heights as indicated in the Signal Path Survey (which shall be conducted by the facilities supplier). Antenna types shall comply with the following:

Omni Directional Type 1: Cushcraft Model # CRX-150B (or approved equal)

Yagi Directional Type 2: Cushcraft Model # P154-4 (or approved equal)

Antennas masts shall be provided with bracing and guides as required for 100 mph wind loading. Masts shall be provided for antenna height requirements as follows:

TAG  
ANT

SERVICE  
Radio Modem Transceiver Antenna

#### **1.27 ANTENNA PROTECTOR:** Radio lightning protection shall be bulkhead mounted and shall be rated as follows:

Throughput Energy: =600  $\Phi$ J

Frequency Range: 1.5 to 400 MHz

Max. Power: 375 W, VHF

125 W, UHF

LA shall be PolyPhaser Model #IS-B50LU-C1 or approved equal.



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SERVICE

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AP

RTU Lightning Arrestor

- 1.28 RADIO MODEM TRANSCEIVERS:** Radio Modem Transceiver shall provide re-farming compliant high-speed data link communication with system security diagnostic reporting. The RMT shall provide full UHF, VHF, and 900 MHz MAS bands as required by the FCC license. The RMT shall be capable of transmitting MODBUS protocol messages. Built-in radio diagnostics shall be included and shall be capable of reporting specific unit programming, link testing, and radio performance statistics including RSSI, temperature, supply voltage, and additional parameters throughout the radio. Radio diagnostic information shall be capable of on-line communication with each transmission with no interruption in the application, and with minimum overhead. The RMT shall also comply with FCC re-farming and power regulations. Bandwidth shall not exceed 12.5 KHz. To assure communications with the **OWNER=S** existing resources and to assure compliance with FCC regulations, Radio Modem Transceivers shall be DataRadio Model #T-96SR B No Substitutes shall be accepted.

TAG  
RMT

SERVICE  
RTU Radio Modem Transceiver

- 1.29 UNINTERRUPTIBLE POWER SUPPLY:** Provide a battery charger for 12 VDC Sealed Lead Acid rechargeable batteries with an optional 24 VDC isolated output. The maximum battery current charging current is 2.9 amps for a completely dead battery and typically less than 0.4 amps for battery voltages over 10 VDC. Trickle charging shall stop at a battery voltage of 13.5 VDC. The unit shall operate on 13.8 VDC with a current rating of up to 11 amps. Provide an optional, integral battery backed up 24 VDC option that is capable of being field mounted onto the unit, for powering external 4-20 mA loops or other instrumentation of up to 1 amp maximum load and shall be isolated from the input power supply if necessary. Provide quick-connect terminal blocks for all connectors. Provide optically isolated, solid-state alarm outputs of the Open Collector, Darlington NPN transistor type for High and Low input power supply voltage.

TAG  
UPS

SERVICE  
Uninterruptible Power Supply

- 1.30 POWER SUPPLY:** Power supplies shall be for 120 VAC primary and 13.5 VDC secondary and shall have a frequency range of 47 - 440 Hz with an inrush current of 35 amps. Secondary adjustment range shall be  $\nabla$ 10% minimum. Line and Load regulation shall be  $\nabla$ 0.3%. Output ripple shall be no more than 180 mV. Voltage Tolerance shall be  $\nabla$ 1%. Over voltage protection shall clamp between 115 - 135% and short circuit protection shall be continuous and self-recovering.

TAG  
DPS

SERVICE  
DC Power Supply

- 1.31 RECHARGABLE BATTERY:** The battery shall be a sealed Lead-Acid type with ABS plastic case and spill proof construction allowing safe operation in any position. Nominal voltage shall be 12 VDC (six cells in series). The nominal capacity shall be 12.0 A.H. at

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a discharge rate of 20 hours (600 mA to 10.5 Volts). Terminal configuration shall be via quick disconnect tabs type F1: 0.187@ x 0.032@. Operating temperature range shall be at least -4E to +122E F. The unit shall be UL recognized.

TAG

BAT

SERVICE

RTU Standby Power Supply

**END**

**Jefferson Parish**  
**Department of Engineering**  
**Sanitary Sewer “Force Main System” General Standard Notes\*<sup>1</sup>**

\* [These notes shall be referenced and shall be included, in their entirety, unedited and unabridged, in all Jefferson Parish Specification Booklets, which include any work related to the Parish Sanitary Sewer Force Main System. Insert a copy of these notes, on green paper, at the end of the “Sanitary Sewer Force Main System Technical Specification” Section of the Specification Booklet. Any Deviations and / or Variations from these General Standard Notes shall be tabulated under the heading of “Deviations From Jefferson Parish Sanitary Sewer Force Main Standards Notes” and shall be included in the “Sanitary Sewer Force Main System Technical Specification” Section of the Specification Booklet.]

**1. NOTIFICATION:**

- 1.1. CONTRACTORS SHALL NOTIFY THE DEPARTMENT OF SEWERAGE AT 736-6661 AND THE DEPARTMENT OF ENGINEERING, INSPECTION DIVISION AT 736-6793, 48 HOURS PRIOR TO ANY FIELD WORK RELATING TO SANITARY SEWER FORCE MAINS, SANITARY SEWER VALVES, ETC. ALL SANITARY SEWER VALVES SHALL BE OPERATED BY PARISH PERSONNEL.
- 1.2. WHERE A TIE-IN TO A SEWER FORCE MAIN IS TO BE MADE BY A CONTRACTOR, THE DEPARTMENT OF ENGINEERING SHALL BE NOTIFIED 24 HOURS IN ADVANCE FOR THE INSPECTION OF THE TIE-IN. THE INSTALLATION AND THE TIE-IN OF ALL SEWER FORCE MAINS SHALL BE INSPECTED AND APPROVED BY THE DEPARTMENT OF ENGINEERING PRIOR TO BACKFILLING.

**2. NON CONFORMANCE**

- 2.1. THE DEPARTMENT OF ENGINEERING HAS THE RIGHT TO REJECT ANY AND ALL EQUIPMENT, OR WORK, WHICH DOES NOT CONFORM TO JEFFERSON PARISH STANDARDS AND SPECIFICATIONS. ANY WORK SO REJECTED SHALL BE REDONE BY THE CONTRACTOR AT HIS OWN EXPENSE.

**3. DOMESTICITY**

- A. **APPURTENANCES** - ALL DUCTILE IRON/CAST IRON VALVES, HYDRANTS, RESTRAINERS (i.e. Mega-Lugs), COUPLINGS, ETC., SHALL BE OF DOMESTIC UNITED STATES OF AMERICA MANUFACTURE. NO APPURTENANCES MANUFACTURED OUTSIDE OF UNITED STATES OF AMERICA WILL BE ALLOWED.

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<sup>1</sup> Jefferson Parish Department of Engineering Sanitary Sewer Force Main System General Standard Notes, January 2002.

- B. **FITTINGS** - DOMESTIC AS WELL AS  Globally Sourced (Foreign) DUCTILE IRON FITTINGS SHALL BE ALLOWED. ALL FITTINGS SHALL BE STRICTLY IN ACCORDANCE WITH THE LATEST APPLICABLE AWWA, ANSI (ANSI/AWWA C153/A21.53, ANSI/AWWA C110/A21.10, ANSI/AWWA C111/A21.11, ANSI/AWWA C104/A21.4, ETC.) AND ASTM STANDARDS FOR SANITARY SEWER. IN ADDITION TO THESE SAID REQUIREMENTS, THE GLOBALLY SOURCED FITTINGS SHALL ALSO BE MANUFACTURED AT AN ISO (INTERNATIONAL ORGANIZATION FOR STANDARDIZATION) REGISTERED MANUFACTURER, WHICH MANUFACTURER SHALL HAVE CURRENT ISO 9001 CERTIFICATION FOR STANDARDIZATION FOR FITTING PRODUCTS.

THESE MANUFACTURING FACILITIES MUST BE COVERED UNDER PERIODIC AUDITS BY THIRD PARTY ACCREDITATION BODIES FOR EVALUATIONS. THESE EVALUATIONS SHALL INCLUDE MANUFACTURING PROCESSES, QUALITY CONTROL, CORRECTIVE AND PREVENTIVE ACTIONS, AND DOCUMENT CONTROL. IN ADDITION, DISTRIBUTION CENTERS MUST BE AUDITED BY THIRD PARTY APPROVAL AGENCIES FOR PERIODIC CONFIRMATION TESTS AND SURVEILLANCE AUDITS. THESE PERIODIC CONFIRMATION TESTS AND SURVEILLANCE AUDITS SHALL DOCUMENT CONTINUATION OF PRODUCT APPROVALS BY AUDITING THE ENTIRE QUALITY SYSTEMS INCLUDING DESIGN, INFRASTRUCTURE, SYSTEM IMPLEMENTATION, DISTRIBUTION, TRAINING, QUALITY CONTROL AND ASSURANCE, AND DOCUMENT CONTROL. ALL FITTINGS MUST BE MANUFACTURED IN ACCORDANCE WITH NSF61.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING AND FURNISHING JEFFERSON PARISH WITH WRITTEN PROOF THAT ALL GLOBALLY SOURCED (FOREIGN) FITTINGS MEET THE AFOREMENTIONED AWWA, ANSI, AND ASTM STANDARDS. THE CONTRACTOR WILL BE RESPONSIBLE FOR VERIFYING THAT THESE FITTINGS ARE MANUFACTURED AT AN ISO REGISTERED MANUFACTURER WITH CURRENT 9001 CERTIFICATION FOR FITTING PRODUCTS AND SHALL FURNISH JEFFERSON PARISH WITH WRITTEN PROOF OF THIS REGISTRATION AND CERTIFICATION. ALL WRITTEN PROOF SHALL BE FURNISHED IMMEDIATELY AFTER EXECUTION OF THE CONTRACT DOCUMENTS AND PRIOR TO ORDERING FITTINGS.

## **4. SANITARY SEWER FORCE MAINS**

- 4.1 **DEPTH OF COVER** - NEW SANITARY SEWER FORCE MAINS 10 INCHES AND SMALLER SHALL HAVE A MINIMUM OF 3 FEET OF COVER. SANITARY SEWER FORCE MAINS 12 INCHES AND LARGER SHALL HAVE A MINIMUM OF 4 FEET OF COVER.

- 4.2 BACKFILL** - BACKFILL ALL TRENCHES WITHIN STREET RIGHT-OF-WAYS WITH RIVER SAND. APPROVED SELECT MATERIAL MAY BE USED FOR BACKFILL OF TRENCHES OUTSIDE STREET RIGHT-OF-WAYS.
- 4.3 PVC PIPE** - POLYVINYL CHLORIDE (PVC) PRESSURE PIPE 4 INCHES THROUGH 12 INCHES IN DIAMETER SHALL MEET AWWA SPECIFICATION C-900, DR18. PVC PIPE 14 INCHES AND LARGER IN DIAMETER SHALL MEET AWWA SPECIFICATION C-905, DR25.
- 4.4 DUCTILE IRON PIPE** - ALL DUCTILE IRON PIPE SHALL CONFORM TO ANSI/AWWA A21.51/C151, ANSI/AWWA A21.50/C150 AND SHALL THICKNESS CLASS 50 FOR ALL PIPES OR PRESSURE CLASS 350 FOR SIZES 3" – 18", PRESSURE CLASS 250 FOR SIZES 20" – 36" AND PRESSURE CLASS 200 FOR SIZES 42" – 54". ALL DUCTILE IRON PIPES THAT WILL HAVE LESS THAN 24" OF COVER SHALL BE MINIMUM THICKNESS CLASS 52 RESTRAINED JOINT PIPE. DUCTILE IRON PIPE AND FITTINGS SHALL HAVE A FACTORY APPLIED INTERIOR COATING/LINING OF VINYL ESTER (TNEMEC SERIES 120 "VINESTER" OR APPROVED EQUAL) AS PER MANUFACTURER'S RECOMMENDATIONS AND REQUIREMENTS FOR SANITARY SEWER APPLICATIONS AND FACTORY ASPHALTIC EXTERIOR COATING. POLYETHYLENE ENCASEMENT IN ACCORDANCE WITH ANSI/AWWA C105/A21.5 SHALL BE SPECIFIED WHEN AGGRESSIVE/CORROSIVE SOIL CONDITIONS WARRANT ITS USE.
- 4.5 STEEL CASINGS** - JEFFERSON PARISH DEPARTMENT OF ENGINEERING MAY REQUIRE SANITARY SEWER FORCE MAINS TO BE INSTALLED IN STEEL CASINGS WHEN CROSSING MAJOR (*TO BE DEFINED BY THE DEPARTMENT OF ENGINEERING*) STREETS.
- 4.6 CASING SPACERS** - WHEN PIPE IS INSTALLED IN CASINGS, COMMERCIALY FABRICATED CASING SPACERS MUST BE USED TO PREVENT DAMAGE TO PIPE AND BELL JOINTS DURING INSTALLATION AND TO PROVIDE PROPER LONG-TERM LINE SUPPORT. USE OF WOODEN SKIDS WILL NOT BE PERMITTED. PIPES IN CASINGS SHALL BE RESTRAINED AND SHALL NOT REST ON BELLS. CASING SPACERS MUST PROVIDE SUFFICIENT HEIGHT TO PERMIT CLEARANCE BETWEEN BELL JOINTS AND CASING WALLS (ALL CASING PIPE SHALL HAVE AN INSIDE CLEAR DIMENSION AT LEAST 2" GREATER THAN THE MAXIMUM OUTSIDE DIMENSION OF THE CARRIER PIPE BELL OR MECHANICAL JOINT RESTRAINTS). SPACE BETWEEN THE CASING AND THE CARRIER PIPE SHOULD NOT BE BACKFILLED. JEFFERSON PARISH APPROVED END CASING SEAL WITH STAINLESS STEEL BANDS SHOULD BE USED TO SEAL THE ENDS OF THE CASINGS.
- 4.7 CANAL CROSSINGS** - LONG-SPAN DUCTILE IRON PIPE SHALL BE USED AS PER MANUFACTURER'S RECOMMENDATIONS AND REQUIREMENTS FOR ALL CANAL CROSSINGS.

CANAL CROSSINGS SHALL BE SUPPORTED BY CONCRETE PILES UNLESS OTHERWISE PERMITTED BY THE JEFFERSON PARISH DEPARTMENT OF ENGINEERING.

#### **4.8 HDPE PIPE (AND FITTINGS)**

HIGH DENSITY POLYETHYLENE (PE) PIPE (*AND FITTINGS*) SHALL CONFORM TO CURRENT REQUIREMENTS OF ASTM D3350 AND ASTM D2337 AND ALL PERTINENT ASTM AND ANSI SPECIFICATIONS FOR SPECIFYING, INSTALLATION AND ACCEPTANCE (PRESSURE TESTING) OF SANITARY SEWER FORCE MAINS.

**4.8.1 MATERIALS** - MATERIALS USED FOR THE MANUFACTURE OF POLYETHYLENE PIPE AND FITTINGS SHALL BE PE 3408 HIGH DENSITY POLYETHYLENE MEETING CELL CLASSIFICATION 345464C FOR BLACK OR 345464E FOR STRIPES PER ASTM D 3350; AND SHALL BE LISTED IN THE NAME OF THE PIPE AND FITTING MANUFACTURER IN PLASTICS PIPE INSTITUTE (PPI ) TR-4, *RECOMMENDED HYDROSTATIC STRENGTHS AND DESIGN STRESSES FOR THERMOPLASTIC PIPE AND FITTINGS COMPOUNDS*, WITH A STANDARD GRADE HDB RATING OF 1600 PSI AT 73°F. THE MANUFACTURER SHALL CERTIFY THAT THE MATERIALS USED TO MANUFACTURE PIPE AND FITTINGS MEET THESE REQUIREMENTS.

**4.8.2 COMPATIBILITY OF PIPE AND FITTINGS** - THE PIPE AND FITTINGS SHALL BE TOTALLY COMPATIBLE AND MEET THE PIPE MANUFACTURER'S RECOMMENDATIONS AND REQUIREMENTS.

**4.8.3 POLYETHYLENE PIPE** - POLYETHYLENE PIPE SHALL BE MANUFACTURED IN ACCORDANCE WITH AWWA C901 FOR SIZES 1-1/4" THRU 3" IPS DIAMETERS AND TO THE REQUIREMENTS OF ASTM D3035. PIPE 4" AND ABOVE SHALL BE MANUFACTURED TO THE REQUIREMENTS OF ASTM F714 AND AWWA C906. POLYETHYLENE (PE) PIPE SHALL BE DUCTILE IRON PIPE SIZE (DIPS) DRISCOPEX 4300" AS MANUFACTURED BY PERFORMANCE PIPE OR APPROVED EQUAL.

**4.8.4 SERVICE IDENTIFICATION STRIPES** - PERMANENT IDENTIFICATION OF THE PIPING SERVICE SHALL BE PROVIDED BY CO-EXTRUDING COLOR STRIPES INTO THE PIPE OUTSIDE SURFACE. THE STRIPING MATERIAL SHALL BE THE SAME MATERIAL AS THE PIPE MATERIAL EXCEPT FOR COLOR. STRIPES PRINTED ON THE PIPE OUTSIDE SURFACE SHALL NOT BE ACCEPTABLE. IPS SIZED PIPES SHALL HAVE FOUR EQUALLY SPACED, LONGITUDINAL COLOR STRIPES. DIPS SIZED PIPES SHALL HAVE THREE EQUALLY SPACED PAIRS OF LONGITUDINAL COLOR STRIPES. THE STRIPE COLOR SHALL BE GREEN.

- 4.8.5 POLYETHYLENE FITTINGS & CUSTOM FABRICATIONS** - POLYETHYLENE FITTINGS AND CUSTOM FABRICATIONS SHALL BE MOLDED OR FABRICATED BY THE APPROVED PIPE MANUFACTURER. ALL FITTINGS AND CUSTOM FABRICATIONS SHALL BE PRESSURE RATED FOR THE SAME INTERNAL PRESSURE RATING AS THE MATING PIPE. REDUCED PRESSURE-RATED (DE-RATED) FABRICATED FITTINGS ARE PROHIBITED.
- 4.8.6 MOLDED FITTINGS** - MOLDED FITTINGS SHALL BE MANUFACTURED IN ACCORDANCE WITH ASTM D 3261 AND SHALL BE SO MARKED.
- 4.8.7 X-RAY INSPECTION** - THE MANUFACTURER SHALL SUBMIT SAMPLES FROM EACH MOLDED FITTINGS PRODUCTION LOT TO X-RAY INSPECTION.
- 4.8.8 FABRICATED FITTINGS** - FABRICATED FITTINGS SHALL BE MADE BY HEAT FUSION JOINING SPECIALLY MACHINED SHAPES CUT FROM PIPE, POLYETHYLENE SHEET STOCK, OR MOLDED FITTINGS. FABRICATED FITTINGS SHALL BE RATED FOR INTERNAL PRESSURE SERVICE AT LEAST EQUAL TO THE FULL SERVICE PRESSURE RATING OF THE MATING PIPE.
- 4.8.9 POLYETHYLENE FLANGE ADAPTERS** - FLANGE ADAPTERS SHALL BE MADE WITH SUFFICIENT THROUGH-BORE LENGTH TO BE CLAMPED IN A BUTT FUSION-JOINING MACHINE WITHOUT THE USE OF A STUB-END HOLDER. THE SEALING SURFACE OF THE FLANGE ADAPTER SHALL BE MACHINED WITH A SERIES OF SMALL V-SHAPED GROOVES (SERRATIONS) TO PROMOTE GASKETLESS SEALING, OR RESTRAIN THE GASKET AGAINST BLOWOUT.
- 4.8.10 BACK-UP RINGS & FLANGE BOLTS** - FLANGE ADAPTERS SHALL BE FITTED WITH BACK-UP RINGS PRESSURE RATED EQUAL TO OR GREATER THAN THE MATING PIPE. THE BACK-UP RING BORE SHALL BE CHAMFERED OR RADIUS TO PROVIDE CLEARANCE TO THE FLANGE ADAPTER RADIUS. FLANGE BOLTS AND NUTS SHALL BE GRADE 2 OR HIGHER.
- 4.8.11 MJ ADAPTERS** - MJ ADAPTERS 4" AND ABOVE SHALL BE PROVIDED WITH HEAVY DUTY BACK-UP RING KITS AND STAINLESS STEEL STIFFENERS.

#### **4.8.12 JOINING**

##### **4.8.12.1 HEAT FUSION JOINING.**

JOINTS BETWEEN PLAIN END PIPES AND FITTINGS SHALL BE MADE BY BUTT FUSION. JOINTS BETWEEN THE MAIN AND SADDLE BRANCH FITTINGS SHALL BE MADE USING SADDLE FUSION. THE BUTT FUSION AND SADDLE FUSION



PROCEDURES USED SHALL BE PROCEDURES THAT ARE RECOMMENDED BY THE PIPE AND FITTING MANUFACTURER. THE CONTRACTOR SHALL ENSURE THAT PERSONS MAKING HEAT FUSION JOINTS HAVE RECEIVED TRAINING IN THE MANUFACTURER'S RECOMMENDED PROCEDURE. THE CONTRACTOR SHALL MAINTAIN RECORDS OF TRAINED PERSONNEL, AND SHALL CERTIFY THAT TRAINING WAS RECEIVED NOT MORE THAN 12 MONTHS BEFORE COMMENCING CONSTRUCTION. EXTERNAL AND INTERNAL BEADS SHALL NOT BE REMOVED.

#### **4.8.12.2 BUTT FUSION OF UNLIKE WALL THICKNESS.**

BUTT FUSION SHALL BE PERFORMED BETWEEN PIPE ENDS, OR PIPE ENDS AND FITTING OUTLETS THAT HAVE THE SAME OUTSIDE DIAMETER AND ARE NOT DIFFERENT IN WALL THICKNESS BY MORE THAN ONE STANDARD DR, FOR EXAMPLE, SDR 13.5 TO SDR 17, OR SDR 11 TO SDR 13.5. TRANSITIONS BETWEEN UNLIKE WALL THICKNESS GREATER THAN ONE SDR SHALL BE MADE WITH A TRANSITION NIPPLE (A SHORT LENGTH OF THE HEAVIER WALL PIPE WITH ONE END MACHINED TO THE LIGHTER WALL) OR BY MECHANICAL MEANS OR ELECTROFUSION. SDR'S FOR POLYETHYLENE PIPE ARE 7.3, 9, 11, 13.5, 17, 21, 26, 32.5 AND 41.

#### **4.8.12.3 JOINING BY OTHER MEANS.**

POLYETHYLENE PIPE AND FITTINGS MAY BE JOINED TOGETHER OR TO OTHER MATERIALS BY MEANS OF (A) FLANGED CONNECTIONS (FLANGE ADAPTERS AND BACK-UP RINGS), (B) MECHANICAL COUPLINGS DESIGNED FOR JOINING POLYETHYLENE PIPE OR FOR JOINING POLYETHYLENE PIPE TO ANOTHER MATERIAL, (C) MJ ADAPTERS OR (D) ELECTROFUSION. WHEN JOINING BY OTHER MEANS, THE INSTALLATION INSTRUCTIONS OF THE JOINING DEVICE MANUFACTURER SHALL BE OBSERVED.

#### **4.8.12.4 ID STIFFENER AND RESTRAINT.**

A STIFFENER SHALL BE INSTALLED IN THE BORE OF THE POLYETHYLENE PIPE WHEN AN OD COMPRESSION MECHANICAL COUPLING IS USED AND WHEN CONNECTING PLAIN END PE PIPE TO A MECHANICAL JOINT PIPE, FITTING OR APPURTENANCE. EXTERNAL CLAMP AND TIE ROD RESTRAINT SHALL BE INSTALLED WHERE PE PIPE IS CONNECTED TO THE SOCKET OF A MECHANICAL JOINT PIPE, FITTING OR APPURTENANCE EXCEPT WHERE AN MJ ADAPTER IS USED.

#### **4.8.12.5 BRANCH CONNECTIONS.**

BRANCH CONNECTIONS TO THE MAIN SHALL BE MADE WITH SADDLE FITTINGS OR TEES. POLYETHYLENE SADDLE FITTINGS SHALL BE SADDLE FUSED TO THE MAIN PIPE PER SECTION 4.8.12.1 ABOVE.

#### **4.8.13 INSTALLATION:**

##### **4.8.13.1 GENERAL.**

WHEN DELIVERED, A RECEIVING INSPECTION SHALL BE PERFORMED AND ANY SHIPPING DAMAGE SHALL BE REPORTED TO THE MANUFACTURER WITHIN 7 DAYS. INSTALLATION SHALL BE IN ACCORDANCE WITH ASTM D 2774, MANUFACTURER'S RECOMMENDATIONS AND THIS SPECIFICATION. ALL NECESSARY PRECAUTIONS SHALL BE TAKEN TO ENSURE A SAFE WORKING ENVIRONMENT IN ACCORDANCE WITH ALL APPLICABLE SAFETY CODES AND STANDARDS.

##### **4.8.13.2 EXCAVATION.**

TRENCH EXCAVATIONS SHALL CONFORM TO THE PLANS AND DRAWINGS, AS AUTHORIZED IN WRITING BY THE PROJECT ENGINEER OR HIS APPROVED REPRESENTATIVE, AND IN ACCORDANCE WITH ALL APPLICABLE CODES. THE CONTRACTOR SHALL REMOVE EXCESS GROUNDWATER. WHERE NECESSARY, TRENCH WALLS SHALL BE SHORED OR REINFORCED, AND ALL NECESSARY PRECAUTIONS SHALL BE TAKEN TO ENSURE A SAFE WORKING ENVIRONMENT.

##### **4.8.13.3 MECHANICAL JOINT & FLANGE INSTALLATION.**

MECHANICAL JOINT AND FLANGE CONNECTIONS SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDED PROCEDURE. MJ ADAPTERS AND FLANGES SHALL BE CENTERED AND ALIGNED TO THE MATING COMPONENT BEFORE ASSEMBLING AND TIGHTENING BOLTS. IN NO CASE SHALL MJ GLAND OR FLANGE BOLTS BE USED TO DRAW THE CONNECTION INTO ALIGNMENT. BOLT THREADS SHALL BE LUBRICATED, AND FLAT WASHERS SHOULD BE USED UNDER THE NUTS. BOLTS SHALL BE EVENLY TIGHTENED ACCORDING TO THE TIGHTENING PATTERN AND TORQUE STEP RECOMMENDATIONS OF THE MANUFACTURER. AT LEAST 1 HOUR AFTER INITIAL ASSEMBLY, FLANGE CONNECTIONS SHALL BE RE-TIGHTENED FOLLOWING THE TIGHTENING PATTERN AND TORQUE STEP RECOMMENDATIONS OF THE MANUFACTURER. THE FINAL TIGHTENING TORQUE SHALL BE AS RECOMMENDED BY THE MANUFACTURER.

##### **4.8.13.4 FOUNDATION & BEDDING.**

PIPE SHALL BE LAID ON GRADE AND ON A STABLE FOUNDATION. UNSTABLE TRENCH BOTTOM SOILS SHALL BE REMOVED, AND A 6" FOUNDATION OR BEDDING OF COMPACTED GRANULAR MATERIAL SHALL BE INSTALLED TO PIPE BOTTOM GRADE. EXCESS GROUNDWATER SHALL BE REMOVED FROM THE TRENCH BEFORE LAYING THE FOUNDATION OR BEDDING FOR THE PIPE.

A TRENCH CUT IN ROCK OR STONY SOIL SHALL BE EXCAVATED TO 6" BELOW PIPE BOTTOM GRADE, AND BROUGHT BACK TO GRADE WITH COMPACTED GRANULAR BEDDING. ALL LEDGE ROCK, BOULDERS AND LARGE STONES SHALL BE REMOVED.

#### **4.8.13.5 PIPE HANDLING.**

WHEN LIFTING WITH SLINGS, ONLY WIDE FABRIC CHOKER SLINGS CAPABLE OF SAFELY CARRYING THE LOAD SHALL BE USED TO LIFT, MOVE, OR LOWER PIPE AND FITTINGS. WIRE ROPE AND CHAIN ARE PROHIBITED. SLINGS SHALL BE OF SUFFICIENT CAPACITY FOR THE LOAD, AND SHALL BE INSPECTED BEFORE USE. WORN OR DAMAGED EQUIPMENT SHALL NOT BE USED.

#### **4.8.13.6 BACKFILLING.**

EMBEDMENT MATERIAL SOIL TYPE AND PARTICLE SIZE SHALL BE IN ACCORDANCE WITH ASTM D 2774. EMBEDMENT SHALL BE PLACED AND COMPACTED TO AT LEAST 90% STANDARD PROCTOR DENSITY IN 6" LIFTS TO AT LEAST 6" ABOVE THE PIPE CROWN. DURING EMBEDMENT PLACEMENT AND COMPACTION, CARE SHALL BE TAKEN TO ENSURE THAT THE HAUNCH AREAS BELOW THE PIPE SPRINGLINE ARE COMPLETELY FILLED AND FREE OF VOIDS.

#### **4.8.13.7 PROTECTION AGAINST SHEAR AND BENDING LOADS.**

IN ACCORDANCE WITH ASTM D 2774, CONNECTIONS SHALL BE PROTECTED WHERE AN UNDERGROUND POLYETHYLENE BRANCH OR SERVICE PIPE IS JOINED TO A BRANCH FITTING SUCH AS A SERVICE SADDLE, BRANCH SADDLE OR TAPPING TEE ON A MAIN PIPE, AND WHERE PIPES ENTER OR EXIT CASINGS OR WALLS. THE AREA SURROUNDING THE CONNECTION SHALL BE EMBEDDED IN PROPERLY PLACED, COMPACTED BACKFILL, PREFERABLY IN COMBINATION WITH A PROTECTIVE SLEEVE OR OTHER MECHANICAL STRUCTURAL SUPPORT TO PROTECT THE POLYETHYLENE PIPE AGAINST SHEAR AND BENDING LOADS.

#### **4.8.13.8 FINAL BACKFILLING.**

FINAL BACKFILL SHALL BE PLACED AND COMPACTED TO FINISHED GRADE. NATIVE SOILS MAY BE USED PROVIDED THE SOIL IS FREE OF DEBRIS, STONES, BOULDERS, CLUMPS, FROZEN CLODS OR THE LIKE LARGER THAN 8" IN THEIR LARGEST DIMENSION.

#### **4.8.14 TESTING**

##### **4.8.14.1 FUSION QUALITY**

THE CONTRACTOR SHALL ENSURE THE FIELD SET-UP AND OPERATION OF THE FUSION EQUIPMENT, AND THE FUSION PROCEDURE USED BY THE CONTRACTOR'S FUSION OPERATOR WHILE ON SITE. UPON REQUEST BY THE OWNER, THE CONTRACTOR SHALL VERIFY FIELD FUSION QUALITY BY MAKING AND TESTING A TRIAL FUSION. THE TRIAL FUSION SHALL BE ALLOWED TO COOL COMPLETELY; THEN TEST STRAPS SHALL BE CUT OUT AND BENT STRAP TESTED IN ACCORDANCE WITH ASTM D 2657. IF THE BENT STRAP TEST OF THE TRIAL FUSION FAILS AT THE JOINT, THE FIELD FUSIONS REPRESENTED BY THE TRIAL FUSION SHALL BE REJECTED. THE CONTRACTOR AT HIS EXPENSE SHALL MAKE ALL NECESSARY CORRECTIONS TO EQUIPMENT, SET-UP, OPERATION AND FUSION PROCEDURE, AND SHALL RE-MAKE THE REJECTED FUSIONS.

##### **4.8.14.2 LEAK TESTING**

HYDROSTATIC LEAK TESTING SHALL BE CONDUCTED IN ACCORDANCE WITH PERFORMANCE PIPE TECHNICAL NOTE 802 LEAK TESTING. PNEUMATIC PRESSURE TESTING IS PROHIBITED.

#### **4.9 FITTINGS**

FITTINGS SHALL BE DUCTILE IRON FLANGED, MECHANICAL OR BOLTLESS RESTRAINED JOINTS MEETING ANSI/AWWA C110/A21.10 AND ANSI/AWWA C111/A21.11, CLASS 250, OR ANSI/AWWA C153/A21.53.84, CLASS 350, COMPACT STANDARD. . DUCTILE IRON FITTINGS SHALL HAVE A FACTORY APPLIED INTERIOR COATING/LINING OF VINYL ESTER (TNEMEC SERIES 120 "VINESTER" OR APPROVED EQUAL) AS PER MANUFACTURER'S RECOMMENDATIONS AND REQUIREMENTS FOR SANITARY SEWER APPLICATIONS AND FACTORY ASPHALTIC EXTERIOR COATING. POLYETHYLENE ENCASEMENT IN ACCORDANCE WITH ANSI/AWWA C105/A21.5 SHALL BE SPECIFIED WHEN AGGRESSIVE/CORROSIVE SOIL CONDITIONS WARRANT ITS USE.

#### **4.10 MINIMUM PIPE LENGTH**

THERE SHALL BE A MINIMUM OF 24 NCHES OF STRAIGHT PIPE BEFORE, AFTER OR IN BETWEEN VALVES, FITTINGS, ETC.

#### **4.11 PIPE AND FITTING JOINT STYLE:**

##### **4.11.1 DUCTILE IRON**

DUCTILE IRON PIPES AND FITTINGS SHALL BE FLANGED (AERIAL/BRIDGE CROSSINGS), PUSH-ON, MECHANICAL, RESTRAINED MECHANICAL OR BOLTLESS RESTRAINED JOINTS MEETING ANSI/AWWA A21.51/C151 AND ANSI/AWWA A21.50/C150.

##### **4.11.2 PVC**

PUSH-ON JOINTS SHALL CONSIST OF AN INTEGRAL BELL WITH A FACTORY INSTALLED "LOCKED-IN" ELASTOMERIC GASKET. THE SPIGOT END OF EACH JOINT SHALL BE FACTORY BEVELED. ELASTOMERIC GASKET SHALL MEET THE REQUIREMENTS OF ASTM "D1869" AND "F-477". RESTRAINING SHALL BE ACCOMPLISHED BY USE OF DUCTILE IRON MECHANICAL JOINTS RESTRAINER GLANDS OR BELL RESTRAINT HARNESS WITH STAINLESS STEEL HARDWARE.

##### **4.11.3 POLYETHYLENE**

POLYETHYLENE PIPING SHALL BE JOINTED BY THERMAL BUTT-FUSION, FLANGE ASSEMBLIES OR POLYETHYLENE MECHANICAL JOINT ADAPTERS BASED UPON MANUFACTURER'S RECOMMENDATIONS AND REQUIREMENTS.

#### **4.12 RESTRAINED JOINTS**

ALL VALVES, FITTINGS, PLUGS, REDUCERS, ETC., SHALL HAVE RESTRAINED JOINTS. UNLESS FIELD CONDITIONS AND / OR SPECIAL DESIGN CONDITIONS NECESSITATE, USE OF THRUST BLOCKING SHALL NOT BE PERMITTED. THRUST BLOCKS ARE PERMITTED ONLY WHEN ADEQUATE LENGTH OF PIPE CANNOT BE RESTRAINED DUE TO FIELD CONDITIONS AND/OR FOR TEMPORARY CONSTRUCTION. LENGTH OF RESTRAINED PIPES SHALL BE PER MANUFACTURER'S REQUIREMENTS. JEFFERSON PARISH WATER STANDARD DRAWINGS PROVIDE SOME MINIMUM LENGTHS FOR RESTRAINED PIPES IN OFFSETS. THESE MINIMUM REQUIREMENTS SHALL ONLY BE USED IF THE MANUFACTURER'S REQUIRED RESTRAINED LENGTHS, BASED ON SOIL TYPE, TRENCH TYPE, TEST PRESSURE, SAFETY FACTOR, DEPTH OF BURY, FITTING

TYPE, NOMINAL SIZE, PIPE MATERIAL, ETC. ARE LESS THAN THESE MINIMUM REQUIREMENTS.

#### **4.13 PAINT**

EXPOSED SANITARY SEWER FORCE MAINS, SUCH AS AERIAL/BRIDGE CROSSINGS OVER DRAINAGE CANALS SHALL HAVE FACTORY APPLIED PRIMER WITH FIELD-FINISH BROWN PAINT. PRIMER AND PAINT MATERIAL SHOULD BE FULLY COMPATIBLE WITH THE EXTERNAL ENVIRONMENT AND IN FULL CONFORMANCE WITH THE MANUFACTURER'S RECOMMENDATIONS AND REQUIREMENTS FOR THE INTENDED PURPOSE.

#### **4.14 TAPPING SLEEVES**

TAPPING SLEEVES FOR PVC, AC AND DUCTILE IRON SHALL BE MANUFACTURED OF 18-8 304 STAINLESS STEEL WITH STAINLESS STEEL FLANGE. TAPPING SLEEVES FOR PRE-STRESSED CONCRETE CYLINDER PIPE SHALL BE IN ACCORDANCE WITH AWWA MANUAL M-2. ALL NUTS AND BOLTS SHALL BE STAINLESS STEEL WITH ANTI-SEIZE COMPOUND OR HEAT TREATED TEFLON COATED COR-TEN. TAPPING SLEEVES SHALL BE MANUFACTURED BY ROMAC, CASCADE OR JCM.

#### **4.15 TAPPING VALVES**

TAPPING VALVES SHALL BE MANUFACTURED BY MUELLER, CLOW, M&H OR KENNEDY. VALVES SHALL HAVE AN OUTLET AND CONNECTION SUITABLE FOR MAKE UP, TAPPING SLEEVE AND ADJACENT PIPE.

#### **4.16 COUPLINGS**

LONG BODY TRANSITIONAL COUPLINGS IN ACCORDANCE WITH FOLLOWING TABLE, SHALL BE USED FOR CONNECTING PROPOSED/NEW PIPES TO EXISTING PIPES OF DIFFERENT MATERIAL, FOR EXAMPLE, **"PVC C-900"** TO **"AC"**.

NOMINAL PIPE SIZE, INCHES.	TRANSITION COUPLING MINIMUM LENGTH, INCHES.
4, 6, 8	12
10, 12, 14, 16	18
18, 20, 24, 30, 36	24

#### **4.17 BOLTS AND NUTS**

ALL BOLTS AND NUTS SHALL BE STAINLESS STEEL WITH ANTI-SEIZE COMPOUND OR HEAT TREATED TEFLON COATED COR-TEN.

#### **4.18 VALVES:**

THE CONTRACTOR SHALL SUBMIT VALVE SHOP DRAWINGS TO THE JEFFERSON PARISH SEWERAGE AND ENGINEERING DEPARTMENTS FOR THEIR APPROVAL BEFORE ORDERING THE VALVES.

##### **4.18.1 GATE VALVES**

ALL GATE SHALL HAVE CAST IRON OR DUCTILE IRON BODIES, BRONZE MOUNTED, 125 # DOUBLE BRONZE FACE DISC. VALVES SHALL CONFORM TO AWWA C500 AND HAVE A NON-RISING STEM, 2 INCH OPERATING NUT AND OPEN IN A COUNTER-CLOCKWISE DIRECTION (LEFT HAND OPENING). GATE VALVES SHALL HAVE A FACTORY APPLIED EPOXY COATING AND HAVE STAINLESS STEEL OR HEAT TREATED TEFLON COATED CORE-TEN BOLTS AND NUTS. NO CADMIUM PLATED NUTS AND BOLTS ARE PERMITTED. GATE VALVES SHALL BE MANUFACTURED BY EAST JORDAN IRON WORKS, INC., MUELLER COMPANY, M & H, KENNEDY, CLOW OR DZURICH. VALVES MUST BE OF DOMESTIC UNITED STATES OF AMERICA MANUFACTURE.

##### **4.18.2 CHECK VALVES**

CHECK VALVES 3 INCH TO 12 INCH IN SIZE SHALL BE M&H BRAND SWING CHECK VALVES, LEVER & WEIGHT FLANGED, CAST IRON OR DUCTILE IRON BODY, BRONZE MOUNTED, 125#, SHOPCOAT FINISH, COMPLIES WITH MSS-SP-71 TYPE II AND MIL. SPEC. MIL-V-18436 GROUP B, TYPE III, TRIM 2, BOLTED CAP, STYLE # 159-02. THE VALVE SHALL BE SUITABLE FOR DIRECT BURIAL AND SHALL HAVE FLANGED OR MECHANICAL JOINT ENDS. VALVES SHALL BE OF DOMESTIC UNITED STATES OF AMERICA MANUFACTURE.

##### **4.18.3 COMBINATION AIR AND VACUUM RELEASE VALVE**

THE VALVE SHALL CONTROL AIR IN SEWAGE SYSTEMS TO PROVIDE MAXIMUM FLOW EFFICIENCY AND SYSTEM PROTECTION. THE DESIGN SHALL PREVENT CONTACT BETWEEN THE SEWAGE AND THE SEALING MECHANISM AND ENSURE A DRIP TIGHT SEAL. THE VALVE SHALL BE 2" MNPT AS MANUFACTURED BY A.R.I. MODEL D-025 OR PRIOR APPROVED EQUAL.

#### **4.19 LINES CONSTRUCTED ON PRIVATE PROPERTY**

ALL SANITARY SEWER FORCE MAINS INSTALLED ON PRIVATE PROPERTY SHALL BE INSTALLED IN ACCORDANCE WITH JEFFERSON PARISH STANDARDS AND SPECIFICATIONS. ALL SANITARY SEWER FORCE MAINS CONSTRUCTED ON PRIVATE PROPERTY, SHALL REMAIN PRIVATE. IN SPECIAL CIRCUMSTANCES WHEN JEFFERSON PARISH MAY HAVE TO TAKE OVER THE MAINTENANCE OF ANY SANITARY SEWER FORCE MAINS, A 20 FOOT WIDE MINIMUM SERVITUDE, CENTERED ON THE MAIN, MUST BE DEDICATED TO JEFFERSON PARISH.

#### **4.20 CLEARANCE**

##### **4.20.1 BETWEEN WATER LINES AND SANITARY SEWER LINES**

WHEN SANITARY SEWER LINES ARE PARALLEL TO WATER LINES, THE CLEARANCE SHALL BE A MINIMUM OF 6 FEET (MEASURED HORIZONTALLY): WHEN SEWER AND WATER LINES CROSS, VERTICAL CLEARANCE SHALL BE 18 INCHES, WITH THE WATER LINE CROSSING ON TOP. IF THESE CONDITIONS CANNOT BE MET, DUE TO FIELD CONDITIONS, THE "10 STATE STANDARDS" ((PHONE (518) 439-7286, WEB SITE: [WWW.HES.ORG](http://WWW.HES.ORG))) GUIDELINES CAN BE FOLLOWED, WITH APPROVAL OF THE JEFFERSON PARISH ENGINEERING DEPARTMENT.

##### **4.20.2 BETWEEN SANITARY SEWER FORCE MAINS AND ANY PRIVATE UTILITY LINES**

MINIMUM CLEARANCE BETWEEN A SANITARY SEWER FORCE MAIN AND ANY PRIVATE UTILITY LINE SHALL BE 6 FEET (MEASURED HORIZONTALLY). PRIVATE UTILITIES SHALL BE INSTALLED IN PRIVATE SERVITUDES.



#### **4.20.3 BETWEEN SANITARY SEWER FORCE MAINS AND BUILDINGS**

SANITARY SEWER FORCE MAINS SHALL NOT BE INSTALLED CLOSER THAN 10 FEET (MEASURED HORIZONTALLY) FROM ANY BUILDING FOUNDATION, WALL OR BUILDING OVERHANG. THIS 10 FOOT CLEARANCE MAY BE REDUCED TO 6 FEET IN AREAS WITH COMMERCIAL ZONING WITH LIMITED RIGHT-OF-WAY AND WITH APPROVAL OF THE JEFFERSON PARISH ENGINEERING DEPARTMENT.

#### **4.21 AS-BUILT PLANS AND FINAL INSPECTION**

PRIOR TO TESTING OF THE SANITARY SEWER FORCE MAIN SYSTEM AND PUTTING THE SEWER LINE INTO SERVICE, AS-BUILT PLANS SHOULD BE COMPLETED AND THREE (3) BLUE-LINE COPIES SHOULD BE SUBMITTED TO THE DEPARTMENT OF ENGINEERING. AS-BUILT PLANS SHOULD BE USED AS A BASIS FOR THE FINAL INSPECTION. AS-BUILT PLANS SHOULD BE COMPLETED IN SUCH A WAY THAT IDENTIFY THE TYPE AND LOCATION OF VALVES, FITTINGS AND OTHER APPURTENANCES AS WELL AS THE PIPE TYPE, SIZE, LENGTH, ETC.

#### **4.22 PRESSURE TESTING SANITARY SEWER FORCE MAINS**

ALL NEW AND/OR MODIFIED SEGMENTS OF THE SANITARY SEWER FORCE MAIN SYSTEM SHALL BE TESTED TO 100 P.S.I. THIS PRESSURE SHALL BE MAINTAINED FOR A PERIOD OF TWO (2) HOURS WITH NO DISCERNIBLE PRESSURE LOSS. LEAKS SHALL BE REPAIRED BY REMOVING AND REPLACING FAULTY SECTIONS. THE PRESSURE TEST SHALL BE PERFORMED BY THE CONTRACTOR UNDER THE DIRECT SUPERVISION OF THE JEFFERSON PARISH ENGINEERING DEPARTMENT. ONLY AFTER SATISFACTORY PRESSURE TESTING IS COMPLETED CAN THE SEGMENT BE TIED INTO THE EXISTING SANITARY SEWER FORCE MAIN SYSTEM OR A MANHOLE. UNDER NO CIRCUMSTANCES WILL THE CONTRACTOR BE ALLOWED TO MAKE A TIE-IN TO THE EXISTING SEWER SYSTEM WITHOUT DIRECT SUPERVISION OF THE JEFFERSON PARISH ENGINEERING DEPARTMENT. ALL COSTS ASSOCIATED WITH THE TESTING PROCEDURE SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.

#### **4.23 PIPE INSTALLATION**

THE INSTALLATION OF SANITARY SEWER FORCE MAINS AND OTHER RELATED APPURTENANCES SHALL BE STRICTLY IN ACCORDANCE WITH THESE JEFFERSON PARISH STANDARD NOTES, AND LATEST APPLICABLE

AWWA STANDARDS SUCH AS AWWA C600 (INSTALLATION OF DUCTILE-IRON FORCE MAINS AND APPURTENANCES), AWWA C605 (UNDERGROUND INSTALLATION OF POLYVINYL CHLORIDE (PVC) PRESSURE PIPE AND FITTINGS FOR FORCE MAINS), ETC. AND THE MANUFACTURER'S REQUIREMENTS AND RECOMMENDATIONS.

#### **4.24 PIPE BEDDING**

THE OBJECTIVE OF BEDDING IS TO PROVIDE A CONTINUOUS SUPPORT FOR THE PIPE AT REQUIRED LINE AND GRADE. THE BEDDING MAY OR MAY NOT BE COMPACTED, BUT IN ANY EVENT, THE PROJECTING BELLS OF THE PIPE SHOULD BE PROPERLY RELIEVED IN THE TRENCH BOTTOM SO THAT THE ENTIRE PIPE IS EVENLY SUPPORTED BY THE BEDDING. WHERE THE TRENCH BOTTOM IS UNSTABLE (ORGANIC MATERIAL, OR "QUICK" SAND OR SIMILAR MATERIAL), THE TRENCH BOTTOM SHOULD BE OVER-EXCAVATED AND BROUGHT BACK TO GRADE UTILIZING DUNNAGE BOARDS, GEOGRID, GEOTEXTILE FABRIC OR APPROVED BEDDING MATERIAL AND/OR ANY COMBINATION OF SAME.

**Jefferson Parish**  
**Department of Engineering**  
**Gravity Sanitary Sewer System General Standard Notes**<sup>\*1</sup>

*\* [These notes shall be referenced and shall be included, in their entirety, unedited and unabridged, in all Jefferson Parish Specification Booklets, which include any work related to the Parish Gravity Sanitary Sewer System. Insert a copy of these notes, on green paper, at the end of the "Gravity Sanitary Sewer System Technical Specification" Section of the Specification Booklet. Any Deviations and / or Variations from these General Standard Notes shall be tabulated under the heading of "Deviations From Jefferson Parish Gravity Sanitary Sewer System General Standard Notes" and shall be included in the "Sanitary Sewer System Technical Specification" Section of the Specification Booklet.]*

1. CONTRACTORS SHALL NOTIFY THE DEPARTMENT OF SEWERAGE AT 736-6661 AND THE DEPARTMENT OF ENGINEERING, INSPECTION DIVISION AT 736-6793, 48 HOURS PRIOR TO ANY FIELD WORK RELATING TO JEFFERSON PARISH SANITARY SEWER SYSTEM.
2. THE MINIMUM ACCEPTABLE SIZE FOR NEW GRAVITY SEWER LINES IS 8 INCHES IN DIAMETER.
3. POLYVINYL CHLORIDE (PVC) GRAVITY PIPE 4 INCHES THROUGH 15 INCHES IN DIAMETER (MAINS AND LATERAL SERVICE CONNECTIONS) SHALL MEET ASTM SPECIFICATION D-3034 (LATEST REVISION), DR26 WITH MINIMUM PIPE STIFFNESS OF 115 PSI. PVC PIPE LARGER THAN 15 INCHES IN DIAMETER SHALL MEET ASTM SPECIFICATION F-679, DR35 (T-1 WALL THICKNESS) OR DR37.6 (T-2 WALL THICKNESS) WITH MINIMUM PIPE STIFFNESS OF 46 PSI. FITTINGS SHALL MEET ASTM SPECIFICATION D-3034 (LATEST REVISION), DR35. PIPE SECTIONS AND FITTINGS SHALL BE INTEGRAL CAST BELL AND ELASTOMERIC GASKET AS RECOMMENDED BY THE MANUFACTURER AND ASTM SPECIFICATION D-3212. INSTALLATION OF THE SEWER GRAVITY LINES SHALL CONFORM TO ASTM SPECIFICATIONS D-2321.
4. SEWER MAINS SHALL BE DESIGNED AND CONSTRUCTED TO PROVIDE MEAN VELOCITIES, WHEN FLOWING FULL, OF NOT LESS THAN 2.0 FEET PER SECOND, BASED ON MANNING'S FORMULA USING AN "N" VALUE OF 0.011. MINIMUM DESIRED SLOPE FOR AN 8 INCH MAIN IS 0.40%. SLOPES SLIGHTLY LESS THAN THE DESIRED SLOPE OF 0.40% (0.40% TO 0.30%) WILL BE PERMITTED TO AVOID EXCEEDING MAXIMUM DEPTH REQUIREMENT FOR SEWER GRAVITY LINES OF 15 FEET, TO ENABLE TYING TO AN EXISTING GRAVITY SYSTEM, AND MINIMIZING THE NUMBER OF LIFT STATIONS.

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<sup>1</sup> Jefferson Parish Department of Engineering "Gravity Sanitary Sewer System General Standard Notes", December 2002.

5. SERVICE CONNECTIONS SHALL BE 6-INCH IN DIAMETER AND SHALL BE INSTALLED IN ACCORDANCE WITH JEFFERSON PARISH SEWER STANDARD DETAILS. SERVICE CONNECTIONS SHALL EXTEND FROM MAIN TO PROPERTY LINE.
6. TRENCH CONSTRUCTION FOR THE GRAVITY SANITARY SEWER LINES SHALL BE DETERMINED BY THE EXISTING SOIL TYPE AND THE DEPTH OF INSTALLATION. REFER TO JEFFERSON PARISH SEWER STANDARD DETAIL SHEET (LATEST REVISION). USE SOIL TYPE [     ].
7. TIMBER SHEETING AND BRACING SHOWN (JEFFERSON PARISH SEWER STANDARD DETAIL SHEET, LATEST REVISION). FOR SANITARY SEWER TRENCHES, ARE THE MINIMUM REQUIRED TO CONTROL THE WIDTH OF THE EXCAVATED TRENCH AND TO SAFEGUARD THE INTEGRITY OF THE SANITARY SEWER FOUNDATION, BEDDING AND BACKFILL. IN ADDITION TO THESE MINIMUM REQUIREMENTS, THE CONTRACTOR MUST PROVIDE SUFFICIENT AMOUNT OF SHEETING AND BRACING TO INSURE SAFE WORKING CONDITIONS FOR HIS WORKMEN.
8. NO INFILTRATION IS ALLOWED WITHIN THE GRAVITY SANITARY SEWER SYSTEM (MANHOLES, MAINS & SERVICE CONNECTIONS).
9. GRAVITY SEWER MAINS SHALL BE INSTALLED FOUR (4) FEET FROM PROPERTY LINES (CENTERLINE OF MAIN TO PROPERTY LINE = 4 FEET). A SIX (6) FOOT MINIMUM HORIZONTAL SPACING (EDGE TO EDGE) SHALL BE MAINTAINED BETWEEN GRAVITY SEWER LINES (MAIN & SERVICE CONNECTIONS) AND WATER MAINS.
10. SEWER LINES SHALL NOT BE INSTALLED CLOSER THAN 10 FEET (MEASURED HORIZONTALLY) FROM ANY BUILDING FOUNDATION, WALL OR BUILDING OVERHANG. THIS 10 FOOT CLEARANCE MAY BE REDUCED TO 6 FEET IN AREAS HAVING COMMERCIAL ZONING WITH LIMITED RIGHT-OF-WAY AND WITH APPROVAL OF THE JEFFERSON PARISH ENGINEERING DEPARTMENT.
11. GRAVITY SEWER MAINS CROSSING WATER MAINS MUST BE INSTALLED BELOW WATER MAINS WITH A MINIMUM VERTICAL CLEARANCE OF EIGHTEEN (18) INCHES BETWEEN THE OUTSIDE OF THE WATER MAIN AND OUTSIDE OF THE SEWER MAIN. THE CROSSING SHALL BE ARRANGED SO THAT THE SEWER MAIN JOINTS WILL BE EQUIDISTANT AND AS FAR AS POSSIBLE FROM THE WATER MAIN JOINTS.
12. SEWER SERVICE CONNECTIONS MAY CROSS OVER WATER MAINS WITH A MINIMUM VERTICAL CLEARANCE OF EIGHTEEN (18) INCHES. ADEQUATE STRUCTURAL SUPPORT SHALL BE PROVIDED FOR THE SEWER SERVICE CONNECTION TO MAINTAIN LINE AND GRADE. ONLY

TYPE III, IV & V SEWER STANDARD TRENCH (SEE JEFFERSON PARISH SEWER STANDARD DETAILS) SHALL BE PERMITTED. THE CROSSING SHALL BE ARRANGED SO THAT THE SEWER MAIN JOINTS WILL BE EQUIDISTANT AND AS FAR AS POSSIBLE FROM THE WATER MAIN JOINTS.

13. FIBERGLASS MANHOLES AS WELL AS BRICK, CAST-IN-PLACE AND PRECAST CONCRETE MANHOLES MAY BE SPECIFIED. THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS, FOR MANHOLES, TO THE PARISH'S CONSULTANT ENGINEER FOR APPROVAL PRIOR TO CONSTRUCTION. ALL CONCRETE USED IN CONSTRUCTION OF CAST-IN-PLACE AND PRECAST CONCRETE MANHOLES, INCLUDING THE TOP SLAB, SHALL INCLUDE XYPEX IN THE MIX REGARDLESS OF ANY SPECIAL COATING THAT MAY HAVE BEEN SPECIFIED FOR CERTAIN MANHOLES AND/OR WET WELLS. XYPEX ADMIX C-1000 SHALL BE INCORPORATED INTO THE MORTAR MIX WHEN BUILDING BRICK MANHOLES. THE DOSAGE SHALL BE 3 % BY WEIGHT OF THE PORTLAND CEMENT. MIXING AND APPLICATION SHALL BE AS PER MANUFACTURER'S SPECIFICATIONS AND REQUIREMENTS. AN ALTERNATE TO THIS WOULD BE TO APPLY TWO COATS OF XYPEX TO THE INTERIOR MORTAR SURFACE OF THE BRICK MANHOLE AS PER MANUFACTURER'S SPECIFICATIONS. THIS TWO COAT SYSTEM IS ONE COAT OF XYPEX CONCENTRATE FOLLOWED BY ONE COAT OF XYPEX MODIFIED. MANHOLE STEPS SHALL NOT BE INSTALLED IN SANITARY SEWER MANHOLES.
14. CONTRACTOR SHALL INSTALL "LIFESAVER STAINLESS STEEL STOPPERS" INSERTS IN SANITARY SEWER MANHOLES IN ACCORDANCE WITH JEFFERSON PARISH STANDARDS.
15. INTERVALS BETWEEN SANITARY SEWER MANHOLES SHALL BE MAXIMUM OF 350 FEET.
16. SEWER SERVICE/HOUSE CONNECTIONS CONNECTED TO A TERMINAL MANHOLE SHALL BE CONNECTED AT THE INVERT OF THE TERMINAL MANHOLE.
17. MINIMUM DEPTH FOR SEWER MANHOLES AND MAINS SHALL BE 3.5 FEET. DROP SEWER MANHOLES SHALL BE INSTALLED WHEN THE VERTICAL DISTANCE FROM THE MANHOLE INVERT TO THE SEWER MAIN INVERT EXCEEDS THREE (3) FEET.
18. ALL VACANT LOTS MUST BE PROVIDED WITH A SEWER SERVICE / HOUSE CONNECTION (HC). SEWER HC, WHERE PRACTICAL, SHALL BE INSTALLED PERPENDICULAR TO THE SEWER MAIN. ALL SEWER HC INSTALLED BY THE CONTRACTOR SHALL BE PROPERLY PLUGGED.

LOCATION OF ALL HC SHALL BE MARKED BY IMPRESSING LETTERS HC IN THE FACE OF STREET CURB IN ACCORDANCE WITH THE REQUIREMENTS OF JEFFERSON PARISH STANDARDS (SEE SEWER STANDARD DETAILS). END OF HC SHALL BE MARKED BY INSTALLING A 2" X 12"- OAK BOARD (MINIMUM THREE FEET (3') OF EXPOSED HEIGHT) VERTICALLY AT THE END OF HC.

**19. EXISTING SANITARY SEWER HOUSE CONNECTIONS, IF DISTURBED, SHALL BE REPAIRED, ADJUSTED OR REPLACED AS FOLLOWS:**

- IF THE EXISTING SANITARY SEWER HOUSE CONNECTION IS MADE OF PVC MATERIAL, ANY REPAIRS OR ADJUSTMENTS SHALL BE ALLOWED ONLY BY REMOVAL AND REPLACEMENT OF SECTIONS OF THE HOUSE CONNECTION IN KIND. USE OF RUBBER COUPLINGS SUCH AS FERNCO COUPLINGS WILL NOT BE PERMISSIBLE UNDER ROADWAYS. ONLY SDR-35 REPAIR COUPLINGS WILL BE ALLOWED FOR REPAIR OF THE EXISTING PVC SANITARY SEWER HOUSE CONNECTIONS UNDER ROADWAYS.
- IF THE EXISTING SANITARY SEWER HOUSE CONNECTION IS MADE OF ANY MATERIAL OTHER THAN PVC MATERIAL, REPAIRS OR ADJUSTMENTS SHALL NOT BE ALLOWED. THESE CONNECTIONS SHALL BE REPLACED WITH PVC PIPE AND FITTINGS FROM THE MAIN TO THE PROPERTY LINE OR TO THE JEFFERSON PARISH MAINTENANCE CLEANOUT, WHICHEVER IS PRACTICAL.
- BEDDING AND BACKFILL OF THE SANITARY SEWER HOUSE CONNECTIONS MUST BE AS INDICATED ON JEFFERSON PARISH SEWER STANDARD DETAIL SHEET (LATEST REVISION).
- NO SIPHONS WILL BE ALLOWED.

**20. MANHOLE CONNECTIONS (CONNECTION OF SEWER PIPES TO MANHOLES) SHALL BE WATERTIGHT. CONNECTION OF PVC SEWER PIPE TO MANHOLES WITH CONCRETE GROUT, WITHOUT SOME FORM OF APPROVED MANHOLE CONNECTOR OR WATER STOP, SHALL NOT BE PERMITTED. THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS FOR MANHOLE CONNECTIONS TO THE PARISH ENGINEER FOR APPROVAL PRIOR TO CONSTRUCTION.**

**21. ALL ABANDONED SEWER LINES UNDER ROADWAYS SHALL BE FILLED WITH FLOWABLE FILL.**

**22. WHEN SANITARY SEWER LINES ARE PARALLEL TO WATER LINES, THE CLEARANCE SHALL BE A MINIMUM OF 6 FEET (MEASURED HORIZONTALLY): WHEN SEWER AND WATER LINES CROSS, VERTICAL**

CLEARANCE SHALL BE 18 INCHES, WITH THE WATER LINE CROSSING ON TOP. IF THESE CONDITIONS CANNOT BE MET, DUE TO FIELD CONDITIONS, THE "10 STATE STANDARDS" ((PHONE (518) 439-7286, WEB SITE: [WWW.HES.ORG](http://WWW.HES.ORG))) GUIDELINES CAN BE FOLLOWED, WITH APPROVAL OF THE JEFFERSON PARISH ENGINEERING DEPARTMENT.

23. MINIMUM CLEARANCE BETWEEN A SEWER LINE AND ANY PRIVATE UTILITY LINE SHALL BE 6 FEET (MEASURED HORIZONTALLY). PRIVATE UTILITIES SHALL BE INSTALLED IN PRIVATE SERVITUDES.
24. THE DEPARTMENT OF ENGINEERING HAS THE RIGHT TO REJECT ANY AND ALL EQUIPMENT, OR WORK, WHICH DOES NOT CONFORM TO SPECIFICATIONS. ANY WORK SO REJECTED SHALL BE REDONE BY THE CONTRACTOR AT HIS OWN EXPENSE.
25. BACKFILL ALL TRENCHES WITHIN STREET RIGHT-OF-WAY WITH PUMPED RIVER SAND.
26. THE CONTRACTOR SHALL PERFORM A PRE-CONSTRUCTION AND POST-CONSTRUCTION VIDEO INSPECTIONS OF ANY VITRIFIED CLAY SANITARY SEWER PIPE WITHIN THE PROJECT LIMITS. THE PURPOSE OF PRE-CONSTRUCTION VIDEO INSPECTION WOULD BE TO PROVIDE ADDITIONAL INFORMATION ABOUT THE CONDITION OF THESE LINES BEFORE THE CONSTRUCTION. THE PURPOSE OF THE POST-CONSTRUCTION VIDEO INSPECTION WOULD BE TO REFLECT ANY DAMAGE CAUSED BY THE CONSTRUCTION. COPIES OF THESE VIDEOS SHALL BE SENT TO THE JEFFERSON PARISH DEPARTMENTS OF ENGINEERING AND SEWERAGE, IMMEDIATELY, AS THEY BECOME AVAILABLE.
27. DEFLECTION TESTING:
  - A 5% DEFLECTION MANDREL SHALL BE USED TO PERFORM THE DEFLECTION TESTING.
  - DEFLECTION TESTING SHALL BE PERFORMED NO SOONER THAN 31 DAYS AFTER THE PIPE HAS BEEN INSTALLED AND ALL BACKFILL OPERATIONS COMPLETED.
  - DEFLECTION TESTING SHALL BE PERFORMED AFTER ALL INFRASTRUCTURES, INCLUDING THE ROADWAY, HAVE BEEN INSTALLED.
  - DEFLECTION TESTING OF ALL GRAVITY LINES AND SUBMITTAL OF A DEFLECTION TESTING REPORT BY AN APPROVED TESTING LAB IS REQUIRED PRIOR TO FINAL ACCEPTANCE.
  - THE OWNER, CONTRACTOR OR HIS AGENT SHALL CONTACT THE DEPARTMENT OF ENGINEERING 24 HOURS IN ADVANCE FOR THE INSPECTION OF THE DEFLECTION MANDREL TEST.

**28.** THE CONTRACTOR SHALL FURNISH TO THE JEFFERSON PARISH DEPARTMENT OF ENGINEERING “AS-BUILT” PLANS (ONE DIGITAL CD, ONE MYLAR & THREE BLUE-LINE SETS). AS-BUILT PLANS SHALL INCLUDE, AS A MINIMUM, THE FOLLOWING:

- DISTANCE OF SEWER HOUSE CONNECTIONS (HC) FROM DOWNSTREAM MANHOLES. THIS DISTANCE SHALL BE MEASURED ALONG THE CENTERLINE OF THE MAIN AND SHALL BE EQUAL TO THE DISTANCE FROM THE CENTER OF THE DOWNSTREAM MANHOLE TO THE PROJECTION POINT OF EACH HC (HC AT PROPERTY LINE) ONTO THE MAIN.
- ELEVATION OF SERVICE HOUSE CONNECTIONS AT THE PROPERTY LINE.
- THE INVERT AND TOP OF CASTING ELEVATIONS AND DEPTH OF EACH MANHOLE.
- PIPE INVERTS AT MANHOLES.
- THE CENTER TO CENTER DISTANCES OF CONSECUTIVE MANHOLES.



**Jefferson Parish**  
**Department of Engineering**  
**Water Distribution System General Standard Notes \*<sup>1</sup>**

\* [These notes shall be referenced and shall be included, in their entirety, unedited and unabridged, in all Jefferson Parish Specification Booklets, which include any work related to the Parish Water Distribution System. Insert a copy of these notes, **on green paper**, at the end of the "Water Distribution System Technical Specification" Section of the Specification Booklet. Any Deviations and / or Variations from these General Standard Notes shall be tabulated under the heading of "Deviations From Jefferson Parish Water Standards Notes" and shall be included in the "Water Distribution System Technical Specification" Section of the Specification Booklet.]

**1. NOTIFICATION:**

- a. CONTRACTORS SHALL NOTIFY THE DEPARTMENT OF WATER AT 736-6743 AND THE DEPARTMENT OF ENGINEERING, INSPECTION DIVISION AT 736-6793, 48 HOURS PRIOR TO ANY FIELD WORK RELATING TO WATER LINES, WATER VALVES, WATER METERS, HYDRANTS, ETC. ALL WATER VALVES 16 INCH AND LARGER SHALL BE OPERATED BY PARISH PERSONNEL. SMALLER VALVES MAY BE OPERATED BY THE CONTRACTOR UNDER THE DIRECT SUPERVISION OF JEFFERSON PARISH PERSONNEL.
  - b. THE DEPARTMENT OF ENGINEERING MUST BE GIVEN A MINIMUM OF 48 HOURS NOTICE BEFORE A TAP IS TO BE MADE ON A WATER LINE (FOR METERS, FIRE SERVICES AND FIRE LINES).
  - c. WHERE A TIE-IN, FIRE SERVICE OR WATER METER INSTALLATION IS TO BE MADE BY OTHER THAN WATER DEPARTMENT PERSONNEL, THE OWNER, CONTRACTOR OR HIS AGENT SHALL CONTACT THE DEPARTMENT OF ENGINEERING 24 HOURS IN ADVANCE FOR THE INSPECTION OF THE INSTALLATION. THE INSTALLATION SHALL BE INSPECTED AND APPROVED BY THE DEPARTMENT OF ENGINEERING PRIOR TO BACKFILLING.
- 2. NON CONFORMANCE - THE DEPARTMENT OF ENGINEERING HAS THE RIGHT TO REJECT ANY AND ALL EQUIPMENT, OR WORK, WHICH DOES NOT CONFORM TO JEFFERSON PARISH STANDARDS AND SPECIFICATIONS. ANY WORK SO REJECTED SHALL BE REDONE BY THE CONTRACTOR AT HIS OWN EXPENSE.**
- 3. VERIFICATION OF EXISTING UTILITIES PRIOR TO ORDERING MATERIALS – THE CONTRACTOR SHALL VERIFY THE SIZE AND MATERIAL OF ALL EXISTING UTILITIES BEFORE ORDERING MATERIALS. JEFFERSON PARISH**

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<sup>1</sup> Jefferson Parish Department of Engineering Water Distribution System General Standard Notes, January 2002.

WILL NOT REIMBURSE THE CONTRACTOR FOR ANY MATERIAL RE-STOCKING FEES.

#### **4. DOMESTICITY**

- A. **APPURTENANCES** - ALL DUCTILE IRON/CAST IRON VALVES, HYDRANTS, RESTRAINERS (i.e. Mega-Lugs), COUPLINGS, ETC., SHALL BE OF DOMESTIC UNITED STATES OF AMERICA MANUFACTURE. NO APPURTENANCES MANUFACTURED OUTSIDE OF UNITED STATES OF AMERICA WILL BE ALLOWED.
- B. **FITTINGS** - DOMESTIC AS WELL AS GLOBALLY SOURCED (FOREIGN) DUCTILE IRON FITTINGS SHALL BE ALLOWED. ALL FITTINGS SHALL BE STRICTLY IN ACCORDANCE WITH THE LATEST APPLICABLE AWWA, ANSI (ANSI/AWWA C153/A21.53, ANSI/AWWA C110/A21.10, ANSI/AWWA C111/A21.11, ANSI/AWWA C104/A21.4, ETC.) AND ASTM STANDARDS FOR POTABLE WATER. IN ADDITION TO THESE SAID REQUIREMENTS, THE GLOBALLY SOURCED FITTINGS SHALL ALSO BE MANUFACTURED AT AN ISO (INTERNATIONAL ORGANIZATION FOR STANDARDIZATION) REGISTERED MANUFACTURER, WHICH MANUFACTURER SHALL HAVE CURRENT ISO 9001 CERTIFICATION FOR STANDARDIZATION FOR FITTING PRODUCTS.

THESE MANUFACTURING FACILITIES MUST BE COVERED UNDER PERIODIC AUDITS BY THIRD PARTY ACCREDITATION BODIES FOR EVALUATIONS. THESE EVALUATIONS SHALL INCLUDE MANUFACTURING PROCESSES, QUALITY CONTROL, CORRECTIVE AND PREVENTIVE ACTIONS, AND DOCUMENT CONTROL. IN ADDITION, DISTRIBUTION CENTERS MUST BE AUDITED BY THIRD PARTY APPROVAL AGENCIES FOR PERIODIC CONFIRMATION TESTS AND SURVEILLANCE AUDITS. THESE PERIODIC CONFIRMATION TESTS AND SURVEILLANCE AUDITS SHALL DOCUMENT CONTINUATION OF PRODUCT APPROVALS BY AUDITING THE ENTIRE QUALITY SYSTEMS INCLUDING DESIGN, INFRASTRUCTURE, SYSTEM IMPLEMENTATION, DISTRIBUTION, TRAINING, QUALITY CONTROL AND ASSURANCE, AND DOCUMENT CONTROL. ALL FITTINGS MUST BE MANUFACTURED IN ACCORDANCE WITH NSF61.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING AND FURNISHING JEFFERSON PARISH WITH WRITTEN PROOF THAT ALL GLOBALLY SOURCED (FOREIGN) FITTINGS MEET THE AFOREMENTIONED AWWA, ANSI, AND ASTM STANDARDS. THE CONTRACTOR WILL BE RESPONSIBLE FOR VERIFYING THAT THESE FITTINGS ARE MANUFACTURED AT AN ISO REGISTERED MANUFACTURER WITH CURRENT 9001 CERTIFICATION FOR FITTING PRODUCTS AND SHALL FURNISH JEFFERSON PARISH WITH WRITTEN

PROOF OF THIS REGISTRATION AND CERTIFICATION. ALL WRITTEN PROOF SHALL BE FURNISHED IMMEDIATELY AFTER EXECUTION OF THE CONTRACT DOCUMENTS AND PRIOR TO ORDERING FITTINGS.

**5. WATER LINES:**

- a. **MINIMUM SIZE** - THE MINIMUM ACCEPTABLE SIZE FOR NEW WATER LINES IS 8 INCHES IN DIAMETER.
- b. **DEPTH OF COVER** - NEW WATER LINES 10 INCHES AND SMALLER SHALL HAVE A MINIMUM OF 3 FEET OF COVER. WATER LINES 12 INCHES AND LARGER SHALL HAVE A MINIMUM OF 4 FEET OF COVER.
- c. **BACKFILL** - BACKFILL ALL TRENCHES WITHIN STREET RIGHT-OF-WAY WITH RIVER SAND.
- d. **PVC PIPE** - POLYVINYL CHLORIDE (PVC) PRESSURE PIPE 4 INCHES THROUGH 12 INCHES IN DIAMETER SHALL MEET AWWA SPECIFICATION C-900, DR18. PVC PIPE 14 INCHES AND LARGER IN DIAMETER SHALL MEET AWWA SPECIFICATION C-905, DR25.
- e. **DUCTILE IRON PIPE** - ALL DUCTILE IRON PIPE SHALL CONFORM TO ANSI/AWWA A21.51/C151, ANSI/AWWA A21.50/C150 AND SHALL BE THICKNESS CLASS 51 OR GREATER. DUCTILE IRON PIPE SHALL HAVE A FACTORY CEMENT MORTAR LINING AS PER ANSI/AWWA A21.4/C104, AND FACTORY ASPHALTIC EXTERIOR COATING. POLYETHYLENE ENCASEMENT IN ACCORDANCE WITH ANSI/AWWA C105/A21.5 SHALL BE SPECIFIED WHEN AGGRESSIVE/CORROSIVE SOIL CONDITIONS WARRANT ITS USE.
- f. **STREET CROSSINGS** - JEFFERSON PARISH DEPARTMENT OF ENGINEERING MAY REQUIRE WATER LINES TO BE INSTALLED IN STEEL CASINGS WHEN CROSSING MAJOR (*To be defined by the department of engineering*) STREETS.

WHEN PIPE IS INSTALLED IN CASINGS, COMMERCIALY FABRICATED CASING SPACERS MUST BE USED TO PREVENT DAMAGE TO PIPE AND BELL JOINTS DURING INSTALLATION AND TO PROVIDE PROPER LONG-TERM LINE SUPPORT. USE OF WOODEN SKIDS WILL NOT BE PERMITTED. PIPES IN CASINGS SHALL BE RESTRAINED AND SHALL NOT REST ON BELLS. CASING SPACERS MUST PROVIDE SUFFICIENT HEIGHT TO PERMIT CLEARANCE BETWEEN BELL JOINTS AND CASING WALLS (ALL CASING PIPE SHALL HAVE AN INSIDE CLEAR DIMENSION AT LEAST 2" GREATER THAN THE MAXIMUM OUTSIDE DIMENSION OF THE CARRIER PIPE BELL OR MECHANICAL JOINT RESTRAINTS). SPACE BETWEEN THE CASING AND THE CARRIER PIPE SHOULD NOT BE BACKFILLED. JEFFERSON PARISH APPROVED END CASING SEAL WITH STAINLESS STEEL BANDS SHOULD BE USED TO SEAL THE ENDS OF THE CASINGS.

- g . CANAL CROSSINGS** - LONG-SPAN DUCTILE IRON PIPE SHALL BE USED AS PER MANUFACTURER'S RECOMMENDATIONS AND REQUIREMENTS FOR ALL CANAL CROSSINGS.

CANAL CROSSINGS SHALL BE SUPPORTED BY CONCRETE PILES UNLESS OTHERWISE PERMITTED BY THE JEFFERSON PARISH DEPARTMENT OF ENGINEERING.

- h . HDPE PIPE (*and fittings*)** – HIGH DENSITY POLYETHYLENE (PE) PIPE (*and fittings*) SHALL CONFORM TO CURRENT AWWA STANDARD C906, POLYETHYLENE (PE) PRESSURE PIPE AND FITTINGS, 4 IN. THROUGH 63 IN., FOR WATER DISTRIBUTION. (PE) PIPE (*and fittings*) SHALL CONFORM TO CURRENT REQUIREMENTS OF ASTM D3350 AND ASTM D2337 AND ALL PERTINENT ASTM AND ANSI SPECIFICATIONS FOR SPECIFYING, INSTALLATION AND ACCEPTANCE (PRESSURE TESTING AND DISINFECTING) OF WATER DISTRIBUTION SYSTEMS.

POLYETHYLENE PIPING SHALL BE JOINTED BY THERMAL BUTT-FUSION, FLANGE ASSEMBLIES OR POLYETHYLENE MECHANICAL JOINT ADAPTERS BASED UPON MANUFACTURER'S RECOMMENDATIONS AND REQUIREMENTS.

POLYETHYLENE (PE) PIPE (*and fittings*) SHALL BE INSTALLED PER THE BURIAL-DESIGN GUIDANCE OF ASTM D2321 FOR THERMOPLASTIC PIPE.

POLYETHYLENE (PE) PIPE (*and fittings*) MATERIAL SHALL MEET THE REQUIREMENTS OF TYPE "III", CLASS "C", CATEGORY "5", GRADE "P34" AS DEFINED IN ASTM D1248, WITH STANDARD GRADE RATING OF 1600 PSI AT 73 DEGREES "F" AND HAVE A PPI RECOMMENDED DESIGNATION OF "PE 3408".

POLYETHYLENE (PE) PIPE (*and fittings*) SHALL BE SPECIFIED BY NOMINAL DUCTILE IRON PIPE SIZE AND SHALL MEET THE REQUIREMENTS OF STANDARD DIMENSION RATIO (SDR) 17 FOR DIRECT BURIAL. PIPES USED FOR DIRECTIONAL BORES, STANDARD JACKING AND BORING, HIGHWAY AND RAILWAY CROSSINGS SHALL BE SDR-11 OR GREATER STRENGTH IF REQUIRED BY SPECIAL DESIGN.

- i . POLYETHYLENE (PE) PLASTIC TUBING** - ALL POLYETHYLENE (PE) PLASTIC TUBING, ¾ INCH THROUGH 2 INCHES SHALL BE PE 3408, DR9, CONFORMING TO ASTM D2737. THE PE MATERIAL SHALL MEET OR EXCEED THE REQUIREMENTS OF D1248 FOR TYPE III, GRADE "P34", CLASS "C" MATERIAL. ALL BRONZE/BRASS FITTINGS, CONNECTORS, CORPORATION STOPS AND ANY OTHER APPLICABLE AND APPROPRIATE APPURTENANCES USED IN CONJUNCTION WITH PE TUBING SHALL BE OF DOMESTIC UNITED STATES OF AMERICA MANUFACTURE AND MEET ALL CRITERIA SET FORTH BY AWWA,

ASTM AND ANSI FOR USE OF THESE ITEMS IN POTABLE WATER DISTRIBUTION SYSTEMS.

6. **FITTINGS** - FITTINGS SHALL BE DUCTILE IRON FLANGED, MECHANICAL OR BOLTLESS RESTRAINED JOINTS MEETING ANSI/AWWA C110/A21.10 AND ANSI/AWWA C111/A21.11, CLASS 250, OR ANSI/AWWA C153/A21.53.84, CLASS 350, COMPACT STANDARD. ALL HYDRANT TEES SHALL BE SWIVEL TYPE. DUCTILE IRON FITTINGS SHALL HAVE A FACTORY CEMENT MORTAR LINING AS PER ANSI/AWWA A21.4/C104, AND FACTORY ASPHALTIC EXTERIOR COATING. POLYETHYLENE ENCASEMENT IN ACCORDANCE WITH ANSI/AWWA C105/A21.5 SHALL BE SPECIFIED WHEN AGGRESSIVE/CORROSIVE SOIL CONDITIONS WARRANT ITS USE.
7. **MINIMUM PIPE LENGTH** - THERE SHALL BE A MINIMUM OF 24 INCHES OF STRAIGHT PIPE BEFORE, AFTER OR IN BETWEEN VALVES, FITTINGS, ETC.
8. **PIPE AND FITTING JOINT STYLE:**
  - a. **DUCTILE IRON** - DUCTILE IRON PIPES AND FITTINGS SHALL BE FLANGED (AERIAL/BRIDGE CROSSINGS), PUSH-ON, MECHANICAL, RESTRAINED MECHANICAL OR BOLTLESS RESTRAINED JOINTS MEETING ANSI/AWWA A21.51/C151 AND ANSI/AWWA A21.50/C150.
  - b. **PVC** - PUSH-ON JOINTS SHALL CONSIST OF AN INTEGRAL BELL WITH A FACTORY INSTALLED "LOCKED-IN" ELASTOMERIC GASKET. THE SPIGOT END OF EACH JOINT SHALL BE FACTORY BEVELED. ELASTOMERIC GASKET SHALL MEET THE REQUIREMENTS OF ASTM "D1869" AND "F-477". RESTRAINING SHALL BE ACCOMPLISHED BY USE OF DUCTILE IRON MECHANICAL JOINTS RESTRAINER GLANDS OR BELL RESTRAINT HARNESS WITH STAINLESS STEEL HARDWARE.
  - c. **POLYETHYLENE** - POLYETHYLENE PIPING SHALL BE JOINTED BY THERMAL BUTT-FUSION, FLANGE ASSEMBLIES OR POLYETHYLENE MECHANICAL JOINT ADAPTERS BASED UPON MANUFACTURER'S RECOMMENDATIONS AND REQUIREMENTS
9. **RESTRAINED JOINTS** - ALL VALVES, FITTINGS, PLUGS, REDUCERS, ETC., SHALL HAVE RESTRAINED JOINTS. HYDRANTS, HYDRANT VALVES AND HYDRANT TEES SHALL BE RESTRAINED. UNLESS FIELD CONDITIONS AND / OR SPECIAL DESIGN CONDITIONS NECESSITATE, USE OF THRUST BLOCKING SHALL NOT BE PERMITTED. THRUST BLOCKS ARE PERMITTED ONLY WHEN ADEQUATE LENGTH OF PIPE CANNOT BE RESTRAINED DUE TO FIELD CONDITIONS AND/OR FOR TEMPORARY CONSTRUCTION. LENGTH OF RESTRAINED PIPES SHALL BE PER MANUFACTURER'S REQUIREMENTS. JEFFERSON PARISH WATER STANDARD DRAWINGS PROVIDE SOME MINIMUM LENGTHS FOR RESTRAINED PIPES IN OFFSETS. THESE MINIMUM

REQUIREMENTS SHALL ONLY BE USED IF THE MANUFACTURER'S REQUIRED RESTRAINED LENGTHS, BASED ON SOIL TYPE, TRENCH TYPE, TEST PRESSURE, SAFETY FACTOR, DEPTH OF BURY, FITTING TYPE, NOMINAL SIZE, PIPE MATERIAL, ETC. ARE LESS THAN THESE MINIMUM REQUIREMENTS.

10. **PAINT** - EXPOSED WATER LINES, SUCH AS AERIAL/BRIDGE CROSSINGS OVER DRAINAGE CANALS SHALL HAVE FACTORY APPLIED PRIMER WITH FIELD-FINISH SILVER ALUMINUM PAINT. PRIMER AND PAINT MATERIAL SHOULD BE FULLY COMPATIBLE WITH THE EXTERNAL ENVIRONMENT AND IN FULL CONFORMANCE WITH THE MANUFACTURER'S RECOMMENDATIONS AND REQUIREMENTS FOR THE INTENDED PURPOSE.
11. **TAPPING SLEEVES** - TAPPING SLEEVES FOR PVC, AC AND DUCTILE IRON SHALL BE MANUFACTURED OF 18-8 304 STAINLESS STEEL WITH STAINLESS STEEL FLANGE. TAPPING SLEEVES FOR PRE-STRESSED CONCRETE CYLINDER PIPE SHALL BE IN ACCORDANCE WITH AWWA MANUAL M-2. ALL NUTS AND BOLTS SHALL BE STAINLESS STEEL WITH ANTI-SEIZE COMPOUND OR HEAT TREATED TEFLON COATED COR-TEN. TAPPING SLEEVES SHALL BE MANUFACTURED BY ROMAC, CASCADE OR JCM.
12. **TAPPING VALVES** - TAPPING VALVES SHALL BE MANUFACTURED BY MUELLER, CLOW, M&H OR KENNEDY. VALVES SHALL HAVE AN OUTLET AND CONNECTION SUITABLE FOR MAKE UP, TAPPING SLEEVE AND ADJACENT PIPE.
13. **SERVICE SADDLES** - SERVICE SADDLES FOR USE ON SERVICE TAPS AND WATER LINE BLOW-OFF INSTALLATIONS SHALL BE CASCADE STYLE CS12, SMITH-BLAIR 391, ROMAC STYLE 202BS OR APPROVED EQUAL.
14. **COUPLINGS** - LONG BODY TRANSITIONAL COUPLINGS IN ACCORDANCE WITH THE FOLLOWING TABLE, SHALL BE USED FOR CONNECTING PROPOSED/NEW PIPES TO EXISTING PIPES OF DIFFERENT MATERIAL, FOR EXAMPLE, **"PVC C-900"** TO **"AC"**.

NOMINAL PIPE SIZE, INCHES.	TRANSITION COUPLING MINIMUM LENGTH, INCHES.
4, 6, 8	12
10, 12, 14, 16	18
18, 20, 24, 30, 36	24

15. **BOLTS AND NUTS** - ALL BOLTS AND NUTS SHALL BE STAINLESS STEEL WITH ANTI-SEIZE COMPOUND OR HEAT TREATED TEFLON COATED COR-TEN.
16. **FIRE HYDRANTS:**

- a. **EASTBANK FIRE HYDRANTS** - EASTBANK FIRE HYDRANTS SHALL BE THREE WAY COMPRESSION TYPE (OPENING AGAINST PRESSURE) CONFORMING TO AWWA C-502. HYDRANTS SHALL HAVE A 5 ¼ INCH INLET CONNECTION WITH TWO 2 ½ INCH NOZZLES AND ONE 4 ¼ INCH PUMPER NOZZLE. ALL NOZZLES SHALL HAVE THE NEW ORLEANS SEWERAGE AND WATER BOARD THREAD STANDARDS. HYDRANTS SHALL HAVE A 1 1/8 INCH OPERATING NUT. RIGHT HAND OPENING (CLOCKWISE). ALL HYDRANTS FOR THE EAST JEFFERSON WATER DISTRICT SHALL BE MUELLER (NO. A423), KENNEDY GUARDIAN (MODEL K81A) OR AMERICAN DARLING (MODEL B-84-B).
- b. **WESTBANK FIRE HYDRANTS** - WESTBANK FIRE HYDRANTS SHALL BE THREE WAY, COMPRESSION TYPE (OPENING AGAINST PRESSURE) CONFORMING TO AWWA C-502. HYDRANTS SHALL HAVE A 5 ¼ INCH INLET CONNECTION WITH TWO 2 ½ INCH HOSE NOZZLES AND ONE 4 ¼ INCH PUMPER NOZZLE. ALL NOZZLES SHALL HAVE NATIONAL STANDARD THREADS. HYDRANTS SHALL HAVE A 1 ¼ INCH OPERATING NUT. LEFT HAND OPENING (COUNTER-CLOCKWISE). ALL HYDRANTS FOR THE WEST JEFFERSON WATER DISTRICT SHALL BE MUELLER SUPER CENTURION 250 (MUELLER NO. A423), KENNEDY GUARDIAN (MODEL K81A) OR AMERICAN DARLING (MODEL B-84-B).
- c. **LOOPED LINES** - FIRE HYDRANTS SHALL BE SUPPLIED BY NOT LESS THAN AN 8 INCH DIAMETER LINE IN LOOPED SYSTEMS.
- d. **DEAD-END LINES** - DEAD-END LINES, WHICH SUPPLY FIRE HYDRANTS, SHALL NOT EXCEED 600 FEET IN LENGTH FOR LINE SIZES LESS THAN 10 INCH IN DIAMETER. EXCEPTION TO THIS REQUIREMENT IS WHEN DESIGN CALCULATIONS WOULD DEMONSTRATE AVAILABILITY OF MINIMUM REQUIRED FIRE FLOW OF “1000 GPM” @ “20 PSI” RESIDUAL PRESSURE FOR THE DEAD-END FIRE HYDRANT.
- ANY FACILITY THAT REQUIRES FIRE PROTECTION SHALL NOT BE FARTHER THAN 200 FEET FROM A FIRE HYDRANT. THIS REQUIREMENT MAY BE WAIVED (MODIFIED) BY THE JEFFERSON PARISH FIRE DEPARTMENT.
- e. **HYDRANT VALVES** - A 6 INCH RESILIENT SEAT GATE VALVE (NRS) SHALL BE INSTALLED ON ALL NEW HYDRANT LEADS REGARDLESS OF WATER LINE SIZE.
- f. **HYDRANT TEES** - ALL HYDRANT TEES SHALL BE SWIVEL TYPE.
- g. **HYDRANT SPACING** - FIRE HYDRANT SPACING SHALL NOT BE GREATER THAN 400 FEET IN RESIDENTIAL AREAS, OR 350 FEET IN COMMERCIAL AREAS. ANY FACILITY THAT REQUIRES FIRE PROTECTION SHALL NOT BE FARTHER THAN 200 FEET FROM A FIRE HYDRANT.

## **17. VALVES:**

- a. GATE VALVES** - ALL GATE VALVES, 4 INCH – 12 INCH, SHALL HAVE CAST IRON OR DUCTILE IRON BODIES, BRONZE MOUNTED RESILIENT SEAT TYPE WITH A 200 P.S.I. WORKING PRESSURE. GATE VALVES SHALL CONFORM TO AWWA C509 OR C515 AND HAVE A NON-RISING STEM, 2 INCH OPERATING NUT AND OPEN IN A COUNTER-CLOCKWISE DIRECTION (LEFT HAND OPENING). GATE VALVES SHALL HAVE A FACTORY APPLIED EPOXY COATING AND HAVE STAINLESS STEEL OR HEAT TREATED TEFLON COATED COR-TEN BOLTS AND NUTS. NO CADMIUM PLATED NUTS AND BOLTS ARE PERMITTED. GATE VALVES SHALL BE MANUFACTURED BY HENRY PRATT COMPANY, MUELLER COMPANY, M & H, CLOW OR DZURICH. VALVES MUST BE OF DOMESTIC UNITED STATES OF AMERICA MANUFACTURE.
- b. BUTTERFLY VALVES** - ALL VALVES 14 INCHES AND LARGER SHALL BE BUTTERFLY VALVES CONFORMING TO AWWA C504, CLASS 150B. VALVES SHALL BE SHORT BODY DESIGN WITH MECHANICAL OR FLANGED ENDS AND OPERATE BY TURNING A TWO (2) INCH OPERATING NUT IN A COUNTER-CLOCKWISE DIRECTION (LEFT HAND OPENING). BUTTERFLY VALVES SHALL HAVE A FACTORY APPLIED EPOXY COATING AND HAVE STAINLESS STEEL OR HEAT TREATED TEFLON COATED COR-TEN BOLTS AND NUTS. NO CADMIUM PLATED NUTS AND BOLTS ARE PERMITTED. BUTTERFLY VALVES SHALL BE MANUFACTURED BY HENRY PRATT COMPANY, MUELLER COMPANY, M & H, CLOW OR DZURICH. VALVES MUST BE OF DOMESTIC UNITED STATES OF AMERICA MANUFACTURE.
- c. CHECK VALVES** - CHECK VALVES SHALL BE PLAIN TYPE WITH BRONZE MOUNTING SUITABLE FOR DIRECT BURIAL, AND BE OF DOMESTIC UNITED STATES OF AMERICA MANUFACTURE.
- CHECK VALVES 3 INCH TO 12 INCH IN SIZE SHALL BE A PLAIN SWING CHECK TYPE WITH A CAST IRON OR DUCTILE IRON BODY, STAINLESS STEEL HINGE PIN, BRONZE DISC AND SEAT RING. THE VALVE SHALL BE SUITABLE FOR DIRECT BURIAL AND SHALL HAVE FLANGED OR MECHANICAL JOINT ENDS. VALVES SHALL BE OF DOMESTIC UNITED STATES OF AMERICA MANUFACTURE.
- d. VALVE LOCATION AND SPACING** – VALVES SHALL BE INSTALLED AS PER PROJECT / SUBDIVISION PLANS AND SHALL MEET THE FOLLOWING MINIMUM JEFFERSON PARISH VALVE REQUIREMENTS: 1) VALVES SHALL BE INSTALLED AT EACH INTERSECTION, IN ACCORDANCE WITH JEFFERSON PARISH STANDARD DRAWINGS. 2) VALVES SHALL BE PLACED SO THAT NO SINGLE CASE OF PIPE BREAKAGE SHALL REQUIRE SHUTTING OFF FROM SERVICE AN ARTERY, OR MORE THAN 500 FEET OF PIPE IN HIGH VOLUME



DISTRICTS (RESIDENTIAL OR COMMERCIAL), OR MORE THAN 800 FEET OF PIPE IN ANY AREA (TRANSMISSION LINES). ANY DISCREPANCIES BETWEEN THESE PLANS AND JEFFERSON PARISH MINIMUM REQUIREMENTS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER PRIOR TO CONSTRUCTION.

- e. **LOCATION IDENTIFICATION:** - THE SYMBOL “ ^ ” (LETTER “V”, UPSIDE DOWN) SHALL BE PLACED IN THE FACE OF THE CURB POINTING TO ALL WATER VALVES (EXCLUDING FIRE HYDRANT VALVES).

**18. METERS:**

- a. **RESIDENTIAL METERS** - RESIDENTIAL METERS (2" OR SMALLER) SHALL BE PROVIDED BY AND INSTALLED BY THE JEFFERSON PARISH DEPARTMENT OF WATER. APPLICANTS SHALL CONTACT THE JEFFERSON PARISH DEPARTMENT OF WATER, EASTBANK (736-6072/73) OR WESTBANK (349-5075), OFFICES TO REQUEST FOR RESIDENTIAL METERS. ALL APPLICABLE FEES ARE PAYABLE TO THE DEPARTMENT OF WATER.
- b. **IRRIGATION/GARDEN METERS** - IRRIGATION/GARDEN WATER METERS (2" OR SMALLER) SHALL BE PROVIDED BY AND INSTALLED BY THE JEFFERSON PARISH DEPARTMENT OF WATER. APPLICANTS SHALL CONTACT THE JEFFERSON PARISH DEPARTMENT OF WATER, EASTBANK (736-6072/73) OR WESTBANK (349-5075), OFFICES TO REQUEST FOR IRRIGATION/GARDEN WATER METERS. ALL APPLICABLE FEES ARE PAYABLE TO THE DEPARTMENT OF WATER.
- c. **COMMERCIAL METERS 2 INCH OR SMALLER** – ALL WATER METERS 2 INCH OR SMALLER SHALL BE PROVIDED BY AND INSTALLED BY THE JEFFERSON PARISH DEPARTMENT OF WATER. APPLICATIONS FOR ALL COMMERCIAL WATER METERS SHALL BE MADE TO THE DEPARTMENT OF ENGINEERING (504) 736-6814 PRIOR TO SCHEDULING ANY CONSTRUCTION. THE APPLICANT SHALL COMPLETE A WATER METER VERIFICATION FORM AS REQUIRED BY THE DEPARTMENT OF ENGINEERING.
- d. **COMMERCIAL WATER METERS 3 INCH AND LARGER** - ALL WATER METERS 3 INCH AND LARGER, SHALL BE FURNISHED AND INSTALLED BY THE APPLICANT. METERS 3 INCH AND LARGER SHALL BE OF THE TYPE AND MANUFACTURER SPECIFIED BY THE DEPARTMENT OF ENGINEERING. CONTACT THE DEPARTMENT OF ENGINEERING FOR REQUIRED METER SPECIFICATIONS PRIOR TO ORDERING ANY METER EQUIPMENT OR MATERIALS. ALL METERS 3 INCH AND LARGER SHALL BE FURNISHED WITH A STRAINER. BY-PASS METERS, IF REQUESTED BY THE OWNER AND/OR IF DEEMED NECESSARY BY THE JEFFERSON PARISH DEPARTMENT OF WATER, SHALL BE 2 INCH MINIMUM. THE APPLICANT MUST PRESENT A RECEIPT FOR ALL REQUIRED FEES AND DEPOSITS (CONSUMER RECEIPT) ON THE

INSTALLATION TO THE DEPARTMENT OF ENGINEERING, INSPECTION DIVISION, (736-6793) PRIOR TO ANY CONSTRUCTION.

- e. **METER ELEVATION** - THE CONTRACTOR SHALL EXPOSE THE LINE TO DETERMINE DEPTH OF THE METER BOX. METER ELEVATION IS TO BE DETERMINED BY THE DEPARTMENT OF ENGINEERING. THE MAXIMUM DISTANCE BETWEEN GROUND SURFACE AND THE CENTERLINE OF THE WATER METER SHALL BE 24 INCHES UNLESS OTHERWISE AUTHORIZED BY THE DEPARTMENT OF ENGINEERING.
- f. **METER VAULTS INSTALLATION** - MATERIALS TO BE USED IN CONSTRUCTION OF METER VAULTS INSTALLED IN TRAFFIC AREAS MAY BE COMMON BRICK, CONCRETE BLOCK, POURED IN PLACE REINFORCED CONCRETE OR A PRECAST CONCRETE BOX AS MANUFACTURED BY BROOKS PRODUCTS OR APPROVED EQUAL.
- g. **METER VAULTS ACCESS HATCH AND VALVE COVERS** - METER VAULT ACCESS HATCH SHALL BE A HEAVY DUTY CAST IRON MANHOLE RING AND COVER WITH MACHINED RING SEATS. THE WORD "WATER" SHALL BE EMBOSSED ON THE COVER. THE MANHOLE RING AND COVER SHALL BE CENTERED OVER THE METER AND SHALL BE A VULCAN V-1406 W/COVER OR APPROVED EQUAL. WATER VALVE COVERS FOR THE METER VAULT SHALL BE HEAVY DUTY CAST IRON VULCAN V-8460 OR APPROVED EQUAL. THE VALVE COVERS SHALL BE CENTERED OVER THE VALVES AND THE WORD "WATER" SHALL BE EMBOSSED ON THE COVER.
- h. **MAINTENANCE RESPONSIBILITY** - JEFFERSON PARISH WILL ASSUME MAINTENANCE RESPONSIBILITY FOR LARGE WATER METERS (3 INCHES AND ABOVE) 365 CALENDAR DAYS FROM THE DATE THE OWNER ACCEPTS THE PROJECT, OR ALL WATER FACILITY WORK IS COMPLETED IN ACCORDANCE WITH JEFFERSON PARISH STANDARD SPECIFICATIONS, WHICHEVER OCCURS LAST. UNTIL JEFFERSON PARISH ISSUES A "LETTER OF WATER FACILITY ACCEPTANCE", THE OWNER IS RESPONSIBLE FOR ALL REPAIR AND REPLACEMENT COSTS FOR WATER FACILITIES.

**19. FIRE SERVICE:**

- a. **FIRE SERVICES 2 INCH OR SMALLER** – ALL FIRE SERVICES 2 INCH OR SMALLER SHALL BE PROVIDED BY AND INSTALLED BY THE JEFFERSON PARISH DEPARTMENT OF WATER. APPLICATIONS FOR ALL FIRE SERVICE INSTALLATIONS SHALL BE MADE TO THE DEPARTMENT OF ENGINEERING (504) 736-6814 PRIOR TO SCHEDULING ANY CONSTRUCTION. THE APPLICANT SHALL COMPLETE A FIRE SERVICE WATER VERIFICATION FORM AS REQUIRED BY THE DEPARTMENT OF ENGINEERING. ALL APPLICABLE FEES ARE PAYABLE TO THE DEPARTMENT OF WATER.

- b. FIRE SERVICES 3 INCH AND LARGER** - ALL FIRE SERVICE TAPS, 3 INCH AND LARGER, SHALL BE FURNISHED AND INSTALLED BY THE APPLICANT. THE APPLICANT MUST PRESENT A RECEIPT FOR ALL REQUIRED FEES AND DEPOSITS (CONSUMER RECEIPT) ON THE INSTALLATION TO THE DEPARTMENT OF ENGINEERING INSPECTION DIVISION (736-6793) PRIOR TO ANY CONSTRUCTION.
  - c. FIRE SERVICE LINES FOR BUILDING SPRINKLER SYSTEMS** - FIRE SERVICE LINES FOR BUILDING SPRINKLER SYSTEMS SHALL HAVE CHECK VALVES ADJACENT TO AND DOWNSTREAM OF THE TAPPING VALVE.
  - d. MAINTENANCE RESPONSIBILITY** - JEFFERSON PARISH MAINTENANCE RESPONSIBILITY FOR FIRE SERVICE LINES WILL NOT INCLUDE ANY SEGMENT OF THESE LINES ON THE PRIVATE PROPERTY SIDE OF THE REQUIRED CHECK VALVE, INCLUDING THE CHECK VALVE. FIRE SERVICE LINE CHECK VALVES WILL BE PRIVATELY OWNED AND MAINTAINED.
- 20. LINES CONSTRUCTED ON PRIVATE PROPERTY** - ALL WATER LINES (INCLUDING "LOOPE" WATER LINES), FIRE LINES (FIRE SERVICE LINES), FIRE HYDRANTS, INSTALLED ON PRIVATE PROPERTY SHALL BE INSTALLED IN ACCORDANCE WITH JEFFERSON PARISH STANDARDS AND SPECIFICATIONS. ALL WATER LINES, AND/OR FIRE SERVICE LINES CONSTRUCTED ON PRIVATE PROPERTY, SHALL REMAIN PRIVATE. IN SPECIAL CIRCUMSTANCES WHEN JEFFERSON PARISH MAY HAVE TO TAKE OVER THE MAINTENANCE OF ANY FIRE SERVICE LINE, A 20 FOOT WIDE MINIMUM SERVITUDE, CENTERED ON THE LINE, MUST BE DEDICATED TO JEFFERSON PARISH.
- 21. CLEARANCE:**
- a. BETWEEN WATER LINES AND SANITARY SEWER LINES** - WHEN SANITARY SEWER LINES ARE PARALLEL TO WATER LINES, THE CLEARANCE SHALL BE A MINIMUM OF 6 FEET (MEASURED HORIZONTALLY); WHEN SEWER AND WATER LINES CROSS, VERTICAL CLEARANCE SHALL BE 18 INCHES, WITH THE WATER LINE CROSSING ON TOP. IF THESE CONDITIONS CANNOT BE MET, DUE TO FIELD CONDITIONS, THE "10 STATE STANDARDS" ((PHONE (518) 439-7286, WEB SITE: [WWW.HES.ORG](http://WWW.HES.ORG))) GUIDELINES CAN BE FOLLOWED, WITH APPROVAL OF THE JEFFERSON PARISH ENGINEERING DEPARTMENT.
  - b. BETWEEN WATER LINES AND ANY PRIVATE UTILITY LINES** - MINIMUM CLEARANCE BETWEEN A WATER LINE AND ANY PRIVATE UTILITY LINE SHALL BE 6 FEET (MEASURED HORIZONTALLY). PRIVATE UTILITIES SHALL BE INSTALLED IN PRIVATE SERVITUDES.

- c. BETWEEN WATER LINES AND BUILDINGS** - WATER LINES SHALL NOT BE INSTALLED CLOSER THAN 10 FEET (MEASURED HORIZONTALLY) FROM ANY BUILDING FOUNDATION, WALL OR BUILDING OVERHANG. THIS 10 FOOT CLEARANCE MAY BE REDUCED TO 6 FEET IN AREAS WITH COMMERCIAL ZONING WITH LIMITED RIGHT-OF-WAY AND WITH APPROVAL OF THE JEFFERSON PARISH ENGINEERING DEPARTMENT.

- 22. AS-BUILT PLANS AND FINAL INSPECTION** – PRIOR TO TESTING AND CHLORINATION OF THE WATER DISTRIBUTION SYSTEM AND PUTTING THE WATER LINE INTO SERVICE, AS-BUILT PLANS SHOULD BE COMPLETED AND THREE (3) BLUELINE COPIES SHOULD BE SUBMITTED TO THE DEPARTMENT OF ENGINEERING. AS-BUILT PLANS SHOULD BE USED AS A BASIS FOR THE FINAL INSPECTION. AS-BUILT PLANS SHOULD BE COMPLETED IN SUCH A WAY THAT IDENTIFY THE TYPE AND LOCATION OF VALVES, HYDRANTS, FITTINGS AND OTHER APPURTENANCES AS WELL AS THE PIPE TYPE, SIZE, LENGTH, ETC.

THE “VALVE OPERATING LOGS” (DEPARTMENT OF WATER FORM “W-101”) SHALL BE SUBMITTED ALONG WITH THE AS-BUILT PLANS.

- 23. PRESSURE TESTING AND DISINFECTION OF WATER LINES** - ALL NEW AND/OR MODIFIED SEGMENTS OF THE WATER DISTRIBUTION SYSTEM SHALL BE TESTED TO 100 P.S.I. THIS PRESSURE SHALL BE MAINTAINED FOR A PERIOD OF TWO (2) HOURS WITH NO DISCERNIBLE PRESSURE LOSS. LEAKS SHALL BE REPAIRED BY REMOVING AND REPLACING FAULTY SECTIONS. THE PRESSURE TEST SHALL BE PERFORMED BY THE CONTRACTOR UNDER THE DIRECT SUPERVISION OF THE JEFFERSON PARISH ENGINEERING DEPARTMENT. BEFORE BEING PLACED IN SERVICE, ALL NEW, MODIFIED AND/OR CONTAMINATED SEGMENTS OF THE WATER DISTRIBUTION SYSTEM SHALL BE FLUSHED AND DISINFECTED (CHLORINATED) EITHER BY JEFFERSON PARISH ENGINEERING DEPARTMENT PERSONNEL OR UNDER THEIR DIRECT SUPERVISION. FLUSHING SHOULD BE DONE AT FLOW RATES SUFFICIENT TO PROVIDE A VELOCITY IN THE LINES OF AT LEAST 2.5 FEET PER SECOND. DISINFECTION SHOULD COMPLY WITH AWWA STANDARD C651, “DISINFECTING WATER MAINS”. ONLY AFTER SATISFACTORY PRESSURE TESTING AND DISINFECTION (CHLORINATION) IS COMPLETED CAN THE SEGMENT BE TIED INTO THE EXISTING WATER DISTRIBUTION SYSTEM. UNDER NO CIRCUMSTANCES WILL THE CONTRACTOR BE ALLOWED TO MAKE A TIE-IN TO THE EXISTING WATER DISTRIBUTION SYSTEM WITHOUT DIRECT SUPERVISION OF THE JEFFERSON PARISH ENGINEERING DEPARTMENT. ALL COSTS ASSOCIATED WITH THE TESTING AND CHLORINATION PROCEDURE SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.

- 24. PIPE INSTALLATION** - THE INSTALLATION OF WATER MAINS AND OTHER RELATED APPURTENANCES SHALL BE STRICTLY IN ACCORDANCE WITH

THESE JEFFERSON PARISH STANDARD NOTES, AND LATEST APPLICABLE AWWA STANDARDS SUCH AS AWWA C600 (INSTALLATION OF DUCTILE-IRON WATER MAINS AND APPURTENANCES), AWWA C605 (UNDERGROUND INSTALLATION OF POLYVINYL CHLORIDE (PVC) PRESSURE PIPE AND FITTINGS FOR WATER), ETC. AND THE MANUFACTURER'S REQUIREMENTS AND RECOMMENDATIONS. ALL PIPES MUST BE SWABBED WITH CHLORINE PRIOR TO INSTALLATION.

- 25. PIPE BEDDING** - THE OBJECTIVE OF BEDDING IS TO PROVIDE A CONTINUOUS SUPPORT FOR THE PIPE AT REQUIRED LINE AND GRADE. THE BEDDING MAY OR MAY NOT BE COMPACTED, BUT IN ANY EVENT, THE PROJECTING BELLS OF THE PIPE SHOULD BE PROPERLY RELIEVED IN THE TRENCH BOTTOM SO THAT THE ENTIRE PIPE IS EVENLY SUPPORTED BY THE BEDDING. WHERE THE TRENCH BOTTOM IS UNSTABLE (ORGANIC MATERIAL, OR "QUICK" SAND OR SIMILAR MATERIAL), THE TRENCH BOTTOM SHOULD BE OVER-EXCAVATED AND BROUGHT BACK TO GRADE UTILIZING DUNNAGE BOARDS, GEOGRID, GEOTEXTILE FABRIC OR APPROVED BEDDING MATERIAL AND/OR ANY COMBINATION OF SAME.

## SECTION 01010

### SUMMARY OF WORK

#### PART 1 – GENERAL

##### 1.01 SCOPE OF WORK

- A. The Contract Work consists of construction of new gravity sewer lines, manholes, service connections, and tie-ins to existing lines and other associated work; construction of new sewer pumping station, sewer forcemain and all associated appurtenances; and construction of water mains, service connections, water valves, fire hydrants and all associated appurtenances. The project work shall include construction of all facilities required to complete, test, and make ready for use by the Owner, all structures, equipment, and systems as specified in the Contract Documents.
- B. The Contractor shall furnish all labor, materials, equipment, tools, services, and incidentals to complete all work required by these specifications and as shown on the drawings.
- C. The Contractor shall perform the work complete, in place and ready for continuous service, and shall include repairs, replacements, and restoration required as a result of damages caused during this construction.
- D. Furnish and install all materials, equipment, and labor which is reasonably and properly inferable and necessary for the proper completion of the work, whether specifically indicated in the Contract Documents or not.

##### 1.02 RELATED REQUIREMENTS

Section 01100: Special Project Procedures

##### 1.03 CONTRACTS

The Contract consists of both lump sum and unit price items. The items bid as lump sum shall include all labor, materials, equipment and incidentals required to construct the item complete in place. No extras shall be granted for any additional work unless specifically defined as a unit price item.

##### 1.04 WORK SEQUENCE

- A. All work to be done under this contract shall be done with minimum inconvenience to the users of the sewer and water systems. The Contractor shall coordinate his work with private property owners such that sewer and water services are maintained to all users to the maximum extent possible.
- B. Construct work in stages to accommodate the Owner's use of the premises during the construction period; coordinate the construction schedule and operations with the Owner's representative.
- C. Construct the work in stages to provide for public convenience. Do not close off public use of facilities until completion of one stage of construction will provide alternative usage.

##### 1.05 WORK LOCATIONS

Work shall be located substantially as indicated on the Drawings, but the Engineer reserves the right to make such modifications in locations as may be found desirable to avoid interference with existing structures or for other reason. Where fittings are noted on the Drawings, such notation is for the Contractor's convenience and does not relieve them from laying jointing different or additional items where required.

##### 1.06 CONSTRUCTION AREAS

- A. Contractor shall limit his use of the construction areas for work and for storage to allow for:
  - 1. Work by other contractors.
  - 2. Owner use.
  - 3. Public use.
- B. Coordinate use of work site, if required, under the direction of the Engineer.
- C. Assume full responsibility for the protection and safekeeping of products under this contract, stored on the

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site.

- D. Move any stored products, under Contractor's control, which interfere with operations of the Owner or any separate contractor.
- E. Obtain and pay for the use of additional storage or work areas needed for operations.

1.07 OWNER OCCUPANCY

- A. Owner will have full access to and use of all existing pump stations during the entire period of construction for the conduct of his normal operations. Cooperate with Owner's representative in all construction operations to minimize conflict, and to facilitate Owner usage.
- B. Contractor shall at all times conduct his operations as to insure the least inconvenience to the general public.

1.08 PARTIAL OWNER OCCUPANCY

The Contractor shall schedule his operations for completion of portions of the work, as designated, for the Owner's occupancy prior to substantial completion of the entire work.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

(End of Section)

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## SECTION 01025

### MEASUREMENT AND PAYMENT

#### PART 1 - GENERAL

Payment for the various items of the Bid Schedule, as further specified herein, shall include all compensation to be received by the Contractor for furnishing all tools, equipment, supplies, and manufactured articles, and for all labor, operations, and incidentals appurtenant to the items of work being described, as necessary to complete the various items of the work all in accordance with the requirements of the Contract Documents, including all appurtenances thereto, and including all costs of compliance with the regulations of public agencies having jurisdiction. The Contractor is hereby on notice that no separate payment will be made for any item that is not specifically set forth in the Bid Schedule, and all costs therefore shall be included in the prices named in the Bid Schedule for the various appurtenant items of work.

#### PART 2 - PRODUCTS (NOT USED)

#### PART 3 - EXECUTION (NOT USED)

#### PART 4 - MEASUREMENT AND PAYMENT

##### 4.01 GENERAL

The Total Bid Price shall cover all work required by the Contract Documents. All costs in connection with the proper and successful completion of the work, including furnishing all materials, equipment, supplies, and appurtenances; providing all construction equipment, and tools; and performing all necessary labor and supervision to fully complete the work, shall be included in the unit and lump sum prices bid. All work not specifically set forth as a pay item in the Bid Form shall be considered a subsidiary obligation of the Contractor and all costs in connection therewith shall be included in the prices bid.

##### 4.02 ESTIMATED QUANTITIES

All estimated quantities stipulated in the Bid Form or other Contract Documents are approximate and are to be used only (a) as a basis for estimating the probable cost of the work, and (b) for the purpose of comparing the bids submitted for the work. The actual amounts of work done and materials furnished under unit price items may differ from the estimated quantities. The basis of payment for work and materials will be the actual amount of work done and materials furnished. No compensation will be given for any quantities not used.

##### 4.03 REMOVAL OF SURFACING AND STABILIZED BASE (ITEM NO. S-202-02-G)

- A. Measurement: Measurement for Removal of Surfacing and Stabilized Base will be by actual field measurement per square yard. Refer to Louisiana Standard Specifications for Roads and Bridges (2000 Edition) Section 202 for all work under this item.
- B. Payment: The total square yardage of existing asphalt concrete and stabilized base removed as determined by actual field measurement, will be paid for at the unit price bid, and this price and payment will constitute complete compensation for breaking, hauling away, and excavation as required, and for furnishing all equipment, tools, labor and incidental items as required to complete the item in accordance with the plans and specifications. This item shall include any saw cutting required for removal. No direct payment will be made for saw cutting.

##### 4.04 CLASS I BASE COURSE (ITEM NO. S-301-01)

- A. Measurement: Class I Base Course shall be measured for payment on a unit price basis per cubic yard of material delivered and placed. Refer to Louisiana Standard Specifications for Roads and Bridges (2000 Edition) Section 301 for all work under this item.
- B. Payment: The actual cubic yards of Class I Base Course installed and accepted, measured as provided above, will be paid at the unit price bid and will constitute complete compensation for furnishing, placement, and compaction of base course as required for replacement of asphalt

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parking lots, and for furnishing all equipment and labor required to complete the item in accordance with the plans and specifications.  
Delivery tickets must be submitted with the monthly invoice in order to be considered for payment.

4.05 ASPHALTIC CONCRETE (ITEM NO. S-501-01)

- A. Measurement: Measurement for payment of asphaltic concrete pavement will be made per measured ton delivered and placed. Refer to Louisiana Standard Specifications for Roads and Bridges (2000 Edition) Section 501 for all work under this item.
- B. Payment: Payment for this item will be made at the per ton unit price bid and will constitute full compensation for all work that is required including installation, labor, equipment, tools, and materials. Payment will be made monthly based on approved weigh tickets. Separate payment will be made under other items for pavement removal and base course.

4.06 WATER LINES (ITEM NO. S-741-01)

- A. Measurement: Measurement for waterlines shall be measured for payment on a unit price basis per linear foot measured along the top centerline of the pipe for the size and type of waterline indicated.
- B. Payment: The actual total linear feet of waterline installed and accepted, measured as provided above, will be paid at the unit price bid and shall include all labor, materials, tools and equipment necessary to furnish, layout, excavate, install, test, chlorinate and backfill the waterline of the size and type indicated. Pipe, excavation, sheeting, shoring, dewatering, geotextile fabric, bedding, foundation lumber, backfill and compaction, sodding and seeding, replacement of trees or shrubs, tie-in connections, as-built survey, and testing shall not be measured separately for payment but shall be considered incidental to the unit price bid for waterline. All HDPE waterlines installed as part of this project shall be installed by directional boring method. Ductile iron fittings and joint restrainers will be paid separately.

4.07 GATE VALVES AND VALVE BOXES (ITEM NO. S-741-02)

- A. Measurement: Measurement for payment of Gate Valves and Gate Valves with Valve Boxes will be by the actual number installed, for each size and type as indicated on the Bid Form.
- B. Payment: Payment will constitute full compensation for furnishing and installing the valves and valve boxes complete, testing, including furnishing all equipment, tools, labor and incidentals to complete the valve and valve box installation in accordance with the plans and specifications. This item includes the gate valves for waterline and sewer force main applications.

4.08 WATER SERVICE TAP (ITEM NO.S-741-03)

- A. Measurement: Measurement for water service taps will be at the unit price per each installed for the size and type indicated.
- B. Payment: Payment will constitute full compensation for all labor, materials, tools, adaptors (taps), plugs and valves necessary to furnish, install, chlorinate and backfill.

4.09 FIRE HYDRANT ASSEMBLY W/VALVE & FITTINGS (ITEM NO. S-741-04)

- A. Measurement: Measurement for payment for each standard fire hydrant will be on a unit price basis per each installed.
- B. Payment: The price paid shall constitute full compensation for furnishing, hauling, installing complete and testing, for furnishing all equipment, tools, labor and incidentals necessary to complete the fire hydrant installation in accordance with the plans and specifications.

4.10 WATER SERVICE LINE (ITEM NO. S-741-05)

- A. Measurement: Measurement for water service lines shall be measured for payment on a unit price basis per linear foot installed.
- B. Payment: The actual total linear feet of water service lines installed and accepted will be paid at the unit price bid and shall include all labor, materials, tools, and equipment necessary to furnish, layout,

excavate, install, chlorinate and backfill. Adjustment and relocation of meters shall not be measured separately for payment but shall be considered incidental to the unit price bid for water service lines. Any new water meters to be installed will be provided by the Jefferson Parish Water Department and no direct payment will be made for installation of these meters. Installation of the meters should be considered part of the work required for installation of the water service lines.

4.11 FIRE HYDRANT REMOVAL (ITEM NO. S-741-13)

- A. Measurement: Measurement for removing existing fire hydrants will be at the unit price per each removed.
- B. Payment: Payment will constitute full compensation for removing and disposing of existing fire hydrants.

4.12 STEEL CASING PIPE BY BORING METHODS FOR WATER LINES (ITEM NO. S-741-15)

- A. Measurement: Measurement for the length of the bore will be the linear footage of pipe installed by boring and jacking under the railway, measured as a horizontal distance from end-to-end, along the route of the pipe.
- B. Payment: The total linear feet of steel casing pipe installed by jack and bore methods and accepted, measured as provided above, will be paid for at the unit price bid for various sizes, and this price and payment will constitute full compensation for furnishing, hauling and installing the pipe complete and will include all excavation, special items of work indicated on the plans for which no pay item has been provided (such as jack & bore pits, casing seals and spacers, and supporting of existing utilities within pits), backfill, compaction, dewatering, removal of surplus earth, and for the furnishing of all equipment, tools, labor and incidental items as shown on the drawings or required to complete the item in accordance with the plans and specifications.

4.13 FURNISH AND INSTALL GRAVITY SEWER (ITEM NO. S-742-01)

- A. Measurement: Gravity sewer pipe of PVC, in sizes from 8-inch to 24-inch, when furnished and installed, excavated and backfilled, and tested, will be measured for payment by the Engineer. Measurement for payment does not signify that the gravity sewer is accepted. Measurement for length of gravity sewer will be the actual linear footage laid, measured along the top centerline of the pipe. No deduction will be made for fittings. However, deductions shall be made for special lump sum bid items such as bore and jack installations as shown on the Plans.

B. Payment:

- 1. The actual total linear feet of gravity sewer installed, measured as provided above, will be paid for at the unit price bid in the Proposal and this price and payment will constitute full compensation for furnishing, hauling and installing the pipe complete, including plugged stubouts at manholes; for all excavation, special items of work indicated on the Plans for which no pay item has been provided, test pits, foundation, bedding, sheeting and shoring, sheeting left in place, geotextile material, drainage, removal and replacement of fences, storm sewers, utility lines, etc. that are disturbed, backfilling and compacting, restoring the trench surface to grade, removal of surplus earth, cleaning and testing the pipe; and for the furnishing of all equipment, tools, labor and incidental items as shown on the Drawings or required to complete the item in accordance with the Plans and Specifications.
- 2. The payment for pipe foundation shall be included in the unit price of the gravity sewer pipe.
- 3. Eight bid items are shown on the bid form:

Bid Item No. 742-01 – 8" PVC Gravity Sewer (under 10'-1")  
Bid Item No. 742-01 – 10" PVC Gravity Sewer (10'-1" to 12'-0")  
Bid Item No. 742-01 – 12" PVC Gravity Sewer (over 12'-0")  
Bid Item No. 742-01 – 15" PVC Gravity Sewer (10'-1" to 12'-0")  
Bid Item No. 742-01 – 15" PVC Gravity Sewer (over 12'-0")  
Bid Item No. 742-01 – 18" PVC Gravity Sewer (10'-1" to 12'-0")  
Bid Item No. 742-01 – 18" PVC Gravity Sewer (over 12'-0")  
Bid Item No. 742-01 – 24" PVC Gravity Sewer (over 12'-0")

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4.14 SANITARY SEWER SERVICE CONNECTION (ITEM NO. S-742-02)

- A. Measurement: Service connections shall be paid for each service connection to the gravity sewer installed as shown on the plans or authorized by the Engineer. A new cleanout will be required for every service connection
- B. Payment: Service connections installed and accepted, measured as provided for above, shall be paid for at the contract unit price per each tie-in to the gravity sewer, complete with all fittings, plugs, etc, which price and payment shall constitute full compensation for furnishing and installing the stack or wye and required fittings and connection, including excavation, backfill, removal of necessary service line, and for furnishing all materials, equipment, tools, labor and incidentals and the performance of all work necessary to complete the item in accordance with the plans and specifications. The cleanout required for each new service connection shall be included in the cost of the service connection.

4.15 SANITARY SEWER SERVICE LINE (ITEM NO. S-742-03)

A. Measurement

Measurement for the length of sewer service will be the horizontal distance of service line installed, measured along the top centerline of the pipe. No deduction will be made for fittings, etc.

B. Payment

- 1. The actual total linear feet of sewer service line installed and accepted, measured as provided above will be paid for at the unit price bid and this price and payment will constitute full compensation for furnishing, hauling and installing the pipe complete; for all excavation, fittings, connections, special items of work indicated on the Plans for which no pay item has been provided, foundation, bedding, sheeting and shoring, geotextile material, backfilling and compacting, removal of surplus earth; and for the furnishing of all equipment, tools, labor and incidental items as shown on drawings or required to complete the item in accordance with the Plans and Specifications. This payment also includes Contractor's Coordination/Notification to Owner regarding location of services.
- 2. Sheeting used shall be cut two (2) ft. below road/street surface and abandoned in place. Sheeting shall extend at least three (3) ft. outside the edge of the existing road/street and is required under street pavement areas (no direct payment).

4.16 SEWER MANHOLES (ITEM NO. S-203)

- A. Measurement: Measurement for payment will be made by the Engineer upward from the invert of the lowest gravity sewer pipe of the manhole to the top of the manhole frame.

B. Payment:

- 1. Payment for furnishing and installing each sewer manhole complete in place will be made for the quantity as determined above at the price bid per vertical foot in the Proposal, which price and payment shall be full compensation for all excavation, stone sub base, concrete and masonry materials, for special items of work indicated on the plans for which no pay item has been provided, foundation, sheeting and shoring, sheeting left in place, backfilling, furnishing and installing precast sections, hauling and installing castings, frames and covers, and equipment, tools, labor and incidental items as shown on the Drawings or required to complete the item in accordance with the Plans and Specifications.
- 2. Three bid items are shown on the bid form:

Bid Item No. SS-003 – Sewer Manhole (under 10'-1")  
Bid Item No. SS-004 – Sewer Manhole (10'-1" to 12'-0")  
Bid Item No. SS-005 – Sewer Manhole (over 12'-0")

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4.17 SEWER MANHOLES TO BE RAISED (ITEM NO. S-206)

- A. Measurement: Measurement for payment will be made by the Engineer for each manhole frame that will be adjusted to match the proposed grade.
- B. Payment:
  - 1. Payment for raising each sewer manhole complete in place will be made for the quantity as determined above at the price bid per vertical foot in the Proposal, which price and payment shall be full compensation for all excavation, stone sub base, concrete and masonry materials, for special items of work indicated on the plans for which no pay item has been provided, foundation, sheeting and shoring, sheeting left in place, backfilling, furnishing and installing precast sections, hauling and installing castings, frames and covers, and equipment, tools, labor and incidental items as shown on the Drawings or required to complete the item in accordance with the Plans and Specifications.

4.18 SEWER MANHOLES TO BE REMOVED (ITEM NO. S-207)

- A. Measurement: Measurement for payment for each unit will be by an actual count removed.
- B. Payment: Payment shall include furnishing all equipment, piping, tools, labor and incidentals necessary to complete the manhole removal.

4.19 VERIFICATION OF EXISTING UTILITIES (ITEM NO. S-212)

- A. Measurement: Measurement for payment for verification of existing utilities will be on a lump sum basis.
- B. Payment: Payment for verification of existing utilities will be made on a lump sum basis and payment shall be full compensation to perform all necessary pot holing, digging, probing or other appropriate work to verify locations and other necessary information about existing utilities to enable installation of items under this contract as authorized by the Engineer and as authorized by the Engineer and as specified herein.

4.20 CONFLICT BOX (ITEM NO. S-215)

- A. Measurement: Measurement for payment will be made by the Engineer for the installation of a conflict box.
- B. Payment: Payment for installing a conflict box complete in place will be made at the lump sum price per the proposal. All excavation, bedding and concrete to be included in price.

4.21 PIPE FITTINGS - DUCTILE IRON (ITEM NO. S-301)

- A. Measurement: The measurement of all ductile iron fittings not included in the cost of other bid items (such as lump sum bids for lift stations) will be by weight in tons (as published by the manufacturer) of the fittings installed.
- B. Payment: The actual fittings installed and accepted, measured as provided above, will be paid for at the unit price per ton and this price and payment will constitute full compensation for furnishing, hauling and installing the fittings complete, including all excavation, special items of work indicated on the plans for which no pay item has been provided, backfilling and equipment, tools, labor and incidental items as shown on the drawings or required to complete the item in accordance with the plans or specifications. This item shall not include fittings which are within the limits of the lift station lump sum price, nor does it include joint restrainers which will be paid for separately.

4.22 REMOVE EXISTING WATERLINES (ITEM NO. S-302)

- A. Measurement: Measurement for removing the existing water lines shall be measured for payment on a unit price basis per linear foot measured along the top centerline of the pipe.

- B. Payment: Payment removing existing water lines shall be on a unit price basis per linear foot and shall include all related site and civil work necessary to perform the work as well as any other incidentals not specifically identified for payment under separate pay item.

4.23 JOINT RESTRAINERS (ITEM NO. S-303)

- A. Measurement: Measurement for joint restrainers will be at the unit price per each installed for the size and type indicated.
- B. Payment: Payment will constitute full compensation for furnishing and installing the joint restrainers for water lines and sewer force mains, including furnishing all equipment, connectors, tools, labor and incidentals to complete the installation in accordance with the plans and specifications.

4.24 FIRE SERVICE LINE (ITEM NO. S-304)

- A. Measurement: Measurement for fire service lines shall be measured for payment on a unit price basis per linear foot installed.
- B. Payment: The actual total linear feet of water service lines installed and accepted will be paid at the unit price bid and shall include all labor, materials, tools, and equipment necessary to furnish, layout, excavate, install, chlorinate and backfill.

4.25 FIRE SERVICE TAPS (ITEM NO. S-305)

- A. Measurement: Measurement for fire service taps will be at the unit price per each installed for the size and type indicated.
- B. Payment: Payment will constitute full compensation for all labor, materials, tools, adaptors (taps), plugs and check valves necessary to furnish, install, chlorinate and backfill.

4.26 MECHANICAL JOINT ADAPTOR (ITEM NO. S-306)

- A. Measurement: Measurement for mechanical joint adaptors will be at the unit price per each installed for the size and type indicated.
- B. Payment: Payment will constitute full compensation for all labor, materials, and tools necessary to furnish and install mechanical joint adaptors in accordance with the plans and specifications.

4.27 ITEMS NOT DIRECTLY PAID FOR

- A. The following items of work shall be accomplished with no separate payment. All costs associated with these items shall be included in other bid items or borne by the Contractor:
  - 1. Pressure and Leakage Tests All pressure and leakage tests required as specified shall be considered a subsidiary obligation of the Contractor. No separate payment shall be made in connection with any pressure or leakage tests.
  - 2. Fencing. No separate payment will be made in connection with any fencing required. All other fencing, such as removal and replacement of existing fencing, shall be included in the unit prices bid for the installed pipe.
  - 3. Stone. No separate payment will be made in connection with the 8" thick stone area within the Pump Station site.
  - 4. Tree Removal and Replacement. No separate payment shall be made for removal and replacement of trees. The removal and replacement of trees is considered a subsidiary obligation of the Contractor and all costs associated with removal, protection, or replacement of trees shall be borne by the Contractor.
  - 5. Drain Pipe Removal and Replacement. No separate payment shall be made for removal and replacement of drain pipes. The removal and replacement of drain pipe is considered a subsidiary obligation of the Contractor and all costs associated with the removal and replacement including excavation, bedding, backfill and compaction thereof, and any work required to install the drain line shall be borne by the Contractor.

6. Steel Sheeting Left in Place  
No separate payment shall be made for the steel sheeting to remain in place. Installation, driving, and cutting of this steel sheeting shall be included in the unit prices bid for the installed pipe and facilities.
7. Field Office for Resident Project Representative
8. Concrete Coatings
9. Crushed Stone, Geotextile Fabric, and all incidental work required to construct the pump station entrance driveway.
10. The abandoned sewer lines are to be filled with flowable fill or low strength grout in accordance with Department of Transportation regulations.
11. Any fittings incidental to the work.

(End of Section)

## SECTION 01025

### MEASUREMENT AND PAYMENT

#### PART 1 - GENERAL

Payment for the various items of the Bid Schedule, as further specified herein, shall include all compensation to be received by the Contractor for furnishing all tools, equipment, supplies, and manufactured articles, and for all labor, operations, and incidentals appurtenant to the items of work being described, as necessary to complete the various items of the work all in accordance with the requirements of the Contract Documents, including all appurtenances thereto, and including all costs of compliance with the regulations of public agencies having jurisdiction. The Contractor is hereby on notice that no separate payment will be made for any item that is not specifically set forth in the Bid Schedule, and all costs therefore shall be included in the prices named in the Bid Schedule for the various appurtenant items of work.

#### PART 2 - PRODUCTS (NOT USED)

#### PART 3 - EXECUTION (NOT USED)

#### PART 4 - MEASUREMENT AND PAYMENT

##### 4.01 GENERAL

The Total Bid Price shall cover all work required by the Contract Documents. All costs in connection with the proper and successful completion of the work, including furnishing all materials, equipment, supplies, and appurtenances; providing all construction equipment, and tools; and performing all necessary labor and supervision to fully complete the work, shall be included in the unit and lump sum prices bid. All work not specifically set forth as a pay item in the Bid Form shall be considered a subsidiary obligation of the Contractor and all costs in connection therewith shall be included in the prices bid.

##### 4.02 ESTIMATED QUANTITIES

All estimated quantities stipulated in the Bid Form or other Contract Documents are approximate and are to be used only (a) as a basis for estimating the probable cost of the work, and (b) for the purpose of comparing the bids submitted for the work. The actual amounts of work done and materials furnished under unit price items may differ from the estimated quantities. The basis of payment for work and materials will be the actual amount of work done and materials furnished. No compensation will be given for any quantities not used.

##### 4.03 REMOVAL OF SURFACING AND STABILIZED BASE (ITEM NO. S-202-02-G)

- A. Measurement: Measurement for Removal of Surfacing and Stabilized Base will be by actual field measurement per square yard. Refer to Louisiana Standard Specifications for Roads and Bridges (2000 Edition) Section 202 for all work under this item.
- B. Payment: The total square yardage of existing asphalt concrete and stabilized base removed as determined by actual field measurement, will be paid for at the unit price bid, and this price and payment will constitute complete compensation for breaking, hauling away, and excavation as required, and for furnishing all equipment, tools, labor and incidental items as required to complete the item in accordance with the plans and specifications. This item shall include any saw cutting required for removal. No direct payment will be made for saw cutting.

##### 4.04 CLASS I BASE COURSE (ITEM NO. S-301-01)

- A. Measurement: Class I Base Course shall be measured for payment on a unit price basis per cubic yard of material delivered and placed. Refer to Louisiana Standard Specifications for Roads and Bridges (2000 Edition) Section 301 for all work under this item.
- B. Payment: The actual cubic yards of Class I Base Course installed and accepted, measured as provided above, will be paid at the unit price bid and will constitute complete compensation for furnishing, placement, and compaction of base course as required for replacement of asphalt

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parking lots, and for furnishing all equipment and labor required to complete the item in accordance with the plans and specifications.  
Delivery tickets must be submitted with the monthly invoice in order to be considered for payment.

4.05 ASPHALTIC CONCRETE (ITEM NO. S-501-01)

- A. Measurement: Measurement for payment of asphaltic concrete pavement will be made per measured ton delivered and placed. Refer to Louisiana Standard Specifications for Roads and Bridges (2000 Edition) Section 501 for all work under this item.
- B. Payment: Payment for this item will be made at the per ton unit price bid and will constitute full compensation for all work that is required including installation, labor, equipment, tools, and materials. Payment will be made monthly based on approved weigh tickets. Separate payment will be made under other items for pavement removal and base course.

4.06 FENCE, REMOVE & REPLACE (ITEM NO. S-705-06)

- A. Measurement: Fence shall be measured for payment on a unit price basis per linear foot measured along the length of fence erected.
- B. Payment: The actual total linear feet of fence installed and accepted, measured as provided above, will be paid at the unit price bid and shall include all labor, materials, tools and equipment necessary to furnish, layout, and construct a six foot tall chain link fence. All materials and labor used in construction of the fence shall not be measured separately for payment but shall be considered incidental to the unit price bid for fence.

4.07 PLANTS (RED TIP, 6FT) (ITEM NO. S-719-01)

- A. Measurement: Measurement for payment of red tip plants will be by the actual number planted, for the size and type of plant indicated. Refer to Louisiana Standard Specifications for Roads and Bridges (2000 Edition) Section 719 for all work under this item.
- B. Payment: Payment will constitute full compensation for furnishing and planting the red tip plants, including all equipment, tools, labor and incidentals required for the plants to be planted.

4.08 WATER LINES (ITEM NO. S-741-01)

- A. Measurement: Measurement for waterlines shall be measured for payment on a unit price basis per linear foot measured along the top centerline of the pipe for the size and type of waterline indicated.
- B. Payment: The actual total linear feet of waterline installed and accepted, measured as provided above, will be paid at the unit price bid and shall include all labor, materials, tools and equipment necessary to furnish, layout, excavate, install, test, chlorinate and backfill the waterline of the size and type indicated. Pipe, excavation, sheeting, shoring, dewatering, geotextile fabric, bedding, foundation lumber, backfill and compaction, sodding and seeding, replacement of trees or shrubs, tie-in connections, as-built survey, and testing shall not be measured separately for payment but shall be considered incidental to the unit price bid for waterline. All HDPE waterlines installed as part of this project shall be installed by directional boring method. Ductile iron fittings and joint restrainers will be paid separately.

4.09 GATE VALVES AND VALVE BOXES (ITEM NO. S-741-02)

- A. Measurement: Measurement for payment of Gate Valves and Gate Valves with Valve Boxes will be by the actual number installed, for each size and type as indicated on the Bid Form.
- B. Payment: Payment will constitute full compensation for furnishing and installing the valves and valve boxes complete, testing, including furnishing all equipment, tools, labor and incidentals to complete the valve and valve box installation in accordance with the plans and specifications. This item includes the gate valves for waterline and sewer force main applications.



4.10 WATER SERVICE TAP (ITEM NO. S-741-03)

- A. Measurement: Measurement for water service taps will be at the unit price per each installed for the size and type indicated.
- B. Payment: Payment will constitute full compensation for all labor, materials, tools, adaptors (taps), plugs and valves necessary to furnish, install, chlorinate and backfill.

4.11 FIRE HYDRANT ASSEMBLY W/VALVE & FITTINGS (ITEM NO. S-741-04)

- A. Measurement: Measurement for payment for each standard fire hydrant will be on a unit price basis per each installed.
- B. Payment: The price paid shall constitute full compensation for furnishing, hauling, installing complete and testing, for furnishing all equipment, tools, labor and incidentals necessary to complete the fire hydrant installation in accordance with the plans and specifications.

4.12 WATER SERVICE LINE (ITEM NO. S-741-05)

- A. Measurement: Measurement for water service lines shall be measured for payment on a unit price basis per linear foot installed.
- B. Payment: The actual total linear feet of water service lines installed and accepted will be paid at the unit price bid and shall include all labor, materials, tools,, and equipment necessary to furnish, layout, excavate, install, chlorinate and backfill. Adjustment and relocation of meters shall not be measured separately for payment but shall be considered incidental to the unit price bid for water service lines. Any new water meters to be installed will be provided by the Jefferson Parish Water Department and no direct payment will be made for installation of these meters. Installation of the meters should be considered part of the work required for installation of the water service lines.

4.13 FIRE HYDRANT REMOVAL (ITEM NO. S-741-13)

- A. Measurement: Measurement for removing existing fire hydrants will be at the unit price per each removed.
- B. Payment: Payment will constitute full compensation for removing and disposing of existing fire hydrants.

4.14 FURNISH AND INSTALL GRAVITY SEWER (ITEM NO. S-742-01)

- A. Measurement: Gravity sewer pipe of PVC, in sizes from 8-inch to 24-inch, when furnished and installed, excavated and backfilled, and tested, will be measured for payment by the Engineer. Measurement for payment does not signify that the gravity sewer is accepted. Measurement for length of gravity sewer will be the actual linear footage laid, measured along the top centerline of the pipe. No deduction will be made for fittings. However, deductions shall be made for special lump sum bid items such as bore and jack installations as shown on the Plans.
- B. Payment:
  - 1. The actual total linear feet of gravity sewer installed, measured as provided above, will be paid for at the unit price bid in the Proposal and this price and payment will constitute full compensation for furnishing, hauling and installing the pipe complete, including plugged stubouts at manholes; for all excavation, special items of work indicated on the Plans for which no pay item has been provided, test pits, foundation, bedding, sheeting and shoring, sheeting left in place, geotextile material, drainage, removal and replacement of fences, storm sewers, utility lines, etc. that are disturbed, backfilling and compacting, restoring the trench surface to grade, removal of surplus earth, cleaning and testing the pipe; and for the furnishing of all equipment, tools, labor and incidental items as shown on the Drawings or required to complete the item in accordance with the Plans and Specifications.
  - 2. The payment for pipe foundation shall be included in the unit price of the gravity sewer pipe.
  - 3. Eight bid items are shown on the bid form:

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Bid Item No. 742-01 – 8" PVC Gravity Sewer (under 10'-1")  
 Bid Item No. 742-01 – 10" PVC Gravity Sewer (10'-1" to 12'-0")  
 Bid Item No. 742-01 – 12" PVC Gravity Sewer (over 12'-0")  
 Bid Item No. 742-01 – 15" PVC Gravity Sewer (10'-1" to 12'-0")  
 Bid Item No. 742-01 – 15" PVC Gravity Sewer (over 12'-0")  
 Bid Item No. 742-01 – 18" PVC Gravity Sewer (10'-1" to 12'-0")  
 Bid Item No. 742-01 – 18" PVC Gravity Sewer (over 12'-0")  
 Bid Item No. 742-01 – 24" PVC Gravity Sewer (over 12'-0")

#### 4.15 SANITARY SEWER SERVICE CONNECTION (ITEM NO. S-742-02)

- A. Measurement: Service connections shall be paid for each service connection to the gravity sewer installed as shown on the plans or authorized by the Engineer. A new cleanout will be required for every service connection
- B. Payment: Service connections installed and accepted, measured as provided for above, shall be paid for at the contract unit price per each tie-in to the gravity sewer, complete with all fittings, plugs, etc, which price and payment shall constitute full compensation for furnishing and installing the stack or wye and required fittings and connection, including excavation, backfill, removal of necessary service line, and for furnishing all materials, equipment, tools, labor and incidentals and the performance of all work necessary to complete the item in accordance with the plans and specifications. The cleanout required for each new service connection shall be included in the cost of the service connection.

#### 4.16 SANITARY SEWER SERVICE LINE (ITEM NO. S-742-03)

##### A. Measurement

Measurement for the length of sewer service will be the horizontal distance of service line installed, measured along the top centerline of the pipe. No deduction will be made for fittings, etc.

##### B. Payment

1. The actual total linear feet of sewer service line installed and accepted, measured as provided above will be paid for at the unit price bid and this price and payment will constitute full compensation for furnishing, hauling and installing the pipe complete; for all excavation, fittings, connections, special items of work indicated on the Plans for which no pay item has been provided, foundation, bedding, sheeting and shoring, geotextile material, backfilling and compacting, removal of surplus earth; and for the furnishing of all equipment, tools, labor and incidental items as shown on drawings or required to complete the item in accordance with the Plans and Specifications. This payment also includes Contractor's Coordination/Notification to Owner regarding location of services.
2. Sheeting used shall be cut two (2) ft. below road/street surface and abandoned in place. Sheeting shall extend at least three (3) ft. outside the edge of the existing road/street and is required under street pavement areas (no direct payment).

#### 4.17 STEEL CASED HIGHWAY AND ROADWAY CROSSING FOR SEWER LINES (ITEM NO. S-742-04)

- A. Measurement: Measurement for length of the Steel Casing will be the actual linear footage laid, measured along the top centerline of the pipe and other work required, between the limits shown on the Drawings and as herein specified. The length of each crossing is shown on the Drawings.

##### B. Payment:

1. The actual total linear feet installed and accepted, measured as provided above, will be paid for per linear foot. Such price and payment shall constitute full compensation for furnishing, hauling, and installing bored and jacked casing, the carrier pipe, installing the carrier pipe, self-restrained joints, restrained joints, fittings, brick, mortar, sand and other materials

complete, for all excavation, jacking pit, receiving pit, steel sheeting, dewatering, drainage, stabilization, testing of carrier pipe, boring, jacking, bedding geotextile material, timber, river sand, and backfilling; and for furnishing all equipment, tools, labor and incidentals and the performance of all work necessary to complete the item in accordance with the Plans and Specifications, and all else incidental thereto for which separate payment is not provided under other items in the proposal.

2. The price bid for these items or work shall cover everything necessary to make the installation of the casing pipe complete.
3. Payment shall fully reimburse the Contractor for cooperating with and meeting all the requirements of the State of Louisiana Department of Transportation and Development and Jefferson Parish Public Works Department and as may be required or necessary to complete the installation.

4.18 FURNISH AND INSTALL 10"Ø HDPE SEWER FORCE MAIN PIPE (ITEM NO. S-201)

A. Measurement: HDPE sewer force main pipe in the sizes required, when furnished and installed, excavated and backfilled, and tested will be measured for payment by the Engineer. Measurement for payment does not signify that the sewer force main is accepted. Measurement for length of sewer force main pipe will be the actual linear footage laid, measured along the top centerline of the pipe. The diameter specified refers to the Ductile Iron Pipe Size (DIPS).

B. Payment:

1. The actual total linear feet of force main installed and tested, measured as provided above, will be paid for at the unit price bid and this price and payment will constitute full compensation for furnishing, hauling and installing the pipe complete; for all excavation, special items of work indicated on the Plans for which no pay item has been provided, test pits, foundation, bedding, sheeting and shoring, sheeting left in place, geotextile material, drainage, removal and replacement of fences, storm sewers, utility lines, etc. that are disturbed, backfilling and compacting, restoring the trench surface to grade, removal of surplus earth, cleaning and testing the pipe; and for the furnishing of all equipment, tools, labor and incidental items as shown on the Drawings or required to complete the item in accordance with the Plans and Specifications.

4.19 FURNISH AND INSTALL 16"Ø HDPE SEWER FORCE MAIN PIPE (ITEM NO. S-202)

A. Measurement: HDPE sewer force main pipe in the sizes required, when furnished and installed, excavated and backfilled, and tested will be measured for payment by the Engineer. Measurement for payment does not signify that the sewer force main is accepted. Measurement for length of unrestrained sewer force main pipe will be the actual linear footage laid, measured along the top centerline of the pipe. No measurement will be made for above ground piping in lift station. The diameter specified refers to the Ductile Iron Pipe Size (DIPS).

B. Payment:

The actual total linear feet of force main installed and tested, measured as provided above, will be paid for at the unit price bid and this price and payment will constitute full compensation for furnishing, hauling and installing the pipe complete; for all excavation, special items of work indicated on the Plans for which no pay item has been provided, test pits, foundation, bedding, sheeting and shoring, sheeting left in place, geotextile material, drainage, removal and replacement of fences, storm sewers, utility lines, etc. that are disturbed, backfilling and compacting, restoring the trench surface to grade, removal of surplus earth, cleaning and testing the pipe; and for the furnishing of all equipment, tools, labor and incidental items as shown on the Drawings or required to complete the item in accordance with the Plans and Specifications.

4.20 SEWER MANHOLES (ITEM NO. S-204 AND S-205)

A. Measurement: Measurement for payment will be made by the Engineer upward from the invert of the lowest gravity sewer pipe of the manhole to the top of the manhole frame.

B. Payment:

1. Payment for furnishing and installing each sewer manhole complete in place will be made for the quantity as determined above at the price bid per vertical foot in the Proposal, which price and payment shall be full compensation for all excavation, stone sub base, concrete and masonry materials, for special items of work indicated on the plans for which no pay item has been provided, foundation, sheeting and shoring, sheeting left in place, backfilling, furnishing and installing precast sections, hauling and installing castings, frames and covers, and equipment, tools, labor and incidental items as shown on the Drawings or required to complete the item in accordance with the Plans and Specifications.
2. Three bid items are shown on the bid form:  
  
Bid Item No. SS-003 – Sewer Manhole (under 10'-1")  
Bid Item No. SS-004 – Sewer Manhole (10'-1" to 12'-0")  
Bid Item No. SS-005 – Sewer Manhole (over 12'-0")

4.21 SEWER MANHOLES TO BE RAISED (ITEM NO. S-206)

A. Measurement: Measurement for payment will be made by the Engineer for each manhole frame that will be adjusted to match the proposed grade.

B. Payment:

1. Payment for raising each sewer manhole complete in place will be made for the quantity as determined above at the price bid per vertical foot in the Proposal, which price and payment shall be full compensation for all excavation, stone sub base, concrete and masonry materials, for special items of work indicated on the plans for which no pay item has been provided, foundation, sheeting and shoring, sheeting left in place, backfilling, furnishing and installing precast sections, hauling and installing castings, frames and covers, and equipment, tools, labor and incidental items as shown on the Drawings or required to complete the item in accordance with the Plans and Specifications.

4.22 SEWER MANHOLES TO BE REMOVED (ITEM NO. S-207)

A. Measurement: Measurement for payment for each unit will be by an actual count removed.

B. Payment: Payment shall include furnishing all equipment, piping, tools, labor and incidentals necessary to complete the manhole removal.

4.23 AIR RELEASE VALVE AND MANHOLE (ITEM NO. S-208)

A. Measurement: Measurement for payment for each unit will be by an actual count installed and tested. Measurement for payment does not signify that the valve and manhole is accepted.

B. Payment:

1. The price paid shall constitute full compensation for furnishing, hauling, testing and installing complete; for sheeting and shoring, sheeting left in place, excavation and backfilling, furnishing and installing air release valves and precast manholes, hauling and installing castings, frames and covers; and for furnishing all equipment, piping, tools, labor and incidentals necessary to complete the manhole and valve installation in accordance with Plans and Specifications. It also includes providing and installing a standard Jefferson Parish sign for Sewer "Valve".
2. Air release valves and valve boxes shall be bid under the following item:

Item No. SS-008 – Air Release Valve and Manhole (10"Ø Sewer Force Main). Which is to be provided with one (1) air release valve (1-10"Ø SFM) and one (1) air release manhole built to the dimensions shown on the plans.

4.24 PUMP STATION (ITEM NO. S-209)

- A. General: The lump sum bid price for construction of the below ground wet well and valve pit pump station facility with site improvements, complete, shall consist of furnishing all plant, tools, equipment, materials, supplies, and manufactured articles and for furnishing all transportation and services, including fuel, power, water, essential communications, and for the complete and satisfactory construction of the facility. The Work includes, but is not limited to, the installation of one (1) wet-well, one (1) below-ground, triplex pump station with submersible pumps, fiberglass enclosure, controls, air release valve, pump-out connection and access road as shown or indicated in the Contract Documents or related detail Drawings. It also includes piping, valves, fittings, panels and controls, electrical cables, conduits, utilities and fixtures, and incidentals. Measurement for this lump sum item will include the labor necessary to construct the pumping station facility with pump-out and air release valve, and wet well, the fully operational, SCADA electronic and communication system, and foundation, including but not limited to, excavation, trenching, bedding, dewatering, bypass pumping, sheeting, shoring, panels, bubblers, floats, instrumentation, valves, piping, coatings, painting, influent and discharge piping and connections between the wet well and pump station, site improvements including, 8" thick stone area and access drive, geotextile fabric, fences and gates, swales, and any incidental items necessary to complete the Work. It shall include the installation of all other materials necessary. The lump sum price also includes design, supplying and installing the sheeting cofferdam. The pump manufacturer's representative shall also be required on site as specified.
- B. Measurement: Measurement will be on a lump sum basis as described above.
- C. Payment: Payment shall be made paid at the lump sum price shown on the bid form for the item "Pump Station ", per Lump Sum.
- D. No other payment will be made for items not included under Paragraph B above. The cost for these items shall be distributed among other pay items shown on the bid form (No Direct Payment).

4.25 REMOVAL OF OLD LIFT STATION (ITEM NO. S-210)

- A. Measurement: Measurement for payment for Removal of old lift station will be on a lump-sum basis as specified herein.
- B. Payment: Payment for Removal of old Lift Station shall cover all preparatory work, removal and disposal of all materials from the existing lift station. This item shall also include filling in the old site with compacted soil.

4.26 REMOVE & REPLACE CONCRETE ROADWAY, SIDEWALK AND DRIVEWAY (ITEM NO. S-211)

- A. Measurement: The measurement for concrete pavement removed and replaced shall be the actual field measured number of square yards removed and replaced as directed by the Engineer in accordance with the thickness indicated on the plans. The area of concrete to be measured for payment will be limited to approved dimensions on the plans unless authorized differently by the Engineer. Contractor shall repair all damaged pavement caused by his operations. The Contractor at no additional cost to the Owner shall repair all damaged areas outside the above limits for measurement.
- B. Payment:
  - 1. Payment for concrete removal and replacement will be made for the quantity, as determined above, measured in square yards, at the price per square yard bid in the Proposal, which price and payment shall be full compensation for breaking, removing, hauling and proper disposal of existing concrete, furnishing and placing the concrete, base course, geotextile fabric and special backfill (including installation and removal of temporary surfacing), proper disposal of other debris, and all else incidental thereto, for which separate payment is not provided under other items in the Proposal.

2. The bid item shall be "Remove & Replace Concrete Sidewalk and Driveway." Concrete paving up to 2" thicker than indicated on the Plans and Specifications may be placed, by order of the Engineer, to match existing concrete thickness at no additional cost. No additional payment will be made for removal of concrete paving greater than thickness specified to be placed. Approval for thicknesses other than those in the plans must be obtained prior to installation.

4.27 VERIFICATION OF EXISTING UTILITIES (ITEM NO. S-212)

- A. Measurement: Measurement for payment for verification of existing utilities will be on a lump sum basis.
- B. Payment: Payment for verification of existing utilities will be made on a lump sum basis and payment shall be full compensation to perform all necessary pot holing, digging, probing or other appropriate work to verify locations and other necessary information about existing utilities to enable installation of items under this contract as authorized by the Engineer and as authorized by the Engineer and as specified herein.

4.28 16"Ø FORCE MAIN TIE IN (ITEM NO. S-213)

- A. Measurement: The wet tap to the existing force main shall be measured on as lump sum basis. It includes the wet-tap to the Price Brothers concrete pressure pipe, a complete strap-type saddle assembly and installation, testing, a protective coating of cement mortar, and permanent support as per Price Brothers manufacturer recommendations and plans and specifications. It includes all fittings as called out in the detail, all labor, equipment, tools, and incidentals to install a full unit.
- B. Payment: The wet-tap installed and tested will be paid at the lump sum price bid, for "16"Ø Force Main Tie In ." The lump sum price and payment will constitute full compensation for furnishing, hauling and installing the wet-tap assembly complete; for all excavation, special items of work indicated on the Plans for which no pay item has been provided, foundation, supports, bedding, sheeting and shoring, sheeting left in place, backfilling and compacting, restoring the surface to grade, removal of surplus earth, and for the furnishing of all equipment, tools, labor and incidental items as shown on the Drawings or required to complete the item in accordance with the manufacturer's recommendations and the Plans and Specifications.

4.29 10" FORCE MAIN TIE IN (ITEM NO. S-214)

- A. Measurement: The wet tap to the existing force main shall be measured on as lump sum basis. It includes the tie in to existing force main, a complete strap-type saddle assembly and installation, testing, a protective coating of cement mortar, and permanent support as per manufacturer recommendations and plans and specifications. It includes all fittings as called out in the detail, all labor, equipment, tools, and incidentals to install a full unit.
- B. Payment: The wet-tap installed and tested will be paid at the lump sum price bid, for "10"Ø Force Main Tie In ." The lump sum price and payment will constitute full compensation for furnishing, hauling and installing the wet-tap assembly complete; for all excavation, special items of work indicated on the Plans for which no pay item has been provided, foundation, supports, bedding, sheeting and shoring, sheeting left in place, backfilling and compacting, restoring the surface to grade, removal of surplus earth, and for the furnishing of all equipment, tools, labor and incidental items as shown on the Drawings or required to complete the item in accordance with the manufacturer's recommendations and the Plans and Specifications.

4.30 PIPE FITTINGS - DUCTILE IRON (ITEM NO. S-301)

- A. Measurement: The measurement of all ductile iron fittings not included in the cost of other bid items (such as lump sum bids for lift stations) will be by weight in tons (as published by the manufacturer) of the fittings installed.
- B. Payment: The actual fittings installed and accepted, measured as provided above, will be paid for at the unit price per ton and this price and payment will constitute full compensation for furnishing, hauling and installing the fittings complete, including all excavation, special items of work indicated

on the plans for which no pay item has been provided, backfilling and equipment, tools, labor and incidental items as shown on the drawings or required to complete the item in accordance with the plans or specifications. This item shall not include fittings which are within the limits of the lift station lump sum price, nor does it include joint restrainers which will be paid for separately.

4.31 REMOVE EXISTING WATERLINES (ITEM NO. S-302)

- A. Measurement: Measurement for removing the existing water lines shall be measured for payment on a unit price basis per linear foot measured along the top centerline of the pipe.
- B. Payment: Payment removing existing water lines shall be on a unit price basis per linear foot and shall include all related site and civil work necessary to perform the work as well as any other incidentals not specifically identified for payment under separate pay item.

4.32 JOINT RESTRAINERS (ITEM NO. S-303)

- A. Measurement: Measurement for joint restrainers will be at the unit price per each installed for the size and type indicated.
- B. Payment: Payment will constitute full compensation for furnishing and installing the joint restrainers for water lines and sewer force mains, including furnishing all equipment, connectors, tools, labor and incidentals to complete the installation in accordance with the plans and specifications.

4.33 FIRE SERVICE LINE (ITEM NO. S-304)

- A. Measurement: Measurement for fire service lines shall be measured for payment on a unit price basis per linear foot installed.
- B. Payment: The actual total linear feet of water service lines installed and accepted will be paid at the unit price bid and shall include all labor, materials, tools, and equipment necessary to furnish, layout, excavate, install, chlorinate and backfill.

4.34 FIRE SERVICE TAPS (ITEM NO. S-305)

- A. Measurement: Measurement for fire service taps will be at the unit price per each installed for the size and type indicated.
- B. Payment: Payment will constitute full compensation for all labor, materials, tools, adaptors (taps), plugs and check valves necessary to furnish, install, chlorinate and backfill.

4.35 MECHANICAL JOINT ADAPTOR (ITEM NO. S-306)

- A. Measurement: Measurement for mechanical joint adaptors will be at the unit price per each installed for the size and type indicated.
- B. Payment: Payment will constitute full compensation for all labor, materials, and tools necessary to furnish and install mechanical joint adaptors in accordance with the plans and specifications.

4.36 BOLLARDS (ITEM NO. S-307)

- A. Measurement: Measurement for bollards will be at the unit price per each installed for the size and type indicated.
- B. Payment: Payment will constitute full compensation for all labor, materials, and tools necessary to furnish and install bollards in accordance with the plans and specifications.

4.37 ITEMS NOT DIRECTLY PAID FOR

- A. The following items of work shall be accomplished with no separate payment. All costs associated with these items shall be included in other bid items or borne by the Contractor:
  - 1. Pressure and Leakage Tests All pressure and leakage tests required as specified shall be considered a subsidiary obligation of the Contractor. No separate payment shall be made in connection with any pressure or leakage tests.

2. Fencing. No separate payment will be made in connection with any fencing required for installation unless otherwise noted on the plans and will be covered under Item No.S-705-06. All other fencing not covered under Item No. S-705-06, such as removal and replacement of existing fencing that is not noted on the plans, shall be included in the unit prices bid for the installed pipe.
3. Stone. No separate payment will be made in connection with the 8” thick stone area within the Pump Station site.
4. Tree Removal and Replacement. No separate payment shall be made for removal and replacement of trees. The removal and replacement of trees is considered a subsidiary obligation of the Contractor and all costs associated with removal, protection, or replacement of trees shall be borne by the Contractor.
5. Drain Pipe Removal and Replacement. No separate payment shall be made for removal and replacement of drain pipes. The removal and replacement of drain pipe is considered a subsidiary obligation of the Contractor and all costs associated with the removal and replacement including excavation, bedding, backfill and compaction thereof, and any work required to install the drain line shall be borne by the Contractor.
6. Steel Sheeting Left in Place  
No separate payment shall be made for the steel sheeting to remain in place. Installation, driving, and cutting of this steel sheeting shall be included in the unit prices bid for the installed pipe and facilities.
7. All items within the Pump Station (Item No. S-209)  
No separate payment shall be made for any item within the fenced area of the Pump Station Site. (Item No. S-209)
8. Field Office for Resident Project Representative
9. Concrete Coatings
10. Crushed Stone, Geotextile Fabric, and all incidental work required to construct the pump station entrance driveway .
11. The abandoned sewer lines are to be filled with flowable fill or low strength grout in accordance with Department of Transportation regulations.
12. Any fittings incidental to the sewer force main and lift station work.

(End of Section)



## SECTION 15030

### DISINFECTION OF WATER DISTRIBUTION SYSTEMS

#### PART 1 – GENERAL

##### 1.01 SCOPE OF WORK

Furnish all labor, materials, equipment and related items required to disinfect all pipelines and other potable water facilities in compliance with these specifications and the requirements of the Louisiana Department of Health and Hospitals (LDHH).

##### 1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 02221: Excavation, Backfilling for Trenches, Pavement and Structures
- B. Section 2622: Polyvinyl Chloride Pipe
- C. Section 2623: High Density Polyethylene Pipe and Fittings

#### PART 2 – PRODUCTS

##### 2.01 DISINFECTING CHEMICALS

- A. Disinfecting chemicals shall comply with AWWA C651. Dry chlorine compounds such as calcium hypochlorite (HTH) shall have at least 60% available chlorine by weight when dissolved in water. The disinfectant used shall be approved by the Engineer.
- B. The disinfectant used shall be delivered to the work site in original unopened and sealed containers bearing the original labels indicating the percentage of available chlorine. The disinfectant shall be recently purchased, and shall be safely stored and handled. During storage, disinfectants shall not be exposed to the weather or direct sunlight, and shall not be opened before use. Chlorine compounds in dry form shall not be stored over 6 months, and liquid compounds shall not be stored over 30 days before use.

##### 2.02 OTHER COMPOUNDS

No chemicals or compounds other than those listed above shall be used for disinfection of potable water lines. No swimming pool or spa chemicals containing bromine, isocyanurate, amines, ammonia, or nitrogen or peroxide compounds shall be used.

#### PART 3 – EXECUTION

##### 3.01 DISINFECTION

- A. Disinfection of potable water lines shall be done in accordance with the applicable sections of AWWA C651. The Contractor shall be responsible for the flushing of all lines and for providing all necessary taps for the disinfection procedure. All methods of work performed by the Contractor in flushing and tapping the lines shall be approved by the Engineer. The Contractor shall notify the Engineer at least 48 hours in advance of any disinfection work that is to be accomplished. Disinfection procedures shall not begin until all leakage and pressure tests are satisfactorily performed, and all leaks and defects have been corrected.
- B. Flushing of the water system before disinfection is recommended; however no type of flushing procedures shall substitute for proper disinfection. Flushing water from a

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disinfected well through the water system, or flushing from a disinfected water supply source, shall not substitute for proper disinfection procedures.

- C. All new piping shall be flushed out and filled completely with a solution containing no less than 50 ppm free chlorine for disinfection. The chlorine solution shall remain in the system no less than 24 hours. During disinfection, valves and hydrants shall be operated to deliver the disinfectant to all fixtures and parts of the system. Disinfectants shall not remain in the system for more than 48 hours before final flushing.
- D. The piping system shall be flushed out thoroughly, with all valves, sample bibs, hydrants, and service valves in the test section being opened and flushed. The piping shall be flushed until the chlorine residual level reaches 1.0 ppm or less, or the level normally carried in the water source used for flushing. Disposal of large volumes of heavily chlorinated water may require a permit from the Louisiana Department of Environmental Quality, which, if necessary, shall be obtained by the Contractor.

### 3.02 SAMPLING AND TESTING

- A. After final flushing, as described above, bacteriological samples shall be taken. At least two (2) samples will be required from each test section, and one (1) sample from each dead end line and each looped line. The total number of samples and the sample locations shall be as directed by the Jefferson Parish Department of Water.
- B. The Contractor shall furnish all materials, equipment, and installations required to sample at the selected test sites. Each of the sampling points shall be flushed until no chlorine resulting from disinfection is present, and a bacteriological sample collected following LDHH procedures. The samples shall be delivered, according to LDHH procedures, to the LDHH Environmental Laboratory or to a laboratory certified by the LDHH for analysis.
- D. All test results from the laboratory shall show “no coliform present”. Any test site showing unsatisfactory results shall require the Contractor to re-disinfect that test section according to the above procedures in this specification. The Contractor shall then arrange for re-sampling these sites. The Contractor shall repeat the disinfection procedures and sampling as often as required to obtain satisfactory results from each sample site.
- E. The water distribution system will not be accepted until passing results from bacteriological samples are obtained from every designated sample site. The Contractor shall be responsible for ensuring that no water is consumed from the system until satisfactory bacteriological samples are obtained, or that the Owner has issued a “boil water” notice until such samples are obtained.
- F. A copy of the bacteriological test results shall be furnished to the Engineer.

(End of Section)

## SECTION 15107

### VALVES FOR WATER SERVICE

#### PART 1 – GENERAL

##### 1.01 SCOPE OF WORK

The Contractor shall provide all labor, materials and equipment required for furnishing and installing valves in locations shown on the drawings in accordance with these specifications and as described in the drawings.

##### 1.02 OTHER REQUIREMENTS

Section 02221: Excavation, Backfilling for Trenches, Pavement and Structures

##### 1.03 QUALITY ASSURANCE

Within the requirements of the section pertaining to "Shop Drawings, Product Data and Samples" of these specifications as well as any other applicable sections of these specifications, the Contractor shall submit shop drawings, product data and other miscellaneous information for all equipment herein specified to the Engineer for approval prior to fabricating or ordering any of the proposed equipment or constructing any item of work which is affected by the particular characteristics of any of the proposed equipment.

##### 1.04 PRODUCT DELIVERY, HANDLING AND STORAGE

The equipment herein specified shall be packaged and shipped in a manner which shall adequately protect the equipment from damage. Upon receipt of the equipment by the Contractor, the equipment shall be stored in a location within the Contractor's staging area remote from possible damage. If any equipment is damaged, lost or stolen at any time prior to acceptance of the project, it shall be replaced at the Contractor's expense.

#### PART 2 – MATERIALS

##### 2.01 GATE VALVES

All gate valves, 4 inch – 12 inch, shall have cast iron or ductile iron bodies, bronze mounted resilient seat type with a 200 p.s.i. working pressure. Gate valves shall conform to AWWA C509 or C515 and have a non-rising stem, 2 inch operating nut and open in a counter-clockwise direction (left hand opening). Gate valves shall have a factory applied epoxy coating and have stainless steel or heat treated teflon coated cor-ten bolts and nuts. No cadmium plated nuts and bolts are permitted. Gate valves shall be manufactured by Henry Pratt Company, Mueller Company, M & H, Clow or Dzurich. Valves must be of domestic United States of America manufacture.

##### 2.02 BUTTERFLY VALVES

All valves 14 inches and larger shall be butterfly valves conforming to AWWA C504, class 150B. Valves shall be short body design with mechanical or flanged ends and operate by turning a two (2) inch operating nut in a counter-clockwise direction (left hand opening). Butterfly valves shall have a factory applied epoxy coating and have stainless steel or heat treated teflon coated cor-ten bolts and nuts. No cadmium plated nuts and bolts

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are permitted. Butterfly valves shall be manufactured by Henry Pratt Company, Mueller Company, M & H, Clow or Dzurich. Valves must be of domestic United States of America manufacture.

2.03 CHECK VALVES

Check valves shall be plain type with bronze mounting suitable for direct burial, and be of domestic United States of America manufacture. Check valves 3 inch to 12 inch in size shall be a plain swing check type with a cast iron or ductile iron body, stainless steel hinge pin, bronze disc and seat ring. The valve shall be suitable for direct burial and shall have flanged or mechanical joint ends. Valves shall be of domestic United States of America manufacture.

PART 3 – EXECUTION

- 3.01 Install valves and valve boxes as detailed in the drawings and in strict accordance with the manufacturer's recommendations.

(End of Section)

## SECTION 15300

### FIRE HYDRANTS

#### PART 1 – GENERAL

##### 1.01 SCOPE OF WORK

The Contractor shall provide all labor, materials and equipment required for furnishing and installing new fire hydrants in locations shown on the drawings in accordance with these specifications and as described in the drawings.

##### 1.02 OTHER REQUIREMENTS

Section 02221: Excavation, Backfilling for Trenches, Pavement and Structures

##### 1.03 QUALITY ASSURANCE

Within the requirements of the section pertaining to "Shop Drawings, Product Data and Samples" of these specifications as well as any other applicable sections of these specifications, the Contractor shall submit shop drawings, product data and other miscellaneous information for all equipment herein specified to the Engineer for approval prior to fabricating or ordering any of the proposed equipment or constructing any item of work which is affected by the particular characteristics of any of the proposed equipment.

##### 1.04 PRODUCT DELIVERY, HANDLING AND STORAGE

The equipment herein specified shall be packaged and shipped in a manner which shall adequately protect the equipment from damage. Upon receipt of the equipment by the Contractor, the equipment shall be stored in a location within the Contractor's staging area remote from possible damage. If any equipment is damaged, lost or stolen at any time prior to acceptance of the project, it shall be replaced at the Contractor's expense.

#### PART 2 – MATERIALS

##### 2.01 FIRE HYDRANTS

**a. EASTBANK FIRE HYDRANTS** - Eastbank fire hydrants shall be three way compression type (opening against pressure) conforming to AWWA C-502. Hydrants shall have a 5 ¼ inch inlet connection with two 2 ½ inch nozzles and one 4 ¼ inch pumper nozzle. All nozzles shall have the New Orleans Sewerage and Water Board Thread Standards. Hydrants shall have a 1 1/8 inch operating nut. Right hand opening (clockwise). All hydrants for the East Jefferson Water District shall be Mueller (No. A423), Kennedy Guardian (Model K81A) or American Darling (Model B-84-B).

**b. WESTBANK FIRE HYDRANTS** - Westbank fire hydrants shall be three way, compression type (opening against pressure) conforming to AWWA C-502. Hydrants shall have a 5 ¼ inch inlet connection with two 2 ½ inch hose nozzles and one 4 ¼ inch pumper nozzle. All nozzles shall have National Standard Threads.

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Hydrants shall have a 1 ¼ inch operating nut. Left hand opening (counter-clockwise).  
All hydrants for the West Jefferson Water District shall be Mueller Super Centurion 250 (Mueller No. A423), Kennedy Guardian (K81A) or American Darling (Model B-84-B).

## 2.02 ACCESSORIES

- A. Fire hydrants shall be furnished fully equipped, with outlet caps and swivel security chains.

## PART 3 – EXECUTION

- 3.01 Install new fire hydrants as detailed in the drawings and in strict accordance with the manufacturer's recommendations.

(End of Section)