

LAFAYETTE UTILITIES SYSTEM

DEVELOPMENT GUIDELINES

Revised
December 2020



LAFAYETTE UTILITIES SYSTEM
1314 WALKER ROAD
LAFAYETTE, LA 70502

(337)291-5858

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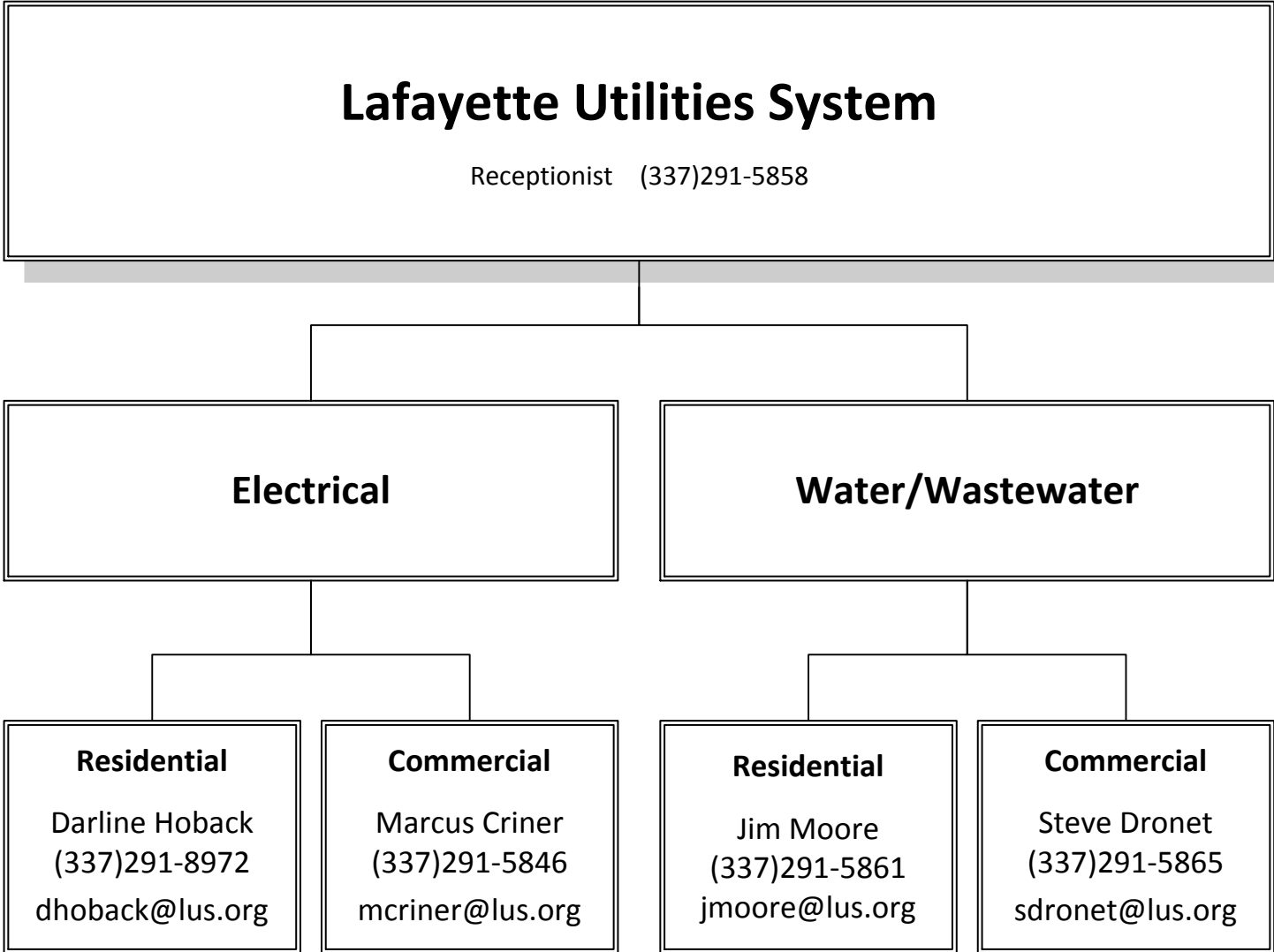
FOREWORD

Lafayette Utilities Systems (LUS) has prepared the following guide that describes the general procedures for the installation and extension of utilities, within LUS jurisdiction. This guide includes design criteria and planning principles that are important to LUS, while also reflecting established professional engineering practices.

When altering or extending any LUS utility or requesting service from LUS, the policies outlined in the following sections will apply. The listed procedures should answer many questions that a developer or builder may have. However, since no guide can list every condition that may need to be addressed during a particular development, a list of LUS personnel is provided, whom may be contacted when more specific guidance is needed.

Plans requiring extensions or modifications to LUS facilities will be reviewed and approved by one of the listed personnel responsible for the applicable development prior to the issuance of a Building Permit or start of the construction process.

SECTION I
CONTACTS



SECTION II
ELECTRICAL PROCEDURES

2-1 General Provisions

A. Type of Developments

Developments in this section are divided into the categories of Single-lot Commercial, Multi-lot Commercial, Single Family Residential and Multi-lot Residential.

1. Single-lot Commercial developments are commercial lots for development as shopping centers, industrial buildings, schools, and churches.
2. Multi-lot Commercial developments are individual parcels of land which have been subdivided into two (2) or more individual commercial lots.
3. Single Family Residential developments are single family detached housing subdivisions located on a singularly owned parcel of land which has been subdivided into individual lots.
4. Multi-Family Residential developments are multi-family complexes (i.e. apartments and townhouses) located on a singularly owned parcel of land.

B. Improvements

Improvements are electrical facilities installed by the Owner/Developer of Developments at their total cost which are necessary to provide electrical service to the Developments. The Improvements are for perpetual maintenance and ownership by LUS upon the acceptance of the facilities by LUS.

C. Agreement to install improvements

The Owner/Developer of all Residential Developments requiring Improvements shall enter into a written agreement with the Lafayette City-Parish Consolidated Government. The Owner/Developer for Multi-lot Commercial Developments requiring Improvements shall install said Improvements as a condition of final plat approval.

D. Guarantee

In order for the Owner/Developer of Developments requiring Improvements to receive approvals (i.e. building permit, certificate of occupancy, plat approval)

prior to the installation and release of the Improvements for service, a performance bond or letter of credit shall be granted to LUS.

E. Warranty and Guaranty

The Owner/Developer of Developments requiring Improvements shall Warrant the Improvements for a period of one (1) year from the established start of the warranty period. The warranty period shall begin no earlier than Final Inspection and completion of the punch list items.

F. Easements

The Owner's/Developer's Engineer shall prepare the necessary easements to encompass the actual location of the installed Improvement on the final plat of the property or a LUS approved format. The typical easement width is ten (10) feet. The Engineer shall record the approved easement in the Lafayette City-Parish Consolidated Government Courthouse and provide a true copy to LUS.

G. Construction Control

The Owner/Developer of all Residential Developments shall provide a qualified resident inspector. LUS provides inspections for all Commercial Developments.

2-2 Commercial Electrical Procedures

A. The developer shall be required to install an underground raceway system in order for LUS to provide an electrical distribution system. LUS shall install the conductors, terminations, cabinets and transformers.

1. Prior to the design, the developer's engineer/ architect shall contact LUS staff to indicate the intentions of the developer relative to building construction.
2. LUS will provide the electrical system design according to LUS criteria and specifications.
3. The Developer shall submit to the LCG permit department a set of construction plans that shall include:
 - Electric site survey showing all existing electric facilities
 - Proposed electric routing (civil consultant shall ensure route has straight line paths and is free of obstructions)
 - Proposed transformer location.
 - Electric load summary, panel schedules and riser diagram.
 - Plat of site including pertinent information as shown on the final

subdivision plat such as street names and right-of-ways, property corners, all bearings, curve data, property dimensions, all existing easements, all new easements, all adjacent property owners and streets, lot numbers, municipal addresses, vicinity map, owner/developer, subdivision name, typical utility easement drawing, north arrow and all notes shown on the final subdivision plat.

4. LUS engineering staff will mark-up in red ink the layout of the proposed system and return same to Developer or his authorized representative. Also submitted to the Developer will be a bid package for construction which consists of the electric layout and a set of LUS specifications and typical details. This information shall be used by the Developer to have the electrical system installed by a licensed and qualified electrical contractor.
5. The Developer or his authorized representative shall schedule a pre-construction meeting with LUS staff prior to commencing construction.

2-3 Residential Electrical Procedures

A. Procedure for Electrical Installation in Multi-family Dwelling Developments

1. The developer shall submit to the LCG permit department a set of construction plans including the following:
 - Electric site survey showing all existing electric facilities
 - Proposed electric routing (civil consultant shall ensure route has straight line paths and is free of obstructions)
 - Proposed transformer location and locations of all meter centers.
 - Electric load summary, panel schedules and riser diagram.
 - Layouts of new utilities water, sewer, drainage, gas, communications, right-of-ways, property corners, all bearings, property dimensions, all existing easements, all new easements, all adjacent property owners and streets, municipal addresses, vicinity map, Owner/Developer name, typical utility easement drawing, North arrow and all notes shown on the final development plat.
 - Architectural plans showing apartment unit numbers and types (1 bed, 2bed) and unit square footage.
2. The developer shall contact LUS engineering for a design request and provide an AutoCAD (.dwg format) utility site plan for the subject development. The AutoCAD plan shall include apartment unit numbers and types (1 bed, 2bed), unit square footage, proposed locations for utility

transformers, locations of electric meter centers, locations of existing easements, new easements, and layouts of all other underground or overhead utilities.

3. LUS will provide the Developer with the electrical layout and specifications for the underground primary electrical distribution system to serve the buildings, along with standard LUS detailed specifications, general procedures, and a list of LUS approved contractors.
4. The Developer shall prepare a bid package for construction utilizing the final electrical system layout, and be responsible for hiring a contractor from the approved list for installation of the complete electrical distribution system.
5. The Developer or his authorized representative shall schedule a pre-construction meeting with LUS staff prior to commencing construction in the development.
6. The Developer shall enter into an electrical agreement with the Lafayette City-Parish Consolidated Government, per Lafayette City-Parish Government Municipal Code § II (94) (IV) (I) 94-208 prior to commencing construction.
7. LUS will supply the pad mount transformers and delivery of the transformers to the job site is the responsibility of the developer.
8. The Developer shall be responsible for staking all electrical facility locations as well as all trench and bore lines prior to the start of construction. The Developer is also responsible for identifying/marketing any other underground facilities that may have been installed by the developer but is/are not yet under the jurisdiction of a utility locating agency.
9. The Developer shall be responsible for installation of the electrical system and inspection of the work during construction to ensure compliance with the system's standards of construction as well as all applicable safety standards as per the LUS Procedures for Underground Contractors.
10. LUS Operations shall perform final inspection and approval of the new installed electrical system.
11. The developer shall submit a final plat including all required utility easements.

12. Certificate of occupancy (CO) will be released once the required utility easement plat is recorded and submitted to LUS. The LUS will supply and install individual standard meter bases for each residential unit, when connected orders are received.
13. LUS Customer service shall be contacted to set up billing accounts for electrical services.
14. Renewable Energy sources may operate in parallel with LUS electric secondary services, subject to LUS approval. LUS net metering standards are available online at <http://www.lus.org>.

B. Procedure for Electrical Installation in Residential Subdivisions

1. The Developer shall contact LUS requesting design of the electrical system for the new development.
2. The developer shall submit an AutoCAD (.dwg format) utility site plan and the final set of plans of the new development in PDF. The plans shall include layouts of new utilities water, sewer, drainage, gas, communications, right-of-ways, property corners, all bearings, property dimensions, all existing easements, all new easements, all adjacent property owners and streets, municipal addresses, vicinity map, Owner/Developer name, typical utility easement drawing, North arrow and all notes shown on the final development plat.

LUS will provide the Developer with the electrical layout and specifications for the underground primary electrical distribution system, along with standard LUS detailed specifications, general procedures, and a list of LUS approved contractors.

3. The Developer or his/her authorized representative will inform LUS Engineering of any conflicts or concerns of the proposed electrical system in writing.
4. The Developer shall prepare a bid package for construction utilizing the final electrical system layout.
5. The Developer shall use the bid package to obtain bids for construction from at least three contractors on the LUS Approved Contractors List.
6. Once the Developer has obtained a minimum of three bids and has decided on a contractor, the Developer or his authorized representative shall schedule a pre-construction meeting with the LUS Engineering Division

prior to starting construction in the subdivision.

7. The lowest three bids must be submitted to LUS at least twenty-four (24) hours prior to the pre-construction meeting for LUS Engineering to review.
8. The Developer shall enter into an electrical agreement with the Lafayette City-Parish Consolidated Government, per Lafayette City-Parish Government Municipal Code § II (94) (IV) (I) 94-208 prior to commencing construction.
9. LUS will supply the cabinets, transformer pads and pad-mount transformers and delivery of all LUS provided materials to the job site is the responsibility of the developer.
10. The Developer shall be responsible for staking all electrical facility locations as well as all trench and bore lines prior to the start of construction. The Developer is also responsible for identifying/marketing any other underground facilities that may have been installed by the developer but is/are not yet under the jurisdiction of a utility locating agency.
11. The Developer shall be responsible for installation of the electrical system and inspection of the work during construction to ensure compliance with the system's standards of construction as well as all applicable safety standards as per the LUS Procedures for Underground Contractors.
12. LUS Operations shall perform final inspection and approval of the new installed electrical system.
13. The developer shall submit a final plat including all required utility easements.

SECTION III

WATER AND WASTEWATER PROCEDURES

3-1 GENERAL PROVISIONS

A. Type of Developments

Developments in this section are divided into the categories of Commercial and Residential. Some Developments are a combination of Commercial and Residential.

1. Commercial developments are individual commercial buildings, shopping centers, multifamily complexes (ie: apartments), industrial buildings, schools, and churches.
2. Residential developments are single family residences located on a singularly owned parcel of land.

B. Improvements

“Improvements” are water and wastewater facilities installed by the Owner/Developer of Developments at their total cost to provide water/wastewater service and fire protection to the Developments. The “Improvements” are for the perpetual maintenance and ownership of LUS upon the final acceptance of the facilities by LUS.

C. Agreement to Install Improvements

The Owner/Developer of Developments requiring Improvements shall enter into a written agreement with the Lafayette Utilities System.

D. Improvements Guarantee

In order for the Owner/Developer of Developments requiring Improvements to receive approvals (ie: building permit, certificate of occupancy, plat approval) prior to the installation and release of the Improvements for service, a performance bond or letter of credit shall be granted LUS. The Guarantee is 100% of the total cost of installation and engineering.

E. Improvements Warranty

The Owner/Developer of Developments requiring Improvements shall Warrant the Improvements for a period of one (1) year from the established start of the warranty period. The warranty period shall begin no earlier than Final Inspection and completion of the punch list items. LUS will accept perpetual maintenance of the Improvements upon the completion of the warranty period.

F. Improvements Materials and Installations

LUS approved materials and installation standards are located in the Appendix of this manual. All materials and installations shall adhere to LUS specifications. Prior approval is required for all non listed materials and installation procedures.

G. Improvements Easements

The Owner's/Developer's Engineer shall prepare the necessary servitude to encompass the actual location of the installed improvement on the final plat of the property or by individual easement plat. The easement width shall be a minimum of ten (10) feet. The Engineer shall record the approved easement in the Lafayette Parish Courthouse and provide a recorded copy to LUS.

H. Improvements Construction Control

The Owner/Developer shall provide for qualified on site inspections and submit the required testing reports and certifications.

I. Improvements Connections to Existing LUS Facilities

LUS shall be contacted 24 hours in advance of any connections. No connection to existing LUS water/wastewater facilities shall be made without the presence of LUS. All water transfers from the existing water system to the new Improvements water system shall be controlled by LUS personnel, only. No discharge into the existing wastewater system will be allowed without the approval of LUS. All wastewater connections to LUS shall remain plugged until the release is approved by LUS. Persons discharging into LUS' wastewater system and operating valves/fire hydrants without LUS approval, will be subject to legal prosecution.

J. Improvements Final Inspection

The Owner's/Developer's Engineer shall schedule a final inspection with LUS upon the completion of all utilities, landscaping, roadways, and any other item that establishes final grade.

3-2 PROCEDURES

The procedures listed below are a general guide as to the sequence of events necessary for a Development installing Improvements.

1. Construction Plans are submitted to LUS for review and approval.
2. LUS forwards the specific project comments and all project related forms to the Architect/Engineer and/or Owner.
3. Architect/Engineer and/or Owner completes the forms, accepts LUS' review comments and/or revises the Construction Plans. If owner(s) are requesting final plat approval, or for certificate of occupancy prior to installation and acceptance of improvements, owners will need to provide for project's guarantee. (Letters of Credit, etc.) LUS grants approval to construct the Improvements and/or grants permits.
4. The Owner's Architect/Engineer schedules a preconstruction meeting with the installing contractor and LUS.
5. The Owner's Architect/Engineer coordinates all phases of construction, provides on site construction inspection, easement, asbuilts, testing reports, and construction certification.
6. The Owner's Architect/Engineer schedules a final inspection upon the installation of all utilities, roadways, landscaping, and any other item that establishes final grade. Upon the completion of the punch list, LUS accepts the Improvements for service and/or grants permits.
7. The Owner warrants the improvements for a period of one (1) year following the acceptance of the Improvements for service. Upon the completion of the warranty period, LUS accepts the Improvements for perpetual maintenance.

3-3 DESIGN CRITERIA

A. Improvements Construction Plans

Construction Plans for improvements shall be submitted to LUS for review and approval. The Plans shall be detailed drawings engineered by a Louisiana Licensed Engineer or Architect qualified to perform services in the area of their competence. The Plans shall reflect established professional civil engineering practice. Plans shall not be based solely on statements such as “extend and connect” or “install according to LUS standards”. Typical Details shall supplement the engineered drawings and shall not be submitted in lieu of detailed engineered drawings.

Key plan elements shall include existing utilities (plan and profile), existing and proposed easements, location and type of connections to existing LUS facilities, methods of restraints for proposed and/or existing LUS facilities, valving, fire protection devices, permits by Authorities of Jurisdiction (ie: LA DOTD, LCG Public Works, State Fire Marshall), grades, materials, installation requirements, testing procedures, and water meter services lines and/or taps, and supporting hydraulic and technical reports.

Approved service connections shall be installed and provided to each and every lot or parcel of development by the Owner/Developer.

B. Design Standards of Reference

WATER

American Water Works Association
Insurance Services Office
National Fire Protection Association
Fire Prevention Code
LCG Code of Ordinances
LUS Details and Specifications
Louisiana Dept. of DOTD
LCG Subdivision Regulations

WASTEWATER

National Environmental Federation
Standard Plumbing Code
Louisiana Sanitary Code
LCG Code of Ordinances
LUS Details and Specifications
Louisiana Dept. of DOTD
LCG Subdivision Regulations

1. General. No Development shall adversely impact the existing Lafayette Utilities System. Additional water and/or wastewater facilities may be required to supplement the existing LUS system(s) to allow the construction of the Development. All associated costs shall be at the total cost of the Owner/Developer. Supporting hydraulic and technical reports may be required to show that the proposed water and wastewater facilities will meet the minimum standard for the particular Development.
2. Water Distribution System Design Requirements. Minimum standards for Water Mains, Valves, and Fire Hydrants are listed below. The actual size of the supply main shall be determined by its ability to deliver water based on the peak-daily demand, plus the designated fire flow. Commercial Developments vary too much in scope to include all applications. Where possible, dead end lines should be avoided. Placement shall be located in an accessible grassy areas or LUS approved locations.

MAINS

Smallest pipes in network	6 in.
Smallest branching pipes (dead ends)	8 in.
Largest spacing of 6 in. grid	600 ft.
Smallest pipes in high-value district	8 in.
Smallest pipes on principal supply mains	12 in.
Largest spacing of supply mains	3000 ft.

VALVES

Largest spacing in network	800 ft.
Largest spacing in high-value district	500 ft.

FIRE HYDRANTS

	Isolation Valve per Each
Largest spacing in network	500 ft.
Largest spacing in high-value district	300 ft.

3. Water Meters. Separate meters are required for domestic service and non-potable applications. The installation of the water meter boxes varies with the type of Development. Placement shall be in a protected, accessible grassy area, or LUS approved location. LUS will determine the size and configuration of all metering, based on needed flow as determine by the developer.

Commercial Developments. The Owner/Developer shall install the necessary water main and/or service line to the Development. LUS will install the water meter/box on existing water mains, at the applicable installation fee, when the water main is located within the Development and where no Improvement is being proposed. Where an existing line is not located within the Development, the Owner/Developer shall install an adequately sized service line and/or the connecting appurtenance. For Developments being master metered (one meter servicing many units), once the Owner/Developer has installed an approved water distribution system, including the water meter connection appurtenance, LUS will install the water meter/box at no cost to the Owner/Developer. Developments requesting a meter for each unit, will install the water meter boxes and all service appurtenances in LUS approved locations (typically, meters are installed groups in these applications). LUS will install the water meters at no cost to the Owner/Developer where the Owner/Developer has installed water meter boxes in LUS approved locations.

Residential Developments. Where the Owner/Developer has installed an LUS approved water distribution system with a water line to every residence and the water meter location is approved by LUS, LUS will install a water meter/box at no cost to the Owner/Developer. This applies only to domestic meters. The water meter boxes for non-potable applications will be installed by the Owner/Developer and LUS will install the meter at no cost to the Owner/Developer, or LUS will install the water meter/box at the standard installation fee where the meter box is located adjacent to the water main.

4. Fire Lines. The Owner/Developer shall install LUS approved fire line supply configurations in LUS approved locations. Typically, the fire line supply appurtenances are installed adjacent to the property line. The water line to the building is under the jurisdiction of the State Fire Marshall and the City of Lafayette Fire Department.

5. Wastewater Collection System Design Requirements. Minimum standards are listed below. The actual size of wastewater mains shall be determined upon the capacity needed to adhere to the standards of jurisdiction. The Owner/Developer shall install a service to each defined parcel of individually owned land. Typically, wastewater collection systems installed within Commercial Developments are considered private plumbing line and not under the jurisdiction of LUS. Private plumbing lines are under the jurisdiction of the Metro Code Plumbing Authority. Residential Developments with installations along Public Streets and/or utilities servitudes are generally under the jurisdiction LUS. The Owner/Developer shall extend wastewater mains to the Development at the necessary depth to service the Development from the existing LUS system.



SERVICES

6 in. at 1% grade

MAINS

8 in. at 0.4% grade

10 in. at 0.28% grade

12 in. at 0.22% grade

MANHOLES

500 ft. at intersecting sections

FORCEMAINS

Sized per Development

LIFT STATIONS

Sized per Development

APPENDIX - A

ELECTRICAL ACKNOWLEDGMENT FORMS

OWNERS ACKNOWLEDGMENT FORM (COMMERCIAL)

ELECTRICAL LOAD SUMMARY (COMMERCIAL)

OWNERS ACKNOWLEDGMENT FORM (RESIDENTIAL)

OWNER'S ACKNOWLEDGMENT FORM FOR ELECTRICAL SERVICE

To: Owner/Developer

Subject: Owner's/Developer's Acknowledgment of Project Requirements for Planning, Zoning, and Codes Plan Reviews (Electric).

Utility: Lafayette Utilities System (LUS) - Commercial Services Section
1314 Walker Road
Lafayette, LA 70506
Attn: Marcus Criner (mcriner@lus.org)

Mission: The intent of this form is to ensure LUS that the Owner/Developer of the properties submitting plans for underground primary line extensions onto private property is properly informed of all project requirements in order to avoid unnecessary delays.

Owner's Acknowledgment:

Project Name: _____

Project Address: _____

Owner's Name: _____

Owner's Signature: _____

Date: _____

I hereby acknowledge the requirements listed below and the specific plan review comments furnished through Planning, Zoning, and Codes (attached) for the above project. The requirements are as follows:

1. _____ is the Owner's Engineer/Architect for this project.
2. Project specifications and typical details shall be submitted to LUS for review. The Owner's Engineer/Architect shall be solely responsible for ensuring current LUS specifications and typical details are adhered to. LUS shall provide copies of said specifications and details to the Owner's Electrical Contractor.
3. The Owner's Engineer/Architect or his authorized representative shall present a proposed route of the underground primary electric line to LUS. The route shall consist of straight-line paths, the length of each straight-line path and the distance each straight-line path is relative to property lines (refer to attached drawing).

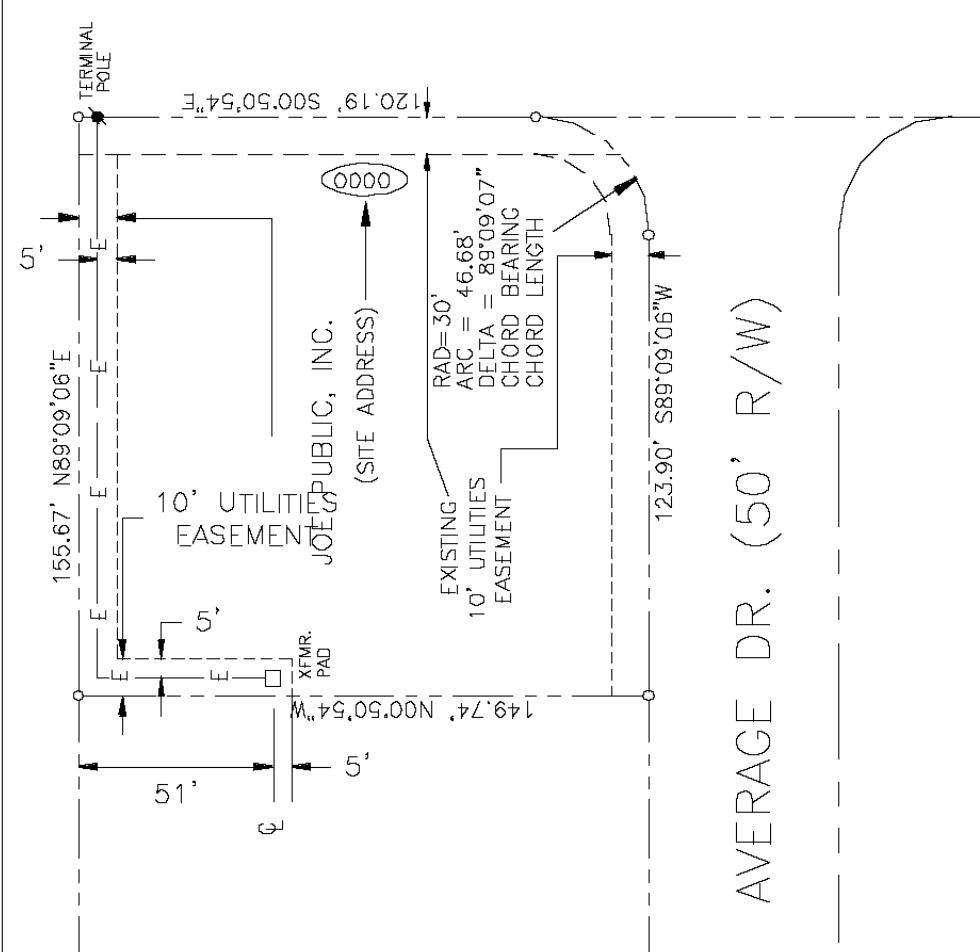
OWNERS ACKNOWLEDGEMENT (ELECTRICAL)

Page 2

The Owner's Engineer/Architect shall select said proposed route in a manner such that there are no conflicts with any obstructions deriving from any other part of the project. Owner/Developer shall be responsible for informing the LUS Engineering Division of any known conflict(s) at the time of this service request and the resolution to rectify said conflict(s). Examples of said conflicts shall include, but not be limited to, overhangs, awnings, gutters, general space requirements for safe operations, and ingress and egress. Owner shall be responsible for notifying the LUS Engineering Division of any unforeseen conflict(s) as soon as the Owner/Developer is made aware of the same.

4. _____ is the Owner's Professional Land Surveyor for this project. The Owner's Surveyor is responsible for preparing a surveyed plat of the property indicating the property boundaries, the building and its location on the lot, the electric source, the transformer, the underground primary line, and a ten (10) foot utilities easement that envelops the underground primary line, five (5) feet on either side of the line. The plat shall show all dimensions and distances described in Item 3 above. The plat shall be recorded at the Lafayette Parish Courthouse and a copy submitted to LUS.
5. The Certificate of Occupancy shall not be issued until all project requirements are completed.

xc: File



COMMON RD. (120' R/W)

AVERAGE DR. (50' R/W)

UTILITIES EASEMENT TO
BE GRANTED TO

LAFAYETTE UTILITIES SYSTEM

BY
JOE PUBLIC, INC.
000 COMMON DR
SECTION 00, TOE-ROE

JOHN DOE, P.L.S. #12345 LAND SURVEYOR

NOTE:
INFORMATION OBTAIN FROM
A PLAT OF SURVEY PREPARED BY LAND SURVEYOR
MONTH DAY, YEAR (DATE OF ORIGINAL SURVEY PLAT)

SCALE: 1"=50'

DATE: 7/20/99

Electrical Load Summary

	Hours of Operation Per Day:	kVA Electric Loads:	Check One Below:
Lights	_____ Hrs	_____ kVA	_____ 1ph, _____ 3ph
Receptacles	_____ Hrs	_____ kVA	_____ 1ph, _____ 3ph
Air Conditioning (no. of units = _____)	_____ Hrs	_____ kVA	_____ 1ph, _____ 3ph
Heat Pump (no. of units = _____)	_____ Hrs	_____ kVA	_____ 1ph, _____ 3ph
Heat Strips (no. of units = _____)	_____ Hrs	_____ kVA	_____ 1ph, _____ 3ph
Water Heater	_____ Hrs	_____ kVA	_____ 1ph, _____ 3ph
Fans	_____ Hrs	_____ kVA	_____ 1ph, _____ 3ph
Motor(s) (largest hp rating _____)	_____ Hrs	_____ kVA	_____ 1ph, _____ 3ph
Welder(s)	_____ Hrs	_____ kVA	_____ 1ph, _____ 3ph
Miscellaneous Load(s)	_____ Hrs	_____ kVA	_____ 1ph, _____ 3ph
Total Load:		_____ kVA	_____ 1ph, _____ 3ph

Voltage: _____

I, _____, state that the information provided above is correct for the following project: _____ at

the following address: _____

and agree to resubmit a new electrical load summary should any changes occur.

Signature of individual providing information: _____

Name of firm: _____

Date submitted: _____

Proposed date of completed electrical service: _____

NOTE:

If copy of LUS plan review comments is desired, please provide fax number: _____

OWNER'S ACKNOWLEDGMENT FORM FOR ELECTRICAL SERVICE

To: Owner/Developer

Subject: Owner's/Developer's Acknowledgment of Project Requirements for Planning, Zoning, and Codes Plan Reviews (Electric).

Utility: Lafayette Utilities System (LUS) - Residential Services Section
1314 Walker Road
Lafayette, LA 70506
Attn: Darline Hoback (dhoback@lus.org)

Mission: The intent of this form is to ensure LUS that the Owner/Developer of the properties submitting plans for underground primary line extensions onto private property is properly informed of all project requirements in order to avoid unnecessary delays.

Owner's Acknowledgment:

Project Name: _____

Project Address: _____

Owner's Name: _____

Owner's Signature: _____

Date: _____

I hereby acknowledge the requirements listed below and the specific plan review comments furnished through Planning, Zoning, and Codes (attached) for the above project. The requirements are as follows:

1. _____ is the Owner's Engineer/Architect for this project.
2. Project specifications and typical details shall be submitted to LUS for review. The Owner's Engineer/Architect shall be solely responsible for ensuring current LUS specifications and typical details are adhered to. LUS shall provide copies of said specifications and details to the Owner's Electrical Contractor.
3. The Owner's Engineer/Architect or his authorized representative shall present a proposed route of the underground primary electric line to LUS. The route shall consist of straight-line paths, the length of each straight-line path and the distance each straight-line path is relative to property lines (refer to attached drawing).

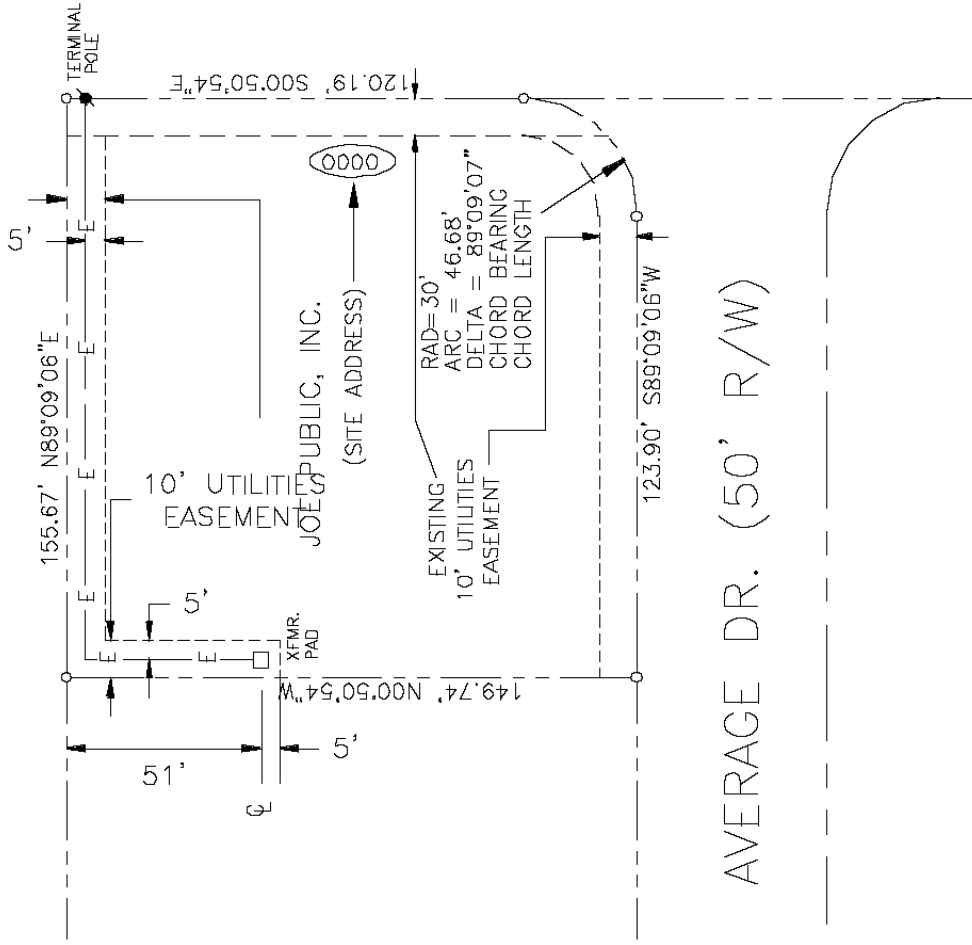
OWNERS ACKNOWLEDGEMENT (ELECTRICAL)

Page 2

The Owner's Engineer/Architect shall select said proposed route in a manner such that there are no conflicts with any obstructions deriving from any other part of the project. Owner/Developer shall be responsible for informing the LUS Engineering Division of any known conflict(s) at the time of this service request and the resolution to rectify said conflict(s). Examples of said conflicts shall include, but not be limited to, overhangs, awnings, gutters, general space requirements for safe operations, and ingress and egress. Owner shall be responsible for notifying the LUS Engineering Division of any unforeseen conflict(s) as soon as the Owner/Developer is made aware of the same.

4. _____ is the Owner's Professional Land Surveyor for this project. The Owner's Surveyor is responsible for preparing a surveyed plat of the property indicating the property boundaries, the building and its location on the lot, the electric source, the transformer, the underground primary line, and a ten (10) foot utilities easement that envelops the underground primary line, five (5) feet on either side of the line. The plat shall show all dimensions and distances described in Item 3 above. The plat shall be recorded at the Lafayette Parish Courthouse and a copy submitted to LUS.
5. The Certificate of Occupancy shall not be issued until all project requirements are completed.

xc: File



COMMON RD. (120' R/W)

AVERAGE DR. (50' R/W)

UTILITIES EASEMENT TO
BE GRANTED TO
LAFAYETTE UTILITIES SYSTEM
BY
JOE PUBLIC, INC.
000 COMMON DR
SECTION 00, TOE-ROE

JOHN DOE, P.L.S. #12345 LAND SURVEYOR

NOTE:
INFORMATION OBTAIN FROM
A PLAT OF SURVEY PREPARED BY LAND SURVEYOR
MONTH DAY, YEAR (DATE OF ORIGINAL SURVEY PLAT)

SCALE: 1"=50'

DATE: 7/20/99

FEEDER LOAD CALCULATION FOR SINGLE FAMILY DWELLING >200A

ADDRESS: _____

ELECTRICIAN: _____

A. LIGHTING LOADS (120V) :

- | | | |
|-------------------------------------|--------------------|--------------------|
| 1. General lighting and receptacles | _____ sq. ft. | |
| | @ 3 W/sq. ft. | _____ W |
| 2. Small appliances & Laundry | _____ each @ 1500W | _____ W |
| 3. | | SUB-TOTAL: _____ W |
| 3A. First 3000W of line 3 @ 100% | | _____ W |
| 3B. Remainder of line 3 @ 35% | | _____ W |
| 4. Total 120V LOAD (Line 3A + 3B) | | _____ W |

B. LARGE APPLIANCES (240V):

- | | | |
|------------------------------------|--|--------------------|
| 5. Stove | | _____ W |
| 6. Dryer | | _____ W |
| 7. Fixed appliance circuits | | _____ W |
| 8. Water heater | | _____ W |
| 9. | | SUB-TOTAL: _____ W |
| 10. TOTAL 240V LOAD (Line 9 @ 70%) | | _____ W |

C. A/C - HEATING LOAD:

- | | | |
|--|-------------|---------|
| 11. A/C units, heat pumps | _____ tons, | _____ W |
| 12. Central electric space heating | | _____ W |
| 13. TOTAL (Larger of lines 11 & 12 @ 100%) | | _____ W |
| Additional OR Anticipated Future Loads: | | _____ W |

(Total of Lines 4, 10 & 13) NET FEEDER LOAD: _____ W

(@Single Phase, 240 v) FEEDER AMPS: _____ A

APPENDIX - B

GENERAL SPECIFICATIONS
FOR
UNDERGROUND ELECTRICAL CONSTRUCTION

GENERAL SPECIFICATIONS FOR UNDERGROUND ELECTRIC

REVISION: 1.0

APPROVED DATE: 12/11/2020



LAFAYETTE UTILITIES SYSTEM

1314 WALKER ROAD, LAFAYETTE, LA 70506

(337) 291-5858



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General Specifications for Underground Electric				Appr. Date:	12/11/2020
Proc. Number:	GS-LUS-0001-20	Revision:	1.0	Issue Date:	12/11/2020

Approvals:

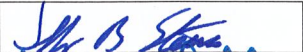

Engineering/Power Supply Manager		Date:	12/07/2020
Electric Operations Manager		Date:	12/4/2020

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1. USE OF GENERAL SPECIFICATIONS

The following is a set of General Specifications for the construction of an underground electric distribution system. Projects may be generated by LUS or may be the responsibility of the Developer. Depending on the scope of the project, all sections may not pertain to all jobs. The Contractor will be responsible only for the sections that pertain to his specific job. If the Contractor is not sure if a section pertains to his job he shall consult the Developer for Residential Projects or LUS Engineering Commercial and Non Commercial projects for verification

2. PROJECT DETAILS

Project Details (Appendix A) shall be completed by LUS and provided to bidders prior to bidding the project. Project Details contain the Project Name, Scope of Work, Schedule, Payments and Penalties

3. REQUIREMENTS

A. GENERAL

1. It is the intention of these General Specifications that all electrical systems be furnished complete and produce a satisfactory installation in a working order
2. All electrical equipment shall be installed per manufacturers specification unless otherwise authorized by LUS
3. The Contractor shall protect the entire electrical system from injury on the project until final acceptance
4. Failure of the contractor to protect the entire electrical system from injury on the project until final acceptance shall be sufficient cause for LUS to reject any equipment
5. The Contractor shall furnish all labor necessary to install the complete electrical portion of the contract
6. For the exception of the materials provided by LUS per the "Detailed Specifications Section (5) (A), the contractor shall provide all material necessary to complete the electrical system per this contract
7. The contractor shall report, to the following, any deficiencies of the design, otherwise shall be responsible in full to meet the conditions set forth, that being, the system is to be in a satisfactory working order:

a) NON COMMERCIAL

LUS

b) COMMERCIAL/RESIDENTIAL

LUS and Developer

B. STANDARDS

1. WORK AND SAFETY

Work shall be done in strict compliance with and therefore bound by the following Federal, State and Local Ordinances, Standards and Procedures governing this class of work:

- (1) National Electrical Code (NEC)
- (2) National Electrical Safety Code (NESC)
- (3) National Fire Protection Association (NFPA)
- (4) Occupational Safety and Health Association (OSHA)
- (5) LCG Code of Ordinances Chapter 78
- (6) Louisiana Administrative Code Title 70 Part 2 Utilities
- (7) LUS Procedures for Underground Contractors (LUS)
- (8) LUS policy on clothing and PPE for ARC Flash (LUS)
- (9) Construction Standards (LUS)

2. MATERIALS

All materials furnished under this contract shall be designed, constructed, rated and shall pass tests as recommended therein in accordance with the following latest applicable standards:

- (1) National Electrical Manufacturers Association (NEMA)
- (2) American National Standards Institute (ANSI)
- (3) American Society for Testing and Materials (ASTM)
- (4) Material Specifications (LUS)

C. UNDERGROUND CONTRACTORS LIST

1. NON COMMERCIAL

The Contractor shall be pre-qualified prior to bidding

2. COMMERCIAL/RESIDENTIAL

- a) The Contractor's name shall appear on the approved underground contractors list provided to the Developer by LUS
- b) Should the Developer desire to hire a contractor whose name does not appear on LUS's approved contractors list, he shall immediately notify the Electric Operations Department (LUS) and request certification of said contractor prior to said contractor making any high-voltage terminations at any locations
- c) Upon written approval from the Electric Operations Department (LUS), the said contractor shall be allowed to proceed with the required terminations on the project

D. SAFETY

1. WORK ON ENERGIZED CONDUCTORS AND EQUIPMENT

- a) The Contractor shall treat all electrical systems as energized and protect the system and workers accordingly.
- b) The Contractor shall also comply with the latest work and safety regulations and practices set forth by the standards in Section (3) (B) (1)

2. LUS reserves the right to reject any employee working under this contract that conducts himself in an unsafe manner or does not properly perform his work
3. All employees of the Contractor will be subject to drug testing at the Contractor's expense prior to beginning work for LUS
4. No employee of the Contractor who fails the test will be allowed to work on LUS' property
5. The Contractor shall be responsible to ensure that all employees are trained in and be familiar with the safety related work practices, safety procedures, and other safety requirements as per Section (B) (1)
6. Contractor must attend a safety briefing at LUS prior to the starting the project
7. Contractor will have a documented safety program for his personnel
8. Contractors are required to investigate all incidents involving energized facilities, following the contractor's process for "near miss" incidents and to submit documentation to LUS' designated representative. In addition and at any time, LUS reserves the following rights:
 - a) The requirement of the Contractor to provide documentation of proper recourse (safety & training conducted with at-fault personnel at the Contractor's expense, etc.) to designated company representative
 - b) If at-fault personnel are repeat offenders, LUS reserves the right to require the removal of the individual(s) from LUS property
 - c) Remove workload from the Contractor
 - d) Bar the Contractor from working on the LUS system

E. MATERIALS

1. APPROVALS

- a) The Contractor shall base his proposal on materials herein specified
- b) Reference to specific manufacturers or trade names is not intended to limit or indicate preference to specific manufacturers, but to indicate a standard of quality
- c) The Contractor shall be responsible for installing the proper materials as described by the drawings and specifications
- d) All materials furnished for this project shall be new, undamaged, and bear the label of the Underwriters' Laboratories, Inc.
- e) Written approval from LUS is required on all substitutions prior to installation

2. DELIVERY AND STORAGE

- a) The contractor shall leave materials in manufacturer's original package and store on skids so that materials are off the ground, and so that product labels are exposed for easy inspection
- b) Remove all wrappings from street light standards

F. PERMITS

The Contractor shall be responsible for obtaining all Federal, State and Local required permits and inspections required for the project as well as assume all cost in obtaining permits and inspections for the project

G. RIGHT OF WAYS

1. PUBLIC RIGHT OF WAY

LCG Code of Ordinances Chapter 78 shall be adhered to in this Contract. Copies of the aforementioned will be made available to the Contractor upon request

2. STATE RIGHT OF WAY

Louisiana Administrative Code Title 70 Part 2 Utilities shall be adhered to in this contract and can be obtained via the Louisiana DOTD website

H. COORDINATION OF WORK

1. DAILY NOTIFICATIONS

- a) The Contractor shall notify LUS Dispatch @ 291-5700 each day of his work location and job number before proceeding to work, each time the Contractor moves into a different area, and when the Contractor leaves the location for the day
- b) In the event that the Contractor causes a fault on the electrical system, the Contractor shall immediately notify LUS Dispatch @ 291-5700
- c) The Contractor shall not intentionally disconnect electric service to any customer, nor shall he operate any devices owned by LUS

2. WORK SCHEDULE

The Contractor shall only work during regular working hours of LUS Field Operations Section or as requested by LUS Field Operations or LUS Engineering

I. FAMILIARITY WITH CONDITIONS

1. SITE

- a) Prior to the submission of the bid proposal, the Contractor shall make and shall be deemed to have made a careful examination of the project site, the plans, and specifications.
- b) The Contractor shall visit the site and become informed of the following:
 - (1) Location and nature of the proposed construction
 - (2) Kind and character of soil and terrain to be encountered
 - (3) Kind of facilities required before and during the construction of the project
 - (4) General local conditions and all other matters that may affect the cost and the time of completion of the project
- c) Failure to become familiar with site conditions shall not relieve him of meeting the responsibility to install the work correctly
- d) The Contractor further agrees that the contract prices are based on his own knowledge and judgment of the conditions and hazards involved, and not upon any representation of the drawings

- e) LUS, nor the Developer, assume any responsibility for any understandings or representations made by any of its representatives prior or during execution of the contract; unless such understandings or representations are expressly stated in the contract and the contract expressly provides that the responsibility, therefore, is assumed by LUS or the Developer

2. OTHER UTILITIES

Any records of sub-surface conditions, water records, gas records, telephone records, cable TV records, other utility records, or other observations which may have been made on the drawings, have been made for informational purposes only and implies no guarantee as to the accuracy of the records nor any interpretation of them

J. TESTING

All testing shall be per the Detailed Specifications Section 19

K. QUANTITIES

1. NON COMMERCIAL

NA

2. COMMERCIAL/RESIDENTIAL

Quantities of materials will be measured by an inspector furnished by the developer to ensure that the items called for on the plans were actually installed

4. SUBMITTALS

The Contractor shall submit the required submittals as per the Detailed Specifications Section 2

5. CONSTRUCTION FORCE

A. PERSONNEL

1. The Contractor shall provide and maintain in full operation at all times during the performance of the contract a qualified and sufficient crew of helpers, linemen and a foreman to execute the work
2. The Contractor shall provide an approved foreman from the list of such who shall be employed full time by the Contractor and who shall be on the job during all working periods
3. The foreman shall also be on the job in the event the Contractor should hire a sub-contractor
4. The Contractor shall be responsible for maintenance and repair of all equipment installed by him or his sub-contractor which fails due to substandard workmanship

5. QUALIFICATIONS

- a) Upon request by LUS Operations, the Contractor shall furnish a list of names and associated letters of qualifications for all personnel employed by the contractor or all employees of its sub-contractors to be used on the project

- b) Personnel not qualified to perform work on energized high voltage electrical lines shall be replaced with qualified personnel
- c) A qualified employee shall have training and be competent in the skills necessary to work on energized high voltage electrical lines
- d) The qualifications shall be based upon the employee's years of experience, work safety record and knowledge of:
 - (1) The skills and techniques necessary to distinguish exposed live parts from other parts of electric equipment
 - (2) The skills and techniques necessary to determine the nominal voltage of exposed live parts
 - (3) The minimum approach distances specified in this section corresponding to the voltages to which the qualified employee will be exposed
 - (4) The proper use of the special pre-cautionary techniques, personal protective equipment, insulating and shielding materials, and insulated tools for working on or near exposed energized parts of electric equipment

B. EXPERIENCE

1. The Contractor shall have a minimum of (5) years of experience in the construction of underground electric distribution systems
2. The contractor, at a minimum, shall have experience working on energized underground electric distribution lines of at least 13.8kV and substation work

3. TERMINATIONS

- a) Prior to the Contractor being awarded the Contract, he shall demonstrate his ability to perform high-voltage terminations per current techniques of LUS, and qualify for such
- b) The test shall be performed in the presence of an approved representative of LUS Electric Operations Division, and arrangements to be made with same

6. DRAWINGS

Drawings are intended to describe and illustrate the desired layout of the project. The dimensions shall be modified only if a conflict in construction arises and LUS Engineering agrees such modifications are necessary.

A. DRAWINGS PROVIDED BY

1. NON COMMERCIAL

LUS Engineering to provide drawings

2. COMMERCIAL/RESIDENTIAL

Developer to provide drawings

B. CHANGE ORDERS

1. At no time shall the Contractor deviate from the intent of the drawings or these specifications unless an approved change order (APPENDIX B) is completed and approved by LUS Engineering

2. If the Contractor deems changes are needed different from the drawings, the Contractor shall notify LUS Engineering to review the changes and create a change order (APPENDIX B) if changes are approved

7. GUARANTEE

A. MATERIAL

1. The contractor shall provide the following guarantee, for all new materials provided by the contractor, for the exception of lamps and fuses which are exempt after acceptance:

- a) **NON COMMERCIAL**

NA

- b) **COMMERCIAL/RESIDENTIAL**

- (1) One full year after formal acceptance of the project

- (2) Contractor shall absorb all costs of contractor provided materials needed for repair of the system

B. WORKMANSHIP

1. The contractor shall provide the following guarantee for workmanship defects caused by the contractor:

- a) One full year after formal acceptance of the project

- b) Contractor shall absorb all costs of labor needed for repair of the system

8. MAINTENANCE

The Contractor shall perform maintenance work which shall include, if applicable, straightening of poles, resetting anchors which do not hold properly, filling of settled trenches or excavations, repairing the damage caused by such settlement, or any other maintenance or repairs relating to the project deemed necessary by LUS Operations. In the event that the repairs are not made within a reasonable time from the date of notice, LUS Operations may have the work performed by other parties. The cost arising from such repairs shall be paid by the Contractor. Maintenance Notices (APPENDIX C) will be sent via the following:

A. NON COMMERCIAL

Written notice (APPENDIX C) shall be given to the Contractor by LUS Operations when maintenance is required

B. COMMERCIAL/RESIDENTIAL

Written notice (APPENDIX C) shall be given to the Developer by LUS Operations when maintenance is required

APPENDIX A

A. PROJECT NAME

--

B. SCOPE OF WORK

<i>Give brief summary of job. List any details that are non-typical of this type of project</i>	
---	--

C. BID PROPOSALS

1. Bidder understands that the total proposed quote is for the total cost of the project

D. SCHEDULE

1. The Contractor shall have a total of _____ (Calendar/Working) days to from the start date to complete the project
2. It is expressly understood and agreed by and between the Contractor and LUS that the time stipulated for completion of the job takes into consideration the potential that adverse weather conditions and industrial conditions may cause delays in prosecution of the work, and the Contractor stipulates and agrees that weather conditions and industrial conditions shall not constitute grounds for extension of the time for the competition of the work contemplated under the contract unless authorized by LUS

E. PAYMENT

1. Non Commercial

- a. The Contractor may invoice LUS for work performed upon completion of the project
- b. The work performed shall meet the approval of LUS prior to any payments made to submitted invoice
- c. LUS will pay to the Contractor a total of _____% of the contract price
- d. The remaining _____% shall be paid to the Contractor after a one year time period

2. Commercial/Residential

- a. The Contractor may invoice the Developer for work performed on a monthly basis
- b. The work performed shall meet the approval of LUS

c. The owner shall process payment after verification of the invoice

F. PENALTIES

1. For each calendar day or working day, as the case may be, that any work remains incomplete after expiration of the contract time and/or any extensions thereof, _____% of the total construction price will be deducted from payments due the Contractor not as a penalty but as liquidated damages as a result of the delay in completion of work
2. In the event that LUS should choose to permit the Contractor to continue the work after expiration of the contract time, or as such contract time may be extended, such will not operate as a waiver by LUS of its rights to recover liquidated damages
3. In the event that the LUS terminates the Contractor, the LUS shall retain the right to assess, collect, and recover liquidated damages from the Contractor and/or the Surety until the work under the contract is satisfactory complete
4. Then amount of liquidated damages will be deducted from the remaining balance of funds due the Contractor under the contract
5. In the event that liquidated damages which accrue prior to completion of the work under the contract should exceed the remaining balance of funds due the Contractor under the contract, the Contractor shall forfeit any rights to claim additional payments under the contract and both the Contractor and his Surety shall be liable for accrued liquidated damages in excess of contract balance

APPENDIX - C

DETAILED SPECIFICATIONS
FOR
UNDERGROUND ELECTRICAL CONSTRUCTION

DETAILED SPECIFICATIONS FOR UNDERGROUND ELECTRIC

REVISION: 1.0

APPROVED DATE: 8/31/2016



LAFAYETTE UTILITIES SYSTEM

1314 WALKER ROAD, LAFAYETTE, LA 70506

(337)-291-5858



Detailed Specifications

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Appr. Date:

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DS-LUS-0001-16

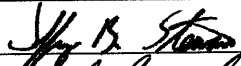
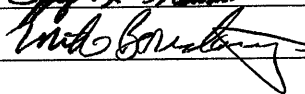
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1. USE OF DETAILED SPECIFICATIONS

The following is a set of detailed specifications for the construction of an underground electric distribution system. Depending on the scope of the project, all sections may not pertain to all jobs. The Contractor will be responsible only for the sections that pertain to his specific job. If the Contractor is not sure if an article pertains to his job he shall consult the Developer for Residential Projects or LUS Engineering Commercial and Non Commercial projects for verification.

2. SUBMITTALS

A. MATERIAL SPECIFICATION SHEET

1. NON COMMERCIAL

- a) Submittals are not required

2. COMMERCIAL

- a) Submittals are not required

3. RESIDENTIAL

- a) Material Specification Sheet located in Section (24) must be filled out in its entirety and turned into LUS operations prior to commencement of work

3. FINAL ACCEPTANCE INSPECTION

A. NON COMMERCIAL

- 1. No Final Acceptance Inspection required

B. COMMERCIAL

- 1. No Final Acceptance Inspection required


C. RESIDENTIAL

- 1. Contractor shall contact LUS Operations via email at subinspection@lus.org when installation of the electrical distribution system is complete
- 2. Within 72 hours of notification by the contractor, LUS will inspect the electrical distribution system and the street lighting system for proper operation and, if needed, create a list of issues that need to be addressed before acceptance of the system
- 3. LUS shall notify the contractor of any outstanding issues via email

4. MATERIALS FURNISHED BY CONTRACTOR

A. NON COMMERCIAL

- 1. All materials listed per the drawings to be provided by LUS

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B. COMMERCIAL

1. All materials listed per the drawing to be provided by the contractor for the exception of materials listed in Section (5) (A) (2)

C. RESIDENTIAL

1. All materials listed per the drawing to be provided by the contractor for the exception of materials listed in Section (5) (A) (3)
2. The contractor shall complete a specification sheet, located in Section (24), in its entirety and submit to LUS prior to installation

5. MATERIALS FURNISHED BY LUS

A. MATERIALS ISSUED

1. NON COMMERCIAL

- a) All materials to be provided by LUS

2. COMMERCIAL

- a) Metering Equipment
- b) Ground Sleeves for Cabinet Pads

3. RESIDENTIAL

- a) Transformers
- b) Cabinets
- c) Ground Sleeves for Cabinet/Transformer Pads

B. PICKUP

1. Material list shall be submitted to inventory 72 hours in advance of starting project to give inventory adequate time to pull material
2. Materials supplied by LUS can be picked up at the Warehouse located at 1210 Walker Rd
3. It shall be the contractors responsibility to transport material from the warehouse to the job site
4. Contractor shall be liable for materials and equipment lost for any reason after these materials have been released by LUS

C. RETURN

1. Any excess material and equipment issued by LUS remaining from the job must be returned to inventory upon completion of work

6. STAKINGS

The Contractor shall be responsible for locating all existing utilities. The Contractor shall not disturb property corner pins, and if so, shall employ a Registered Land Surveyor to replace said pins. The Contractor shall be responsible for all damages to landscaping that he causes.

A. NON COMMERCIAL

1. LUS shall stake the centerline of the trenches, right-of-ways, easements, niches and the locations of all structures per LUS Underground Standards

B. COMMERCIAL

1. The developer shall be responsible for providing all documentation for staking trench lines, property lines and niches

C. RESIDENTIAL

1. The Developer shall stake the trench centerline, structures at the trench centerline and side property lines, back of niche and side property line, side property line, when there is no niche, and radius points, where applicable as per LUS Underground Specifications

7. OTHER UTILITIES

It shall be the responsibility of the contractor to coordinate work with all other utilities and contractors involved with this project

8. CONDUIT**A. POLYVINYLCHLORIDE PLASTIC (PVC)****1. SCHEDULE 40**

- a) Shall be in accordance with NEMA Standard TC2-2013, EPC-40 and as specified in LUS Standard UCONV-__

2. SCHEDULE 80

- a) Shall be in accordance with NEMA Standard TC2-2013, EPC-80 and as specified in LUS Standard UCONV-80-__

B. ELBOWS (PVC)

1. Elbows shall adhere to radius requirements as specified in LUS Standard UC-90-__

C. POLYETHYLENE PLASTIC (PE)

1. Shall be in accordance with the most current ASTM Standards D3035 and NEMA Standard TC7 and as specified in LUS Standard UCONE-__

D. PULL STRING

1. Contractor shall install pull string in all empty conduit
2. Shall have a 1200 pound minimum pulling capacity
3. Shall be a minimum of 3/16" inches
4. Shall be rust, proof, mildew proof, and be pre lubricated

E. CONDUIT PREPARATION

1. The Contractor shall ensure that the cable can be drawn through the conduit with ease and with no obstructions that could damage the cable prior to the pulling of the high-voltage cable into the conduit
2. Preparation shall include swabbing the inside of the conduit with mandrels to clean and lubricate it
3. Lubricant shall be a high-grade silicone type that can be introduced into the conduit in conjunction with the mandrels.
4. Any equipment used to prepare the conduits should be intended for that type of work
5. Conduit ends shall be sealed until cable is to be pulled through
6. All conduit joints shall be either solvent welded or fusion welded

9. CASING**A. STEEL CASING****1. MATERIAL**

- a) Contractor shall furnish and install cold-rolled hard carbon steel casing of correct quantity and in the locations as indicated in the drawings
- b) Casing shall have a complete bitumastic coating before and after installation
- c) Size of casing shall be per drawing

2. DEPTHS

- a) Depth shall be per LUS Standards LUS Standard UXSC-__ unless otherwise stated by drawings

3. WELDING

- a) Casing shall be joined together by the shielded electric arc welding process, in compliance with the current specifications of the American Welding Society, applicable to the work performed
- b) Welding operators and machines shall be qualified for the particular type of work to be done
- c) In no case shall welding be done in inclement weather, or under physical conditions that may in the opinion of LUS impair the efficiency of the welder in making acceptable welds
- d) All welds on casing shall be continuous

10. CABLE**A. INSTALLATION**

1. Pulling Lube shall be used on any underground installation of cables in conduit, including any length and all conductor types and sizes
2. Cables pulled in a single conduit shall be of the same size and type

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3. When two or more cables are pulled into one conduit, they shall be pulled at the same time
4. Cables shall be pulled into conduit with a pulling eye attached to the cable or a pulling grip placed over the cable sheath, insulation or jacket
5. Cables that will not be terminated the same day they are pulled shall have the ends sealed
6. Contractor shall provide an approved hydraulic pressure cable tension monitoring system or a dynamometer used on all pulls
7. Contractor shall provide equipment necessary to handle heavy cable-pulling which includes minimum 8" wide pulling sheaves, cable guides, and any other accessories required to ensure that the cable is pulled into the conduit without damage to the cable

B. CABLE TENSION

1. Maximum Cable Tension and Maximum Side Wall Pressure shall be stated per drawings
2. It is recommended that for future upgrading of cable in the proposed conduit, Maximum Cable Tension and Maximum Side Wall Pressure be calculated for the maximum size cable that can utilized in the conduit

11. TRENCHING (GENERAL)

A. TRENCH LINES

1. Trenches shall be straight with center line as shown on the drawings
2. A chalk line or other acceptable means of marking shall be used to maintain a straight trench.

B. LAYOUT/SEPERATION

1. Conduit layout and separation shall be per LUS Standard UXT-__ unless otherwise stated per drawings

C. DEPTHS

1. Depths shall be per LUS Standard UCONV-__ unless otherwise stated per drawings
2. Depths that do not meet the minimum cover required shall be encased in concrete with prior approval by LUS

D. EXCAVATED MATERIAL

1. All excavated material shall be placed in such a manner that the public will not be inconvenienced
2. All driveways, crosswalks, sidewalks, streets and private roadways shall remain unobstructed unless authorized by LUS
3. All drains, gutters and sewers for surface drainage shall be kept clean of excavated material and if unavoidably closed, other provisions shall be made for drainage

E. PUBLIC SAFETY

1. The Contractor shall provide barricading for any open excavation left overnight
2. The perimeter of the excavation shall have strong vertical supports placed every five (5) feet around the perimeter, and firmly secured to such shall be four (4) foot high, orange-colored, stabilized polyethylene barrier fencing with a mesh of 0.78" by 0.30"
3. Excavations that are eight (8) feet wide or less shall be covered with 3/4" thick plywood. Vertical supports shall be set a minimum of 28" in the earth or have a concrete foundational base.

F. BACKFILLING

1. The bottom of the trench shall be smooth and free of coarse aggregate and loose dirt
2. All trenches shall be backfilled the same day that they are trenched if possible otherwise Section (11) (E) must be followed.
3. The Contractor shall backfill and return the soil to its original compaction, elevation and contour of surrounding soil
4. If the backfill material is too dry to compact the desired density, it shall be wetted as required
5. If the backfill is too wet to compact, fresh backfill shall be used in its place

12. DIRECTIONAL BORING (GENERAL)

A. RECEIVING PITS

1. EXCAVATING

- a) Small receiving pits will be allowed at both the starting and terminating point of a bore
- b) Pits for boring shall be dug at Right of Way lines unless otherwise directed by LUS
- c) Pits shall only be as wide and deep as needed to begin boring
- d) Sod above receiving pits shall be removed with at least 1" of soil attached prior to digging the pit and replaced upon completing of backfilling
- e) Contractor shall provide adequate sheeting and shore bracing to prevent earth cave-ins if applicable

2. BACKFILLING

- a) **STATE/PUBLIC RIGHT OF WAY (Title 70)(Part II)(Chapter 5)(§515)(A)(3)**
 - (1) Shall be backfilled and tamped in six inch layers to the density of the adjacent undisturbed soil
 - (2) When backfilling shoulder of roadway, the top six inches of backfill shall be sand-clay gravel or equivalent
 - (3) Where SOD is removed or destroyed, it shall be replaced

b) LUS EASEMENTS/PRIVATE

(1) Shall be backfilled and return the soil to its original compaction, elevation and contour of surrounding soil

B. BORING

1. Conduit to be used shall be stated per the drawing
2. Bores shall be made horizontally and the method of boring shall be directionally controlled, fluid assisted mechanical cutting
3. All bores shall be surface-launched
4. The maximum allowable bore length under ideal soil conditions shall be 500 linear feet
5. Less than ideal conditions will necessitate that bores be less than 500 feet long
6. Any changes in bore length stated on drawings shall require prior approval by LUS

C. DEPTHS

1. Minimum depth shall be per LUS Standard UCONE-__ unless otherwise stated per drawings
2. Maximum depth shall be 6' unless approved by LUS
3. Depths that don't meet the minimum cover required shall be encased in concrete with prior approval by LUS

D. SLURRY

1. The drilling fluid/slurry that is suitable for local soil conditions including but not limited to bentonite or polymer type shall be utilized during the drilling process

E. BORE SIZING


1. Bores containing single or multiple conduits per bore shall be back reamed to the size necessary for the installation of the required conduit unless otherwise specified by drawings

F. REAMER

1. Bored holes shall be back-reamed to the size necessary for the installation of the required conduit (s)
2. Utility conduits pulled into place during the reaming process will be attached to the reamer with a suitable swivel in order to prevent any twisting of the conduit (s)

G. DRILLING UNIT

1. The Contractor shall have the ability to track the drill bit/head with an accuracy of at least +/- 6 inches both horizontally and vertically during boring. The maximum allowable percent of vertical grade of the bore shall be 2% (i.e., 2 feet vertical in 100 feet horizontal). The maximum horizontal deviation of the bore is 2% (i.e., 2 feet on one side of the centerline in a 100 foot run) measured from the centerline of the bore
2. The boring equipment shall be furnished with a safety sensing device in the boring bit that sounds an alarm to the operator when the bit is in the vicinity of an energized electric line.

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3. In the event the Contractor should hire a Subcontractor to perform the directional drilling portion of the work, he shall provide the information in Appendix B on said Subcontractor.
4. The Contractor shall also provide the information in Section (25) on the specific directional drilling unit to be utilized on this project regardless of whether the Contractor or the Subcontractor owns said unit.
5. The Contractor shall make said directional drilling unit available to LUS Operations for inspection within twenty-four (24) hours after the bid opening.

13. ROAD CROSSING

A. JACKING/BORING

1. Conduit to be used shall be per drawing
2. Water jetting will not be permitted
3. **STATE ROADS**
 - a) Top of the conduit(s) shall be at least 4 feet below the bottom of the existing or proposed pavement (Title 70) (Part II) (Chapter 5) (515) (B) (2) (b)
 - b) Top of the conduit(s) shall be at least 2 feet below ditches or drainage structures unless otherwise stated per drawings (Title 70) (Part II) (Chapter 5) (515) (B) (2) (c)
 - c) Markers shall be installed over installation at Right of Way lines denoting location, product carried, operator and telephone number (Title 70) (Part II) (Chapter 5) (515) (B) (3) (a) (ii)
 - d) Overcutting in excess of 1 inch of diameter of pipe shall be remedied by pressure grouting the entire length of the installation within the Right of Way (Title 70) (Part II) (Chapter 5) (515) (B) (7) (b) (iv)
 - e) Multiple bores shall maintain a minimum of 6 inch and a maximum of 12 inch separation between conduits in all directions
4. **PUBLIC ROADS (ARTERIAL)**
 - a) Minimum depth shall be per LUS Standard UXPC-__ unless otherwise stated per drawing
 - b) Multiple bores shall maintain a minimum of 6 inch and a maximum of 12 inch separation between conduits in all directions
 - c) Conduit shall be installed by boring such that the bore hole is not greater by two inches than the outside barrel diameter of the casing (Section 78-123, LCG Code of Ordinance)
5. **PUBLIC ROADS (RESIDENTIAL)**
 - a) Refer to Section (13) (A) (4) for specification

B. STREET CUTTING

1. **STATE ROADS**
 - a) No open cutting of roads is allowed

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2. PUBLIC ROADS (ARTERIAL)

- a) Conduit to be used shall be per drawings
- b) Conduit layout and separation shall be per LUS Standard UXT-__ unless otherwise stated per drawings
- c) Depths shall be per LUS Standard UCONV-__ unless otherwise stated per drawings.
- d) All street cuts whether concrete or asphalt shall be saw cut to produce a straight, clean edge around patch to be restored.
- e) The street crossing shall be backfilled to sub-grade with "Fill-Crete", a cement grout mixture combined in the following proportions per yard:

Cement	188 lbs.
Sand	3010 lbs.
Water	42.6 gal.

- f) Concrete or any other alteration of this mix is not acceptable
- g) One half of street may be cut at one time allowing traffic to use other lane unless LUS and Public works approves the entire street to be cut at one time.
- h) Streets shall be closed to through traffic without the permission of LUS.

3. PUBLIC ROADS (RESIDENTIAL)

- a) Refer to Section (13) (B) (2) for specifications

14. COULEE CROSSINGS, OBSTRUCTIONS AND SUBSURFACE DRAINAGE

A. TRENCHING

1. TRENCH LINES

- a) Refer to Section (11) (A) for specifications

2. LAYOUT/SEPERATION


- a) Refer to Section (11) (B) for specifications

3. DEPTHS

- a) Depths shall be per LUS Standard UXCC-__ unless otherwise stated per drawings
- b) It shall be the decision of LUS to determine if an obstruction crossing warrants reinforcement with red dye concrete
- c) All conduits are to be laid at a depth of at least eighteen (18) inches below the invert of drainage pipes for public or private drainage
- d) With the approval of LUS and Public Works, in cases where this depth is deemed excessive, conduits may be laid above subsurface drainage provided minimum cover is maintained

4. EXCAVATED MATERIAL

- a) Refer to Section (11) (D) for specifications

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5. CONCRETE

- a) The concrete shall encase the conduits with a minimum of 3" all around each conduit
- b) The concrete shall be as in Section (13) (B) (2) (e) with the addition of red dye
- c) Concrete or any other alteration of this mix is not acceptable

6. PUBLIC SAFETY

- a) Refer to Section (11) (E) for specifications

7. BACKFILLING

- a) Refer to Section (11) (F) for specifications

B. JACKING/BORING

- 1. All coulee crossings shall be made with PE SDR-11 conduit
- 2. Depths shall be per LUS Standard UXCC-__ unless otherwise stated per drawings

15. FOUNDATIONS AND PADS

A. GRADE

1. CABINET PADS

- a) The top of all concrete cabinet pads (feed-thru and fused) shall be per LUS specifications and standards for cabinets

2. TRANSFORMER PADS


- a) The top of all concrete transformer pads shall be per LUS specifications and standards for transformers

B. BACKFILLING

- 1. Backfill shall be placed in 6" layers (loose depth) and mechanically tamped to attain 95% compaction
- 2. No sand of any sort may be used in backfilling

C. CONCRETE

- 1. Concrete shall have a minimum compression strength of 3,000 psi at 28 days
- 2. The water-cement ratio shall not exceed seven (7) U.S. gallons of water per sack of cement
- 3. The concrete shall contain a minimum of five (5) sacks of cement per cubic yard, and shall be a gravel/sand mix
- 4. The concrete slump shall be between 1" and 3" without a frequency vibrator, and reduced by 1/3 when a frequency vibrator is used
- 5. All poured-in-place concrete structures shall be poured monolithically, vibrated to assure freedom from cavities and honeycomb, and the surfaces are to be finished smooth with no indentations or bumps
- 6. All concrete test to be performed by LUS as necessary

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D. ASSEMBLY

1. Refer to LUS standards for assembly and components of foundations and pads

E. STUB OUTS

1. Bell ends shall be installed at the end of all stub out entries into structures, and shall extend at least 1", but no more than 2", into the structure
2. Contractor shall provide the number of conduits in the transformer pad or cabinet pad as indicated in the drawing
3. Stub Outs from transformers and pedestals for services to homes shall be 2" PVC conduit

4. SPARE STUB OUTS

- a) Contractor shall provide the number of spare conduits in the transformer pad or cabinet pad as indicated per the drawings
- b) The spare stub outs from the transformer pad, cabinet pad or pedestal shall be extended a minimum of 36" from the edge of the pad or pedestal in the direction indicated in the drawings

16. TAGGING/LABELING

A. CABLE

1. Tags shall be provided by LUS
2. Cable Ties shall be provided by LUS

B. TRANSFORMERS/CABINETS/PEDESTAL ENCLOSURES

1. Shall be labeled with 4" adhesive decals
2. Decals shall be yellow and black alphanumeric plastic peel-off type
3. Decals shall be applied in the upper right-hand corner of the front door of transformers and cabinets
4. Decals shall be applied in the upper front part of pedestals so that the decals can easily be seen from the street
5. Decals shall be supplied by LUS


C. RISER POLES

1. Shall be labeled with 4" adhesive decals
2. Decals shall be yellow and black alphanumeric plastic peel-off type
3. Decals shall be applied 6' from grade level and visible from road
4. Decals shall be supplied by LUS

17. TRANSFORMER/CABINETS/PEDESTALS

A. GROUNDING

1. The primary neutrals will be bonded together in the high voltage compartment using compression connectors

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2. The ground wire shall be a 2/0 bare soft drawn copper wire and shall be bonded to the primary neutral in the high voltage compartment and to the transformer ground lug
3. In the low voltage compartment, the 2/0 wire shall be tied to the neutral bussing of the transformer and to the transformer ground at the pad
4. All ground wire running through the concrete pad shall be installed in 1" PVC conduit
5. Transformer type ground lug shall be provided by:
 - a) **NON COMMERCIAL**
 - (1) LUS shall provide transformer ground lugs
 - b) **COMMERCIAL**
 - (1) LUS shall provide transformer ground lugs
 - c) **RESIDENTIAL**
 - (1) Contractor shall furnish transformer type ground lug per LUS Standards for transformers

B. TAGGING/LABELING

1. **CABLE**
 - a) Refer to Section (16) (A) for tagging cable
2. **TRANSFORMERS/CABINETS/PEDESTAL ENCLOSURES**
 - a) Refer to Section (16) (B) for tagging enclosures

18. RISER POLES AND CONDUIT SUPPORT

A. CONDUIT


1. Refer to Section (8) (A) (2) for specifications
2. Conduit for riser poles shall extend from a minimum of one (1) foot below grade to a minimum of eight (8) feet above grade
3. All conduits above 8' may be PVC Schedule 40 conduit per Section (8) (A) (1)
4. Bell ends shall be installed at the end of all risers

B. CONDUIT HANGERS

1. Conduit hangers shall be provided per the following guidelines:
 - a) **NON COMMERCIAL**
 - (1) LUS shall provide conduit riser standoffs
 - b) **COMMERCIAL**
 - (1) Contractor shall provide conduit riser standoffs
 - c) **RESIDENTIAL**
 - (1) Contractor shall provide conduit riser standoffs

C. TAGGING/LABELING

1. **CABLE**
 - a) Refer to Section (16) (A) for tagging cable

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2. CONDUIT

- a) Refer to Section (16) (C) for tagging conduit

D. OTHER FACILITIES

1. Cross-arms required for pothead installations shall be provided and installed by LUS
2. Existing facilities to be adjusted shall be done by LUS
3. The Contractor shall be required to complete the underground system up to and including a point that shall be indicated in the drawings


19. CABLE TESTING

A. HIGH POTENTIAL TEST FOR H.V. CABLE

1. All tests shall be made by LUS, which will include supplying the necessary testing equipment and a qualified operator of that equipment.
2. Interpretation of the results of the tests shall be made by LUS.
3. The Contractor's representative shall be present during all tests.
4. The Contractor shall notify LUS at least 48 hours prior to the time he desires to have the tests performed.
5. If a cable fails the test, the contractor shall locate any and all faults and replace cable as necessary at no extra charge.
6. If, in the opinion of LUS, other cables in the same conduit have not been damaged, they may remain installed while the cable that failed the test shall be replaced with a new cable.
7. After replacement of faulty or damaged cable, all cable within that conduit shall be re-tested.

20. TORQUING OF CONNECTIONS

Conductors inserted in the secondary connectors shall be torqued to the force in ft.-lbs. as per the manufacturer's specifications. The contractor shall provide LUS with a Manufacturers Specification Sheet located in Appendix A which contains the manufacturers name and torque specifications for all secondary connectors. LUS will inspect the connections by means of a torque-reading device. Should any connection not meet the manufacturers specifications, the Contractor may be required, by LUS, to re-torque all secondary connections in the project.

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21. FINAL GRADE

A. RESIDENTIAL

1. Final Grade shall be established and achieved by the developer prior to any electrical construction commencing
2. Final Grade must be 36" minimum above all conduits, according to LUS specifications in the construction standards
3. LUS Electric Operations shall inspect the depth of the conduits and the height of the top of all concrete pads, in regards to the Final Grade prior to any backfilling, for adherence to LUS specifications
4. If the Final Grade is higher than the height of the roadway, all driveways shall be constructed so as to not affect the minimum depth of conduit that must be maintained
5. No final acceptance will be issued by LUS until all of these requirements have been met
6. No final acceptance will be issued by LUS until all of these requirements have been met

22. LIGHTING

A. RESIDENTIAL

1. FOUNDATIONS FOR ALUMINUM POLES

- a) The Contractor shall provide all concrete, reinforcing steel, ground rods and anchor bolts necessary for a complete foundation
- b) The concrete shall be as described above and shall be poured in place
- c) Set anchor bolts in accordance with manufacturer's template and recommendations
- d) Foundations shall be as shown on the plans

2. APRONS FOR ALUMINUM POLES

- a) The top of the foundation shall have an apron that extends an additional 20" diameter to the foundation and is 4" thick
- b) The apron shall be at the same grade as the foundation, and shall be poured as part of the foundation (no joints)

3. POLE EXCAVATION FOR FIBERGLASS POLES

- a) Streetlight pole excavations are to be four (4) feet deep with a minimum diameter of twelve (12) inches and maximum diameter of sixteen (16) inches
- b) Excavations are to be compacted to match existing grade

4. SETTING AND ALIGNING POLES

- a) Poles shall be set level with true vertical, which shall be done after the luminaire is mounted
- b) For installation in the vicinity of open ditches, streetlight standards shall not be installed until the final contour of the ditch is attained

- c) In the vicinity of curbs and subsurface drainage, the street light standards shall not be installed until the paving contractor has installed the curbs
- d) Conduits may be installed prior to the installation of curbs, as desired by the Contractor, but the cost of adjusting shall be borne by the Contractor
- e) Poles shall be set in the locations as dictated by LUS

5. STREET LIGHTING CONDUCTORS

- a) Conductors shall be copper, type THHN or better, rated for 600 Volts, stranded and sized as indicated in the plans
- b) The neutral conductor's insulation shall be striped to distinguish it from the phase conductors, possibly by means of white permanent marking tape at the termination points
- c) Conductors above the fuse holders and/or hand hole in the light poles (load side) shall be #12 THHN copper, stranded and rated for 600 Volts
- d) Conductors beyond the fuse holders in the transformer or pedestal shall be as indicated on the plans
- e) Conductors shall be installed in continuous lengths, without splices, from terminal to terminal
- f) Make connections in the bases with in-line connections
- g) Poles shall be bonded to ground with a #10 AWG bare copper wire

6. GROUNDING FOR STREET LIGHTING


- a) The Contractor shall furnish and install all materials necessary for grounding all poles and electrical services, in accordance with NEC requirements
- b) Provide ground rods as called for in the plans. Grounding connections to the ground rods shall be made with Blackburn type G5 clamp, or approved equal
- c) Grounding connections made to bolts in the poles shall be a Buchanan type L lug, or approved equal
- d) Streetlight fixtures shall be grounded with the fourth wire (green) from the pedestal or transformer ground
- e) The electrical system shall contain a grounding conductor (#8 THHN copper, stranded, green colored insulation), which shall be continuous throughout and shall interconnect all metal poles to the services and to each other

7. TESTING

- a) Testing for street lighting cable shall follow standards as set forth in Section (19) (A)

8. LUMINAIRES

- a) All streetlights shall have individual photocells and each shall be fused in the base of the pole or in the pedestal or transformer, wherever the source is acquired
- b) The Contractor agrees to replace any lamps having burned out or repair any luminaires having failed within one year of system final acceptance date.
- c) The Contractor shall furnish with his bid the complete warranty applicable to the streetlights


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9. LIGHT STANDARDS

- a) Installation of Standard Fiberglass Street Lights shall be per LUS Standard SLP-21F unless otherwise stated per drawings
- b) Installation of (Single Luminaire) Standard Fiberglass Decorative Street Lights shall be per LUS Standard SLD-15F unless otherwise stated per drawings
- c) Installation of (Double Luminaire) Standard Fiberglass Decorative Street Lights shall be per LUS Standard SLD-15FD unless otherwise stated per drawings

23. ELECTRICAL SWITCHING

All Switching of Underground Electrical Systems shall be performed by LUS Operations personnel only. Contractors requiring Switching of Underground Electrical Systems shall notify LUS Operations 48 hours in advance of when switching operations are to be initiated

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24. APPENDIX A

Material Specification Sheet

Project: _____

Date: _____

Primary Cable

(Include manufacturers specification sheet for all cable used)

Manufacturer: _____

Stock Number: _____

Cable Size: _____

Manufacturer: _____

Stock Number: _____

Cable Size: _____

Secondary Cable

(Include manufacturers specification sheet for all cable used)

Manufacturer: _____

Stock Number: _____

Cable Size: _____

Manufacturer: _____

Stock Number: _____

Cable Size: _____

Transformer Secondary Connectors

(Include manufacturers specification sheet w/torque requirements for all connectors used)

Manufacturer: _____

Stock Number: _____

Cable Size: _____

Torque Specifications: Yes No



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Manufacturer: _____
Stock Number: _____
Cable Size: _____
Torque Specifications: Yes No

Pedestal Secondary Connectors

(Include manufacturers specification sheet w/torque requirements for all connectors used)

Manufacturer: _____
Stock Number: _____
Cable Size: _____
Torque Specifications: Yes No

Manufacturer: _____
Stock Number: _____
Cable Size: _____
Torque Specifications: Yes No

200A Terminators (Elbow)


Manufacturer: _____
Stock Number: _____

Manufacturer: _____
Stock Number: _____

200A Cold Shrink Terminator

Manufacturer: _____
Stock Number: _____

Manufacturer: _____
Stock Number: _____

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25. APPENDIX B

Subcontractor Information:

FIRM: _____

INDIVIDUAL: _____ **TITLE:** _____

ADDRESS: _____

TELEPHONE NO. _____

CONTRACTOR'S LICENSE NO. _____

Directional Drilling Unit Information:

MANUFACTURER: _____

MODEL #: _____

OWNER OF UNIT: _____

APPENDIX - D

RESERVED

APPENDIX - E

RESERVED

APPENDIX - F

ELECTRIC AGREEMENT

FOR

RESIDENTIAL DEVELOPMENT UNDERGROUND LINE
EXTENSION (SUBDIVISIONS)

ELECTRIC AGREEMENT
FOR
DEVELOPER CONSTRUCTED UNDERGROUND LINE EXTENSIONS
FOR RESIDENTIAL DEVELOPMENT
SINGLE-FAMILY DETACHED HOUSING SUBDIVISIONS

THIS AGREEMENT, made and entered into on this ____ day of _____, 20____,
by and between the Lafayette City-Parish Consolidated Government, hereinafter referred
to as "System", and

WITNESSETH

WHEREAS, the property owner, hereinafter referred to as "Developer", of a certain tract of
land situated within the City of Lafayette, Louisiana, or within the "Area of Influence" and
which tract of land is designated as

as shown on the attached plat which is marked "Exhibit A" for identification herewith, and

WHEREAS, the total development front footage (as defined below) is _____.

WHEREAS, the Developer is desirous of installing underground electric distribution
facilities, as required by the Lafayette City-Parish Consolidated Government's Subdivision
Regulations, to serve the future homes within said tract of land, and

WHEREAS, the Developer is willing to install the underground electric facilities on certain
terms and conditions under which the System will make payments to the Developer.

NOW, THEREFORE, the parties hereto agree as follows:

1. The developer shall enter into an agreement with the system prior to commencing work.
2. The developer shall provide and record easements for all facilities to be owned by the system upon acceptance of the construction work by the system.
3. Upon completion of the newly constructed facilities by developer and acceptance of same by the system, the developer shall donate all facilities to be owned by the system to the system.
4. The system will provide the electrical system design and a copy of the system's standards for construction specifications for the required facilities to be constructed by the developer. The developer shall be responsible for providing the system with a reproducible quality plat of the development and for producing a compiled set of construction plans and specifications utilizing the system's design and standard specifications. Final plans and specifications shall be reviewed and approved by the system prior to commencement of construction to ensure that the system's standards have been satisfied. The developer shall be responsible for securing an approved electrical contractor to construct the required system. A list of the electrical contractors preapproved by the director will be provided to the developer. The developer shall be responsible for inspection of the work during construction to ensure compliance with the system's standards of construction. It shall be the developer's responsibility to transport the transformers and any other equipment furnished by the system from the system's warehouse to the development site. Any excess material shall be returned upon the completion of the construction. The developer shall be responsible for equipment lost or damaged through negligence, theft or vandalism. The system will not accept the construction work until all facilities are completed according to the approved plans and specifications or with changes approved by the system. All work shall be inspected and approved by the system, in addition to the developer's inspection, prior to acceptance. Changes in the originally issued plans and specifications shall be approved by the system prior to construction of these changes.
5. The street lighting standards (poles), fixtures, mounting brackets, wiring, fuses and other associated equipment shall be installed by the developer. All standards and fixtures shall be as per the system's approved standards for residential lighting. After acceptance of the construction, the system has the option of energizing only those lights which serve a permanent residence.
6. Payment to the developer shall be a contribution to partially compensate for the cost of installing an electrical distribution system with standard non-decorative street lights.
 - a. Developer shall obtain, and provide copies to the system of, no less than the three lowest competitive bids from a list of electrical contractors preapproved by the director. The competitive bids shall include all labor and material construction costs for the complete electrical distribution system (including only standard non-decorative street lights) for the subdivision. Payment will be made to developer in an amount equal to the lowest competitive bid (excluding any change orders) less

\$4.00 per front foot times the total front footage calculated per this section (6)a.1, (6)a.2 and (6) a.3. For the purpose of determining payment made to developer, total front footage shall be determined as follows:

1. Add the front footage of all lots within the subdivision, except corner lots.
 2. Add the front footage of all corner lots within the subdivision and divide the sum by two.
 3. The sum of sections (6)a.1 and (6)a.2 will be the value used as the total front footage of the subdivision.
- b. The payment by the system to the developer shall be made only after all electrical construction work is completed by developer and accepted by the system, in accordance with plans and specifications.
7. The facilities to be owned and maintained by the system upon acceptance shall include the complete distribution system and public street lighting constructed by the developer in accordance with this agreement. Electrical services (service laterals from the pedestal or transformer to the customer, whichever is applicable) for individual residences shall not be included in the contract for construction under this agreement. It is the responsibility of the developer, or assigned property owner, to install the service when the development is connected and to maintain the service after construction of the dwelling is complete. The system shall not assume ownership of any electrical services.
 8. Should the developer choose to select one of the system's approved decorative street lights for the subdivision, the developer agrees to pay the additional material costs associated with decorative street lighting; however, the system's contribution to the developer shall only be based on standard non-decorative street lights.
 9. Should the developer require temporary electric service before permanent service is available to the subdivision, the developer agrees to pay all costs for such service.
 10. Developer shall provide a written statement to the System with this Agreement confirming whether the roadways within the development are public or private. If the roadways within said development are private (i.e. non-public) roadways, provision of the street lighting system within the development shall be the sole responsibility of the Developer along with all associated cost of same.

Developer is solely responsible for registration of private street lighting systems with Louisiana One Call and agrees to assume the position and responsibility of an "Operator" of such private street lighting systems for purposes of compliance with Louisiana One Call requirements. Developer is solely responsible for damage to private street lighting systems and shall indemnify and hold the System harmless for all such damage.

THUS DONE AND SIGNED on the day and date first written above, after due reading of the whole.

DEVELOPER:

LAFAYETTE CITY-PARISH
CONSOLIDATED GOVERNMENT

NAME/COMPANY

AUTHORIZED REPRESENTATIVE

Joel Robideaux
MAYOR-PRESIDENT

WITNESSES:

APPENDIX - G

ELECTRIC AGREEMENT

FOR

RESIDENTIAL DEVELOPMENT UNDERGROUND LINE EXTENSION
(APARTMENTS/TOWNHOMES)

ELECTRIC AGREEMENT
FOR
DEVELOPER CONSTRUCTED UNDERGROUND LINE EXTENSIONS
FOR RESIDENTIAL DEVELOPMENT
MULTIFAMILY DWELLINGS

THIS AGREEMENT, made and entered into on this ___ day of _____, 20___, (the "Effective Date") by and between the Lafayette City-Parish Consolidated Government, hereinafter referred to as "System", and

WITNESSETH

WHEREAS, the property owner, hereinafter referred to as "Developer", of a certain tract of land situated within the City of Lafayette, Louisiana, or within the "Area of Influence" and which tract of land is designated as

as shown on the attached plat which is marked "Exhibit A" for identification herewith, and

WHEREAS, said tract of land is being developed into _____ residential units and

WHEREAS, the Developer is desirous of installing underground electric distribution facilities, as required by the Lafayette City-Parish Consolidated Governments Subdivision Regulations, to serve the residential dwelling units within said tract of land, and

WHEREAS, the Developer is willing to install the underground electric facilities on certain terms and conditions under which the System will reimburse the Developer one hundred dollars (\$100.00) per residential unit as a Contribution-in-Aid of construction of the primary electrical system (high

voltage distribution conductors, conduits, manholes, pullboxes, transformer pads, etc.) and approved street lighting along dedicated rights-of-way under the following conditions:

NOW, THEREFORE, the parties hereto agree as follows:

1. The Developer shall enter into this Agreement with the System prior to commencing work.
2. The Developer shall provide and record easements for all facilities to be owned by the System upon acceptance of the construction work by the System.
3. Upon completion and acceptance of the newly constructed facilities by the System, the Developer shall donate all facilities to be owned by the System to the System.
4. The System will provide the electrical system design and a copy of the System's "Standards for Construction" specifications for the required facilities to be constructed by the Developer. The Developer shall be responsible for providing the System with a reproducible quality plat of the development and for producing a compiled set of construction plans and specifications utilizing the System's design and standard specifications. Final plans and specifications shall be reviewed and approved by the System prior to commencement of construction to ensure that the System's standards have been satisfied. The Developer shall be responsible for securing an approved electrical contractor to construct the required system. A list of the electrical contractors pre-approved by the Director will be provided to the Developer. The Developer shall be responsible for inspection of the work during construction to ensure compliance with the System's Standards of Construction. It shall be the Developer's responsibility to transport the transformers and any other equipment furnished by the System, from the System's warehouse to the development site. Any excess material shall be returned upon the completion of the construction. The Developer shall be responsible for equipment lost or damaged through negligence, theft or vandalism. The System will not accept the construction work until all facilities are completed according to the approved plans and specifications or with changes approved by the System. All work shall be inspected and approved by the System, in addition to the Developer's inspection, prior to acceptance. Changes in the originally issued plans and specifications shall be approved by the System prior to construction of these changes.
5. Payment to the Developer in the amount of one hundred dollars (\$100.00) per residential unit shall be a contribution to partially compensate for the cost of installing the electrical distribution system.
6. The facilities to be owned and maintained by the System upon acceptance shall include the primary conductors, terminations, transformers, switching cabinets and approved street lights along dedicated rights-of-way. The Developer will own and maintain the primary conduit, transformer pads and manholes located on the complex site.
7. In the event of a failure in the facilities to be owned by the System (i.e., primary conductors, terminations, transformers, switching cabinets and approved street lights along dedicated rights-of-way), the System agrees to repair and/or replace any of these failed facilities at its expense.

8. In the event of a failure in the facilities to be owned by the Developer (i.e., primary conduit, transformer pads and manholes located on the complex site), the Developer agrees to expose these facilities, make the necessary repairs and restore the area at his expense.
9. Payment to the Developer shall be made after all work is completed in accordance with plans and specifications.
10. Should the Developer require temporary electric service before permanent service is available to the Development, the Developer agrees to pay all costs for such service.
11. All work shall be completed in accordance with all plans and specifications and all residential units under this contract shall be completed and issued a certificate of occupancy within two (2) years of the Effective Date. If all work is not completed in accordance with all plans and specifications and/or all residential units under this contract have not been issued a certificate of occupancy within two (2) years of the Effective Date, LUS may choose to make payment to the developer in the amount of one hundred dollars (\$100.00) for each residential unit that has been issued a certificate of occupancy and terminate this contract.

THUS DONE AND SIGNED on the day and date first written above, after due reading of the whole.

DEVELOPER:

LAFAYETTE CITY-PARISH
CONSOLIDATED GOVERNMENT

NAME/COMPANY

AUTHORIZED REPRESENTATIVE

Joel Robideaux
MAYOR- PRESIDENT

WITNESSES:

APPENDIX - H

WATER/WASTEWATER FORMS

OWNER'S ACKNOWLEDGMENT FORM

LETTER OF CREDIT AGREEMENT

SUBDIVISION IMPROVEMENTS AGREEMENT

DUMPSTER CHECKLIST

LAFAYETTE UTILITIES SYSTEM (LUS)
OWNER'S/DEVELOPER'S ACKNOWLEDGMENT FORM FOR
INSTALLATIONS OF WATER/WASTEWATER IMPROVEMENTS

Owner's/Developer's Acknowledgment:

Please Print or Type

Project Name: _____

Project Address: _____

Owner's Name: _____ Phone _____

Owner's Signature: _____ Date _____

Owner's Engineer/Architect Name: _____

Owner's Engineer/Architect Signature: _____ Date _____

I hereby acknowledge the requirements listed below and the specific plan review comments provided under separate cover. The requirements are as follows:

1. The Owner's Engineer/Architect shall be solely responsible to ensure that the required water/wastewater improvements are installed in accordance with LUS standards. As a condition of acceptance of the required water/wastewater improvements, the Owner's Engineer/Architect shall provide and record all necessary easements and provide a written certification that the construction was in accordance with the approved construction plans and LUS standards. Acceptance of the required water/wastewater improvements does not constitute acceptance of the improvements for perpetual maintenance. The certification letter shall include the following reports:

Wastewater

Manhole Infiltration Report

Low Air Pressure Report

Note: In locations where it is possible that the wastewater installations

can be damaged through the installation of project facilities (IE: drainage, gas, electric, water, telephone, cable tv lines), LUS may conduct a second air pressure test to determine the integrity of the installations prior to release of service and/or Final Acceptance.

Where buildings have connection(s) prior to release of service by LUS, the Owner's/Developer's contractor shall conduct the second air test to the section where the house/building have connected.

Water

Pressure Test

2. The Owner's Engineer/Architect shall conduct a preconstruction meeting with LUS and the installing contractor. The Owner's Engineer/Architect shall provide a written summary of the preconstruction meeting within five (5) working days.
3. The Owner's Engineer/Architect shall provide resident inspection during the installation of the required water/wastewater improvements, witness the connections and construction testing, and coordinate with LUS (24 hrs. in advance) for all taps/connections, valve operations, and testing. Prior to water/wastewater system testing, the Owner's Engineer shall submit asbuilt record drawings. The Owner's Engineer shall be responsible for LA ONE CALL location requests until LUS receives the Water/Wastewater asbuilt record drawings.
 Note: Remove all water testing risers and sampling points within five (5) days of approved health sample.
4. The Owner's Engineer/Architect shall conduct a final inspection with LUS and the installing contractor upon completion of all utilities construction, paving, and landscaping.
5. The Owner shall warrant the required water/wastewater improvements for a one (1) year period following the acceptance of the improvements by LUS. LUS shall own and operate the water/wastewater improvements during the warranty period. Upon the completion of the warranty period, LUS will accept perpetual maintenance.

Lafayette Utilities System
 1314 Walker Road
 Lafayette, LA 70506
 Attn: J.B. Cormier
 337-291- 5883 (Fax 337-291-5999)

APPENDIX C

IRREVOCABLE LETTER OF CREDIT

LETTER OF CREDIT NO. _____ DATE _____

TO: Lafayette Consolidated Government
State of Louisiana

Gentleman:

For value received _____ (Developer) _____, a corporation domiciled in _____, is herewith granted a letter of credit in the full sum of \$ _____ for the purpose of guaranteeing to Lafayette Consolidated Government the availability of funds for the purpose of completing improvements in _____ Subdivision as more fully shown by reference to a plat of survey prepared by _____ (Engineers or Land Surveyors) _____, dated _____ (Dated) _____ and revised _____ (Date if any) _____, to show final lot dimensions, a copy which is attached hereto and made a part hereof by reference, and which improvements are estimated to cost the sums of money set forth hereinafter, to-wit:

Now, therefore, the undersigned, _____ (Bank) _____ does by these presents promise and agree that unless such improvements set forth and described hereinabove are completed by the said _____ (Developer) _____ within one (1) year from the date hereof that funds will be made available to Lafayette Consolidated Government in an amount not to exceed that set forth hereinabove for the completion of said improvements and which said funds will be charged against the account of _____ (Developer) _____ without an obligation on the part of Lafayette Consolidated Government to reimburse the _____ (Bank) _____ and is further provided, however, that in the event that such improvements aforesaid are completed and accepted by Lafayette Consolidated Government then and in such event, this letter of credit shall be null and void and have no effect and at which time the _____ (Bank) _____ shall be release from any and all further liability in connection herewith.

The undersigned does herewith acknowledge that this letter is executed and submitted to Lafayette Consolidated Government to enable _____ (Developer) _____ to obtain approval from Lafayette Planning Commission of a plat of survey to be submitted to said Planning Commission without the completion of such improvements which said approval would not be given the Lafayette Planning Commission except for this letter of credit.

All of the above is subject to the following terms and conditions:

6. No payment under this letter of credit will be made until such time as the Bank has received, in writing, Estimate for Payment (Partial or full), approved by Engineers of Lafayette Consolidated Government.
7. The Bank shall have no liability whatsoever to determine disputed questions of fact or law but will rely entirely upon the Estimates for Payment furnished it by Engineers of Lafayette Consolidated Government and the facts stated herein.
8. This Letter of Credit is accompanied by draft(s) being held by this Bank marked Drawn under _____, Letter of Credit No. _____, Dated _____.
9. This Credit is subject to the Uniform Customs and Practice for Documentary Credits 1962 Revision fixed by the International Chamber of Commerce Brochure No. 222.
10. This Letter of Credit will terminate and all Bank's liability hereunder shall cease within one (1) year from date (Date) , at the end of business or whereby agree with the drawers, endores and bonafide holder of drafts drawn under and in compliance with this Credit that some shall be duly honored upon presentation to the drawee Bank as specified above.

Sincerely,

(BANK)

(AUTHORIZED SIGNATURE)

Subdivision Improvements Agreement Utilities Departments

RE: _____
Name of Subdivision
Location

Intending to be legally bound and in order to secure Final Plat approval, the undersigned subdivider hereby agree to provide throughout this subdivision and shown on the subdivision plat of _____ dated _____, the following improvements:

<u>Type of Improvements</u>	<u>Unit</u>	<u>Estimated Construction Cost</u>	<u>Construction Completion Date</u>
Sanitary Sewer			
Trunk Lines			
Mains			
Laterals or House Connections			
Treatment Works			
Water Mains			
Water Supply			
Fire Hydrants			
Street Lights			
Other Improvements (Specify) _____			
<u>SUB TOTAL</u>			

Cost of Supervision, Contingencies, and Inflation (25%) _____

Total Estimated Cost of Improvements and Supervision _____

The above improvements shall be constructed in accordance with Lafayette Utilities System requirements and specifications, and conformance with this provision shall be determined solely by Lafayette Utilities System or its duly authorized agent.

The improvements shall be constructed in accordance with the time schedule shown above.

Signature of Subdivider _____
Date

(If corporation, to be signed by President and attested to by Secretary, together with the Corporate Seal.)

Signature of Utilities Dept. _____
Date
Validating Figures

CHECKLIST FOR DUMPSTER CONNECTIONS TO THE CITY OF
LAFAYETTE SEWER SYSTEM

**TO BE USED BY METRO CODE INSPECTORS WHEN APPROVING OR
DISAPPROVING PLANS AND ACTUAL CONSTRUCTION OF DUMPSTER PADS.**

- Dumpster drain must be routed to a grease trap.
- Dumpster pad must be elevated to prevent the collection of rainwater from adjacent areas.
- Dumpster pad must be enclosed to prevent anyone other than the owner from disposing into the dumpster.
- Dumpster drain shall be plugged when the dumpster area is not being washed.
- Dumpster drain shall be situated in an area of the pad so that the drain will not be hidden by the dumpster and be visible for inspection.

**THIS CHECKLIST IS TO BE ROUTED TO THE WASTEWATER PRETREATMENT
SECTION AFTER IT IS FILLED OUT BY INSPECTOR.**

CONTACT: 337-291-5980

APPENDIX - I

WATER/WASTEWATER SPECIFICATIONS

MOBILIZATION

MISCELLANEOUS CONSTRUCTION REQUIREMENTS

MAINTENANCE AGGREGATE

SITE PREPARATION

SPECIAL BACKFILL AND TOPSOIL

WATER MAIN DISTRIBUTION SYSTEM

FIRE HYDRANTS, SERVICES, AND VALVES

WASTEWATER COLLECTION SYSTEM

WASTEWATER FORCE MAINS

SUBMERSIBLE SEWAGE LIFT STATION

CULVERTS

REPLACEMENT OF STREETS, DRIVES, AND SIDEWALKS

FENCES AND GATES

HYDROSEEDING

FILL-CRETE

CONSTRUCTION VIDEO

STANDARD DETAILS

INSPECTION GUIDE - WATER

INSPECTION GUIDE – WASTEWATER GRAVITY LINES

INSPECTION GUIDE – LIFT STATION

MOBILIZATION

PART 1 GENERAL

1.01 WORK INCLUDES

Work consists of preparatory work and operations, including, but not limited to, those necessary for scheduling; preliminary meetings; traffic control planning; cost of bonds and any required insurance; movement of personnel, equipment, supplies and incidentals to the project; and establishment of all facilities necessary for work on this project.

1.02 BASIS OF PAYMENT

- A. Maximum amount to be bid on this item will be two percent (2%) of the total bid amount.
- B. Payment will be based on a lump sum amount. Payment for this item will be made in partial payments based on the following payment table:

<u>Percent of Total Contract Amount Earned</u>	<u>Allowable Percent of the Lump Sum Price for the Item</u>
1 st Partial Payment	25
10	50
25	75
50	100

PART 2

Not Used

PART 3

Not used

MISCELLANEOUS CONSTRUCTION REQUIREMENTS

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Water
- B. Sanitary Facilities
- C. Barriers
- D. Protection of Installed Work
- E. Controls
- F. Cleaning During Construction
- G. Access to Emergency and Other Facilities
- H. Traffic Regulation
- I. Temporary Surfacing
- J. Construction Parking
- K. Removal
- L. Unit Prices

1.02 WATER

- A. Source: Arrange with authorities and connect to public utility. No connections shall be allowed without approval of Lafayette Utilities System.

1.03 SANITARY FACILITIES

- A. Provide required facilities and enclosures.
- B. Toilet Facilities: Enclosed portable self-contained units or temporary water closets and urinals, secluded from the public view.
- C. Provide facilities at time of site mobilization.

- D. Clean areas of facilities daily, maintain in sanitary condition. Provide toilet paper, paper towels, and soap in suitable dispensers.

1.04 BARRIERS

- A. Provide as required to prevent public entry to construction areas and to protect existing facilities and adjacent properties from damage from construction operations.
- B. Prohibit traffic and material storage on lawn and landscaped areas.

1.05 PROTECTION OF INSTALLED WORK

- A. Provide temporary protection for installed products. Control traffic in immediate area to minimize damage from subsequent operations.

1.06 CONTROLS

- A. All aspects of Louisiana Pollutant Discharge Elimination System (LPDES) Permit shall be followed by the Contractor.
- B. Water Control: Rough grade site to prevent standing water and to direct surface drainage away from excavations, trenches, adjoining properties, and public rights-of-way. Maintain excavations and trenches free of water. Provide and operate pumping equipment and dewatering systems of a capacity to control water flow as required to conduct construction operations properly.
- C. Dust Control: Execute Work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere.
- D. Mud Control: Control accumulation of excessive mud or debris from the work site onto the Public Access Road.
- E. Erosion and Sediment Control:
 - 1. Plan and execute construction by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.
 - 2. Minimize amount of bare soil exposed at one time.
 - 3. Provide temporary measures such as berms, dikes, and drains to prevent water flow.

4. Construct fill areas by selective placement to avoid erosive surface silts or clays.
5. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.

F. Noise:

1. Noise abatement measures are to be exercised during the course of the project in order to maintain construction noise as low as is practicable.
2. Maintain and operate equipment in a manner which will minimize noise generation.
3. Equipment to be equipped with properly functioning mufflers.

1.07 CLEANING DURING CONSTRUCTION

- A. Control accumulation of waste materials, rubbish and other debris; remove periodically and dispose of off-site.

1.08 ACCESS TO EMERGENCY AND OTHER FACILITIES

- A. Maintain access, free from obstruction, hydrants under pressure, valve boxes, fire and police call boxes, or other emergency or utility controls which are not part of the Work.

1.09 TRAFFIC REGULATION

- A. Conduct operations to minimize interference with public travel and vehicles utilizing public and private highways, streets, and roads.
- B. Provide and maintain warning signs, flagmen, flares, lights, barricades, pavement markings, and other devices as necessary to regulate traffic through the construction area.
- C. Provide representative to receive calls and dispatch proper personnel and equipment on a 24 hour basis for the purpose of maintaining traffic regulation devices.
- D. Provide regulation and safety precautions as required by insurers.
- E. Bear responsibilities for the safety of the traveling public and for any liability in connection therewith.
- F. Comply with all State and local laws and ordinances.

- F. Comply with all other requirements regarding the protection of the work, workmen, and safety of the public.
- G. Regulate traffic to comply with the following requirements:
 - 1. All streets, roads and highways:
 - a. Provide and maintain local traffic and access.
 - b. Restore traffic prior to sunset.
- H. Provide adequate notification (4 days minimum) to appropriate government entities and private owners prior to commencement of construction operations that may interfere with their daily routine operations.
 - 1. Provide 24 hour notice to owners of private driveways prior to interference.
 - 2. Provide seven day notice to owners of above and below grade utilities and owners of other underground facilities prior to commencing construction in the vicinity of their facilities.

1.10 TEMPORARY SURFACING

- A. Maintain temporary surfacing as required by the individual Specification Sections.
- B. Provide representative to receive calls and dispatch proper personnel and equipment on a 24 hour basis for the purpose of maintaining temporary surfacing.

1.11 CONSTRUCTION PARKING

- A. Control vehicular traffic to prevent interference with public traffic and access by emergency vehicles.
- B. Monitor parking of construction personnel's vehicles.
- C. Prevent parking on or adjacent to public roadways, private driveways or in non-designated areas.

1.12 REMOVAL

- A. Remove temporary materials, equipment, services, and construction prior to Substantial Completion inspection.

- B. Clean and repair damage caused by installation or use of temporary facilities. Remove underground installations; underground installations over a depth of 2 feet may remain if approved by the Engineer. Grade site as indicated. Restore existing facilities used during construction to specified, or to original condition.

1.13 UNIT PRICES

- A. Method of Measurement: Items and actions required by and provided under this Section will not be measured for payment.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

MAINTENANCE AGGREGATE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Aggregate for temporary applications.
- B. Aggregate for permanent applications.

1.02 REFERENCES

- A. DOTD Designation: TR 113 – Sieve Analysis of Fine and Coarse Aggregates.

1.03 UNIT PRICES

- A. Method of Measurement:
 - 1. Maintenance Aggregate (Temporary and Permanent Applications): Measured by the ton in approved hauling vehicles at the point of delivery. No adjustment factor will be used.
- B. Basis of Payment:
 - 1. Maintenance Aggregate (Temporary and Permanent Applications): Paid for by the ton which includes furnishing, placement, compaction, maintenance, removal, stockpiling, reuse and disposal.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Maintenance Aggregate (Limestone): Limestone aggregate material shall be approved 100% crushed limestone; shall show not more than 45% loss when tested by AASHTO Designation: T96; shall show not more than 15% loss when tested in accordance with DOTD Designation: T104, and shall meet the following gradation requirements:

U.S. SIEVE**PERCENT PASSING (BY WEIGHT)**

1 ½"	100
1"	90 to 100
¾"	70 to 95
⅜"	50 to 80
No. 4	35 to 65
No. 10	25 to 50
No. 40	10 to 26
No. 200	4 to 12

PART 3 EXECUTION**3.01 TEMPORARY APPLICATIONS**

- A. Verify thickness of aggregate to be used.
- B. Verify subgrade is properly compacted.
- C. Place and compact aggregate by suitable means to tight uniform condition. Compact to the satisfaction of the Engineer.
- D. Maintain aggregate in good condition at all times.
- E. Maintain by blading, recompacting, and adding additional material as necessary to maintain a tight uniform condition.
- F. Remove and reuse or stockpile for future reuse aggregate which is no longer necessary for the particular temporary application.
- G. Dispose of removed aggregate when no longer necessary for temporary applications.

3.02 PERMANENT APPLICATIONS

- A. Verify thickness of aggregate to be used.
- B. Verify subgrade is properly compacted, to proper grade and approved.
- C. Place and compact aggregate by suitable means to tight uniform condition. Compact to the satisfaction of the Engineer.
- D. Fill and blade ruts as necessary to prevent breaking through into subgrade.

- E. Level surface to elevations and gradients. Holes, waves and deficiencies in thickness not corrected by blading to be rectified by the addition of more material.
- F. Perform hand tamping in areas inaccessible to compaction equipment.
- G. Final surface to be smooth, uniform, closely knit, and free from ridges, depressions or loose material.

3.03 SCHEDULE OF APPLICATIONS

A. Temporary Applications:

1. Temporary patching for driveways, shoulders, walks, roadways, and other areas as necessary.
2. Locations as directed by the Engineer.

B. Permanent Applications:

1. Permanent surfacing for driveways and shoulders.
2. Locations designated in the Drawings and as directed by the Engineer.

SITE PREPARATION

PART 1 GENERAL

1.01 SPECIFICATION INCLUDES

- A. Clearing and Grubbing
- B. Removing Surface Debris
- C. Removal of Structures and Obstructions
- D. Salvage
- E. Relocated or Reinstalled Items

1.02 REGULATORY REQUIREMENTS

- A. Conform to applicable laws and ordinances for disposal of debris.

1.03 DEFINITIONS

- A. Clearing and Grubbing: Consists of cutting timber, logs, brush, stumps, cane and debris; excavation and removal of all stumps, roots, submerged logs, snags, corduroy and other perishable and objectionable material; and disposing of removal material and cleaning up the construction area.
- B. Removal of Structures and Obstructions: Consists of removal and satisfactory disposal of all buildings, septic tanks, fences, culverts, structures, pavements, abandoned pipelines and other obstructions not designated or permitted to remain on the Site; includes salvaging of designated materials and backfilling trenches, holes and pits.
- C. Removal and Replacement of Signs: Consists of removal and satisfactory replacement of existing sign. Sign shall be re-installed to the satisfaction of the Engineer. If existing sign is damaged by Contractor, the sign shall be replaced using the same materials of equal quality, color, and texture as the original at no expense to the owner. The sign shall be the same size, shape, and form as the original or as directed by the Owner.

1.04 UNIT PRICES

- A. Method of Measurement:

1. Work described under this section will not be measured for payment.

PART 2 PRODUCTS

2.01 MATERIALS

- A. See Section 1.03.C

PART 3 EXECUTION

3.01 PREPARATION

- A. Protect existing structures and appurtenances to remain from damage or displacement.
- B. Protect bench marks and existing work from damage or displacement.
- C. Protect above and below grade utilities and other Underground Facilities designated to remain.
- D. Protect items salvaged until reuse or delivery to Owner.

3.02 CLEARING AND GRUBBING

- A. Minimize areas to be cleared for access and execution of work.
- B. Remove trees and shrubs only as necessary for execution of work. Grub out stumps, roots, and other perishable and objectionable matter.
- C. Remove and promptly dispose of contaminated, vermin infested, or dangerous materials encountered.
- D. Backfill and compact stump holes and other holes from which obstructions are removed.

3.03 REMOVAL OF STRUCTURES AND OBSTRUCTIONS

- A. Remove as required for proper execution of work, existing structures, foundations, pavements or other obstructions as indicated in the Drawings or designated in individual Specifications Sections. Demolish and remove in an orderly and careful manner.
- B. Exercise due care in removal of items to be stored and reused as indicated in the Drawings or required by individual Specifications Sections.

3.04 DISPOSITION OF MATERIALS

- A. Salvaged Items: Salvage items designated with reasonable care and deliver to a location specified by the Owner within 10 miles of the site. Store and protect on the site until time of delivery.
- B. Unsalvaged Items: Remove from site in accordance with the provisions of this Section.
- C. Relocated or Reinstalled Items: Remove items designated to be removed or reused in the same or different location on the site. Store and reinstall in such a manner to prevent damage to the item.

3.05 REMOVAL

- A. Remove debris from site as work progresses. Leave site in a clean condition.
- B. Debris to be removed from site prior to commencement of other work.

SPECIAL BACKFILL AND TOPSOIL

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Special backfill for backfilling of trenches or around structures.
- B. Topsoil for final dress-up applications.

1.02 REFERENCES

- A. DOTD Section 715-Topsoil.

1.03 UNIT PRICES

A. Method of Measurement:

- 1. Special Backfill: Measured by the cubic yard in approved hauling vehicles at the point of delivery. Special backfill shall be used only with the Engineers approval where the excavated material is not suitable for backfilling the trench or obtaining the required compaction.
- 2. Topsoil: Measured by the cubic yard in approved hauling vehicles at the point of delivery.

B. Basis of Payment:

- 1. Special Backfill: Paid for by the cubic yard, which includes furnishing, placement, and compaction.
- 2. Topsoil: Paid for by the cubic yard, which includes placement and grading.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Special Backfill: Class A-6 soil classification, as per La. DOTD Designation: TR 423, Plasticity Index of between 11 and 20 and a Liquid Limit of 40, free of all foreign matter.

- B. Topsoil: Natural, workable, loamy soil, free of debris, refuse, and similar foreign matter and reasonably free of subsoil, hard lumps, gravel, roots, and other such material. Topsoil shall have a minimum plasticity index of 4 and shall be capable of supporting adequate vegetation.

PART 3 EXECUTION

3.01 PLACEMENT OF SPECIAL BACKFILL

- A. Special Backfill shall be used, with the Engineer's approval, where the excavated material is not suitable for backfilling the trench and obtaining the required compaction. (At the Contractor's option, limestone may be used for special backfill at no additional cost to L.U.S.)
- B. Where compaction density is specified, maximum density shall be determined in accordance with requirements of Louisiana DOTD Designation: TR 418 and TR 401.
- C. Placement of special backfill shall follow the provisions as set forth in Section 02730.

3.02 PLACEMENT OF TOPSOIL

- A. Topsoil shall be used, with the Engineer's approval, where final dressing is being conducted.
- B. Placement of topsoil shall conform to the existing natural ground and shall have a smooth transition to existing natural ground.
- C. Hand raking shall be utilized to obtain the necessary placement, if required by the Engineer.

3.03 PROTECTION OF FINISHED WORK

- A. Maintain settlement of backfills which may occur within one year after final completion of the Contract under which the Work was performed.

WATER MAIN DISTRIBUTION SYSTEM

PART I GENERAL

1.01 SECTION INCLUDES

- A. Pipe Materials and Fittings
- B. Main Installation
- C. Testing and Disinfection

1.02 SCOPE OF WORK

The work covered by this section of the specifications consists of furnishing all labor and material for the construction of water lines and appurtenances as described in the plans and elsewhere in the specifications.

1.03 REFERENCES

- A. ANSI/ASTM D 1784 Rigid Poly (vinyl Chloride) (PVC) Compounds.
- B. ANSI/ASTM D 2241 Poly (vinyl Chloride) (PVC) Plastic Pipe (SDR-PR).
- C. ANSI/AWWA C104/A21.4 Cement Mortar Lining for Ductile-Iron Pipe and Fittings.
- D. ANSI/AWWA C110/A21.10 Ductile-Iron and Gray-Iron Fittings, 3 In. through 48 In.
- E. ANSI/AWWA C111/A21.11 Rubber Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings.
- F. ANSI/AWWA C150/A21.50 Thickness Design of Ductile-Iron Pipe.
- G. ANSI/AWWA C151/A21.51 Ductile-Iron Pipe for Water or Other Liquids.
- H. AWWA C651 Disinfecting Water Mains.
- I. AWWA C900 Poly (vinyl Chloride) (PVC) Pressure Pipe 4 In. through 12 In.
- J. AWWA C605 Underground Installation of PVC Pressure Pipe & Fittings for Water.

1.04 REGULATORY REQUIREMENTS

- A. Conform to applicable state and local codes for installation and testing of the work in this section.

1.05 QUALITY CONTROLS

- A. Submit manufacturer's certifications that PVC pipe and fittings meet requirements of AWWA or the appropriate ASTM standard.
- B. Submit manufacturer's certifications that ductile iron pipe and fittings meet requirements of the appropriate ANSI standard.

1.06 MEASUREMENT AND PAYMENT

- A. Method of Measurement:

1. Water Main: Water main installed will be measured by the linear foot of the various sizes and types actually installed excluding water main that is required to complete other items of work that have been defined in the bid. Measurement shall be continuous from end to end without deductions for fittings, valves, or jack or bored mains.
2. Fittings: Ductile iron fittings installed with water lines shall be measured by the ton, based on the catalog weight per fitting. The weights of the fittings shall be exclusive of bolts, nuts, and gaskets and exclusive of glands when a retainer is used. All fittings not specifically included in the other items of work defined in the proposal shall be included in this measurement.
3. Jacking or Boring: Jacking or boring measurement shall be by the linear foot and shall be the actual center line length of pipe so installed as measured from the vertical cut on each side of the obstruction to be bored but shall not exceed two (2') feet beyond obstruction. Jacking or boring operations shall in no way interfere with the operation of railroads, streets, highways, or other facilities and shall not weaken or damage such facilities. Jacking or boring HDPE pipe quantity shall include adapters, reducers, and fittings necessary to tie-in HDPE pipe with PVC pipe.
4. Casing Pipe: The basis of measurement for casing pipe shall be by the linear foot and shall be the actual center line of casing so installed.
5. Stream Crossing: Stream crossing shall be measured by the lump sum for the limits designated in the water details which includes pipe, fittings, and all incidentals necessary to complete the work for this item.

6. Tie-In To Existing Mains: Tie-in connections to existing mains shall be paid for per each. Valves and fittings are measured and paid for under other items.
7. Select Fill: Select fill for foundation or for backfill over pipe shall be measured by the cubic yard based on the truck volume placed, as ordered by the Engineer.

B. Payment:

1. Water Main: Payment for water main installed, tested, and accepted will be made at the unit price bid per linear foot of pipe of the various sizes. Such payment shall also include excavation, backfill, hauling, and disposition of surplus excavated material.
2. Fittings: Payment shall be based on the number of tons actually installed and shall be made at the price bid per ton. Payment shall include full compensation for all labor, materials, supplies, thrust blocks, anchors, equipment, tools and incidentals necessary for completely installing the fittings in accordance with these specifications and the contract drawings.
3. Jacking or Boring: The work performed and materials furnished as specified herein shall be paid for at the contract unit price bid per linear foot of jacking or boring, which price shall be full compensation for furnishing all materials (except carrier pipe, casings, or liners), labor, tools, equipment and incidentals necessary to complete the work.
4. Casing Pipe: Payment for casing installed will be at the unit price bid for furnishing and installing the casing pipe. No direct payment will be made for casing spacers installed around the carrier pipe in the casing.
5. Stream Crossing: Payment for stream crossing shall be lump sum as stipulated in the bid. This work will consist of furnishing all labor, material, equipment, tools and other incidentals necessary to complete this item as shown on the plans.
6. Tie-In To Existing Mains: Tie-in to existing main shall be paid for per each and includes full compensation for furnishing all equipment, tools, labor, and incidentals necessary to complete the connection.
7. Select Fill: Payment for select fill shall be by the cubic yard at the unit price bid and shall constitute full compensation for furnishing, hauling, placing the fill and removal of excavated material.

PART 2 PRODUCTS

2.01 WATER MAIN

A. PVC Pipe (2 Inch)

1. Pipe and fittings shall be made from clean, virgin NSF approved Type I, Grade I PVC conforming to ASTM Resin Specification D1784-65T.
2. Clean, reworked material generated from the manufacturer's own pipe production may be used.
3. Pipe shall meet working pressure of 160 psi, SDR 26, Commercial Standard C5256-63, and be approved by the National Sanitation Foundation. Laying lengths shall be 20 feet \pm 1 inch.
4. Fittings shall be brass, compression type.
5. Provisions must be made for contraction and expansion at each joint with a rubber ring. Pipe and fitting must be assembled with a non-toxic lubricant.

B. PVC Pipe (Above 2 Inch)

1. Pipe: AWWA C900, SDR 18, 150 psi pressure, NSF approved, 12454 B PVC compound conforming to ASTM Resin Specification D1784.
2. Provide pipe which is homogeneous throughout, free of voids, cracks, inclusions, and other defects, uniform as commercially practical in color, density, and other physical properties.
3. Fittings shall be ductile iron and conform to Section 2.01.D.
4. Joints shall be made of gasket bell push-on type. Joints shall be gasket joints conforming to ASTM F477. Joints assembled with non-toxic lubricant.
5. PVC pipe shall be supplied in standard nominal laying lengths of 20 feet. The color of pipe shall be blue or white with blue lettering. The pipe shall be marked with the size, material code, dimension ratio (DR), AWWA pressure class and AWWA C900 designation.

C. Ductile Iron Pipe

1. Pipe shall be designed in accordance with ANSI Specification A 21.50 (AWWA C-150), latest revision, for 250 psi water working pressure, laying condition B, and maximum depth of cover up to 9 feet.
2. Pipe shall be manufactured in accordance with ANSI Specification A 21.51 (AWWA C-151), latest revision, except the minimum nominal wall thickness shall be as shown on the following table:

<u>Size</u>	<u>Thickness</u>
6"	0.25
8"	0.27
10"	0.29
12"	0.31
14"	0.33
16"	0.34

3. Joints: All pipe joints shall conform to A.S.A. A 21.11 (AWWA C111)
 - a. Under normal service conditions, joints shall either be push-on or mechanical joint.
 - b. Pipe with submarine, flexible, ball and socket joint types shall be installed for stream or canal crossings where specifically indicated on the drawings.
 - c. Flanged joints shall be used for connecting to pumps or where indicated on the drawings.
4. Pipe shall be standard cement lined and seal coated on the inside with a bituminous coat in accordance with ANSI Specification A 21.4 (AWWA C104).
5. The exterior of the pipe shall be coated, with an asphalt coating in accordance with ANSI Specification A 21.51 (AWWA C151).
6. The pipe shall be of best quality in materials and workmanship. It shall bear the Underwriter's laboratory inspection stamp.
7. Any piece found to be defective shall be rejected and shall be immediately removed from the project.
8. Pipe joints shall be of maximum available length for the size, weight and joint type. Proper joint accessories shall be supplied for each length of

pipe, and shall be of the type furnished or recommended by the manufacturer and approved by the Engineer. Joint accessories shall include all materials necessary to provide a tight joint.

D. Fittings

1. Ductile Iron: Ductile iron fittings shall be standard body ANSI A21.10/AWWA C110 or compact body ANSI A21.53/AWWA C153. The rated working pressure shall be 350 PSI. Sufficient quantities of gaskets, glands, bolts and nuts shall be furnished to provide for each socket opening. Bolts and nuts shall be alloy steel (Corten Type). All fittings shall be asphalt coated outside and cement lined and seal coated inside in accordance with ANSI A21.4/AWWA C104. Fittings must be manufactured in the United States.

E. Polyethylene Pipe (PE Pipe)

1. Pipe: AWWA C906, SDR11, PE 3408 High Density, Cell Classification 345434C, in accordance with ASTM D3350.
2. Transition Fittings shall be a mechanical joint adapter (Harvey Adapter) fabricated from HDPE pipe conforming to ASTM 3350. The fitting shall have a pre-positioned stiffener and shall offer full axial restraint.

F. Casing

1. Casing shall be welded smooth steel pipe conforming to APL 5L, Grade B or ASA B36.10, coated inside and outside with asphalt or painted with two coats of bitumastic paint.
2. Minimum thickness of 0.375 inches is required.
3. Spacers shall be provided at manufacturer's recommended increments.

G. Polyethylene Encasement

1. Polyethylene wrap is to be used in open-cut construction for ductile iron pipe when a cathodic protection system is required.
2. Polyethylene encasement shall conform to AWWA C105.
3. Film shall be Class C-Black, minimum thickness of 0.008 inches (8 mils), and furnish a certificate of conformance of the material to the requirement of AWWA C105.

4. Tape shall have a pressure sensitive adhesive face capable of bonding to metal, bituminous coating, and polyethylene, minimum thickness of 8 mils, and a minimum width of 3 inches.

H. Detection Wire

1. A THW 14 insulated solid copper wire shall be placed over the center of PVC and PE pipe for the entire length including crossings.
2. Attach wire to all fixtures and appurtenances to ensure continuous flow of electrical current.
3. Splices in detection wire shall be installed in a direct bury splice kit manufactured by 3M or approved equal.
4. Detection wire and splice kit is to be included in unit price for either PVC or PE pipe.

I. Retainer Glands

1. Retainer glands and bell joint restraints shall be of the following manufacturer or approved equal:

Retainer Glands – UFR 1400 Ford or EBBA Megalug for Ductile Iron Pipe

Retainer Glands – UFR 1500 Ford or EBBA Megalug for PVC Pipe

Bell Joint Restraints – UFR 1390 Ford or EBBA Megalug for PVC and Ductile Iron Pipe

J. Marking Tape

All PVC pipe shall be marked using a nonmetallic tape buried at least 15 inches above the top of the pipe. Water mains shall be marked with blue tape. Tape shall be 3 inches wide minimum and on the Board's list of materials and approved manufacturers. After the tracer wire has been placed, the pipe trench shall be backfilled to approximately 15 inches over the top of the pipe then the nonmetallic tape shall be placed flat over top of pipe within trench. Backfill shall be carefully placed to a depth of 3 inches by hand to assure that the tape is secured in place over the pipe. It is the intent to provide a visible marker in the event of excavation near a water line.

2.02 WORKMANSHIP

- A. Furnish pipe and fittings that are homogeneous throughout and free from visible cracks, holes, foreign inclusions, or other injurious defects. Provide pipe as

uniform as commercially practical in color, opacity, density, and other physical properties.

PART 3 EXECUTION

3.01 PREPARATION

- A. Less than 48 hour notice for approved disconnection to customers shall be the responsibility of the contractor.
- B. Identify and protect above and below grade utilities and other underground facilities to remain.
- C. Conform to applicable manufacturers installation specifications for types of pipe used.
- D. Lay pipe to lines and grades shown on drawings. Establish the route for water lines along with highway and stream crossings.
- E. Provide minimum 6 feet horizontal clearance between water mains and sewer lines running parallel and minimum 18 inch vertical clearance at crossings. In cases where it is not practical to maintain a 6 foot separation, Lafayette Utilities System (LUS) may allow deviation on a case-by-case basis.

3.02 TRENCHING

- A. Maintain a minimum cover for pipes eight (8") inches or less in diameter at 36" and for pipes ten (10") or greater at 48", except where required to meet existing water lines.
- B. The bottom of the trench shall be excavated to a uniform grade and shall be free from obstructions, which would result in the weight of the pipe being concentrated at certain points.
- C. Where subsurface obstructions are encountered in the trenching operations, the Contractor will be permitted to lay pipe above the obstruction if the minimum cover required can be obtained while providing at least three (3") inches thick clearance between the bottom of the pipe and the top of the obstruction.
- D. Where the 6" minimum cover cannot be obtained above an obstruction, the Contractor will be required to lay the pipe under the obstruction. No additional compensation for additional depth of bury will be paid for constructing the line in this manner.
- E. Maximum length of trench to be opened in advance of a section of completed water main shall be 200 feet.

- F. The Engineer shall at his discretion limit the maximum length of trench opened in advance of the completed main.
- G. The Contractor will be required to keep the sides of the trench as nearly vertical as possible by means of sheathing or bracing, as may be required to thoroughly support the sides of the excavation.
- H. If sheathing is used, the bottom width of the trench in the clear shall be twelve (12") inches wider than the greatest horizontal diameter of the water pipe. Unless otherwise ordered by the Engineer, that portion of sheathing in the trench extending below the top of the water main shall not be withdrawn before more than six (6") inches of earth is placed above the top of the main. If the sheathing cannot be removed without injury to the water main or to the adjoining structures, it shall be left in place, or it shall be cut where directed and the upper part shall be removed.
- I. Excavated material shall be placed in such a manner that will not endanger the work or prevent obstruction of sidewalks or driveways. No street shall be closed to through traffic without the permission of the Engineer.
- J. The Contractor shall take every precaution to protect existing structures and landscaping.
- K. The Contractor shall give sufficient notice to the interested utility of his intention to remove or disturb any other pipe or conduit and shall abide by their regulations governing such work.
- L. During construction operations the Contractor shall make all provisions to not disturb existing piping or conduit systems. If any existing systems are damaged, the Contractor shall be responsible for any and all repairs to the satisfaction of the Engineer.
- M. If during construction operations a utility service line is broken, the Contractor shall repair the line at his own expense, or if preferred by the utility involved, shall pay the utility for utilizing their own forces. Delays for extended periods will not be tolerated, thus the Owner reserves the right to make repairs at the Contractor's expense without prior notification.
- N. Mains shall be jack or bored under all concrete roadways and sidewalks except where specified or in special cases where no other practical method for installation is available. In the event the concrete surface is damaged during construction operations, repairs to the pavement shall be made by the Contractor at no additional cost to the Owner.
- O. City of Lafayette Ordinance number 0-2552 shall be followed in all trenching and backfilling operations.

3.03 DEWATERING

- A. The Contractor shall furnish all equipment necessary for pumping water accumulated in the trenches.

- B. Trenches and other excavations shall be kept clear of water while pipe is being installed or concrete structures are being constructed.
- C. No pipe or appurtenances shall be laid in water.

3.04 PIPE INSTALLATION

- A. Excavate bottom of trench to uniform grade to achieve stable trench conditions and satisfactory compaction of foundation or bedding materials.
- B. Where, in the opinion of the Engineer, the floor of the trench is not sufficiently stable to prevent vertical or lateral movement of the pipe after installation, the pipe shall be laid on a timber foundation or the trench shall be excavated below grade and brought back to grade with suitable filling of limestone or select fill material, as directed.
- C. Immediately prior to placement of embedment materials, the bottoms and sidewalls of trenches shall be free of loose or unsuitable soil.
- D. Thoroughly clean interior of pipe before lowering into the trench while keeping pipe interior free of foreign matter during laying operations.
- E. When work is not in progress, the ends of the pipe and fittings shall be sealed so foreign material cannot enter pipe.
- F. The pipe shall be installed and backfilled in accordance with the manufacturer's specifications. Items of work not mentioned specifically herein shall be performed in compliance with the current revision of AWWA C605, "Standard for Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water."
- G. Pipe laying operations shall not block, obstruct, or prevent streams, ditches, canals, culverts, conduits, or gutters from carrying their normal flows or of serving their normal function without the approval of the Engineer. Any disruption shall be restored by the Contractor.
- H. The trench shall provide continuous support for the pipe without voids or soft spots under the pipe.
- I. Concrete thrust blocks shall be provided at all fittings where a change of direction occurs or as specified by the Engineer for all pipe three (3") in diameter or greater. Thrust blocks shall be poured against undisturbed soil and shall not cover the bolts or nuts on the fittings. A plastic barrier shall protect bolts or nuts from being covered.
- J. The water main shall be installed in steel casing where indicated in the Drawings, typically under state highways, railroads, or as indicated by the Engineer.
- K. Pipe shall be laid beneath all ditches, sewers, culverts, pipes, conduits, drainage canals, tracks and similar structures. Regular pipe laying methods shall be used in all such cases except where special crossings are indicated.

- L. The Contractor shall not operate any valves that will allow water to flow or stop the flow of water. These valves will be operated by the Lafayette Utilities System personnel **only**.
- M. Water service to customers shall be maintained without interruption as much as possible. Interruption of service shall be allowed only at times agreed to by the Owner and with proper notice to the customer (at least one hour in advance).
- N. The Owner may require that major connections which require lengthy interruptions to service be made during periods of low water use or that temporary service lines be provided by the Contractor at no additional cost to the Owner.
- O. Assembly of fittings and other preparatory work shall be done in advance to reduce the off time and to keep interruption to a minimum.

3.05 BACKFILLING OF TRENCH

- A. Perform backfill operations and restore surface as soon as practicable. Leave only the minimum length of trench open as necessary for construction.
- B. Re-excavation of the trench for replacement of pipe, tapping, testing, or disinfecting shall be done by the Contractor at no additional cost to the Owner.
- C. The Owner reserves the right to order any trench or trenches backfilled at any time after installation of pipe if the particular trench remaining open constitutes a public nuisance.
- D. Outside of Public Right-of-Ways:
 1. Compact excavated material around and to a depth of 12" above the pipe for the entire length of the trench to 90 percent of maximum standard proctor density in 6" to 8" lifts.
 2. The remaining portion of the trench shall be backfilled in 12" lifts and thoroughly compacted leaving a slightly crowned condition, not to exceed 12" above natural ground.
- E. Inside of Public Right-of-Ways:
Outside of Public Roadways:
 1. Compact excavated material around and to a depth of 12" above the pipe for the entire length of the trench to 95 percent of maximum standard proctor density in 6" to 8" lifts.
 2. The remaining portion of the trench shall be backfilled in 12" lifts and thoroughly compacted leaving a slightly crowned condition, not to exceed 12" above natural ground.

Underneath roadways, streets, shoulders, walks, and drives (as per details in the drawings):

1. Limestone shall be compacted in 12" lifts to 95 percent density up to 3" (min.) –12" (max.) above pipe.
 2. A mechanical vibrator shall be used to compact the limestone.
 3. The remainder of the trench shall be filled with fill-crete (188 lbs. of cement, 3010 lbs. of sand, and 46.2 gals. of water).
- D. All excavated material shall be cleared from adjacent street surfaces, gutters, sidewalks, and lots. Salvaging and replacement of sod on lawns may be ordered by the Engineer at no additional cost to the Owner. All surplus excavated material shall be removed by the Contractor, and shall be disposed of at locations and in a manner approved by the Engineer.

3.06 FLUSHING OF WATER MAIN

- A. As-built information shall be provided to LUS personnel prior to any flushing and testing.
- B. The flushing process shall be performed in the presence of LUS personnel. The Contractor shall notify LUS personnel at least 48 hours prior to flushing of the water mains.
- C. All water mains shall be flushed before testing and sampling of the water system.
- D. Provide properly sized riser pipes for flushing when hydrant outlets are not convenient. LUS personnel shall approve size of riser pipes for flushing.
- E. The duration of the flushing shall be determined in the field by the Engineer.
- F. The size of the flushing outlet shall be as shown below:

<u>Water Main Size</u>	<u>Size of Flushing Outlet</u>
2"	2" Riser
4"	2" Riser
6"	One 4 ½" Hydrant Pumper Outlet or One 6" Riser
8"	One 4 ½" Hydrant Pumper Outlet or One 6" Riser
10"	One 6" Riser
12"	One 8" Riser
16"	One 12" Riser

3.07 HYDROSTATIC TESTING OF MAINS

- A. The Contractor shall furnish all materials, equipment, and labor to satisfactorily test the pipe at no cost to Owner.
- B. The Owner shall supply water for testing purposes.
- C. The allowable leakage for push-on or mechanical joint ductile iron pipe per inch of diameter, per miles, per twenty-four (24) hour day, when tested at one hundred fifty (150) pounds per square inch pressure, shall not be more than twenty-three point three (23.3) gallons, based on nominal lengths of eighteen (18) or twenty (20) feet.

3.08 DISINFECTION OF WATER LINES

- A. All water lines and appurtenances shall be disinfected before placing in service.
- B. Disinfection shall be performed in accordance with the latest revision of AWWA C651.
- C. A solution of calcium hypochlorite, sodium hypochlorite, or liquid chlorine shall be used to obtain a solution of at least 50 mg/l of available chlorine throughout the entire piping system.
- D. While the disinfectant is being applied to any section of the system, the water shall be allowed to flow at all extremities of the section until an orthotolidine test shows a deep orange color.
- E. Allow the chlorine solution to remain in the pipe for minimum of 24 hours. Then tests shall be performed to determine that a chlorine residual of at least 5 mg/l remains in the system.
- F. Repeat disinfection if chlorine residual is less than 5 mg/l.
- G. Following disinfection, the lines shall be thoroughly flushed to remove the chlorine.
- H. The Contractor shall be responsible to furnish taps, corporation stops, tubing, faucets, and labor to help obtain samples of water from the disinfected lines.
- I. The disinfection process shall be made in the presence of Lafayette Utilities System personnel. The Contractor shall notify LUS Personnel at least 48 hours prior to testing of the water lines.
- J. If bacteriological tests indicate that the water lines are not free of coliform organisms, the disinfection procedure shall be repeated on that part of the system until samples are proven to be free of contamination.
- K. Disinfection shall be considered acceptable when reports indicate the lines are free of contamination and with the approval of the Engineer.

- L. The Contractor will be responsible for removing all testing and flushing risers within 5 working days after notice of clear sample.
- M. After all tests have been completed and risers removed, the corporation stops shall be plugged with a Mueller brass plug (No. H10033) or approved equal.

3.09 COOPERATING WITH LAFAYETTE UTILITIES SYSTEM (LUS)

- A. The source of water shall be the public water system operated by the Lafayette Utilities System.
- B. Connections to the water system shall be made in accordance with the plans and in cooperation with LUS personnel.

3.10 STORAGE OF MATERIALS

- A. All water main pipe and appurtenances shall be stored in an appropriate stock yard upon receipt by the Contractor and shall be secured so foreign and contaminating substances do not enter the water line materials.
- B. Pipe and fittings shall be placed on the job site only as needed and not in quantities greater than those to be installed in one working day.

FIRE HYDRANTS, SERVICES, AND VALVES

PART I GENERAL

1.01 SECTION INCLUDES

- A. The work covered by this section consists of furnishing all labor, equipment, appliances, materials, and all operations in connection with the installation of fire hydrants, services, and valves complete and in place, in accordance with the specifications and drawings.

1.02 REFERENCES

- A. AWWA C502 Dry-Barrel Fire Hydrants.
- B. AWWA C509 or C515 Resilient-Seated Gate Valves for Water and Sewerage Systems.
- C. AWWA C700 Cold Water Meters – Displacement Type.
- D. AWWA C800 Underground Service Line Valves and Fittings.
- E. AWWA C901 Polyethylene (PE) Pressure Pipe and Tubing.

1.03 QUALITY ASSURANCE

- A. Submit a certificate of compliance from the manufacturer stating product meets standards as set forth in these specifications.

1.04 UNIT PRICES

- A. Method of Measurement:
 - 1. Fire Hydrant: Measured per each according to the type installed. Hydrant leads (pipe required in addition to typical hydrant installation) shall be measured and paid for as water main.
 - 2. Vertical Hydrant Extensions: Measurement shall be by the vertical foot actually installed.
 - 3. Service Connections: The following are the type of services available for installation per each.

- a. Type-A Service Connections - Type-A service connections shall be measured at the unit price per each as bid for the various sizes.
 - b. Type-B Service Connections - Type-B service connections shall be measured at the unit price per each as bid for the various sizes. Measurement shall be the quantities actually installed, as described in the bid form and on the plans.
 - c. Type-C Service Connections - Type-C service connections shall be paid for at the unit price per each as bid for the various sizes. Measurement shall be the quantities actually installed, as described in the bid form and on the plans. Connection shall be paid for at the unit price per each as bid for the various sizes.
 - d. Type-D Service Tap for Water Mains Four (4") Inches or Smaller: Type-D service taps shall be paid for at the unit price per each as bid for the various sizes. Measurement shall be the quantities actually installed as described in the bid form and on the plans.
 - e. Type-E Service Taps for Water Mains Six (6") Inches or Larger: Type-E service taps shall be paid for at the unit price per each as bid for the various sizes. Measurement shall be the quantities actually installed as described in the bid form and on the plans.
4. Valves and Valve Boxes: Payment for valves and valve boxes shall be based on the actual number installed and shall be paid for at the contract price per each for the various size valves and valve boxes, such price to cover both valve and valve box and any necessary joint adapters for fitting the valves into the system.
 5. Tapping Sleeves and Valves: Measurement shall constitute full compensation for furnishing the sleeves and valves, valve boxes, the labor, equipment, tools, materials, supplies, thrust blocks, anchors and other incidentals necessary for complete installation in accordance with these specifications and the contract drawings.
 6. Cut-In Sleeves and Valves: Measurement of cut-in sleeves and valves shall be based on the number of each size actually installed and payment shall be at the unit price bid per each.
 7. Polyethylene Tubing: Measurement of tubing shall be based on the actual linear foot installed and accepted.
 8. Corporation Stops: Measurement shall be per each based on the quantities actually installed.

B. Basis of Payment:

1. Fire Hydrant: Paid for per each installed and accepted, according to type of

installation, includes hydrant, anchoring fittings, labor, equipment, tools, materials, and supplies necessary to complete the hydrant installation.

2. Vertical Hydrant Extension: Paid for at the contract unit price per vertical foot including full compensation for furnishing all materials, tools, labor, equipment, and incidentals necessary to complete the installation.
3. Service Connections:
 - a. Type-A Service Connection: Connection shall be paid for at the unit price per each as bid for the various sizes.
 - b. Type-B Service Connection: Connection shall be paid for at the unit price per each as bid for the various sizes. Payment shall constitute full compensation for furnishing a new corporation stop and the labor, equipment, tools and incidentals necessary for changing the existing service from the old main to the new main.
 - c. Type-C Service Connection: Connection shall be paid for at the unit price per each as bid for the various sizes. Payment shall constitute full compensation for furnishing materials, labor, equipment, tools, supplies, and other incidentals necessary for complete installation of the service and valves from the main to the meter.
 - d. Type-D Service Tap for Water Mains 4" or Smaller: Connection shall be paid for at the unit price per each as bid for the various sizes. Payment shall constitute full compensation for furnishing and installing the corporation stop and strap.
 - e. Type-E Service Taps for Water Mains 6" or Larger: Connection shall be paid for at the unit price per each as bid for the various sizes. Payment shall constitute full compensation for furnishing the corporation stop.
4. Valves and Valve Boxes: Valves shall be paid for at contract unit price per each for the various size valves and valve boxes. Such payment shall constitute full compensation for furnishing the valves and valve boxes and for all labor, equipment, tools and supplies necessary for installation of the valves and valve boxes in accordance with these specifications and the drawings.
5. Tapping Valves and Sleeves: Payment of tapping sleeves and valves shall be based on the number of each size actually installed at the unit price bid per each which shall include all labor, equipment, tools and supplies necessary to complete the installation.

6. Cut-Valves and Sleeves: Payment of each size actually installed shall constitute full compensation for furnishing the sleeves and valves, valve boxes, the labor, equipment, tools, materials, supplies, thrust blocks, anchors and other incidentals necessary for complete installation in accordance with these specifications and the contract drawings.
7. Polyethylene Tubing: Paid for by the actual linear feet installed and accepted.
8. Corporation Stops: Paid for at the unit price per each as bid for the various sizes and types.

PART 2 PRODUCTS

2.01 FIRE HYDRANTS

- A. The fire hydrant shall conform to AWWA Standards C 502-94 or updated revisions thereof for improved type three-way dry barrel type hydrants. All hydrants must be UL and FM approved.
- B. Features:
 1. Operating nut must be:
 - a. Bronze.
 - b. Non-rising, pentagonal in shape, measuring 1-1/2" from point to flat.
 2. Hold-down nut must:
 - a. Incorporate an integral resilient weather seal.
 - b. Must be: counterclockwise.
 3. Lubrication chamber must be provided:
 - a. Sealed top and bottom with "O" rings.
 - b. Filled with lubricant which shall be either oil or grease.
 - c. The design shall be such that the thrust collar and the threaded operating parts are automatically lubricated each time the hydrant is cycled.

- d. There must not be less than two (2) “O” rings separating the lubrications reservoir from the waterway and that portion of the stem contracting these “O” rings shall be sleeved with bronze.
 - e. An anti-friction device must be in place above the trust collar to further minimize operating torque.
 4. Hydrants bonnet – must be attached to the upper barrel by not less than four (4) bolts and nuts, with an inserted flat rubber gasket as a pressure seal.
 5. Hydrants must be:
 - a. “Three-way”, having two (2) 2-1/2” hose nozzles with National Standards Threads and one (1) pumper nozzle measuring 4-1/2” I.D. with National Standard Thread.
 - b. Nozzles must attach counterclockwise into hydrant barrel utilizing “O” ring pressure seals.
 - c. A suitable nozzle lock must be in place to prevent inadvertent nozzle removal.
 - d. “Traffic-model”, having upper and lower barrels joined approximately 2” above the ground line by a separated and breakable “swivel” flange providing 360 degree rotation of upper barrel for proper nozzle facing. This flange must employ not less than eight (8) bolts.
 - e. Stem must be: two-piece, not less than 1-1/4” diameter or 1” x 1” square (excluding threaded or machined areas) and must be connected by a breakable stem coupling near the ground line flange. Screws, pins, bolts or fasteners used in conjunction with the stem coupling must be stainless steel.
 - f. Painted with Yellow Enamel #54-302 PPG or equal on exterior.
 6. Hydrant shoe and barrel casting must be fabricated of ASTM, A-126, Class B Gray Iron or Ductile Iron ASTM, A1-536, but no combination thereof, assuring uniform strength of all cast components, minimizing the possibility of shoe breakage upon traffic impact. The inside diameter of the hydrant barrel shall not be less than six and one-eighth inches (6-1/8).
 7. Main valves must be:

- a. Compression type closing with the pressure and must be not less than 5-1/4" diameter.
 - b. Composition of the main valve must be molded rubber or neoprene, having a durometer hardness of 95 (+) (-) 5 and must be not less than 1" thick.
8. Hydrants must be equipped with drain valves which drain the barrel when the hydrant is closed and seal shut when the hydrant is open.
9. Seat ring and drain ring (show bushing) must be:
- a. Bronze (ASTM B-62) and work in conjunction to form an all bronze drain way.
 - b. Two (2) drain openings are required and if they are in the cast iron shoe, they must be bronze lined and the bronze seat ring must thread into bronze drain ring (or shoe bushing) providing bronze to bronze connection.
 - c. Seat ring seals must be "O" rings. The 6" shoe connection must be specified (flanged, A/C, M.J., etc.) having ample blocking for sturdy setting and a minimum of eight (8) bolts and nuts is required to fasten the shoe to the lower barrel.
 - d. The interior of the shoe shall have a protective coating of a two-part thermosetting epoxy of at least 4 mils. If a stem cap nut is utilized it must be locked in place by a stainless steel lock washer or similar non-corrosive device.
10. Hydrant must have:
- a. A working pressure rating of 250 PSIG and be tested at 500 PSIG.
 - b. Have a manufacture's warranty against defects in material or workmanship for a period of (5) years from date of manufacture.
11. Upon request, supplier must furnish flow data indicating friction loss in PSI at the flow of 1,000 GPM from the pumper nozzle. Such friction loss must not exceed 3 PSI.
12. Hydrant bury shall be three (3'), four (4'), five (5') and six (6') feet unless specified in bid form.
13. Hydrant extension sections shall be furnished by the same manufacturer as for the hydrant to which section is to be added.

14. One (1) hydrant wrench shall be furnished with each ten (10) hydrants or fraction thereof.
15. All nozzle caps shall have extra long, heavy (no smaller than five (5) gauge) link chains that will not kink. The chain loop at the cap end shall permit free turning of the caps.
16. a. Anchor couplings or swivel hydrant fittings shall be used where indicated on the drawings or where required by the Engineer to tie six (6") inch pipe from the main to the hydrant.
 - b. The three (3) types of anchoring fittings available are- anchoring tees, anchoring elbows and anchoring couplings.
 - c. Swivel mechanical joint hydrant fittings shall be made with AWWA Class "D" metal thickness throughout, with applicable dimensions, laying lengths and radii, conforming to AWWA A21.10 and AWWA C-111.
 - d. All anchoring tees shall be six (6") inch by six (6") inch by six (6") inch MJ by MJ by Swivel.
 - e. All anchoring elbows shall be six (6") inch by six (6") inch Swivel by Swivel ninety (90^o) degree elbow.
 - f. All anchoring couplings shall be six (6") inch by six (6") inch Swivel by solid adapter twelve (12") long.
 - g. Acceptable manufacturers of anchor couplings: Tyler Pipe and Foundry Company, U.S. Pipe and Foundry Company, James B. Clow and Sons or approved equal.

C. Acceptable manufacturers:

1. Mueller A-423 "Centurion"
2. M & H Dresser 929 "Reliant"
3. Kennedy K-81 "Guardian"
4. Clow F2545 Medallion
5. American B-84-B

2.02 SERVICE CONNECTIONS

- A. Water Tubing (high density polyethylene): All high density polyethylene plastic tubing shall be SDR 9, Class 200 PSI, PE-3408 (Cell Class 355434-C) and shall conform to ASTM D2737-37, the latest amendment thereof. Stainless steel inserts (liners) are required on all connections to pack joint fittings.
- B. Corporation Stops: All corporation stops used shall conform to AWWA Standard C-800 and shall be Ford No. F-1000 or approved equal and shall be of the size required in the drawings.
- C. Curb Stops: Curb stops shall not be used unless such use is specifically requested and is approved by the Water Division. If required, these shall conform to AWWA Standards and shall be Ford Ball Valves or approved equal and shall be of the size required.
- D. Meter Boxes: Cast iron meter boxes shall be sized by the Water Division and shall be of the following types or approved equal.

<u>SIZE OF CONNECTIONS</u>		<u>METER SIZE</u>	<u>TYPE</u>
<u>INLET</u>	<u>OUTLET</u>		
1"	1"	5/8" X 3/4"	Ford Yokebox No. YL 244-244
1"	1"	1"	Ford No. 4 Yokebox
2"	2"	1-1/2" & 2"	1/4" Cast Iron Box with 1/4" steel floor plate cover (Per Detail)

Meter boxes for meters up to and including 1" shall have pack joint fittings on each inlet and outlet connection and shall be coated with a coal tar type paint. Lids shall have "WATER METER" imprinted on them.

- E. Check Valves: All one (1") inch services shall use Stockman B-345 or approved equal. Check valves less than one (1") inch shall be used when determined by the Water Division or LCG Codes as necessary.
- F. Service Fittings: Brass goods and fittings shall be made of red brass of composition 85-5-5-5. All threads shall be standard in accordance with AWWA Standard C-800 for service fittings.

Pack joints for joining galvanized pipe, K copper and polyethylene plastic tubing PE 3408 shall be Ford Pack Joint Couplings or approved equal.

- G. Customer Shut-Off Valve: The customer shut-off valve shall be a gate valve type, Mueller H 10914, Nibco T-22 or approved equal. Body shall be of waterworks brass, tapped and threaded for iron pipe. Valves shall be a positive stop to prevent flow.
- H. Service Saddle Clamps: The service saddle clamps shall be as called for in the plans and/or bid form.

2.03 VALVES AND VALVE BOXES

- A. Gate valves shall be mechanical joint gate valves (four (4") inch through twelve (12") inch) having a resilient seat and shall conform to AWWA Specifications C509 or C515 and UL/FM approved.
- B. Design of gate valves four (4") inch through twelve (12") inch shall provide non-rising stem (NRS), dual seal between gate and body, smooth closing gate and one piece cast iron wedge with integral lugs. Valve shall be furnished with standard o-ring seals, two o-ring seals shall be set above the stem thrust collar and one below. Direction to open shall be counter-clockwise equivalent to American Flow 2500, M&H 4067-01 or 7571, Clow F6100 (C509 or C515) or Mueller A-2360.
- C. Valves for use with two (2") inch pipe shall be AWWA non-rising stem, iron body, resilient seat gate valves, similar to the type specified for larger sizes, except that the joints shall be screwed ends.
- D. Valves larger than twelve (12") inch shall be approved by LUS Civil Engineering Division.
- E. Valves shall be provided with two (2") inch operating nuts marked to indicate the direction of opening. Valves shall open counterclockwise.
- F. Valve boxes for all valves twelve (12") inch in diameter and smaller shall be made of cast iron and shall be of the heavy roadway type with inside diameter of not less than five (5") inches. The top section shall be adjustable for elevation. The base shall be sufficiently enlarged so that it will not come in contact with the valve or pipe at any point. All valve boxes shall be provided with covers on which the word "WATER" is printed in raised letters. A pre-cast concrete pad shall be installed for all valve boxes outside pavement.

2.04 TAPPING SLEEVES AND VALVES

- A. Mechanical joint type cast iron tapping sleeves and valves shall be used where indicated on the drawings or where required by the Engineer to make connections to existing four (4") inch and larger water mains.
- B. The tapping valves shall have a resilient seat and shall conform to AWWA Specifications C509 or C515. (Approved manufacturers: Kennedy, Clow, M&H, American Flow, or Mueller)

- C. For connecting to Class 150 asbestos cement pipe, stainless steel tapping sleeves shall be used. (Romac SST 304 stainless steel flange or approved equal)
- D. The tapping sleeves shall be Mueller No. H-615, Kennedy 920, or approved equal.

2.05 CUT-IN SLEEVES AND VALVES

- A. Cut-in valves shall be furnished with mechanical joints and shall installed within a valve box.
- B. Cut-in valves shall be Mueller H-866 or approved equal.
- C. Cut-in sleeves shall be Mueller H-842 or approved equal.

PART 3 EXECUTION

3.01 FIRE HYDRANT INSTALLATION

- A. Install hydrants at locations indicated in the Drawings with pumper nozzles facing the street.
- B. Each hydrant shall be placed on a concrete base and shall be secured against dislocation, as indicated on the typical detail drawings.
- C. A minimum of seven (7) cubic feet of clean washed gravel shall be placed around each hydrant base. Backfill above gravel shall be thoroughly tamped.
- D. Bury hydrants to the point indicated on the barrel. Where necessary and where required by the Engineer, hydrant extension sections shall be installed to adjust the hydrant to grade.
- E. Fire hydrant bury shall be 3 ½ ‘ for both 6” and 8” mains and 4 ½’ for 10” and above mains.
- F. Hydrants shall be installed plumb. Hydrants shall be properly lubricated and shall be in good working order before acceptance.
- G. Touch up painting will be required prior to acceptance.
- H. Fire hydrant leads (pipe required in addition to typical hydrant installation) will be classified as mains and will be paid for as such.

3.02 SERVICE CONNECTION INSTALLATION

- A. Install service connections as detailed in the Drawings with all necessary connections, fittings, and appurtenances.

3.03 VALVE AND VALVE BOX INSTALLATION

- A. Valves shall be installed in locations shown on the plans or at locations designed by the Engineer.
- B. Installation of valves shall conform to the detail drawings or in accordance with manufacturer's instructions.
- C. All water valves shall be set vertically, unless otherwise directed by the Engineer.
- D. A concrete foundation shall be provided for each valve.
- E. Before being placed in the trench, all valves and fittings shall be carefully examined by the Contractor to assure that they are in good working order.
- F. A valve box shall be placed over each valve with the cover being placed level with the surface of the ground, finished street grade, or the elevation specified by the Engineer.
- G. The weight of the valve box shall not be supported by the valve or piping.

WASTEWATER COLLECTION SYSTEM

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Collection line piping, fittings, and accessories.
- B. Manholes.
- C. Pipe Testing.

1.02 DEFINITION

- A. "L.U.S." shall refer to the Lafayette Utilities System (a Department of the Lafayette City-Parish Consolidated Government (LCPCG)) or their authorized representative.

1.03 REFERENCES

- A. Where reference standards are specified throughout this section, the date of the standard is that in effect as of the Bid Date, or date of Owner-Contractor Agreement when there are no bids.
- B. ASTM A 746 - Ductile Iron Gravity Sewer Pipe.
- C. ANSI/ASTM D 1784 - Rigid Polyvinyl Chloride (PVC) Compounds.
- D. ANSI/ASTM D 2241 - Polyvinyl Chloride (PVC) Plastic Pipe (SDR-PR).
- E. ANSI/ASTM D 2321 - Recommended Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe.
- F. ANSI/ASTM D 3034 - Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- G. ASTM F 477 - Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
- H. ANSI A21.11/AWWA C111 - Standard for Rubber-Gasket Joints for Ductile Iron and Gray Iron Pressure Pipe and Fittings.
- I. ANSI A21.50/AWWA C150 - Thickness Design of Ductile Iron Pipe.
- J. ANSI A21.51/AWWA C151 - Standard for Ductile Iron Pipe for Water or Other Liquids.
- K. ASTM C 923 - Resilient Connectors Between Reinforced Concrete Manhole Structures and Pipes.

- L. Louisiana Standard Specifications for Roads and Bridges, Department of Transportation and Development, Office of Highways, 2000 Edition.
- M. ASTM C 39 - Compressive Strength of Cylindrical Concrete Specimens.
- N. ASTM C 150 - Portland Cement.
- O. ASTM C 443 - Specification for Joints for Circular Concrete Sewer and Culvert Pipe Using Rubber Gaskets.
- P. ASTM C 478 - Precast Reinforced Concrete Manhole Sections.
- Q. ANSI/ASTM D 3212 - Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.
- R. ANSI A21.4/AWWA C104 - Cement-Mortar Lining for Ductile Iron and Gray-Iron Pipe.
- S. ASTM D 2564 - Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Pipe and Fittings.
- T. ASTM D 2855 - Practice for Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings.

1.04 REGULATORY REQUIREMENTS

- A. Observe and comply with all applicable federal, state and local laws, municipal ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the project.
- B. Observe and comply with all applicable safety and health standards published by the Secretary of Labor under Section 107, Part 1585 of the Contract Work Hours and Safety Standards Act.

1.05 SUBMITTALS

- A. Submit product data for pipe, fittings and accessories.
- B. Submit when requested by the Engineer, manufacturer's printed instructions for delivery, storage, preparation, assembly, installation, adjusting and finishing.
- C. Submit, if requested by the Engineer, within thirty days after signing the Contract, a list of all materials and equipment ordered for the project, the manufacturers or agents from whom ordered, catalog and type, quantity ordered and promised delivery date of each item. Any subsequent changes in this list shall be promptly brought to the attention of the Engineer.

1.06 PROJECT RECORD DOCUMENTS

- A. Accurately record location of pipe runs, connections, manholes, and invert elevations.

- B. Reference measurements to appropriate datum control.
- C. Document field changes of dimension and detail.
- D. Submit construction record drawings as per L. U. S. standard format.

1.07 QUALITY ASSURANCE

- A. Submit a certificate of compliance from the pipe, pipe coupling, fittings, and manhole manufacturers stating that the material complies with the specifications. Certificate shall include all applicable test result data and the date manufactured for each lot of material delivered to the project site. Certificate shall also show the date of the latest test.
- B. Materials used on the basis of a certificate of compliance may be sampled and tested at any time. Materials used on said basis shall not relieve the Contractor of responsibility for incorporating material in the work which conforms to the plans and specifications. Such material not conforming to requirements will be rejected.
- C. Each fitting, length of pipe, and manhole section shall be legibly marked with the name of the manufacturer, rating or class, type, service, schedule and specification number, in conformance with the applicable standard.
- D. Where industry standard specifications, such as ANSI, ASTM or AWWA have been referenced for pipe and materials, the manufacturer or supplier shall furnish copies of the latest edition of the standard upon request by the Engineer.

1.08 QUALITY CONTROL

- A. All testing that may be required by L.U.S. to determine the quality, fitness and suitability of materials shall be performed at the direction and upon the order of the Engineer, and at no expense to the Contractor provided the tests prove that the materials meet the specified requirements.
- B. Where tests prove that materials do not meet the specified requirements, the Contractor shall bear the cost of that test and of all retesting until satisfactory results are achieved. L.U.S. will only pay for tests which demonstrate compliance with the specified requirements.
- C. Samples of materials may be secured and tested whenever considered necessary by the Engineer.
- D. The Contractor, at his own expense, shall deliver the materials for testing at the time and to the place designated by the Engineer.

1.09 STORAGE AND HANDLING

- A. Store all materials and equipment in an appropriate stock yard upon receipt, in accordance with the manufacturer's recommendations, and in a manner that leaves the material and equipment accessible to Inspectors.
- B. Store fittings and other appurtenances on pallets.
- C. Replace damaged material.

1.10 PRE-CONSTRUCTION CONFERENCE

- A. Within ten days of the date of the Notice to Proceed, the Contractor and his project superintendent shall meet with the representative of L.U.S. for a pre-construction conference.
- B. Submit a proposed construction schedule at this meeting.
- C. Location of the meeting to be designated by L.U.S.
- D. Provide L.U.S. with a phone number where someone is available to take calls at all times, in case of emergency, trouble or other matters requiring the Contractor's attention.

1.11 COPIES OF PLANS AND SPECIFICATIONS FURNISHED

- A. Contractor will be furnished with three (3) sets of plans and specifications for construction purposes.
- B. Upon request, additional copies of plans and specifications may be obtained at the cost of reproduction.

1.12 UNIT PRICES

A. Method of Measurement:

1. Sewer Main: Measured by the linear foot actually installed according to size and incremental depth. Measurement will be horizontally from center to center of manholes and from center of manhole to end of pipe without deductions for fittings, manholes, length of sewer main designated to be jacked or bored or lengths of sewer main installed in casing. The depth of cut for the various sizes of pipe will be the average depth of cut between manholes measured along the center line of the trench. The average depth will be calculated from elevations taken approximately 50 feet apart on the ground or pavement before it is disturbed to the invert of the sewer pipe directly below. The average depth will be the summation of the depths taken, divided by the number of depths taken, from manhole to manhole. In irregular terrain, measurements shall be taken at such other spacing as may be necessary to determine a true average. In cases where the average determined is an exact foot, payment will be made under the pay item for which that exact foot is the upper limit.

2. Manholes: Manholes shall be measured by the actual number constructed at the incremental depths. Depths of the manholes will be measured from the invert of the lowest pipe to the top of the manhole cover. In cases where the depth is an exact foot, measurement and payment will be made under the bid item for which that exact foot is the upper limit. Measurement shall include all items used in the construction of manholes including cast iron frame and cover, base and top, walls, and bedding material under the manhole base and under the connecting pipes as shown on the Typical Sewer Details.
3. Manhole Drop Inlet: Measured by the actual number installed and accepted per each at the depth indicated. Drop inlet shall include vertical pipe, bends, and tee.
4. 6" Service Line: Measured horizontally from end to end of service lines actually installed with no deductions in length for fittings, jacked or bored, or length of service installed in steel casing.
5. Service Riser: Measured according to size and linear foot installed, from the invert of the main to invert of the service line without deductions for fittings and as shown on the Drawings.
6. Fittings: Measured per each according to size and type actually installed. Only fittings designated as pay items will be measured for payment.
7. Embedment Material: Measured by the linear foot from end to end of each run of sewer main to be used in areas of unstable soil conditions. Cross sectional areas shall be as detailed in the Typical Sewer Detail drawings as Type II sewer foundation. Type I sewer foundation shall not be measured for payment; likewise, required Type II sewer foundation for sewer mains 12' or deeper shall not be measured for payment.
8. Connection to Existing Manhole: Measured per each connection to existing manhole actually installed.
9. Jacking or Boring (Sewer Main or Service Line): Measured, end to end along the centerline, by the linear foot according to the size and type of pipe.
10. Furnish and Install Steel Casing (Jack or Bore): Measured by the linear foot installed according to size and type of installation.
11. Furnish and Install Steel Casing (Open Cut): Measured by the linear foot installed according to size and type of installation.
12. Sheeting Left in Place: Measured per thousand board feet of sheeting left in place as ordered by the Engineer. Sheeting and bracing not required to be left in place shall be included in the cost of sewer main.

13. Stainless Steel Watertight Manhole Inserts: Measured per each including valve body and components.

B. Basis of Payment:

1. Sewer Main: Payment for furnishing and installing sewer main shall be based on the actual number of linear feet installed according to size and incremental depth.
2. Manholes: Payment for manholes shall be based on the actual number constructed at the incremental depths per each.
3. Manhole Drop Inlet: Payment shall be per each based on the actual number installed and accepted at the depth indicated.
4. 6" Service Line: Payment for service lines shall be paid for per linear of line installed and accepted.
5. Service Riser: Payment shall be per vertical linear foot installed including heavy wall sewer pipe, wye, bend at top of riser, and limestone encasement of the service riser.
6. Fittings: Payment shall be per each installed and accepted for the various sizes and types.
7. Embedment Material: Payment shall be by the linear foot of embedment material placed in poor soil conditions, as shown in the Drawings as Type II sewer main foundation.
8. Connection to Existing Manhole: Payment shall be per each and shall include all items necessary to tie sewer main to existing manhole.
9. Jacking or Boring (Sewer Main or Service Line): Payment shall be per linear foot of the various sizes and materials. The sewer main and service line shall be paid for under other items.
10. Furnish and Install Steel Casing (Jack or Bore): Payment shall be by the linear foot installed and accepted according to the size and type of pipe which includes the steel casing and installation by the jack or bore method.

11. Furnish and Install Steel Casing (Open Cut): Payment shall be by the linear foot installed and accepted according to size and type of pipe which includes the steel casing and installation by the open cut method.
12. Sheeting Left in Place: Payment for sheeting left in place shall be based on the actual sheeting ordered to be left in place by the Engineer and shall be paid for per thousand board feet.
13. Stainless Steel Watertight Manhole Inserts: Payment for manhole inserts shall be per each and shall include all components necessary to install the insert according to manufacturers instructions.

PART 2 PRODUCTS

2.01 SEWER PIPE

A. PVC:

1. a. Pipe (for depths up to 12 feet): ANSI/ASTM D 3034, SDR 35, 12454-B PVC cell classification in accordance with ASTM D 1784; additives and fillers shall not exceed 10 parts (by weight) per hundred of PVC resin in the compound.
- b. Pipe (for depths greater than 12 feet): ANSI/ASTM D 2241, SDR 26, 12454-B PVC cell classification in accordance with ASTM D 1784; additives and fillers shall not exceed 10 parts (by weight) per hundred of PVC resin in the compound.
2. Joints: Push on type joint in accordance with ASTM D 3212; flexible elastomeric seals (gaskets) in accordance with ASTM F 477.
3. Fittings: Same material and cell classification as pipe.
4. Solvent Cements: ASTM D 2564

B. Ductile Iron:

1. Pipe: ASTM A 746, thickness in accordance with ANSI A21.50 for Class 50 pipe wall thickness; asphalt coated outside and cement lined and seal coated inside in accordance with ANSI A21.4/AWWA C104.
2. Joints: Push on (boltless, single gasketed) similar to that known as "Super-Bell-Tite", "Fastite", "Tyton" or approved equal; or Mechanical Joint in accordance with ANSI A21.11/AWWA C111, corrosion resistant high strength low alloy steel bolts and nuts ("COR-TEN").
3. Fittings: Ductile iron, ANSI A21.10/AWWA C110.

C. Polyethylene Pipe (P.E. Pipe):

1. Pipe: PE 3408, minimum cell classification valves shall be 345434C in accordance with ASTM D3350, 160 psi pressure rating, SDR17.
2. Joints: Butt fusion
3. Fittings: Molded from a polyethylene compound having a cell classification equal to or exceeding the pipe compound; supplied by the same manufacturer of the pipe being supplied.

D. Joining Pipe of Different Material:

1. Connect pipe of dissimilar material with manufactured adapters specifically intended for this purpose. Devices shall be manufactured by Fernco Systems or approved equal.

2.02 CASING FOR JACKED, BORED AND OPEN TRENCH INSTALLATIONS

- A. Welded standard smooth steel pipe conforming to ASA B36.10; precoated inside and out with an approved bitumen compound. Minimum pipe thickness shall be as follows:

INSIDE DIAMETER (Inches)	SMOOTH STEEL PIPE (Min. Wall Thickness, Inches)
4	0.237
6	0.280
8	0.322
10	0.365
12 - 36	0.375

2.03 MANHOLES

- A. Manholes (Precast Shaft, Cone Top, and Base Pad Construction): conform to ASTM C478; integral base pad.
- B. Watertight Connectors: ASTM C923, flexible watertight connectors, KOR-N-SEAL (NPC Systems, Inc.), Z-LOK XP (A-Lok Products, Inc.) or approved equal.
- C. Frame and Cover: Size and type shown on Typical Sewer Details.

2.04 STAINLESS STEEL WATERTIGHT MANHOLE INSERTS

- A. Insert and all components shall be manufactured from corrosion proof material suitable for atmospheres containing hydrogen sulfide and dilute sulfuric acid as well as other gases associated with wastewater collection systems.

- B. The insert shall be manufactured of 304 stainless steel with a thickness of not less than 18 gage.
- C. The insert shall have a configuration such that the lip will rest on the seating surface of the manhole frame.
- D. In order to reduce excess weight accumulation, the insert shall not exceed 6 1/2" in overall depth.
- E. The gasket shall be manufactured of close cell neoprene or approved equal. The gasket shall be compatible with the stainless steel insert to form a long lasting bond in wet or dry conditions.
- F. The watertight manhole insert as specified above, upon installation as per manufacturer's recommendations, shall not allow more than 1 gallon of inflow during a period of 24 hours.
- G. The manhole insert shall have a handle of 3/16" minimum plastic coated stainless steel cable attached to the insert body. The handle shall be attached with a No. 6 high grade stainless steel rivet. The cable shall be braided in a manner, which resists cutting with common bolt cutters. The cable terminal and eye shall be stainless steel.

2.05 CONCRETE

- A. Cement shall be Portland Cement conforming to ASTM C 150.
- B. Test for compressive strength of concrete in accordance with ASTM C 39.
- C. Concrete for Embedment: 3000 psi minimum at 28 days, five sacks of cement minimum per cubic yard, not more than 7 gallons of water per sack of cement.
- D. Grout: One part Portland Cement, two parts mortar sand, and water as required for proper consistency; use within 30 minutes of mixing.

2.06 EMBEDMENT MATERIAL

- A. A mixture of either gravel or stone with 35 percent (plus or minus) sand as verified by proof of material deliveries, conforming to the following requirements:
 - 1. Gravel: Material from a source on the DOTD Qualified Products List conforming to the following gradation:

<u>U. S. SIEVE</u>	<u>PERCENT PASSING</u>
--------------------	------------------------

1-1 1/2"	95-100
----------	--------

No. 200	0-2
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2. Stone: Material from the DOTD Qualified Products List conforming to the following gradation:

<u>U. S. SIEVE</u>	<u>PERCENT PASSING</u>
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1-1 1/2"	95-100
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3/4"	40-85
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No. 4	0-15
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3. Sand: Non-plastic siliceous material conforming to the following gradation requirements:

<u>U. S. SIEVE</u>	<u>PERCENT PASSING</u>
--------------------	------------------------

1/2"	100
------	-----

No. 4	75-100
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No. 200	0-10
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- B. Limestone conforming to the following gradation requirements:

<u>U.S. SIEVE</u>	<u>PERCENT PASSING (BY WEIGHT)</u>
-------------------	------------------------------------

1-1/2"	100
--------	-----

1"	90-100
----	--------

3/4"	70-95
------	-------

3/8"	50-80
------	-------

2.07 SAND

- A. Non-plastic siliceous material conforming to the following gradation requirements:

<u>U.S. SIEVE</u>	<u>PERCENT PASSING (BY WEIGHT)</u>
-------------------	------------------------------------

1/2"	100
------	-----

2.08 MORTAR SAND

- A. Non-plastic siliceous material conforming to the following gradation requirements:

U.S. SIEVE

PERCENT PASSING (BY WEIGHT)

- B. Percentage of foreign matter not to exceed the following:
- | | | |
|----|-----------------|--------------|
| 1. | Coal or Lignite | 0.25 percent |
| 2. | Clay Lumps | 0.50 percent |

PART 3 EXECUTION

3.01 ALIGNMENT AND GRADE

- A. Prior to excavation, the Engineer will provide alignment and location of manholes. Notify Engineer at least two working days prior to the time staking is required.
- B. Uncover, relay and backfill installed pipe where horizontal and vertical alignment is determined by Engineer to be unacceptable or erroneous, at no cost to L.U.S.

3.02 EXCAVATION AND TRENCHING

- A. Excavation shall include the removal, handling, rehandling, refill or backfilling, and disposal of any and all materials encountered in the work, and shall include all pumping, bailing, drainage and sheeting and bracing. It includes clearing and the removal of shrubbery and other obstructions not otherwise provided for.
- B. Perform all excavation, of whatever substance encountered, to depths indicated on the drawings or established by field stakeout.
- C. If the Engineer determines it is necessary to adjust, correct, relocate or in any way change the line and profile shown on the Plans, the Contractor shall perform the excavation and backfill required by said change under the terms of these specifications.
- D. Fill all excavations beyond authorized depths and widths with compacted embedment material at no cost to L.U.S. Over-excavated trenches shall not be brought up to grade with excavated material.
- E. All excavation shall be by open cut except where indicated otherwise in the Plans.
- F. Width of the trench to a point two (2) feet above the top of the pipe installation shall not exceed the external diameter of the barrel of the pipe plus nine (9) inches on each side. Additional cost for special foundation and backfill material and requirements as a result of failure to confine the excavation to this width shall be borne by the Contractor.

- G. Keep banks of trenches as nearly vertical as practical.
- H. Where required to control trench width, protect adjacent structures and to safeguard employees, properly sheet and brace trench.
- I. Where in the opinion of the Engineer, damage is liable to result from withdrawing sheeting, the sheeting will be required to be left in place. Neither the giving of such orders by the Engineer nor his failure or refusal to issue such orders shall in any way relieve the Contractor of the responsibility for damages to pavements or structures.
- J. When embedment material is not required, lay pipe on a firm, undisturbed, native earth foundation.
- K. Prevent surface ground water from flowing into the excavations.
- L. Remove all water accumulated in the trenches or other excavations by pumping or other approved methods, at no cost to L.U.S., prior to laying pipe.
- M. Stockpile material suitable for backfilling a sufficient distance back from the edges of the excavation to avoid overloading and to prevent slides or cave-ins.
- N. Control banks of all excavated areas to prevent movement of soil in areas supporting existing foundations, slabs, pole lines, pipelines or other structures. If, as a result of such excavation or through fault or neglect of the Contractor, the earth or ground under such structures is disturbed, corrective measures, as approved by the Engineer, shall be taken by and at the expense of the Contractor.
- O. Keep all drains, gutters, culverts, etc. for surface drainage open, or if they are unavoidably closed, make other provisions for this drainage.
- P. Length of the trench to be opened or the area of surface to be disturbed and unrestored at any one time will be limited by the Engineer with regard to both expeditious construction and the convenience and comfort of persons residing in the neighborhood or frequenting the street in question.
- Q. Trenches left open during non-working hours shall be properly protected from accidental entry.

3.03 EMBEDMENT

- A. Typical sewer foundations are as shown on the Typical Sewer Details.
- B. All pipe shall be bedded in a Type I Foundation or as otherwise stated herein, in the Plans, or as determined in the field.
- C. Where cuts to inverts of sewer mains are twelve (12) feet or more, Type II foundation shall be required.

- D. Where the bottom of the trench is not sufficiently stable or firm to prevent vertical or lateral displacement of the pipe after installation, the Engineer may direct the Contractor to provide a Type II foundation.

3.04 MANHOLE INSTALLATION

- A. Construct precast manholes to proper alignment and elevation as shown in the Plans and in accordance with the Typical Sewer Details.
- B. Provide minimum of six (6) inches clear between the outer surface of the manhole and the embankment or timber sheeting.
- C. Set metal frames as shown in standard details.
- D. Invert channels shall be smooth, accurately shaped and in accordance with L.U.S. template and the Typical Sewer Details.
- E. All pipe connections to manholes shall be installed using watertight connectors as per Article 2.03(B).
- F. Manhole drop inlets and services into manholes shall be constructed as shown on the Typical Sewer Details with materials meeting all requirements of these specifications.

3.05 PIPE INSTALLATION

- A. Where a certain pipe material is specified on the Plans, only that material can be used. Where the term "Sewer Pipe" is shown on the plans or in the proposal, it shall be interpreted to mean any of the specified pipe materials meeting the requirements of this section, as the Contractor elects, of the dimension shown on the plans.
- B. Install pipe in accordance with the manufacturer's recommendations and in accordance with the specifications herein. In addition, install PVC pipe in accordance with ASTM D 2321. In the event there is a conflict, consult with Engineer for clarification.
- C. Install solvent weld cap on the new line into the first manhole constructed immediately upstream of the existing manhole to prevent sewer gases from entering the work area and to prevent drainage into the existing system.
- D. Thoroughly clean interior of pipe before lowering into the trench. Keep pipe interior clean and free of foreign matter during laying operations.
- E. Do not lay pipe in unsuitable weather conditions. Stabilize wet trench conditions before laying pipe.
- F. Plug open ends of pipe and fittings when work is not in progress.

- G. Replace pipe found to be defective, before or after laying, with new pipe by and at expense of the Contractor.
- H. Use embedment material for pipe bedding where required.
- I. Grade pipe bedding by hand to provide uniform pipe bearing for its entire length and to provide proper grade and alignment.
- J. Provide bell or coupling holes at each joint to permit proper joint assembly and pipe support.
- K. Lay pipe with spigot end pointing in direction of flow.
- L. Walking or working on the completed sewer pipe, except as may be necessary in tamping or backfilling shall not be permitted until the trench has been backfilled to a height of at least one foot above the top of the pipe.
- M. Check each joint of pipe for line and grade before the next succeeding joint is placed.
- N. Maintain proper alignment of pipe during haunching and initial and final backfilling operations.
- O. Keep the sewer line pumped dry at all times.

3.06 SERVICE RISERS

- A. Install service risers as indicated on the Typical Sewer Details at locations shown on the Plans or designated in the field by the Engineer.
- B. For sewer mains 8" or larger, the tee shall be a short-body ductile iron tee conforming to AWWA C153.

3.07 WYE BRANCHES OR TEES

- A. Furnish wye branches or tees with connection of the size specified, securely and permanently fastened to the barrel of the pipe in the process of manufacture.
- B. Wyes and tees shall be given an inclination above a horizontal line and shall be properly bedded.
- C. All wyes and tees shall conform to the specifications and test standards of the pipe it is to be installed on.

3.08 CONNECTION TO EXISTING MANHOLES

- A. Connection to existing manholes shall be made above the existing manhole base.
- B. Manhole penetrations shall be cored as shown in standard details.

- C. Provide watertight connectors at tie-in to the manhole.
- D. Cap new sewer pipe from existing system at first manhole constructed immediately upstream from existing system tie-in.
- E. Where the connection has to be made at the same elevation as the existing pipe, the base shall be broken in the area where the connection is to be made and the new base shall conform to the requirements set forth in these specifications.

3.09 BACKFILLING

- A. Where compaction density is specified, maximum density shall be determined in accordance with requirements of Louisiana DOTD Designation: TR 418 and TR 401.
- B. Upon completion of joints and approval of Engineer, place acceptable material, free from stones, hard clay lumps, or other hard substances under the haunches of the pipe and up to the spring line of the pipe. Place initial backfill, in not more than six (6) inch uniform loose lifts, to a point twelve (12) inches above the top of the pipe. Compact each stage by hand or mechanical tamping to obtain a minimum of 85% maximum density.
- C. Avoid displacement of the pipe in placement of backfill about the haunches.
- D. Take care to avoid contact between the pipe and compaction equipment.
- E. Backfill trenches for mains and services beneath existing pavement as shown in the Typical Sewer Details.
- F. Compact remainder of backfill over and above 12" above the surface of the pipe for mains and services laid within the right-of-way as follows:
 1. Backfill with select excavated site materials in not more than twelve inch (12") uniform loose layers with each layer mechanically compacted to a minimum 90% of maximum density.
 2. Within state highway right-of-way, the compaction requirements shall be 100% of the density of the surrounding undisturbed material, compacted in uniform loose layers of not more than twelve inches (12").
 3. Slightly overfill the trench with backfill to create a crowned condition but not to exceed 6".
- G. Compact remainder of backfill over and above 12" above the surface of the pipe for mains and services laid outside the right-of-way as follows:
 1. Backfill with select excavated material, in not more than eighteen (18) inch uniform loose lifts, to the elevation 24" below the finished ground surface.

2. Compact each layer of the material to eliminate all voids and to obtain a soil density equivalent to the existing undisturbed surrounding soil.
 3. Compact the remaining top two feet of the trench backfill, in not more than twelve (12) inch uniform loose lifts, to obtain a minimum of 90% of maximum density.
 4. Slightly overfill the trench with backfill to create a crowned condition but not to exceed 6".
- H. The Contractor shall be responsible for obtaining suitable compaction of all trench backfill, including that in proposed streets, parking areas or other surfaced locations and shall be responsible for the failure of any surfacing due to trench settlement.
- I. Compaction will be verified through compaction tests ordered by the Engineer at no expense to the Contractor, except as stated herein. If the test results indicate insufficient compaction, the cost for that compaction test and of all retesting shall be borne by the Contractor until satisfactory results are achieved. L.U.S. will pay only for those tests that prove that the specified compaction has been achieved.
- J. Avoid damage to pipe during compaction.
- K. Backfill material shall contain no stumps or roots and shall be free of lumber, trash, or other debris.
- L. Use special backfill, with Engineer's approval, where the excavated material is not suitable for backfilling the trench and obtaining the required compaction. At the Contractor's option, limestone may be used for special backfill at no additional cost to L.U.S.
- M. Maintain trenches in good and safe condition during construction and during one-year warranty period.

3.10 CASING INSTALLATION

- A. Clean and coat weld joints with approved bitumen compound after joining and before installation.
- B. Install casing as to prevent the formation of a waterway below the obstruction traversed.
- C. Casing shall have even bearing throughout its length and shall slope toward one end.
- D. Provide casing lengths to meet requirements of Plans or as established by the Engineer.
- E. Seal ends of the casing to prevent entrance of earth and groundwater.

- F. Provide polyethylene or stainless steel casing spacers attached to the sewer pipe to prevent damage to pipe and bell joints during installation and to provide proper long-term line support, at no cost to L.U.S. Skid arrangement to be in accordance with manufacturer's recommendations. Spacers shall be manufactured by Advance Products and System, Inc. or approved equal.

3.11 JACKING OR BORING

- A. Install pipe by means of a boring machine, auger, jack or by other means satisfactory to the Engineer.
- B. In the event the jacking or boring operations result in injury or damage to railroad tracks or pavements, repairs shall be the responsibility of the Contractor and shall be done at no cost to L.U.S.
- C. Any overcutting of the borehole shall be remedied by pressure grouting the entire length of the installation.
- D. Backfill boring pits to the bottom of the pipe with limestone at no direct cost to L.U.S.
- E. Schedule jacking or boring operations such that no pits shall be left open at the end of the day.

3.12 EXISTING STRUCTURES

- A. Existing structures shall be defined as all above and below ground level structures, including all pipelines, poles, tracks, roads, culverts, sidewalks, drains, cables, wires, conduits, vaults, manholes, landscaping, and other appurtenant facilities, whether owned or operated by public bodies, private individuals, corporations, firms or companies.
- B. Protect all existing structures from damage during construction.
- C. Utility facilities shown on the Plans are approximate locations and do not include service locations. There is no expressed or implied guarantee as to the accuracy of the various utilities or any omissions.
- D. The Contractor shall verify the locations of all utilities and follow OSHA Law Section 1926.651 at no cost to L.U.S. Final project location will be determined in the field by the Engineer upon the Contractor's verification of all utilities.
- E. In no case shall the Contractor receive additional compensation due to the location of existing utilities in relation to the final location of the proposed lines and appurtenances.
- F. Notify all utilities or other interested parties prior to starting work and advise them of any adjustments required.

- G. Contractor shall be responsible for investigating and informing himself of the condition, character, and extent of all structures which may be encountered during construction.
- H. Perform work in a manner to prevent interference with or damage to existing structures. Any damages done by the Contractor shall be his responsibility and all repairs shall be made immediately to the satisfaction of L.U.S.
- I. L.U.S. and/or his agents shall not be responsible for any damages to or any costs incurred as a result of any delays due to existence, removal, adjustment or repair to any structures mentioned herein, shown on the Plans or encountered during construction.

3.13 FLUSHING SEWER LINES

- A. Water flush and thoroughly clean all sewer lines prior to acceptance by L.U.S.

3.14 TESTING SEWER LINES

A. General:

1. Test sewer lines by low pressure air testing and television equipment. Deflection tests may also be performed as described in paragraph (D) below.
2. Test manholes by air vacuum testing, visual inspection, and by infiltration. Manhole leakage will not be acceptable.
3. Repair and retest manholes and sections of sewer lines which fail to meet the specified tests.
4. Do not remove plugs installed on the new system until the system has been accepted.
5. Furnish all equipment, labor and materials required for making the test.

B. Low pressure air testing

1. Clean the interior of the pipe immediately prior to testing.
2. Furnish test plugs, air compressor, test gages, stop watch and personnel for conducting the test.
3. The Engineer has the option to have the Contractor's testing equipment independently checked and certified for accuracy.
4. All pneumatic plugs shall be tested before being used in the actual test installation.

- a. One length of pipe shall be laid on the ground and sealed at both ends with the pneumatic plugs to be checked.
 - b. Air shall be introduced into the plugs to 25 psig.
 - c. Pressurize the sealed pipe to 5 psig.
 - d. The plugs shall hold against this pressure without bracing and without movement of the plugs out of the pipe.
5. After pneumatic plugs are checked by the above procedure, place the plugs in the line at each manhole and inflate to 25 psig.
 6. Introduce low-pressure air into the sealed line until the internal air pressure reaches 4 psig greater than the average back pressure of any ground water that may be over the pipe.
 7. Allow at least two minutes for the air pressure to stabilize.
 8. After the stabilization period (3.5 psig minimum pressure in the pipe), disconnect the air hose from the control panel to the air supply.
 9. The portion of the line being tested shall be termed "Acceptable" if the time required in minutes for the pressure to decrease from 3.5 to 2.5 psig (greater than the average back pressure of any ground water that may be over the pipe) shall not be less than the time shown for the given diameter in the following table:

<u>PIPE DIAMETER IN INCHES</u>	<u>MINUTES</u>
4	2.0
6	3.0
8	4.0
10	5.0
12	5.5
15	7.5
18	8.5
21	10.0
24	11.5

10. If ground water is known to be present over the pipe, the Contractor shall install a one-half inch diameter capped pipe nipple, approximately 10" long, through the manhole wall directly over one of the sewer lines entering the manhole. This is to be done at the time the sewer line is installed. Immediately prior to the performance of the test, the ground water shall be determined by removing the pipe cap, blowing air through the pipe nipple into the ground so as to clear it, and then connecting a clear plastic tube to the pipe nipple. The hose shall be held vertically and a measurement of the height in feet of water over the invert of the pipe shall

be taken after the water has stopped rising in this plastic tube. The height in feet shall be divided by 2.3 to establish the pounds of pressure that will be added to all readings. (For example, if the height of water is 11.5 feet above the invert of the pipe, then the added pressure will be $11.5/2.3$ or 5 psig. This increases the 3.5 psig to 8.5 psig, and the 2.5 psig to 7.5 psig.) The allowable drop of one pound and the timing remain the same. In no case should the starting test pressure exceed 9.0 psig. Recap and seal the pipe nipple to prevent any future infiltration.

11. In lieu of (10) above, if the ground water level can be readily determined during the installation of the manhole, and jointly agreed upon by the Contractor and L.U.S., the height of the ground water above the invert of the sewer pipe can be used in determining the pounds of pressure to be added to all readings.

C. Television Testing

1. Prior to putting each system into service, the line will be visually inspected by television equipment operated by the L.U.S. Wastewater Collection Division. The Contractor shall be responsible for cleaning the system prior to inspection by television equipment. If rejected, the Contractor shall pay at current rates for television equipment operation until proper flushing and/or pipe installation has been achieved.

D. Deflection Test

1. If during the operation of the television equipment by L.U.S. there is suspicion of deflection of the sewer pipe, the Engineer reserves the right to require the Contractor to perform a deflection test on that section of pipe at the Contractor's expense.
2. No pipe shall exceed a deflection of 5%.
3. Test for deflection using a mandrel with a diameter equal to 95% of the inside diameter of the pipe.
4. Perform test without mechanical pulling devices.
5. Should any deflection test fail, L.U.S. reserves the right to require the Contractor to perform deflection tests on any or all additional pipe at no cost to L.U.S.

E. Manhole Air Vacuum Test

1. Air vacuum testing of manholes shall be performed on at least 20% of the manholes, minimum of one (1) per project. The selection of which manhole(s) to be vacuum tested shall be determined by the Engineer.
2. Test manholes immediately after assembly of the manhole and the connecting pipes and before any backfill is placed around the manhole.

3. Plug lift holes.
4. Plug pipe openings, taking care to securely brace the plugs and the pipe.
5. Perform test using an inflatable compression band, vacuum pump and appurtenances specifically designed for vacuum testing manholes.
6. After the testing equipment is in place, a vacuum of 10 inches of Hg shall be drawn on the manhole. The manhole will be considered to have passed the test if the vacuum does not drop more than 1 inch of Hg in one minute.
7. If the manhole fails the initial test, the Contractor shall locate the leakage and make proper repairs, and retest until a satisfactory test result is obtained.
8. If any manhole fails the vacuum test, the Engineer reserves the right to require the Contractor to test any or all additional manholes at the Contractor's expense.

F. Manhole Infiltration Test

1. Construct a minimum 2' deep by 2' wide trench around the manhole.
2. Fill the trench with water and drill 3/4" (minimum) holes 5' deep (or the depth of the manhole). These holes shall circle the manhole at 6" intervals.
3. Two hours later the trench shall be refilled with water.
4. Up to two hours after the second filling, the Engineer will check the manhole for infiltration.
5. The manhole will be considered to have passed the test if no infiltration is detected. Repair and retest manholes failing the above test.

G. Visual Inspection

1. After the manholes have been backfilled and prior to final acceptance of the project, any signs of leaks or weeping visible from the inside of the manhole shall be repaired by the Contractor and the manhole made watertight.

3.15 MAINTENANCE OF TRAFFIC

- A. Refer to "Louisiana Department of Highways Maintenance Traffic Controls Handbook" (for state highway right-of-way) and "The Work Area Traffic Control Handbook" (for City-Parish streets).

- B. Conduct operations as to minimize interference with public travel and inconvenience to the public and to property owners.
- C. Provide and maintain, at Contractor's expense, suitable bridges, detours or other temporary facilities for the accommodation of public or private travel, as directed by the Engineer.
- D. Give twenty-four (24) hours notice to owners of private driveways prior to interfering with them.
- E. Keep local fire protection authorities informed at all times of the location of construction operations and fire lanes. Maintain access for fire-fighting equipment as requested by the Fire Department.
- F. Maintain traffic on all streets during construction, except where suitable detours or other arrangements are agreed upon. LCG Traffic and Transportation shall be given a minimum 4 day notice of any detours or disruptions in traffic patterns.
- G. Provide motorized rubber wheel road grader on site upon completion of backfilling of all excavations in roadways and streets. Maintain all streets and roadways in a satisfactorily condition approved by the Engineer for the duration of the contract.
- H. Contractor shall have someone available to take calls at all times. Provide L.U.S. with a night phone number to call so that the Contractor may be advised of any emergency, trouble or other matter requiring his attention.

3.16 CARE OF STREETS, SIDEWALKS & ROADS

- A. Remove all excess materials, debris or other obstruction from streets or roads immediately after completing backfilling, at Contractor's expense.
- B. Wash streets, sidewalks and roads daily to remove dust problem.
- C. No cross streets, sidewalks or roads shall be wholly obstructed except by written permission from the Engineer.
- D. If at any time the Contractor neglects to remove such material or obstruction and place streets, sidewalks and roads in suitable condition for traffic within twenty-four (24) hours after having received notice (written or verbal) from the Engineer, the work may be done by L.U.S., and the cost thereof charged to the Contractor and deducted from his final estimate.
- E. Repair and replace streets, sidewalks, roads, ditches and culverts to the satisfaction of the Engineer and parties concerned.

3.17 PROTECTION AND CARE OF PUBLIC OR PRIVATE PROPERTY AND SERVITUDES

- A. Continuously maintain and protect all underground and above ground structures, utilities, including the restoration of all public utilities, water mains, water services, gas mains, gas services, culverts, drains, ditches, curbs, sidewalks, landscaping and/or other facilities which may be damaged, to a condition at least equal to their original status, at no additional cost to L.U.S. In the event of damage to any facilities, the appropriate utility will be notified immediately. L.U.S. will repair damaged facilities at the Contractor's expense or require the Contractor to repair said damage.
- B. All construction work under this contract on servitudes, right-of-way, private property or franchise shall be confined to the limits of such servitudes, right-of-way or franchise. All work shall be accomplished so as to cause the least amount of disturbance and a minimum amount of damage.
- C. No trees or shrubbery shall be removed or trimmed without the consent of the Engineer. With such approval ornamental trees and shrubbery shall be carefully removed, with the earth surrounding their roots wrapped in burlap and replanted in their original positions within forty-eight (48) hours. All shrubbery or trees destroyed or damaged shall be replaced by the Contractor with material of equal quality at no cost to L.U.S.
- D. All obstacles such as fences, markers, mail boxes, driveway culverts, etc. shall be removed by the Contractor and immediately replaced after the trench is backfilled in their original position and condition at no direct cost to L.U.S.
- E. Maintain adequate drainage during the process of construction.

3.18 CLEAN-UP

- A. Remove from the site all tools, equipment, temporary structures and surplus materials.
- B. Dispose of all excess soil, waste, rubbish, debris or objectionable materials off the site and in a manner and a location that complies with local ordinances and laws and is acceptable to all parties concerned and is approved by the Engineer.
- C. When disposal of excess soil is upon private lands, the Contractor shall be required to produce a written agreement with the private landowner stating the agreed terms and conditions.
- D. The entire construction site shall be left clean and to the satisfaction of the Engineer.

WASTEWATER FORCE MAINS

PART 1 GENERAL

1.01 WORK INCLUDES

- A. The work covered by this section of the specifications consists of furnishing all labor, supervision, equipment, tools, appliances and all materials and in performing all operations in connection with the installation of sewage force mains, complete, in accordance with the specifications and the applicable drawings.

1.02 REFERENCES

- A. ANSI/ASTM D 1784 Rigid Poly (Vinyl Chloride) (PVC) Compounds.
- B. ANSI/ASTM D 2241 Poly (Vinyl Chloride) (PVC) Plastic Pipe (SDR-PR).
- C. ANSI/ASTM D 3139 Joints for Plastic Pressure Pipe Using Flexible Elastomeric Seals.
- D. ANSI/ASTM D 1248 Polyethylene Plastics Molding and Extrusion Materials.
- E. ANSI/ASTM D 3350 Polyethylene Plastics Pipe and Fittings Materials.
- F. ANSI/AWWA C 111/A21.11 Rubber-Gasket Joints for Ductile Iron and Gray Iron Pressure Pipe and Fittings.
- G. ANSI/AWWA C 151/A21.51 Ductile Iron Pipe for Water or Other Liquids.
- H. DOTD Designation: TR 401 – Method of Test for the Determination of In-Place Density.
- I. DOTD Designation: TR 418 – Method of Test for Moisture-Density Relationships.
- J. DOTD Designation: TR 423 – Procedure for the Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes.

1.03 PROTECTION

- A. Locate, maintain, and protect above and below grade utilities and other underground facilities remaining within the construction area.
- B. Protect and maintain trench excavations by cribbing, sheathing, shoring, and bracing as necessary for protection of Work, existing foundations, utilities, underground facilities, other structures, and the safety of personnel.

- C. Responsibility for the design, installation, and maintenance of cribbing, sheathing, and shoring required by job conditions is the obligation of the Contractor.
- D. Prevent surface water from entering trench.
- E. Adequate pumping equipment shall be on hand to remove any surface or groundwater from trench.
- F. Protect plants, lawns, bench marks, existing structures, fences, sidewalks, pavement, and curbs from excavation equipment and vehicular traffic.
- G. Access to hydrants, valve boxes, fire and police call boxes which are not part of the Work.

1.04 QUALITY ASSURANCE

- A. Submit a certificate of compliance from the pipe manufacturer stating chemical and physical properties of materials used.
- B. Verify that survey benchmarks and intended elevations are as shown on the Drawings.

1.05 PROJECT RECORD DOCUMENTS

- A. Accurately record location of pipe runs, valves, and changes in invert elevations.

1.06 STORAGE OF PIPE AND FITTINGS

- A. Store pipe and fittings in accordance with manufacturer's recommendations.
- B. Any damaged pipe shall be replaced by the Contractor.

1.07 UNIT PRICES

- A. Method of Measurement:
 1. Force Main: Measured by the linear foot according to size, along the centerline of the pipe installed and accepted without deductions for fittings, length of force main designated to be jacked or bored, or length of force main installed in steel casing.
 2. Jacked or Bored Force Main: Measured by the linear foot along the centerline length according to size installed and accepted.
 3. Force Main Tie-in to Manhole: Measured per each installed and accepted.
 4. Force Main Tie-in to Lift Station: Measured per each installed and accepted.

5. Furnish and Install Steel Casing: Measured by the linear foot installed according to size and type of installation.

B. Basis of Payment:

1. Force Main: Paid for by the actual number of linear feet installed and accepted, according to size of pipe.
2. Jacked or Bored Force Main: Paid for by the actual number of linear feet installed and accepted according to size of pipe. This item is to cover the additional cost of installing this pipe by the jacking or boring method.
3. Force Main Tie-in to Manhole: Paid for per each installed and accepted.
4. Force Main Tie-in to Lift Station: Paid for per each installed and accepted.
5. Furnish and Install Steel Casing (Jack or Bore) or (Open Cut): Paid for by the linear foot furnished, installed, and accepted according to size and type of installation.

PART 2 PRODUCTS

2.01 PIPE MATERIALS:

A. Force Main:

1. Ductile Iron (DI)
 - a. Pipe shall be designed in accordance with ANSI Specification A21.50 (AWWA C-150) for 200 psi water working pressure.
 - b. Pipe shall be manufactured in accordance with ANSI Specification A21.51 (AWWA C-151), latest revision, except the minimum nominal wall thickness shall be as shown on the following table:

<u>SIZE</u>	<u>THICKNESS</u>	<u>SIZE</u>	<u>THICKNESS</u>
6"	.25	12"	.31
8"	.27	14"	.33
10"	.29	16"	.34

- c. All pipe shall be asphalt-coated outside and cement lined to standard thickness and seal coated inside in accordance with ANSI Standard A21.4.
- d. The following joint types shall be used, conforming to ANSI A21.11:

1. Mechanical Joint (Type III)
 2. Push-On (boltless, single-gasketed) joint similar to that known as “Super-Bell-Tite”, “Fastite”, “Tyton”, or approved equal.
 3. Submarine, flexible, ball and socket joint (for underwater installation).
 2. PVC Pipe:
 - a. Pipe shall conform to ASTM 2241, 160 psi working pressure, standard dimension ratio SDR 26, shall be made from clean, virgin, Type I, Grade I, PVC compound in accordance with ASTM D 1784.
 - b. Clean, reworked material generated from the manufacturer’s own pipe production may be used.
 - c. Joint material shall be push-on type in accordance with ANSI/ASTM D 3139 and assembled with a non-toxic lubricant.
 - d. Fittings smaller than 3” shall be the same material as pipe with 160 psi working pressure rating. Fittings 3” and larger shall be ductile or cast iron with restrained mechanical joints in accordance with ANSI/AWWA C111/A21.11 respectively. All fittings shall be asphalt-coated outside and cement-lined to standard thickness and seal coated inside in accordance with ANSI Standard A21.4.
 - e. Laying lengths shall be 20 feet (plus or minus 1”).
 - f. A THW 14 insulated solid copper wire shall be placed above the center of all PVC pipe for its entire length. This wire must be connected from the discharge pipe inside the pump station to the ring of the discharge manhole. Splices in detection wire shall be installed in a direct bury splice kit manufactured by 3M or approved equal.
 3. Polyethylene Pipe (P.E. Pipe):
 - a. Pipe: PE 3408, minimum cell classification values shall be 345434C in accordance with ASTM D 3350, 160 psi pressure rating, SDR 11.
 - b. Joints: Butt fusion.
 - c. Fittings: Molded from a polyethylene compound having a cell classification equal to or exceeding the pipe compound; supplied by the same manufacturer of the pipe being supplied.
- B. Sample of pipe and physical and chemical data sheets shall be submitted to the Engineer for approval and his approval shall be obtained before pipe is purchased.

- C. The pipe shall be homogeneous throughout and free from cracks, holes, foreign inclusions or other defects.
- D. At the option of the owner, manufacturers may be disqualified if they do not have proper experience in the manufacture of the material specified.

2.02 CASING FOR JACKED, BORED, AND OPEN TRENCH INSTALLATIONS

- A. Welded standard smooth steel pipe conforming to ASA B36.10 or API Standard 5L; pre-coated inside and out with an approved bitumen compound; minimum thickness shall be as follows:

<u>INSIDE DIAMETER (INCHES)</u>	<u>SMOOTH STEEL PIPE</u> (Min. Wall Thickness, Inches)
4	0.237
6	0.280
8	0.322
10	0.365
12-36	0.375

2.03 WATERTIGHT CONNECTORS

- A. Connectors shall meet ASTM C923, shall be KOR-N-SEAL flexible watertight connectors as manufactured by NPL Systems, Inc., or approved equal.

PART 3 EXECUTION

3.01 PREPARATION

- A. Identify and protect above and below grade utilities and other underground facilities to remain.
- B. Pipe shall be installed in accordance with the manufacturer's recommendations.
- C. The Owner reserves the right to change the location of the pipe within the streets and sewer-ways as may be required by the Engineer at the time of construction.
- D. Force mains shall be installed with a clear distance of not less than 6', horizontally and 18" vertically from water lines.
- E. Pipe shall be installed with lettering facing upward.

3.02 TRENCHING

- A. The trench shall be excavated to the depth established by the Engineer and under no condition shall the cover over the pipe be less than thirty-six (36) inches, forty-eight (48) inches of cover for 12" pipe and above.
- B. Depth of cover over pipe at specific locations to avoid other utilities or obstructions shall be as indicated on the plans or as authorized by the Engineer.
- C. The bottom of the trench shall be excavated to a uniform grade and shall be free from obstructions that would result in the weight of the pipe being concentrated at certain points.
- D. Where unknown subsurface obstructions are encountered in the trenching, the Contractor will be permitted to lay pipe above the obstruction if the minimum cover required can be obtained while providing a cushion between the bottom of the pipe and the top of the obstruction of at least six (6) inches. Where this minimum cover cannot be obtained, the Contractor will be required to lay pipe under the obstruction and he will receive no additional compensation for constructing the line in this manner.
- E. Stockpile excavated material in a manner that will not endanger the Work or prevent obstruction of sidewalks and driveways.
- F. Verify excavated material is a usable soil and suitable for backfilling, otherwise remove non-conforming material from the site and replace with usable soil.
- G. Remove excess excavated material from the site.
- H. Remove water by pumps from the trench until the pipe has been installed and the backfill has been placed to a sufficient height to prevent pipe flotation.

3.03 PIPE FOUNDATION

- A. Maintain uniform pipe support over its entire length.
- B. Provide bell holes at each joint to permit proper joint assembly and uniform pipe support.
- C. Do not use blocking to change pipe grade or to intermittently support pipe across excavated sections.
- D. Install concrete thrust blocks at changes in direction.

3.04 BACKFILLING

- A. In backfilling all trenches, the excavated materials shall be thoroughly tamped and compacted around and to a depth of six (6) inches above the pipe for the entire length of the trench, due care being exercised so as not to damage the pipe or pile connections in the tamping operation.

- B. The remaining portion of the trench shall be backfilled and thoroughly compacted for the entire length of the trench and left in a slightly overfilled and crowned condition.
- C. The method of compacting trenches shall be strictly in accordance with the manufacturers' recommendations, and as approved by the Engineer.
- D. Exercise due care so as not to damage the pipe during compaction operations.
- E. Reshape ditches and ground surfaces to original contours to assure proper drainage.

3.05 JACKING OR BORING

- A. Begin work at the outfall end of the pipe whenever possible.
- B. Excavate adequate size pits when conducting operations for jacking or boring. Use sheathing and bracing when necessary.

3.06 FORCE MAIN TIES TO MANHOLES OR LIFT STATIONS

- A. Connect force main to manholes or lift stations at locations indicated in the Drawings.
- B. Provide watertight connector at force main tie-in.
- C. Force main tie-in shall be installed as shown on standard details.

3.07 TESTING

- A. Mains shall be tested to hydrostatic pressure of 100 psi for sufficient time to determine the leakage rate, but for no less than one hour.
- B. The leakage shall not exceed ten (10) gallons per hour per mile for pipe up to and including twelve (12) inches in diameter. For large pipe the allowable rate shall be computed in accordance with the above-mentioned specifications for installation.

3.08 CASING INSTALLATION

- A. Install casing as to prevent the formation of a waterway below the obstruction.
- B. Ends of casing shall be sealed.
- C. Spacers shall be installed inside of casing pipe.

SECTION 02535

SUBMERSIBLE SEWAGE LIFT STATION

PART I GENERAL

1.01 SECTION INCLUDES

- A. The work covered by this section of the specifications consists of furnishing all labor, plant, equipment, appliances and materials for installing an automatic, submersible sanitary sewage pumping station, complete with all necessary accessories, controls and equipment.
- B. The station shall be installed in accordance with the contract drawings and specifications and the installation instructions of the manufacturers.

1.02 COORDINATION

- A. Coordinate pumps and motors with electrical work as specified in Division 16-Electrical.
- B. Review installation procedures under other Sections and coordinate with the Work related to this Section.
- C. Be aware that certain areas of the pump station are considered Class I, Division I, Group C and D “hazardous” areas, as defined in Articles 500 and 501 in the National Electrical Code. Special wiring techniques, materials, and equipment must be used in such areas. All equipment used in hazardous areas must be suitable for use in such areas.
- D. All equipment shall be designed and arranged to comply fully with provisions of NFPA 820, “Fire Protection in Wastewater Treatment and Collection Facilities”, relative to hazardous environments. All wiring methods, enclosures, options and accessories required to comply fully with NFPA 820 shall be included in the bid.

1.03 REFERENCES

- A. ANSI/ASTM C76 – Reinforced Concrete Culvert, Storm Drain and Sewer Pipe.
- B. ASTM C923 – Resilient Connectors Between Reinforced Concrete Manhole Structures and Pipes.
- C. ANSI/AWWA C151/A21.51 – Standard for Ductile Iron Pipe for Water or Other Liquids.

- D. ANSI/AWWA C111/A21.11 – Standard for Rubber-Gasket Joints for Ductile Iron and Gray Iron Pressure Pipe and Fittings.
- E. ANSI/AWWA C115/A21.15 – Standard for Flanged Ductile Iron and Gray Iron Pipe with Threaded Flanges.
- F. ANSI/AWWA C110/A21.10 – Standard for Ductile Iron and Gray Iron Fittings, 3 In. through 48 In., for Water and Other Liquids.
- G. ASTM A53 – Pipe, Steel, Black and Hot-Dipped, Zinc Coated Welded and Seamless.
- H. ASTM A123 – Zinc (Hot Galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars, and Strip.
- I. ASTM A153 – Zinc Coating (Hot Dip) on Iron and Steel Hardware.
- J. ASTM A276 – Stainless and Heat Resisting Steel Bars and Shapes.
- K. ASTM A307 – Carbon Steel Externally Threaded Fasteners.
- L. ASTM A666 – Austenitic Stainless Steel, Sheet, Strip, Plate, and Flat Bar for Structural Applications.
- M. ASTM C150 – Portland Cement.
- N. AASHTO M198 – Joints for Circular Concrete Sewer and Culvert Pipe Using Flexible Watertight Gaskets.
- O. DOTD Standard Specifications Section 805 – Structural Concrete.
- P. DOTD Standard Specifications Section 902 – Portland Cement Concrete for Minor Structures.
- Q. DOTD Standard Specifications Section 1006.05 – Concrete Pipe Joints.
- R. DOTD Standard Specifications Section 1008.07 – Asphaltic Varnish.

1.04 PERFORMANCE AND QUALITY ASSURANCE

- A. Furnish and install wastewater pumps capable of handling raw sewage in accordance with the Specifications and as shown on the Drawings.
- B. All materials used shall be new, high grade, and with properties best suited to the work

required.

- C. In order to ensure equipment compatibility, one manufacturer shall be responsible for providing all wastewater pumping equipment, including pump, motor ~~access frame~~ and guides.
- D. Pumping equipment provided under this section shall be a standard product in regular production by manufacturers whose products have proven reliable in similar service.
- E. The Contractor shall retain overall responsibility for equipment coordination, installation, testing, and operation.

1.05 WARRANTY

- A. The Contractor shall furnish a written guarantee from the pump manufacturer which shall warrant the pumps and motors against defects in workmanship and materials for a period of five (5) years under normal use, operation and service to commence from the date of acceptance by LUS.
- B. The Contractor shall furnish a written guarantee covering all other parts and equipment for a period of one (1) year from the date of acceptance by LUS. It shall be warranted that all parts and equipment are free from defects in design, materials and workmanship.
- C. Replacement parts of all components found to be defective shall be furnished and installed by the Contractor at no additional cost to LUS during the guarantee period.
- D. The Contractor shall furnish to LUS at least four (4) copies of instructions for installation, maintenance and operation of the pumps and components, together with parts lists and pump performance curves.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store equipment off the ground and in accordance with manufacturers recommendation.

1.07 SUBMITTALS

- A. Five (5) copies of all shop drawings and operating manuals shall be submitted.
- B. At the time of submission, Contractor shall in writing call Engineer's attention to any deviations that the Shop Drawings may have from the requirements of the Contract Documents.
- C. Engineer will review and approve with reasonable promptness Shop Drawings, but his review and approval shall be only for conformance with the design concept of the Project

and for compliance with the information given in the Contract Documents. The approval of a separate item as such will not indicate approval of the assembly in which the item functions. Contractor shall make any corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings. Contractor shall direct specific attention in writing or on resubmitted Shop Drawings to revisions other than the corrections called for by Engineer on previous Submittals. Contractor's stamp of approval on any Shop Drawing shall constitute a representation to LUS and Engineer that Contractor has either determined or verified all quantities, dimension, field construction criteria, materials, catalog numbers and similar data or he assumes full responsibility for doing so, and that he has reviewed or coordinated each Shop Drawing with the requirements of the work and the Contract Documents.

- D. No related work shall be commenced until the Shop Drawing(s) has been approved by Engineer. A copy of each approved Shop Drawing shall be kept in good order by Contractor at the site and shall be available to Engineer.
- E. Engineer's approval of Shop Drawings shall not relieve Contractor from his responsibility for any deviations from the requirements of the Contract Documents unless Contractor has in writing called Engineer's attention to such deviation at the time of submittal and Engineer has given written approval to the specific deviation, nor shall any approval by Engineer relieve Contractor from responsibility for errors or omissions in the Shop Drawings.

1.08 LIFT STATION STARTUP FIELD TESTS

- A. Contractor shall ensure that the wet well is free of mud and all debris prior to the lift station start-up field test.
- B. Start-up field tests shall be conducted by the pump manufacturer's factory trained start-up representative. The start-up test shall be conducted in the presence of the design engineer, representatives of the LUS Lift Station Maintenance Section and Civil Engineering Section, and the contractor.
- C. A start-up test shall be conducted on each pump and shall consist of continuous operation for a period equivalent to drawdown of one half the total volume of the wet well.
- D. The test shall be performed with the motor fully loaded and the wet well water level held above the pump/motor assembly.

1.09 UNIT PRICES

- A. Method of Measurement:
 - 1. Submersible Sewage Lift Station: Measured on a lump sum basis installed and accepted.

B. Basis of Payment:

1. Submersible Sewage Lift Station: Paid for on a lump sum basis for lift station installed and accepted which includes the wet well and valve box structures, bedding material, piping, pumps and pump installation, valves and valve installation, access frames and covers, vent pipes, electrical control box foundation, electrical components, and all other appurtenances necessary for construction of the lift station in accordance with the Drawings and these Specifications. Such payment also constitutes full compensation for installation, equipment, tools, labor, supervision, incidentals, and all work necessary to complete the sewage lift station.

PART 2 PRODUCTS

2.01 WET WELL AND VALVE BOX

- A. Concrete pipe used for the wet well and outside valve box shall be standard strength reinforced concrete pipe conforming with all requirements of the "Standard Specifications for Reinforced Concrete Culvert Pipe", ASTM Designation C-76 for Class III, Wall B. Circular reinforcement shall be utilized, ASTM A615-82 and the supplementary requirement S1, Grade 60. Use No. 14 or 16 gauge wire, tie wire and supply chairs, bolsters, bar supports, and spacers as necessary for reinforcement support.
- B. All concrete pipe joints shall be made watertight by using a profile gasket for single step joints. Profile gasket shall be Type 288-4G as manufactured by Press-Seal Gasket Corporation.
- C. All penetrations of the concrete pipe shall be cast-in-place or cored. Electrical conduit shall extend 4" within the inside wall. The electrical conduit risers through which the submersible pump cables pass shall extend 18 inches above the top of the wet well cover.
- D. Watertight connectors shall be ASTM C923, KOR-N-SEAL, flexible watertight connectors as manufactured by NPL Systems, Inc. or approved equal.
- E. Provide Class A concrete under the provisions of DOTD Standard Specification 901.
- F. Grout shall be one part portland cement, two parts mortar sand, and water as required for proper consistency; to be used within 30 minutes of mixing.
- G. The quick connect installed in the valve box shall be a 4" Camlock Type F, aluminum, male camlock x male pipe thread. The Cam shall be fitted with a Camlock dust cover.
- H. Piping and fastening appurtenances which will be in contact with wastewater after

installation shall be shop primed then painted with an epoxy phenolic coating system, or approved equal, as specified in section 2.17.

- I. Internal surfaces of the wet well shall be painted with an epoxy phenolic coating system, or approved equal, as specified in section 2.17.

2.02 PIPE, VALVES, AND FITTINGS

- A. Pipe 3 inches and larger within and between the wet well and valve box shall be ductile iron, ANSI/AWWA C151/A21.51 with flanged or restrained mechanical joint ends in accordance with ANSI/AWWA C110/A21.10 AND ANSI/AWWA C111/A21.11, respectively. All ductile pipe shall be ceramic epoxy lined inside. Epoxy ceramic lining shall be PROTECTO 401 as manufactured by US Pipe & Foundry Company, or approved equal, and shall be installed in accordance with the manufacturer's recommendations.
- B. Flanged fittings shall conform to ANSI A21.10 (AWWA C110) or ANSI B16.1 Specifications. Gaskets for all flanged joints shall be full-faced, 1/8" solid rubber. Ductile iron fittings shall be manufactured in strict accordance with AWWA C153, AWWA C110 and AWWA C111. Fittings shall be asphalt coated outside and ceramic epoxy lined inside. Epoxy ceramic lining shall be PROTECTO 401 as manufactured by US Pipe & Foundry Company, or approved equal, and shall be installed in accordance with the manufacturer's recommendations.
- C. Gate valves over 2" shall conform to the latest edition of AWWA Specification C509, and shall have a non-rising stem, iron body, iron wedge encapsulated with molded rubber and "O"-ring seals, Mueller 2360 Series Resilient Wedge Gate Valve, Catalogue No. 2360-6 Flanged Ends, or equal.
- D. Gate valves 2" and under shall be bronze, with rising stem, double disk with screwed ends (Crane Bronze Gate Valve, Class 150, Rising Stem, Threaded Ends, Figure 4310B, or equal). All gate valves shall be furnished with operating handwheels.
- E. Check valves shall be iron body, bronze mounted, swing type spring and lever check valves with flanged ends, (Mueller Catalogue No. A-2602-6-02, or approved equal). Check valve shall comply with AWWA C508.
- F. Check valves 2" and under shall be bronze, swing type spring and lever check valves with screwed ends (Crane 1700 Series Bronze Check Valve, Class 125, Threaded Ends, Figure 1707, or equal).
- G. Measuring and sensing devices shall require a ball valve with brass body and stainless steel ball.

2.03 PUMP CONSTRUCTION

- A. The pumps shall be fitted with impellers of the non-clog design, constructed of a material suitable for continuous submergence in raw sewage.
- B. The impeller shall be a closed, single or two vane type, capable of passing 3” solids and easily removable.
- C. Pump casings shall be fitted with a wear-ring system that will provide efficient sealing between the volute and impeller. Pumps impellers shall be easily removable.
- D. The pump shafts shall be of high grade alloy steel, accurately machined and ground to exact size, and shall be isolated from the pumped liquid.
- E. Double mechanical pump shaft seals shall be provided to prevent leakage. The seals shall not require maintenance nor adjustment; however, the seals shall be easily inspected and replaceable.
- F. The seals shall be oil lubricated from a oil chamber. The seal system shall not rely upon the pumped media for lubrication.
- G. The shaft sealing system shall be capable of operating submerged to depths of, or pressures equivalent to 50 feet. No seal damage shall result from operating the pumping unit out of its liquid environment.
- H. Pump fasteners shall be of 303 stainless steel or better.

2.04 MOTORS

- A. Pump motors shall be of the sealed submersible type, having a nameplate rating that exceeds the maximum horsepower required by the pumps.
- B. Motors shall be sized in accordance with N.E.M.A. design Class B, and incorporate Class F insulation materials to withstand a continuous operating temperature of 155°C (311°F).
- C. All pump motors shall be designed for continuous duty and shall be non-over loading over the full range of the pump curve.
- D. Motors shall be capable of sustaining a minimum of fifteen (15) starts per hour. Lubrication and cooling systems, double mechanical seals, double sealed roller bearings, and other components shall be adequately designed for the stated operating conditions.

- E. Motors and pumps shall be capable of unsubmerged operation for a minimum period of at least one (1) hour without damage to the units.
- F. Motors shall be provided with thermal overload protection and two moisture detection sensors. The moisture detection sensors shall be wired internally to the control cable at the top of the motor.
- G. Comply with the National Electrical Code (N. E. C.) requirements for Class 1, Group C and D, Division 1 locations.

2.05 MOTOR CABLE

- A. The special pump motor multi-conductor cable shall be suitable for submersible pump application and shall comply with the National Electrical Code (NEC) requirements for Class I, Division 1 Hazardous (Classified) Locations. This shall be indicated by a code or legend permanently embossed on the cable.
- B. The flexible cable shall be of a type listed for extra-hard usage. It shall contain a grounding conductor having a continuous identifying marker readily distinguishing it from other conductors (i.e., motor phase conductors, seal failure probe conductors, over-temperature conductors) in an approved manner.
- C. Cable shall be connected to terminals of supply conductors in an approved manner and be sized according to NEC ampacity tables (for 125% of load).
- D. Cable shall be supported by clamps or other suitable means that will prevent tension on the terminal connections.
- E. Cable shall be provided with suitable CG hub-type seals where the flexible cord leaves the wet well conduit and where it enters the intermediate junction box.
- F. The flexible cable must be removable without entering the wet well.
- G. The cable entry water seal design shall be such that precludes specific torque requirements to insure a watertight and submersible seal.
- H. Epoxies, silicones or other secondary sealing systems shall not be required or allowed.
- I. The cable entry junction box and motor shall be separated by a sealing device which shall isolate the motor interior from foreign materials gaining access through the pump top.

2.06 PUMP REMOVAL

- A. Lift station shall be furnished with a submersible discharge connection system to permit removal and installation of the pump without the necessity of an operator entering the wet well. The design must insure an automatic and firm connection of the pump to the discharge piping when lowered into position.
- B. Pump Mounting Base:
1. A separate mounting plate shall be furnished for each pump. These plates shall include adjustable guide rail supports and discharge elbow with flange to align with pump hydraulic sealing flange.
 2. The discharge base elbow shall be furnished by the pump manufacturer. The discharge elbow shall have a foot for anchoring to the wet well floor and a means for firmly supporting the guide rails.
 3. Contractor shall verify location of anchor bolts prior to pouring wet well base.
 4. The design and mass of the discharge elbow shall be sufficient for rigidly supporting the eccentric load of the pump unit and discharge piping.
 5. The discharge of each pump shall be fitted with a hydraulically operated sealing flange.
 6. When the pump is in operation, pressure shall provide a leak-proof seal. When pump is idle, pressure shall be removed so that pump can be removed from sump with no mechanical contact of sealing flanges.
 7. Complete weight of pump to rest on bottom support plate, no weight to be supported on guide rails or discharge elbow.
 8. The discharge elbow outlet shall connect to the discharge piping riser.
 9. The elbow outlet shall have ANSI, 125 pound flange dimensions and drilling, of the size indicated on the construction drawings.
 10. Plates and fittings shall be cast iron with stainless steel hardware.
- C. Guide Bracket:
1. A sliding guide bracket shall be an integral part of the pump unit.
 2. The design of the bracket shall obtain a pure vertical shearing action at the pump to discharge flange face when connecting or disconnecting to pump to the discharge

elbow. The bracket design shall obtain a wedging action at the flange faces as the final alignment of pump to piping occurs.

D. Guide Rails:

1. Each pumping unit support shall be equipped with a stainless steel dual guide rail system sized to fit the discharge elbow and guide bracket, as recommended by manufacturer's specifications.
2. The dual guide rails shall extend from the pump up to the access frame at the top of the wet well.
3. Intermediate stainless steel supports shall be installed to stiffen the pump guide rails (at maximum of 10 foot intervals). Supports shall be secured to the wet well wall utilizing Type 316 stainless steel wedge anchors.

E. Lifting Cable:

1. Provide a stainless steel cable/chain for each pump/motor assembly, sized according to manufacturer's recommendations, for installing and removing the entire assembly without failure.
2. Provide a means for attaching the other end of the cable to the wet well access frame.

F. Wire Hanger:

1. The cable wire hanger shall be as per the detail in the plans.
2. Three quarter inch aluminum rods and one-quarter inch thick aluminum shall be used to fabricate the rack.
3. All hardware shall be stainless steel.
4. Cables shall be supported on the wire hanger by stainless steel cable grips.
5. The wire hanger needs to be clear of pump guide system and discharge piping (gravity and/or force main), and beam path of ultrasonic transducer.
6. The wire hanger shall be readily accessible from main hatchway.

2.07 ACCESS FRAMES AND COVERS

A. Wet Well:

1. An access assembly shall be installed in the wet well cover capable of supporting a live load of 150 pounds per square foot.
2. Concrete in contact with aluminum surfaces shall be isolated by coating concrete surfaces with an approved phenolic epoxy system as specified in section 2.17.B.
3. Size of clear opening shall accommodate both pumps with a minimum opening of 36" x 48".
4. Single or double access doors are acceptable; single doors shall open toward the valve box; double doors shall open towards the front and back of site layout. Double doors are required on wet wells with internal diameters greater than 72".
5. Cover assembly and hardware shall be aluminum and shall be supplied with upper guide bearing brackets, stainless steel safety chain hook, hinged and hasped covers, level sensor cable holders, automatic lock when opened 90 degrees, and shall be lockable.
6. The wetwell access hatch shall be fitted with a hinged grating panel to provide a system for fall through protection. The safety system shall be manufactured by Halliday Products, Inc. or approved equal.
7. Proper clearance for pump removal shall be assured by the Contractor. The actual clear opening of the wet well access hatch frame cover shall provide a minimum of 3-1/2 inches clearance behind the pump opposite the discharge and a minimum of 2-1/2 inches clearance on the side of the pump.

B. Valve Box:

1. Construction and materials shall be same as for wet well cover and frame with a minimum opening of 36" x 48".

2.08 PRESSURE GAUGES

- A. The contractor shall furnish and install, as indicated on the plans, a 4" diameter pressure gauge with 1/2" inch male connection on lower back and 1/2" gate or stainless steel needle shut off valve.
- B. Pressure gauge shall be as manufactured by Tel-Tru Manufacturing Company, Model 30 or approved equal. Pressure range of each gauge shall be 0 - 60 psi.
- C. Each gauge shall be equipped with a diaphragm seal protector as manufactured by Tel-Tru Manufacturing, Model M - Mini seal for up to 4 1/2" gauges or approved equal.

- D. Gauges shall be glycerin filled. All components of gauges shall be non-corrosive (i.e. stainless steel or other acceptable nonferrous material).

2.09 ANCHOR BOLTS

- A. All assembly and anchor bolts, nuts, and washers shall be stainless steel. Bolts shall conform to ASTM A276, Type 430; nuts shall conform to ASTM A276, Type 302. Washers shall conform to ASTM A666, Type 302 or 304.

2.10 MISCELLANEOUS

- A. All hardware and appurtenances shall be a minimum type 316 stainless steel unless a higher grade is called out.
- B. Stainless steel fabrications to be in accordance with ASTM specifications applicable to the type of component or hardware.
- E. Provide Reliner modular inside drop system with stainless steel straps by Duran, Inc. (800-504-8008) or approved equal. The bowl size shall be determined considering the incoming pipe diameter at full flow in accordance with manufacturer's recommendations.
- F. A four inch aluminum quick-connect shall be installed in the valve box (Cam-Locks or approved equal).

2.11 BEDDING MATERIAL

- A. Stone material shall consist of 100 percent stone and shall conform to the following gradation:

<u>U.S. Sieve</u>	<u>Percent Passing</u>
1 1/2"	100
1"	90-100
3/4"	70-100
No. 4	35-65
No. 40	12-32
No. 200	5-12

- B. The fraction of stone passing the No. 40 sieve shall be non-plastic.
- C. Location & thickness to be as shown on plan detail.

2.12 STRUCTURAL CONCRETE

- a. Concrete used in construction of the foundations shall have a minimum compressive strength of 4,000 psi at twenty-eight (28) days when tested in accordance with AASHTO Designation T22.
- b. Forms for concrete structures shall be designed and built so as to be mortar-tight, sufficiently rigid to prevent pressure distortion, and capable of being removed without injuring the concrete. Forms shall not be removed until the concrete has obtained sufficient strength to support the load imposed.
- c. Steel reinforcing bars shall be new billet stock, Grade 60 conforming to ASTM Specification A-615 and deformed to conform to ASTM Specification A-305. Splicing of bars will not be permitted without approval of the Engineer. Bent bar reinforcement shall be cold bent to the shapes shown on the plans. All bends shall be made around a pin having a diameter not less than six times the minimum thickness of the bar. All reinforcement shall be free from loose rust scale or other coatings that will destroy or reduce the bond. All reinforcement shall be inspected and approved by the Engineer before placing concrete.
- d. Curing of the finished concrete surfaces shall be by covering within twelve (12) hours with canvas, burlap, straw or sand, which shall be kept wet by sprinkling for at least three (3) days.
- e. Completed concrete that will be left exposed shall be finished by rubbing the exposed surfaces with Carborundum or other abrasive to a smooth surface and to the removal of all form marks. Non-exposed surfaces shall have the form finish, except that all defects and holes shall be corrected. All edges or corners shall be chamfered as indicated on the Plans or as directed by the Engineer.

2.13 DOMESTIC WATER SUPPLY

- A. The Contractor shall provide a Metro Code approved water service (the Metro Code fee shall be the responsibility of the Contractor).
- B. The 1" water riser with hose bib shall be located within the lift station site to the left of the main gate unless otherwise directed.
- C. The Contractor shall furnish and install the water meter box as approved by LUS.

2.14 CONTROL SYSTEM

- A. For submersible sewage pump stations installed for new residential or commercial development, the developer or the developer's contractor may request LUS to furnish the Control Panel, complete in all respects, including an ultrasonic level transducer, to control

the liquid level in the wet well. Cost of the Control Panel must be borne by the developer or the developer's contractor (contact LUS for current cost). As an option, the control panel may be supplied by the contractor subject to complete conformance with LUS control panel standard specifications and details.

- B. The unit shall include an alternator or pump controller (see plans), to alternate the starting sequence of Pump No. 1 and Pump No. 2 (starting the first pump as a "Lead" pump) - in addition, the controls shall be able to operate the pumps singly, either automatically or manually. Should either pump, operating alone, fail to run, the other pump shall start. Should the first pump fail to lower the level, then the other pump shall operate and run as a "Lag" pump.
- C. Across-the-line magnetic starters and thermo-magnetic circuit breakers shall be provided for each pump, along with a Hand-Off-Automatic (H-O-A) selector switch for each starter, with overload relay and reset button.
- D. LUS shall furnish two (2) tip float type level sensors. The tip floats shall be LUS Material Specification 33005305. No mercury switches will be acceptable. The contact closure shall be dry form "C" contacts (both a n/o & n/c with a common). The floats and cables shall be made of a material that will withstand raw sewage. Cables shall be minimum forty (40) feet in length (Contractor shall verify that the length is sufficient for the application). Float tip switches shall be the Consolidated Electric's Direct Acting Model 9G-EF (EF = Environmentally Friendly) Float Switch (or prior approved equal) Teflon coated 316 SS with PVC jacketed cable that resists build up of solids. The tip float type level sensors shall be installed by Contractor.
- E. One of the float switches shall act as a Low Water Cut Off (LWCO) and the other shall act as a High Level indicator. In addition, these two float switches shall act as emergency pump start/stop switches in the event of a control failure.
- F. Additional controls to be provided are as follows:
 - a. Heat sensing units attached to motor winding to trip starter if motor overheats.
 - b. Motor seal failure alarm light to indicate water in seal chamber.
 - c. Pump elapsed time meters.
 - f. Delay in motor starting, to prevent both pumps starting simultaneously after a power outage.
 - g. Starting capacitors shall be provided by the contractor, if required, and shown on the plans.
- G. The control panel enclosure shall be NEMA 4X aluminum or stainless steel, weatherproof and tamper-proof. The circuit breakers, overload reset buttons and control switches shall be operable from an inner door.

- H. The control panel shall be mounted and terminated by the Contractor.
- I. The Contractor shall furnish a 7.5-kVA, 240/120-V, single-phase transformer to provide control circuit power from a 480-V service.
- J. The Contractor shall furnish a 100-A (or if required by motor power requirements, a 200-A) service duty double throw switch (On-Off-On) for routing power from either the utility service or the generator service receptacle. The generator service receptacle, mounted on the underside of the double-throw switch enclosure, shall be rated at either 100-A or 200-A, depending on the motor power requirements.

2.15 ELECTRICAL

- A. See Section 16000 and 16900 for Electrical and Pump Controls.
- B. The electrical system shall be installed as shown on the plans, and as required in these specifications and shall conform to the requirements of the National Electrical Code (latest edition) for a Class I, Division 1 location, the applicable local codes, and the rules and regulations of the local utility.
- C. The electrical service, as shown on the plans, (100-A or 200-A, depending on the motors) shall be provided by LUS up to the sewage pump station equipment rack as part of this Contract, as well as a 100-A (or 200-A) service-side meter disconnect and meter base. The Contractor shall mount the meter base upon the equipment rack and provide all conduit and wiring from the weather-head or pad-mounted transformer.
- D. It is to be expressly noted that the Contractor shall furnish and install all electrical wiring, fixtures, and connections required for the complete hookup of the pump station, including conduit, conductors, bulbs, etc. as required.
- E. All wiring in the pump station shall be color coded as indicated on the wiring diagram. Wiring diagrams matching the unit wiring shall be provided to LUS.

2.16 ACCEPTABLE PUMP MANUFACTURERS

- A. Fairbanks Morse
- B. Flygt
- C. Gorman Rupp
- D. Hydromatic

G. Goulds

H. ABS

I. Yeomans

2.17 PAINTING

A. Piping and Fastening Appurtenances.

- a. Piping and fastening appurtenances shall be coated with Carboline 187 Epoxy Phenolic System or an approved equal. Carboline 187 Epoxy Phenolic System shall consist of two (2) coats, 4.0 – 6.0 mils DFT each. The first coat shall be Red color number 274-0500 and the finish /topcoat color shall be Gray color number 274-C703
- b. A “Stripe Coat” shall be applied to all flanges, appendages, etc. during the application of both coats. In the event of a spray application (preferred), a “stripe coat” is defined as an application of the given coating material to all edges, seams and other difficult to reach, see or hard to coat surfaces. These areas shall be given special attention (even by brush/roller application if needed), thinned as necessary to insure adequate mils DFT are applied. Immediately after the application of the said stripe coat, the full and overall application of the given coat is then applied, i.e. in a wet-to-wet mode.
- c. The pipe shall be clean, dry and decontaminated prior to abrasive blasting. Surfaces to be coated shall be cleaned per SSPC-SP1. Following this process, the surfaces shall be abrasive blasted to meet SSPC-SP5 cleanliness standard to obtain a 1.5 – 3.0 mil anchor profile.
- d. Field touchup of pipe coating:
 - i. All shop coats shall be touched-up and completed at welds or joints after field erection. Surfaces shall be properly prepared per the following procedure for all field repairs of welds and coating system damages:
 - Clean, dry and decontaminate the surfaces to be repaired per SSPC-SP1.
 - Clean surfaces per SSPC-SP2 and/or SSPC-SP3 – Hand/Power Tool Cleaning as needed.
 - All edges of existing, tightly adhered coatings shall be feather-edged to provide a beveled/smooth transition configuration for the coating to be applied. All discolored coatings surrounding weld burns shall be removed to a point where the existing coating are sound (typically 1” – 2” from the weld seam).
 - Apply a coat of Carboline’s Carbomastic 15 (or Carbomastic 15 FC for temperatures below approximately 80 deg. F) to obtain 6.0 – 8.0 mil DFT.

- Apply a finish/topcoat of Carboline's Phenoline 187 Finish Topcoat color Gray number 274—C703.
- All priming and finish/topcoat shall be applied as per manufacture's Product Data Sheet (PDS).

B. Wetwell Internal Surfaces

- a. Wetwell internal surfaces shall be coated with Carboline 187 Epoxy Phenolic System, Zebron 386, Warren M210/S301, Polyurea, Raven 405, Dynakote #21, Belzona 5811 or approved equal.
- b. Plugging and patching repairs shall be made with Preco Plug and Preco Patch.
- c. Surface preparation, plugging, patching and coating application shall be performed in accordance with manufacturer's recommendations.
- d. Coating thicknesses shall be as recommended by the manufacturer of the product utilized.

2.18 SCADA POLE

- A. When required by LUS, the Contractor shall furnish and install a utility pole of the size indicated on the Plans for the installation of SCADA transceiver antenna. Contractor shall coordinate the installation of the pole with Lafayette Utilities System.

PART 3 EXECUTION

3.01 PREPARATION

- A. Verify orientation of pumps, access openings and site layout.
- B. Verify location of influent and effluent lines.
- C. Verify location of electrical conduit.
- D. Installation of the pumping equipment shall conform to the manufacturer's instructions and recommendations and reviewed shop drawings.

3.02 EXCAVATION, BACKFILL, AND GRADING

- A. The Contractor shall excavate to the depths required to install the structures in accordance with the drawings, keeping the limits of excavation to within two (2) feet of the neat lines of foundations wherever possible.
- B. Excavation beyond the required depths and widths shall be filled with suitable materials at no extra cost to LUS.

- C. Excavated material shall be stockpiled for use in backfilling. It shall be placed a safe distance from the excavation without overloading the undisturbed soil.
- D. The excavation shall be accomplished in a manner to protect adjacent structures and to safeguard workmen.
- E. It shall be the responsibility of the Contractor to install underpinning, shoring, sheeting or other protection where needed to protect facilities and workmen.
- F. All existing structures, pipes and foundations which are to be incorporated into the final work shall be adequately protected or shall be replaced by the Contractor.
- G. Surface water shall be directed away from the excavation by grading and/or constructing ditches or berms.
- H. The Contractor shall submit his proposed excavation plan to the Engineer in writing before commencement of the work.
- I. The method of construction adopted shall be subject to approval of the Engineer, but such approval shall not relieve the Contractor of his responsibility for the safety and adequacy of his construction procedures.
- J. Prior to placing backfill, all trash, debris and timber shall be removed from the trench or excavation. The backfill shall be made from suitable materials.
- K. Backfill shall be placed in layers not to exceed 8 inches in depth and shall be compacted by mechanical tamping or rolling, or by other methods proposed in writing by the Contractor and approved by the Engineer.
- L. Fill shall be compacted to 90% maximum density in accordance with ASTM 1557 (modified proctor).
- M. Final lift station slab elevation shall be one foot (1') above the one hundred (100) year flood elevation unless otherwise approved in writing by the LUS Wastewater Superintendent. Fill material and grading of site as shown on plans shall be included as lump sum payment for pump station.
- N. All affected areas of the project site shall be graded to the elevations, contours, and shapes as required on the drawings. All roots, trash, and debris shall be removed. The earth shall be finished to be free of humps, ridges and depressions.

3.03 WET WELL AND VALVE BOX INSTALLATION

- A. Excavate to depths required to install the structures in accordance with the Drawings.

Maintain limits of excavation to 3 feet of the lines of foundations as much as possible.

- B. Holes shall be predrilled in wet well and valve box to receive watertight connectors at influent lines.
- C. Provide foundation bedding as indicated on the Drawings.
- D. Erect wet well precast pipe sections with watertight joints as indicated in the Drawings.
- E. Access frames and covers shall be installed in the pre-cast concrete top, assuring correct orientation and location with regard to hinges, direction of opening, components, and accessories.

3.04 WET WELL TIGHTNESS TESTING

- A. Prior to backfilling wetwell, a hydrostatic test shall be performed on the wetwell structure in accordance with ACI 350.1R-01.

3.05 PUMPS, PIPING, VALVES, AND ACCESSORIES INSTALLATION

- A. Attach the upper guide brackets to the access frame.
- B. Install anchor bolts, nuts, and washers for mounting pump base to wet well floor in accordance with pump manufacturers instructions.
- C. Position pump mounting base and discharge elbow on the floor on the wet well.
- D. Install guide rails between upper guide brackets and discharge elbow with intermediate brackets.
- E. Insure guide system is properly aligned and level and anchored according to manufacturers instructions.
- F. While pumps are being lowered onto the guide rail system, a check shall be made between the volute flange and discharge elbow flange.
- G. After pump base is grouted into place, install all piping in accordance with manufacturers instructions and the Drawings.
- H. Install pressure gauges on discharge piping at the location as indicated in the Drawings.
- I. Install inside drop system as per manufacturers instructions.

3.06 FENCE, DRIVEWAY AND SURFACING

- A. The Contractor shall furnish and install a 6-foot cedar or chain link fence (as called for by the engineer) around the perimeter of the pump station site in accordance with the details shown on the construction drawings and specifications contained within Section 02830. The fence shall be fitted with extension arms and three strands of barbed wire along its top rail (as called for by the engineer).
- B. The Contractor shall provide 8-inch thick limestone surfacing with geotextile fabric for entire lift station site. A 6-inch thick concrete driveway shall be provided to the pump station as seen on the lift station site plan. Compaction shall be to a uniform density of at least 95% of maximum density at optimum moisture. The site shall be graded to drain and swale side ditches shall be constructed as necessary to carry the drainage run-off to the main road ditch.
- C. The Contractor shall furnish and install pipe culverts in the location and of the type and size as shown on the construction drawings. Reinforced concrete pipe shall conform to the requirements of ASTM Designation C-76 for Class III, Wall B (Table III) pipe.

3.07 ELECTRICAL

- A. Install electrical equipment, controls, and accessories in accordance with the provisions of Division 16 and the Drawings.

END OF SECTION

CULVERTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Furnishing and installation of culverts.

1.02 REFERENCES

- A. ANSI/ASTM C76 – Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
- B. AASHTO M198 – Joints for Circular Concrete Sewer and Culvert Pipe Using Flexible Watertight Gaskets.
- C. DOTD Standard Specifications Section 1006.05 – Concrete Pipe Joints.
- D. DOTD Standard Specifications Section 1019 – Geotextile Fabric (Plastic Filter Cloth).
- E. DOTD Designation: TR401 – Method of Test for the Determination of In-Place Density.
- F. DOTD Designation: TR418 – Method of Test for Moisture-Density Relationships.
- G. DOTD Designation: TR423 – Procedure for the Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes.

1.03 CLASSIFICATIONS AND TESTS

- A. Maximum Density: To be determined in accordance with DOTD Designation: TR418.
- B. In-Place Density: To be determined in accordance with DOTD Designation: TR401.
- C. Soil Classification: To be determined in accordance with DOTD Designation: TR423.

1.04 SAMPLES

- A. Frequency for testing will be determined by the Engineer.
- B. Submit a certificate of compliance from pipe manufacturers.

1.05 UNIT PRICES

- A. Method of Measurement:
 - 1. Culverts: Measured by the linear foot using the following methods:

- a. Pipe not confined by fixed structures: Measured by the number of joints at the nominal length of each joint.
 - b. Pipe confined by fixed structures: Measured along the pipe between the termini of pipe in structure walls.
 - c. Pipe confined by a fixed structure on one end and unconfined at the other end: Measured along the pipe from the terminus of pipe in the structure wall to the unconfined end of pipe.
- 2. Plastic Filter Cloth: Plastic filter cloth will not be measured for payment.
 - 3. Incidentals: Preparation, furnishing and hauling materials, excavation, dewatering, trench supporting, backfill, compaction, labor, tools and all incidentals necessary to complete the items in accordance with the Drawings and this Section will not be measured for payment but included in the price bid for the above items.
- B. Basis of Payment:
- 1. Culverts: Paid for by the linear foot according to type and size.

PART 2 PRODUCTS

2.01 USABLE SOILS

- A. Under roadways, parking areas, aprons, curbs, drives, walks, and shoulders:
 - 1. Classes A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-3, & A-4 in accordance with DOTD TR423; Liquid Limit less than 35 and Plasticity Index of 15 or less, but greater than 6.
- B. In open fields, lawns, unimproved rights of way, or neutral grounds, which are free from traffic:
 - 1. Classes A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-3 & A-4 in accordance with DOTD TR423; Liquid Limit less than 35 and a Plasticity Index of 15 or less, but greater than 6.
 - 2. Classes A-4, A-6 & A-7 in accordance with DOTD TR423; Plasticity Index of 35 or less.
- C: Free of large lumps, large rock, tree stumps and other objectionable material.

2.02 MORTAR SAND

- A. Non-plastic siliceous material conforming to the following gradation requirements:

U.S. SIEVE	PERCENT PASSING
No. 4	100
No. 8	95-100
No. 100	0-25
No. 200	0-10

B. Percentages of foreign matter not to exceed the following:

- | | |
|-------------------|--------------|
| 1.Coal or Lignite | 0.25 percent |
| 2.Clay Lumps | 0.50 percent |

2.03 DRAINAGE PIPE MATERIALS

- A. Reinforced Concrete Pipe: ASTM C76, Class III, with Wall Type A, B, or C; diameter as required in the Drawings.
- B. Reinforced Concrete Pipe Joints: Bell and spigot or tongue and groove end joints meeting the requirements of AASHTO M198.
1. Type 1 joints for joining pipe under drives and for side drains.
 2. Type 2 joints for joining pipe used for cross drains under roadways, including turnouts.
 3. Type 3 joints for joining pipe used for closed storm drain systems. Refer to Subsection 1006.05(a) of DOTD Standard Specifications for joint type descriptions.
- C. Gasket Materials:
1. Rubber: AASHTO M198, Type A; lubricant as specified by manufacturer.
 2. Flexible Plastic: AASHTO M198, Type B; gasket and primer to be from a source on the DOTD QPL.

2.04 PLASTIC FILTER CLOTH

- A. Plastic Filter Cloth: Geotextile fabric meeting the requirements of DOTD Section 1019.

PART 3 EXECUTION

3.01 PREPARATION

- A. Identify required lines, levels, contours, and datum.
- B. Protect above and below grade utilities and other Underground Facilities to remain.
- C. Verify with Engineer areas to be undercut.

- D. Verify type of material for maintaining subgrades lowered at the direction of Engineer.
- E. Verify character of subgrade before installation.
- F. Beginning of installation means acceptance of substrate.

3.02 DEPTH OF FOUNDATION SUBGRADES

- A. Elevations shown on the Drawings for soil subgrades of drainage pipes shall be considered as approximate and the Engineer may order, in writing, changes in dimensions or elevation of such subgrades as he deems necessary in order to secure a satisfactory foundation. Additional compensation will not be provided for additional excavations required.

3.03. EXCAVATION

- A. Excavate subsoil to depths indicated on the Drawings and to a width sufficient for proper joining of pipe sections and thorough compaction of backfill material under and around pipe, undercut, as directed, soft areas of subgrade not capable of insitu compaction or incapable of properly supporting the pipe.
- B. Dispose of material not satisfactory for backfill.

3.04 TRENCHING

- A. The Contractor shall perform trench excavation of whatever substance encountered to the depths indicated on the plans. Proper enlargements shall be made at each bell to distribute the load to the barrel of the pipe. Muck or other unsuitable material shall be removed and replaced with suitable material as ordered by the Engineer at no extra cost to the Owner.
- B. The trench shall be excavated so that the walls are as nearly vertical as possible to a minimum width which will provide working room to obtain specified compaction. Where required to safeguard employees or adjacent structures, the sides of the trench shall be properly sheathed and braced.
- C. Where, in the opinion of the Engineer, damage is liable to result from withdrawing the sheathing, the sheathing will be required to be left in place.
- D. Any water accumulated in the trenches shall be removed at no additional cost to the Owner prior to laying pipe. During excavation, material suitable for backfilling shall be stockpiled in an orderly manner, a sufficient distance from the edge of the excavation to avoid over loading and to prevent slides or cave-in. Trenching shall not be in more than three hundred (300') feet ahead of pipe laying.

3.05 INSTALLATION - PIPE

- A. Bring subgrade to the proper elevation along the length of pipe to be installed and grade to provide uniform support for the full length of the pipe.
- B. Provide bell holes at each joint to permit proper joint assembly and uniform pipe support.
- C. Begin pipe installation from the downstream end of the system.
- D. Provide mechanical pipe puller for joining pipes over 36 inches in diameter.
- E. Place bell or groove ends facing upstream in the system.
- F. Install pipe and seal joints watertight; join such that ends are fully entered and inner surfaces are flush and even.
- G. Wrap Type 2 and Type 3 joints with plastic filter cloth for a minimum of 12 inches on sides of joint, lapping a minimum of 10 inches. Secure cloth at end section of each pipe by means of a non-corroding plastic strap having a minimum breaking strength of 380 lbs., and secure the ends with a self-sealing buckle. Prior approval of this product by the Engineer will be required before installation.

3.06 BACKFILLING

- A. Conduits shall be inspected before backfill is placed and any found to be damaged or out of required alignment or grade shall be removed and relaid or replaced, at the Contractor's expense; and any conduits damaged or out of the required alignment or grade due to backfill operations or other cause shall be removed and relaid or replaced, at the Contractor's expense. At the time of final acceptance, all conduits installed or extended by the Contractor shall be cleaned of all debris and soil to the invert elevation of the conduit.
- B. As soon as the joints are complete and checked, backfill material free of large lumps, clods, or rock shall be deposited evenly on both sides of the pipe in layers not exceeding eight inches (8") thick. Each layer shall be compacted by use of approved mechanical tampers to maximum density requirements in Section 3.07, determined in accordance with the requirements of AASHTO Method T-99. Backfilling shall proceed in this manner to a point twelve inches (12") above the top of the pipe.
- C. On surfaced streets or in areas designated by the Engineer to be surfaced, backfilling from a point twelve inches (12") above the top of the pipe to street grade shall be accomplished by depositing the backfill material in layers not exceeding eight inches (8") in thickness and tamping each layer with approved mechanical tampers to a maximum density shown in Subsection 3.07, determined

in accordance with the requirements of AASHTO Method T-99. In the event the material excavated during the trenching operation has a high moisture content, this material shall be dried to backfilling. If unsuitable material for backfilling is encountered in a given location, suitable trench or roadway excavation from other locations on the project shall be used in the backfill operation. If part of the trench lies in an area designated to be surfaced and paralleling the centerline of the roadway, the total width of the trench shall be compacted as designated in this paragraph.

- D. In unsurfaced areas and where the pipe is too deep to be compacted in one foot (1') layers by the wheels of the heavy equipment, at the option of the Contractor with approval of the Engineer, the backfill above a point twelve inches (12") above the top of the pipe and two feet (2') below ground surface may be accomplished by blading the material into the trench and using water to tamp. Compaction of the last two feet (2') of backfill may be accomplished by driving heavy equipment over the trench. The Contractor shall fill to grade, all trenches in which settlement of backfill occurs for the duration of the Contract and maintenance period.
- E. The Contractor shall be required at his own expense, to remove all excess materials, debris or other obstructions from the streets or roads immediately after the backfilling has been completed. No cross streets, sidewalks or roads shall be wholly obstructed, except by special permission from the Engineer. If at any time, the Contractor neglects to remove such materials or obstructions and place streets, sidewalks, and roads in suitable condition for traffic within twenty-four (24) hours after having received written notice from the Engineer, the work may be done by the Owner, and the cost thereof charged to the Contractor and deducted from his final estimate. The Contractor shall repair or replace streets, sidewalks, roads and culverts to the satisfaction of the Engineer and parties concerned.
- F. All fences, markers, mail boxes, street signs or other temporary obstacles shall be removed by the Contractor and immediately replaced after the trench is backfilled, in their original position. The Contractor shall notify the Engineer and property owner at least twenty-four (24) hours in advance of any work done on easements or rights-of-way.
- G. It is expressly understood that the Contractor shall restore all easements and rights-of-way to a condition equal to its original condition, and in a condition satisfactory to the property owners and the Engineer.
- H. Trenching, backfilling and hauling excess material as specified herein shall be considered as incidental to the work and will not be measured or paid for under these items.

3.07 SCHEDULE OF LOCATIONS

- A. The paragraphs below identify location and the minimum compacted density expressed as a percentage of maximum density and optimum moisture in comparison with that determined in accordance with DOTD Designation: TR418
- B. Under paved areas: 95 percent.
- C. Within five feet of paved areas: 90 percent.
- D. Under headlands and agricultural loading areas: 90 percent.
- E. Non-Load bearing areas: 85 percent.

WASTEWATER COLLECTION SYSTEM

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Collection line piping, fittings, and accessories.
- B. Manholes.
- C. Pipe Testing.

1.02 DEFINITION

- A. "L.U.S." shall refer to the Lafayette Utilities System (a Department of the Lafayette City-Parish Consolidated Government (LCPCG)) or their authorized representative.

1.03 REFERENCES

- A. Where reference standards are specified throughout this section, the date of the standard is that in effect as of the Bid Date, or date of Owner-Contractor Agreement when there are no bids.
- B. ASTM A 746 - Ductile Iron Gravity Sewer Pipe.
- C. ANSI/ASTM D 1784 - Rigid Polyvinyl Chloride (PVC) Compounds.
- D. ANSI/ASTM D 2241 - Polyvinyl Chloride (PVC) Plastic Pipe (SDR-PR).
- E. ANSI/ASTM D 2321 - Recommended Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe.
- F. ANSI/ASTM D 3034 - Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- G. ASTM F 477 - Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
- H. ANSI A21.11/AWWA C111 - Standard for Rubber-Gasket Joints for Ductile Iron and Gray Iron Pressure Pipe and Fittings.
- I. ANSI A21.50/AWWA C150 - Thickness Design of Ductile Iron Pipe.
- J. ANSI A21.51/AWWA C151 - Standard for Ductile Iron Pipe for Water or Other Liquids.

- K. ASTM C 923 - Resilient Connectors Between Reinforced Concrete Manhole Structures and Pipes.
- L. Louisiana Standard Specifications for Roads and Bridges, Department of Transportation and Development, Office of Highways, 2000 Edition.
- M. ASTM C 39 - Compressive Strength of Cylindrical Concrete Specimens.
- N. ASTM C 150 - Portland Cement.
- O. ASTM C 443 - Specification for Joints for Circular Concrete Sewer and Culvert Pipe Using Rubber Gaskets.
- P. ASTM C 478 - Precast Reinforced Concrete Manhole Sections.
- Q. ANSI/ASTM D 3212 - Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.
- R. ANSI A21.4/AWWA C104 - Cement-Mortar Lining for Ductile Iron and Gray-Iron Pipe.
- S. ASTM D 2564 - Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Pipe and Fittings.
- T. ASTM D 2855 - Practice for Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings.

1.04 REGULATORY REQUIREMENTS

- A. Observe and comply with all applicable federal, state and local laws, municipal ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the project.
- B. Observe and comply with all applicable safety and health standards published by the Secretary of Labor under Section 107, Part 1585 of the Contract Work Hours and Safety Standards Act.

1.05 SUBMITTALS

- A. Submit product data for pipe, fittings and accessories.
- B. Submit when requested by the Engineer, manufacturer's printed instructions for delivery, storage, preparation, assembly, installation, adjusting and finishing.
- C. Submit, if requested by the Engineer, within thirty days after signing the Contract, a list of all materials and equipment ordered for the project, the manufacturers or agents from whom ordered, catalog and type, quantity ordered and promised delivery date of each item. Any subsequent changes in this list shall be promptly brought to the attention of the Engineer.

1.06 PROJECT RECORD DOCUMENTS

- A. Accurately record location of pipe runs, connections, manholes, and invert elevations.
- B. Reference measurements to appropriate datum control.
- C. Document field changes of dimension and detail.
- D. Submit construction record drawings as per L. U. S. standard format.

1.07 QUALITY ASSURANCE

- A. Submit a certificate of compliance from the pipe, pipe coupling, fittings, and manhole manufacturers stating that the material complies with the specifications. Certificate shall include all applicable test result data and the date manufactured for each lot of material delivered to the project site. Certificate shall also show the date of the latest test.
- B. Materials used on the basis of a certificate of compliance may be sampled and tested at any time. Materials used on said basis shall not relieve the Contractor of responsibility for incorporating material in the work which conforms to the plans and specifications. Such material not conforming to requirements will be rejected.
- C. Each fitting, length of pipe, and manhole section shall be legibly marked with the name of the manufacturer, rating or class, type, service, schedule and specification number, in conformance with the applicable standard.
- D. Where industry standard specifications, such as ANSI, ASTM or AWWA have been referenced for pipe and materials, the manufacturer or supplier shall furnish copies of the latest edition of the standard upon request by the Engineer.

1.08 QUALITY CONTROL

- A. All testing that may be required by L.U.S. to determine the quality, fitness and suitability of materials shall be performed at the direction and upon the order of the Engineer, and at no expense to the Contractor provided the tests prove that the materials meet the specified requirements.
- B. Where tests prove that materials do not meet the specified requirements, the Contractor shall bear the cost of that test and of all retesting until satisfactory results are achieved. L.U.S. will only pay for tests which demonstrate compliance with the specified requirements.
- C. Samples of materials may be secured and tested whenever considered necessary by the Engineer.
- D. The Contractor, at his own expense, shall deliver the materials for testing at the time and to the place designated by the Engineer.

1.09 STORAGE AND HANDLING

- A. Store all materials and equipment in an appropriate stock yard upon receipt, in accordance with the manufacturer's recommendations, and in a manner that leaves the material and equipment accessible to Inspectors.
- B. Store fittings and other appurtenances on pallets.
- C. Replace damaged material.

1.10 PRE-CONSTRUCTION CONFERENCE

- A. Within ten days of the date of the Notice to Proceed, the Contractor and his project superintendent shall meet with the representative of L.U.S. for a pre-construction conference.
- B. Submit a proposed construction schedule at this meeting.
- C. Location of the meeting to be designated by L.U.S.
- D. Provide L.U.S. with a phone number where someone is available to take calls at all times, in case of emergency, trouble or other matters requiring the Contractor's attention.

1.11 COPIES OF PLANS AND SPECIFICATIONS FURNISHED

- A. Contractor will be furnished with three (3) sets of plans and specifications for construction purposes.
- B. Upon request, additional copies of plans and specifications may be obtained at the cost of reproduction.

1.12 UNIT PRICES

- A. Method of Measurement:
 - 1. Sewer Main: Measured by the linear foot actually installed according to size and incremental depth. Measurement will be horizontally from center to center of manholes and from center of manhole to end of pipe without deductions for fittings, manholes, length of sewer main designated to be jacked or bored or lengths of sewer main installed in casing. The depth of cut for the various sizes of pipe will be the average depth of cut between manholes measured along the center line of the trench. The average depth will be calculated from elevations taken approximately 50 feet apart on the ground or pavement before it is disturbed to the invert of the sewer pipe directly below. The average depth will be the summation of the depths taken, divided by the number of depths taken, from manhole to manhole. In irregular terrain, measurements shall be taken at such other spacing as may be necessary to determine a true average. In cases where the average determined is an exact foot, payment will be made under the pay item for which that exact foot is the upper limit.

2. Manholes: Manholes shall be measured by the actual number constructed at the incremental depths. Depths of the manholes will be measured from the invert of the lowest pipe to the top of the manhole cover. In cases where the depth is an exact foot, measurement and payment will be made under the bid item for which that exact foot is the upper limit. Measurement shall include all items used in the construction of manholes including cast iron frame and cover, base and top, walls, and bedding material under the manhole base and under the connecting pipes as shown on the Typical Sewer Details.
3. Manhole Drop Inlet: Measured by the actual number installed and accepted per each at the depth indicated. Drop inlet shall include vertical pipe, bends, and tee.
4. 6" Service Line: Measured horizontally from end to end of service lines actually installed with no deductions in length for fittings, jacked or bored, or length of service installed in steel casing.
5. Service Riser: Measured according to size and linear foot installed, from the invert of the main to invert of the service line without deductions for fittings and as shown on the Drawings.
6. Fittings: Measured per each according to size and type actually installed. Only fittings designated as pay items will be measured for payment.
7. Embedment Material: Measured by the linear foot from end to end of each run of sewer main to be used in areas of unstable soil conditions. Cross sectional areas shall be as detailed in the Typical Sewer Detail drawings as Type II sewer foundation. Type I sewer foundation shall not be measured for payment; likewise, required Type II sewer foundation for sewer mains 12' or deeper shall not be measured for payment.
8. Connection to Existing Manhole: Measured per each connection to existing manhole actually installed.
9. Jacking or Boring (Sewer Main or Service Line): Measured, end to end along the centerline, by the linear foot according to the size and type of pipe.
10. Furnish and Install Steel Casing (Jack or Bore): Measured by the linear foot installed according to size and type of installation.
11. Furnish and Install Steel Casing (Open Cut): Measured by the linear foot installed according to size and type of installation.
12. Sheeting Left in Place: Measured per thousand board feet of sheeting left in place as ordered by the Engineer. Sheeting and bracing not required to be left in place shall be included in the cost of sewer main.

13. Special Backfill: Measured by the cubic yard in approved hauling vehicles. Special backfill shall be used only with the Engineers approval where the excavated material is not suitable for backfilling the trench or obtaining the required compaction.
14. Stainless Steel Watertight Manhole Inserts: Measured per each including valve body and components.

D. Basis of Payment:

1. Sewer Main: Payment for furnishing and installing sewer main shall be based on the actual number of linear feet installed according to size and incremental depth.
2. Manholes: Payment for manholes shall be based on the actual number constructed at the incremental depths per each.
3. Manhole Drop Inlet: Payment shall be per each based on the actual number installed and accepted at the depth indicated.
4. 6" Service Line: Payment for service lines shall be paid for per linear of line installed and accepted.
5. Service Riser: Payment shall be per vertical linear foot installed including heavy wall sewer pipe, wye, bend at top of riser, and limestone encasement of the service riser.
6. Fittings: Payment shall be per each installed and accepted for the various sizes and types.
7. Embedment Material: Payment shall be by the linear foot of embedment material placed in poor soil conditions, as shown in the Drawings as Type II sewer main foundation.
8. Connection to Existing Manhole: Payment shall be per each and shall include all items necessary to tie sewer main to existing manhole.
9. Jacking or Boring (Sewer Main or Service Line): Payment shall be per linear foot of the various sizes and materials. The sewer main and service line shall be paid for under other items.
10. Furnish and Install Steel Casing (Jack or Bore): Payment shall be by the linear foot installed and accepted according to the size and type of pipe which includes the steel casing and installation by the jack or bore method.
11. Furnish and Install Steel Casing (Open Cut): Payment shall be by the linear foot installed and accepted according to size and type of pipe which includes the steel casing and installation by the open cut method.

12. Sheeting Left in Place: Payment for sheeting left in place shall be based on the actual sheeting ordered to be left in place by the Engineer and shall be paid for per thousand board feet.
14. Special Backfill: Payment for special backfill used with the Engineer's approval shall be per cubic yard which shall include hauling, compaction, and removal of unsuitable material.
15. Stainless Steel Watertight Manhole Inserts: Payment for manhole inserts shall be per each and shall include all components necessary to install the insert according to manufacturers instructions.

PART 2 PRODUCTS

2.01 SEWER PIPE

A. PVC:

1. a. Pipe (for depths up to 12 feet): ANSI/ASTM D 3034, SDR 35, 12454-B PVC cell classification in accordance with ASTM D 1784; additives and fillers shall not exceed 10 parts (by weight) per hundred of PVC resin in the compound.
 - b. Pipe (for depths greater than 12 feet): ANSI/ASTM D 2241, SDR 26, 12454-B PVC cell classification in accordance with ASTM D 1784; additives and fillers shall not exceed 10 parts (by weight) per hundred of PVC resin in the compound.
2. Joints: Push on type joint in accordance with ASTM D 3212; flexible elastomeric seals (gaskets) in accordance with ASTM F 477.
3. Fittings: Same material and cell classification as pipe.
4. Solvent Cements: ASTM D 2564

B. Ductile Iron:

1. Pipe: ASTM A 746, thickness in accordance with ANSI A21.50 for Class 50 pipe wall thickness; asphalt coated outside and cement lined and seal coated inside in accordance with ANSI A21.4/AWWA C104.
2. Joints: Push on (boltless, single gasketed) similar to that known as "Super-Bell-Tite", "Fastite", "Tyton" or approved equal; or Mechanical Joint in accordance with ANSI A21.11/AWWA C111, corrosion resistant high strength low alloy steel bolts and nuts ("COR-TEN").
3. Fittings: Ductile iron, ANSI A21.10/AWWA C110.

- C. Joining Pipe of Different Material:
 - 1. Connect pipe of dissimilar material with manufactured adapters specifically intended for this purpose. Devices shall be manufactured by Fernco Systems or approved equal.

2.02 CASING FOR JACKED, BORED AND OPEN TRENCH INSTALLATIONS

- A. Welded standard smooth steel pipe conforming to ASA B36.10; precoated inside and out with an approved bitumen compound. Minimum pipe thickness shall be as follows:

INSIDE DIAMETER (Inches)	SMOOTH STEEL PIPE (Min. Wall Thickness, Inches)
4	0.237
6	0.280
8	0.322
10	0.365
12 - 36	0.375

2.03 MANHOLES

- A. Manholes (Precast Shaft, Cone Top, and Base Pad Construction): conform to ASTM C478; integral base pad.
- B. Watertight Connectors: ASTM C923, flexible watertight connectors, KOR-N-SEAL (NPC Systems, Inc.), Z-LOK XP (A-Lok Products, Inc.) or approved equal.
- C. Frame and Cover: Size and type shown on Typical Sewer Details.
- D. Asphaltic Varnish: DOTD Standard Specification Section 1008.03.

2.04 STAINLESS STEEL WATERTIGHT MANHOLE INSERTS

- A. Insert and its associated valve body along with all components shall be manufactured from corrosion proof material suitable for atmospheres containing hydrogen sulfide and dilute sulfuric acid as well as other gases associated with wastewater collection systems.
- 3. The insert shall be manufactured of 304 stainless steel with a thickness of not less than 18 gage.
- 4. The insert shall have a configuration such that the lip will rest on the seating surface of the manhole frame.
- 5. In order to reduce excess weight accumulation, the insert shall not exceed 6 1/2" in overall depth.

6. The relief valve shall be recessed to insure the cast iron manhole cover will not come into contact with the relief valve when sliding during removal or replacement.
7. The gas relief valve shall be designed to release at a pressure differential equivalent to approximately 1 psi. The valve body shall be manufactured of medium density polyethylene, or other approved material, for prevention of corrosion.
- G. The gasket shall be manufactured of close cell neoprene or approved equal. The gasket shall be compatible with the stainless steel insert to form a long lasting bond in wet or dry conditions.
- H. The watertight manhole insert as specified above, upon installation as per manufacturer's recommendations, shall not allow more than 1 gallon of inflow during a period of 24 hours.
- I. The manhole insert shall have a handle of 3/16" minimum plastic coated stainless steel cable attached to the insert body. The handle shall be attached with a No. 6 high grade stainless steel rivet. The cable shall be braided in a manner which resists cutting with common bolt cutters. The cable terminal and eye shall be stainless steel.

2.05 CONCRETE

- A. Cement shall be Portland Cement conforming to ASTM C 150.
- B. Test for compressive strength of concrete in accordance with ASTM C 39.
- C. Concrete for Embedment: 3000 psi minimum at 28 days, five sacks of cement minimum per cubic yard, not more than 7 gallons of water per sack of cement.
- D. Grout: One part Portland Cement, two parts mortar sand, and water as required for proper consistency; use within 30 minutes of mixing.

2.06 EMBEDMENT MATERIAL

- B. A mixture of either gravel or stone with 35 percent (plus or minus) sand as verified by proof of material deliveries, conforming to the following requirements:
 1. Gravel: Material from a source on the DOTD Qualified Products List conforming to the following gradation:

<u>U. S. SIEVE</u>	<u>PERCENT PASSING</u>
1-1 1/2"	95-100
No. 4	0-15
No. 200	0-2

2. Stone: Material from the DOTD Qualified Products List conforming to the following gradation:

<u>U. S. SIEVE</u>	<u>PERCENT PASSING</u>
1-1 1/2"	95-100
3/4"	40-85
No. 4	0-15

3. Sand: Non-plastic siliceous material conforming to the following gradation requirements:

<u>U. S. SIEVE</u>	<u>PERCENT PASSING</u>
1/2"	100
No. 4	75-100
No. 200	0-10

- B. Limestone conforming to the following gradation requirements:

<u>U.S. SIEVE</u>	<u>PERCENT PASSING (BY WEIGHT)</u>
1-1/2"	100
1"	90-100
3/4"	70-95
3/8"	50-80
No. 4	35-65
No. 10	25-50
No. 40	10-26
No. 200	4-12

2.07 SAND

- A. Non-plastic siliceous material conforming to the following gradation requirements:

<u>U.S. SIEVE</u>	<u>PERCENT PASSING (BY WEIGHT)</u>
1/2"	100
No. 10	75-100
No. 200	0-10

2.08 MORTAR SAND

- A. Non-plastic siliceous material conforming to the following gradation requirements:

<u>U.S. SIEVE</u>	<u>PERCENT PASSING (BY WEIGHT)</u>
No. 4	100
No. 8	95-100
No. 100	0-25
No. 200	0-10

- B. Percentage of foreign matter not to exceed the following:

1. Coal or Lignite	0.25 percent
2. Clay Lumps	0.50 percent

2.09 SPECIAL FILL (CLASS A-6 SOIL):

- A. Class A-6 soil classification, as per La. DOTD Designation: TR 423; Plasticity Index of between 11 and 20 and a Liquid Limit of 40; free of all foreign matter.

PART 3 EXECUTION

3.01 ALIGNMENT AND GRADE

- A. Prior to excavation, the Engineer will provide alignment and location of manholes. Notify Engineer at least two working days prior to the time staking is required.
- B. Uncover, relay and backfill installed pipe where horizontal and vertical alignment is determined by Engineer to be unacceptable or erroneous, at no cost to L.U.S.

3.02 EXCAVATION AND TRENCHING

- A. Excavation shall include the removal, handling, rehandling, refill or backfilling, and disposal of any and all materials encountered in the work, and shall include all pumping, bailing, drainage and sheeting and bracing. It includes clearing and the removal of shrubbery and other obstructions not otherwise provided for.
- B. Perform all excavation, of whatever substance encountered, to depths indicated on the drawings or established by field stakeout.
- C. If the Engineer determines it is necessary to adjust, correct, relocate or in any way change the line and profile shown on the Plans, the Contractor shall perform the excavation and backfill required by said change under the terms of these specifications.

- D. Fill all excavations beyond authorized depths and widths with compacted embedment material at no cost to L.U.S. Over-excavated trenches shall not be brought up to grade with excavated material.
- E. All excavation shall be by open cut except where indicated otherwise in the Plans.
- F. Width of the trench to a point two (2) feet above the top of the pipe installation shall not exceed the external diameter of the barrel of the pipe plus nine (9) inches on each side. Additional cost for special foundation and backfill material and requirements as a result of failure to confine the excavation to this width shall be borne by the Contractor.
- G. Keep banks of trenches as nearly vertical as practical.
- H. Where required to control trench width, protect adjacent structures and to safeguard employees, properly sheet and brace trench.
- I. Where in the opinion of the Engineer, damage is liable to result from withdrawing sheeting, the sheeting will be required to be left in place. Neither the giving of such orders by the Engineer nor his failure or refusal to issue such orders shall in any way relieve the Contractor of the responsibility for damages to pavements or structures.
- J. When embedment material is not required, lay pipe on a firm, undisturbed, native earth foundation.
- K. Prevent surface ground water from flowing into the excavations.
- L. Remove all water accumulated in the trenches or other excavations by pumping or other approved methods, at no cost to L.U.S., prior to laying pipe.
- M. Stockpile material suitable for backfilling a sufficient distance back from the edges of the excavation to avoid overloading and to prevent slides or cave-ins.
- N. Control banks of all excavated areas to prevent movement of soil in areas supporting existing foundations, slabs, pole lines, pipelines or other structures. If, as a result of such excavation or through fault or neglect of the Contractor, the earth or ground under such structures is disturbed, corrective measures, as approved by the Engineer, shall be taken by and at the expense of the Contractor.
- O. Keep all drains, gutters, culverts, etc. for surface drainage open, or if they are unavoidably closed, make other provisions for this drainage.
- P. Length of the trench to be opened or the area of surface to be disturbed and unrestored at any one time will be limited by the Engineer with regard to both expeditious construction and the convenience and comfort of persons residing in the neighborhood or frequenting the street in question.
- Q. Trenches left open during non-working hours shall be properly protected from accidental entry.

3.03 EMBEDMENT

- A. Typical sewer foundations are as shown on the Typical Sewer Details.
- B. All pipe shall be bedded in a Type I Foundation or as otherwise stated herein, in the Plans, or as determined in the field.
- C. Where cuts to inverts of sewer mains are twelve (12) feet or more, Type II foundation shall be required.
- D. Where the bottom of the trench is not sufficiently stable or firm to prevent vertical or lateral displacement of the pipe after installation, the Engineer may direct the Contractor to provide a Type II foundation.

3.04 MANHOLE INSTALLATION

- A. Construct precast manholes to proper alignment and elevation as shown in the Plans and in accordance with the Typical Sewer Details.
- B. Provide minimum of six (6) inches clear between the outer surface of the manhole and the embankment or timber sheeting.
- C. Set metal frames in Preco Patch or approved equal.
- D. Invert channels shall be smooth, accurately shaped and in accordance with L.U.S. template and the Typical Sewer Details.
- E. Coat metal castings with asphalt varnish as described in Article 2.03(D).
- F. All pipe connections to manholes shall be installed using watertight connectors as per Article 2.03(B).
- G. Manhole drop inlets and services into manholes shall be constructed as shown on the Typical Sewer Details with materials meeting all requirements of these specifications.

3.05 PIPE INSTALLATION

- A. Where a certain pipe material is specified on the Plans, only that material can be used. Where the term "Sewer Pipe" is shown on the plans or in the proposal, it shall be interpreted to mean any of the specified pipe materials meeting the requirements of this section, as the Contractor elects, of the dimension shown on the plans.
- B. Install pipe in accordance with the manufacturer's recommendations and in accordance with the specifications herein. In addition, install PVC pipe in accordance with ASTM D 2321. In the event there is a conflict, consult with Engineer for clarification.

- C. Install solvent weld cap on the new line into the first manhole constructed immediately upstream of the existing manhole to prevent sewer gases from entering the work area and to prevent drainage into the existing system.
- D. Thoroughly clean interior of pipe before lowering into the trench. Keep pipe interior clean and free of foreign matter during laying operations.
- E. Do not lay pipe in unsuitable weather conditions. Stabilize wet trench conditions before laying pipe.
- F. Plug open ends of pipe and fittings when work is not in progress.
- G. Replace pipe found to be defective, before or after laying, with new pipe by and at expense of the Contractor.
- H. Use embedment material for pipe bedding where required.
- I. Grade pipe bedding by hand to provide uniform pipe bearing for its entire length and to provide proper grade and alignment.
- J. Provide bell or coupling holes at each joint to permit proper joint assembly and pipe support.
- K. Lay pipe with spigot end pointing in direction of flow.
- L. Walking or working on the completed sewer pipe, except as may be necessary in tamping or backfilling shall not be permitted until the trench has been backfilled to a height of at least one foot above the top of the pipe.
- M. Check each joint of pipe for line and grade before the next succeeding joint is placed.
- N. Maintain proper alignment of pipe during haunching and initial and final backfilling operations.
- O. Keep the sewer line pumped dry at all times.

3.06 SERVICE RISERS

- A. Install service risers as indicated on the Typical Sewer Details at locations shown on the Plans or designated in the field by the Engineer.
- B. For sewer mains 8" or larger, the tee shall be a short-body ductile iron tee conforming to AWWA C153.

3.07 WYE BRANCHES OR TEES

- A. Furnish wye branches or tees with connection of the size specified, securely and permanently fastened to the barrel of the pipe in the process of manufacture.

- B. Wyes and tees shall be given an inclination above a horizontal line and shall be properly bedded.
- C. All wyes and tees shall conform to the specifications and test standards of the pipe it is to be installed on.
- D. Field cut-in wyes or tees will not be permitted.

3.08 CONNECTION TO EXISTING MANHOLES

- A. Connection to existing manholes shall be made above the existing manhole base.
- B. Provide watertight connectors at tie-in to the manhole.
- C. Cap new sewer pipe from existing system at first manhole constructed immediately upstream from existing system tie-in.
- D. Where the connection has to be made at the same elevation as the existing pipe, the base shall be broken in the area where the connection is to be made and the new base shall conform to the requirements set forth in these specifications.

3.09 BACKFILLING

- A. Where compaction density is specified, maximum density shall be determined in accordance with requirements of Louisiana DOTD Designation: TR 418 and TR 401.
- B. Upon completion of joints and approval of Engineer, place acceptable material, free from stones, hard clay lumps, or other hard substances under the haunches of the pipe and up to the spring line of the pipe. Place initial backfill, in not more than six (6) inch lifts, to a point twelve (12) inches above the top of the pipe. Compact each stage by hand or mechanical tamping to obtain a minimum of 85% maximum density.
- C. Avoid displacement of the pipe in placement of backfill about the haunches.
- D. Take care to avoid contact between the pipe and compaction equipment.
- E. Backfill trenches for mains and services beneath existing pavement as shown in the Typical Sewer Details.
- F. Compact remainder of backfill over and above 12" above the surface of the pipe for mains and services laid within the right-of-way as follows:
 - 1. Backfill with select excavated site materials in not more than twelve inch (12") layers with each layer mechanically compacted to a minimum 90% of maximum density.

2. Within state highway right-of-way, the compaction requirements shall be 100% of the density of the surrounding undisturbed material, compacted in layers of not more than twelve inches (12").
 3. Slightly overfill the trench with backfill to create a crowned condition but not to exceed 6".
- G. Compact remainder of backfill over and above 12" above the surface of the pipe for mains and services laid outside the right-of-way as follows:
1. Backfill with select excavated material, in not more than eighteen (18) inch lifts, to the elevation 24" below the finished ground surface.
 2. Compact each layer of the material to eliminate all voids and to obtain a soil density equivalent to the existing undisturbed surrounding soil.
 3. Compact the remaining top two feet of the trench backfill, in not more than twelve (12) inch lifts, to obtain a minimum of 90% of maximum density.
 4. Slightly overfill the trench with backfill to create a crowned condition but not to exceed 6".
- H. The Contractor shall be responsible for obtaining suitable compaction of all trench backfill, including that in proposed streets, parking areas or other surfaced locations and shall be responsible for the failure of any surfacing due to trench settlement.
- I. Compaction will be verified through compaction tests ordered by the Engineer at no expense to the Contractor, except as stated herein. If the test results indicate insufficient compaction, the cost for that compaction test and of all retesting shall be borne by the Contractor until satisfactory results are achieved. L.U.S. will pay only for those tests which prove that the specified compaction has been achieved.
- J. Avoid damage to pipe during compaction.
- K. Backfill material shall contain no stumps or roots and shall be free of lumber, trash, or other debris.
- L. Use special backfill, with Engineer's approval, where the excavated material is not suitable for backfilling the trench and obtaining the required compaction. At the Contractor's option, limestone may be used for special backfill at no additional cost to L.U.S.
- M. Maintain trenches in good and safe condition during construction and during one year warranty period.

3.10 CASING INSTALLATION

- A. Clean and coat weld joints with approved bitumen compound after joining and before installation.

- B. Install casing as to prevent the formation of a waterway below the obstruction traversed.
- C. Casing shall have even bearing throughout its length and shall slope toward one end.
- D. Provide casing lengths to meet requirements of Plans or as established by the Engineer.
- E. Seal ends of the casing to prevent entrance of earth and excessive flow of groundwater but to allow some drainage.
- F. Provide polyethylene or stainless steel casing spacers attached to the sewer pipe to prevent damage to pipe and bell joints during installation and to provide proper long-term line support, at no cost to L.U.S. Skid arrangement to be in accordance with manufacturer's recommendations. Spacers shall be manufactured by Advance Products and System, Inc. or approved equal.

3.11 JACKING OR BORING

- A. Install pipe by means of a boring machine, auger, jack or by other means satisfactory to the Engineer.
- B. In the event the jacking or boring operations result in injury or damage to railroad tracks or pavements, repairs shall be the responsibility of the Contractor and shall be done at no cost to L.U.S.
- C. Any overcutting of the borehole shall be remedied by pressure grouting the entire length of the installation.
- D. Backfill boring pits to the bottom of the pipe with limestone at no direct cost to L.U.S.
- E. Schedule jacking or boring operations such that no pits shall be left open at the end of the day.

3.12 EXISTING STRUCTURES

- A. Existing structures shall be defined as all above and below ground level structures, including all pipelines, poles, tracks, roads, culverts, sidewalks, drains, cables, wires, conduits, vaults, manholes, landscaping, and other appurtenant facilities, whether owned or operated by public bodies, private individuals, corporations, firms or companies.
- B. Protect all existing structures from damage during construction.
- C. Utility facilities shown on the Plans are approximate locations and do not include service locations. There is no expressed or implied guarantee as to the accuracy of the various utilities or any omissions.

- D. The Contractor shall verify the locations of all utilities and follow OSHA Law Section 1926.651 at no cost to L.U.S. Final project location will be determined in the field by the Engineer upon the Contractor's verification of all utilities.
- E. In no case shall the Contractor receive additional compensation due to the location of existing utilities in relation to the final location of the proposed lines and appurtenances.
- F. Notify all utilities or other interested parties prior to starting work and advise them of any adjustments required.
- G. Contractor shall be responsible for investigating and informing himself of the condition, character, and extent of all structures which may be encountered during construction.
- H. Perform work in a manner to prevent interference with or damage to existing structures. Any damages done by the Contractor shall be his responsibility and all repairs shall be made immediately to the satisfaction of L.U.S.
- I. L.U.S. and/or his agents shall not be responsible for any damages to or any costs incurred as a result of any delays due to existence, removal, adjustment or repair to any structures mentioned herein, shown on the Plans or encountered during construction.

3.13 FLUSHING SEWER LINES

- A. Prior to testing sewer lines, water flush the sewer line with a sufficient volume of water to cause the pipe to flow at least half full and remove all sand, gravel and other foreign objects.
- B. Water flush and thoroughly clean all sewer lines prior to acceptance by L.U.S.

3.14 TESTING SEWER LINES

- A. General:
 - 1. Test sewer lines by low pressure air testing, lamping and television equipment. Deflection tests may also be performed as described in paragraph (D) below.
 - 2. Test manholes by air vacuum testing, visual inspection, and by infiltration. Manhole leakage will not be acceptable.
 - 3. Repair and retest manholes and sections of sewer lines which fail to meet the specified tests.
 - 4. Do not remove plugs installed on the new system until the system has been accepted.
 - 5. Furnish all equipment, labor and materials required for making the test.

B. Low pressure air testing

1. Clean the interior of the pipe immediately prior to testing.
2. Furnish test plugs, air compressor, test gages, stop watch and personnel for conducting the test.
3. The Engineer has the option to have the Contractor's testing equipment independently checked and certified for accuracy.
4. All pneumatic plugs shall be tested before being used in the actual test installation.
 - a. One length of pipe shall be laid on the ground and sealed at both ends with the pneumatic plugs to be checked.
 - b. Air shall be introduced into the plugs to 25 psig.
 - c. Pressurize the sealed pipe to 5 psig.
 - d. The plugs shall hold against this pressure without bracing and without movement of the plugs out of the pipe.
5. After pneumatic plugs are checked by the above procedure, place the plugs in the line at each manhole and inflate to 25 psig.
6. Introduce low pressure air into the sealed line until the internal air pressure reaches 4 psig greater than the average back pressure of any ground water that may be over the pipe.
7. Allow at least two minutes for the air pressure to stabilize.
8. After the stabilization period (3.5 psig minimum pressure in the pipe), disconnect the air hose from the control panel to the air supply.
9. The portion of the line being tested shall be termed "Acceptable" if the time required in minutes for the pressure to decrease from 3.5 to 2.5 psig (greater than the average back pressure of any ground water that may be over the pipe) shall not be less than the time shown for the given diameter in the following table:

<u>PIPE DIAMETER IN INCHES</u>	<u>MINUTES</u>
4	2.0
6	3.0
8	4.0
10	5.0
12	5.5

15	7.5
18	8.5
21	10.0
24	11.5

10. If ground water is known to be present over the pipe, the Contractor shall install a one-half inch diameter capped pipe nipple, approximately 10" long, through the manhole wall directly over one of the sewer lines entering the manhole. This is to be done at the time the sewer line is installed. Immediately prior to the performance of the test, the ground water shall be determined by removing the pipe cap, blowing air through the pipe nipple into the ground so as to clear it, and then connecting a clear plastic tube to the pipe nipple. The hose shall be held vertically and a measurement of the height in feet of water over the invert of the pipe shall be taken after the water has stopped rising in this plastic tube. The height in feet shall be divided by 2.3 to establish the pounds of pressure that will be added to all readings. (For example, if the height of water is 11.5 feet above the invert of the pipe, then the added pressure will be $11.5/2.3$ or 5 psig. This increases the 3.5 psig to 8.5 psig, and the 2.5 psig to 7.5 psig.) The allowable drop of one pound and the timing remain the same. In no case should the starting test pressure exceed 9.0 psig. Recap and seal the pipe nipple to prevent any future infiltration.
11. In lieu of (10) above, if the ground water level can be readily determined during the installation of the manhole, and jointly agreed upon by the Contractor and L.U.S., the height of the ground water above the invert of the sewer pipe can be used in determining the pounds of pressure to be added to all readings.

C. Lamping and Television Equipment

1. Prior to putting each system into service, the line will be visually inspected by lamping and by television equipment operated by the L.U.S. Wastewater Collection Division. The Contractor shall be responsible for cleaning the system prior to lamping and inspection by television equipment. If rejected, the Contractor shall pay at current rates for television equipment operation until proper flushing and/or pipe installation has been achieved.

D. Deflection Test

1. If during the operation of the television equipment by L.U.S. there is suspicion of deflection of the sewer pipe, the Engineer reserves the right to require the Contractor to perform a deflection test on that section of pipe at the Contractor's expense.
2. No pipe shall exceed a deflection of 5%.
3. Test for deflection using a mandrel with a diameter equal to 95% of the inside diameter of the pipe.

4. Perform test without mechanical pulling devices.
5. Should any deflection test fail, L.U.S. reserves the right to require the Contractor to perform deflection tests on any or all additional pipe at no cost to L.U.S.

E. Manhole Air Vacuum Test

1. Air vacuum testing of manholes shall be performed on 10% of the manholes, minimum of one (1) per project. The selection of which manhole(s) to be vacuum tested shall be determined by the Engineer.
2. Test manholes immediately after assembly of the manhole and the connecting pipes and before any backfill is placed around the manhole.
3. Plug lift holes.
4. Plug pipe openings, taking care to securely brace the plugs and the pipe.
5. Perform test using an inflatable compression band, vacuum pump and appurtenances specifically designed for vacuum testing manholes.
6. After the testing equipment is in place, a vacuum of 10 inches of Hg shall be drawn on the manhole. The manhole will be considered to have passed the test if the vacuum does not drop more than 1 inch of Hg in one minute.
7. If the manhole fails the initial test, the Contractor shall locate the leakage and make proper repairs, and retest until a satisfactory test result is obtained.
8. If any manhole fails the vacuum test, the Engineer reserves the right to require the Contractor to test any or all additional manholes at the Contractor's expense.

F. Manhole Infiltration Test

1. Construct a minimum 2' deep by 2' wide trench around the manhole.
2. Fill the trench with water and drill 3/4" (minimum) holes 5' deep (or the depth of the manhole). These holes shall circle the manhole at 6" intervals.
3. Two hours later the trench shall be refilled with water.
4. Up to two hours after the second filling, the Engineer will check the manhole for infiltration.
5. The manhole will be considered to have passed the test if no infiltration is detected. Repair and retest manholes failing the above test.

G. Visual Inspection

1. After the manholes have been backfilled and prior to final acceptance of the project, any signs of leaks or weeping visible from the inside of the manhole shall be repaired by the Contractor and the manhole made watertight.

3.15 MAINTENANCE OF TRAFFIC

- A. Refer to "Louisiana Department of Highways Maintenance Traffic Controls Handbook" (for state highway right-of-way) and "The Work Area Traffic Control Handbook" (for City-Parish streets).
- B. Conduct operations as to minimize interference with public travel and inconvenience to the public and to property owners.
- C. Provide and maintain, at Contractor's expense, suitable bridges, detours or other temporary facilities for the accommodation of public or private travel, as directed by the Engineer.
- D. Give twenty-four (24) hours notice to owners of private driveways prior to interfering with them.
- E. Keep local fire protection authorities informed at all times of the location of construction operations and fire lanes. Maintain access for fire-fighting equipment as requested by the Fire Department.
- F. Maintain traffic on all streets during construction, except where suitable detours or other arrangements are agreed upon.
- G. Provide motorized rubber wheel road grader on site upon completion of backfilling of all excavations in roadways and streets. Maintain all streets and roadways in a satisfactorily condition approved by the Engineer for the duration of the contract.
- H. Contractor shall have someone available to take calls at all times. Provide L.U.S. with a night phone number to call so that the Contractor may be advised of any emergency, trouble or other matter requiring his attention.

3.16 CARE OF STREETS, SIDEWALKS & ROADS

- A. Remove all excess materials, debris or other obstruction from streets or roads immediately after completing backfilling, at Contractor's expense.
- B. Wash streets, sidewalks and roads daily to remove dust problem.
- C. No cross streets, sidewalks or roads shall be wholly obstructed except by written permission from the Engineer.

- D. If at any time the Contractor neglects to remove such material or obstruction and place streets, sidewalks and roads in suitable condition for traffic within twenty-four (24) hours after having received notice (written or verbal) from the Engineer, the work may be done by L.U.S., and the cost thereof charged to the Contractor and deducted from his final estimate.
- E. Repair and replace streets, sidewalks, roads, ditches and culverts to the satisfaction of the Engineer and parties concerned.

3.17 PROTECTION AND CARE OF PUBLIC OR PRIVATE PROPERTY AND SERVITUDES

- A. Continuously maintain and protect all underground and above ground structures, utilities, including the restoration of all public utilities, water mains, water services, gas mains, gas services, culverts, drains, ditches, curbs, sidewalks, landscaping and/or other facilities which may be damaged, to a condition at least equal to their original status, at no additional cost to L.U.S. In the event of damage to any facilities, the appropriate utility will be notified immediately. L.U.S. will repair damaged facilities at the Contractor's expense or require the Contractor to repair said damage.
- B. All construction work under this contract on servitudes, right-of-way, private property or franchise shall be confined to the limits of such servitudes, right-of-way or franchise. All work shall be accomplished so as to cause the least amount of disturbance and a minimum amount of damage.
- C. No trees or shrubbery shall be removed or trimmed without the consent of the Engineer. With such approval ornamental trees and shrubbery shall be carefully removed, with the earth surrounding their roots wrapped in burlap and replanted in their original positions within forty-eight (48) hours. All shrubbery or trees destroyed or damaged shall be replaced by the Contractor with material of equal quality at no cost to L.U.S.
- D. All obstacles such as fences, markers, mail boxes, driveway culverts, etc. shall be removed by the Contractor and immediately replaced after the trench is backfilled in their original position and condition at no direct cost to L.U.S.
- E. Maintain adequate drainage during the process of construction.

3.18 REMOVAL AND REPLACEMENT OF CONCRETE AND/OR ASPHALT SURFACING

- A. Comply with all the requirements of the LCPCG Ordinance O-2552 and the requirements stated herein.
- B. Removal and replacement of surfacing for drives and parking areas shall conform to the Details for street repair.

- C. Pavements, driveways and sidewalks must be replaced expeditiously and in no case more than 10 working days from the acceptance of televised lines.
- D. The decision of the Engineer will be final as to the classifying of any form of pavement or surfacing not specified in the contract or of any forms where the classification is at all doubtful.
- E. Should the street, sidewalk surfacing, curbs, gutters, bridges, etc., outside the width measured for payment be damaged, cracked, settled, disturbed or injured in any manner by the Contractor's operations, such damage or injury must be replaced and the surfacing, etc. restored to its former condition by the Contractor with no separate compensation being made thereof.

3.19 CLEAN-UP

- A. Remove from the site all tools, equipment, temporary structures and surplus materials.
- B. Dispose of all excess soil, waste, rubbish, debris or objectionable materials off the site and in a manner and a location that complies with local ordinances and laws and is acceptable to all parties concerned and is approved by the Engineer.
- C. When disposal of excess soil is upon private lands, the Contractor shall be required to produce a written agreement with the private landowner stating the agreed terms and conditions.
- D. The entire construction site shall be left clean and to the satisfaction of the Engineer.

REPLACEMENT OF STREETS, DRIVES, AND SIDEWALKS

PART I GENERAL

1.05 SECTION INCLUDES

- A. Removal and replacement of streets, drives, and sidewalks necessary to complete the work.

1.06 SAMPLES

- A. Frequency of testing for concrete surfacing will be determined by the Engineer.
- B. Frequency of testing for asphalt concrete mixtures will be determined by the Engineer, but not to exceed the following:
 - 1. One sample per 100 tons (or less) up to maximum of 5 samples for that portion of each lot placed in the project. Sample the top 4" of the finished section.
- C. Contractor shall provide samples for testing.

1.07 QUALITY ASSURANCE

- A. Finish and materials shall be same as existing surface.

1.08 UNIT PRICES

- A. Method of Measurement
 - 1. Replacement of streets, drives, and sidewalks shall be measured by the square yard. Design quantities may be adjusted to meet field conditions. Removal of existing surfacing and excavation will not be measured for payment. Formwork, compaction of subgrade, and tack coat for asphaltic pavement will not be measured for payment.
- B. Basis of Payment
 - 1. Payment of replacement of streets, drives, and sidewalks shall be paid for by the unit price bid per square yard. The payment shall constitute full compensation for removal of existing paving, backfill, compaction, subgrade preparation, finishing and curing, furnishing, hauling, and installing of all materials, and for furnishing equipment, tools, labor, and other incidentals necessary to complete this item.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Concrete and incidentals necessary for construction shall be in accordance with DOTD Standard Specifications (2000 Edition)- Section 706-Concrete Walks, Drives and Incidental Paving.
- B. Asphalt concrete pavement shall be in accordance with DOTD Standard Specifications (2000 Edition)-Section 501, Type 3 and asphaltic tack coat in accordance with Section 504.

PART 3 EXECUTION

3.01 PROTECTION

- A. Conduct operations to prevent damage to walks and drives not designated or authorized for removal.
- B. Remove and replace streets, drives, curbs, and walks, not designated or authorized for removal, which is damaged by construction operations. The removal and replacement shall be performed at no cost to the Owner.

3.02 PREPARATION

- A. Remove all temporary maintenance aggregate and debris from trench area.
- B. Excavation to required depth and width, removing and replacing unstable material at no direct pay.
- C. Remove necessary fill-crete to section as indicated on drawings.
- D. Shape subgrade and compact to a firm, even surface conforming to the section shown on the plans.
- E. Existing streets, drives, and walks shall be saw-cut to necessary limits.

3.03 FORMS

- A. Forms shall be of wood or metal and shall extend the full depth.
- B. Forms shall be straight, clean and of sufficient strength.
- C. Forms shall be braced for proper alignment at all times.

3.04 SUBGRADE

- A. Thoroughly moisten subgrade prior to placing concrete.
- B. Coat subgrade and pavement surfaces that will receive asphaltic concrete pavement with an even distribution of asphaltic tack coat.

3.05 PLACING AND FINISHING

- A. Concrete:
 - 1. Concrete shall be deposited on subgrade, strike off to required thickness, and tamp sufficiently to bring mortar to the surface.
 - 2. Finish surface with a wood float or steel trowel, followed by brushing to a slightly rough finish.
 - 3. Joints and edges shall be rounded with an edging tool having a 1/4" radius.
- B. Asphaltic Concrete Pavement:
 - 1. Spreading, finishing and compaction of asphaltic concrete shall leave the surface reasonably smooth and level with, or slightly above, the edge of existing pavement.
 - 2. Match existing pavement crown or develop crown to facilitate proper drainage and assure a rideable surface.
 - 3. Patching to be completed or trenches to be filled and compacted by end of the day's operations to maintain through traffic.

3.06 JOINTS

- A. Expansion Joints:
 - 1. Fill joints with 1/2" thick preformed expansion joint filler.
 - 2. Install at maximum 100 foot intervals and between intersecting paving and any fixed structure.
 - 3. Extend for full width and depth of paving.
- B. Dummy or Contraction Joints:
 - 1. Form with jointing tool or other acceptable means.

2. Extend into concrete ¼” and shall be approximately 1/8”.
 3. Space in walks shall be equal to the width of walk.
 4. A longitudinal joint shall be formed along the centerline of drives more than 16’ wide and transverse joints of drives equal to the width but not greater than 16’.
- C. Construction Joints:
1. Construction joints shall be formed around manholes, utility poles, etc., extending into pavement and ¼” thick preformed expansion joint filler shall be installed in these joints.
- D. Tie-ins of existing concrete shall be made by full depth sawing at no direct pay.

3.07 CURING

- A. Roadway pavement surface shall be uniformly sprayed with white pigmented curing compound immediately after completion of surface finishing.
- B. Curing shall be maintained continuously for 72 hours.
- C. Have available at the site sufficient material to cover the last hour’s pour against the effects of rain.

3.08 PAVEMENT STRIPING AND RAISED PAVEMENT REFLECTORS

- A. Striping and raised pavement reflectors removed during construction shall be replaced with new material at similar spacing as existing.

FENCES AND GATES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. This work consists of constructing or rebuilding fences and gates in accordance with these specifications and in conformity with lines and grades shown in the Drawings or established by the Engineer.

1.02 REFERENCES

- A. ASTM A 90 – Weight of Coating on Zinc-Coated (Galvanized) Iron or Steel Articles.
- B. ASTM A 116 – Zinc-Coated (Galvanized) Iron or Steel Farm-Field and Railroad Right of Way Wire Fencing.
- C. ASTM A 120 – Pipe, Steel, Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless, for Ordinary Uses.
- D. ASTM A 121 – Zinc-Coated (Galvanized) Steel Barbed Wire.
- E. ASTM A 123 – Zinc (Hot-Galvanized) Coatings on Products.
- F. ASTM A 392 – Zinc-Coated Steel Chain-Link Fence Fabric.
- G. ASTM A 525 – Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.
- H. ASTM A 702 – Hot-Rolled Steel Fence Posts and Assemblies for Field and Line-Type Fencing.
- I. ASTM B 211 – Aluminum – Alloy, Bars, Rods and Wire.
- J. AASHTO M 181 – Chain-Link Fence.
- K. DOTD Louisiana Standard Specifications for Roads and Bridges (LSSRB), 2000 Edition, Section 705 – Fences.
- L. DOTD LSSRB Section 901 – Portland Cement Concrete (Class R).
- M. DOTD LSSRB Section 1010 – Fence and Guard Rail.

1.03 QUALITY ASSURANCE

- A. All dimensions and gauges of material are subject to accepted industry tolerance standards.
- B. All materials will be subject to inspection for acceptance as to condition at any time during the work. Any material found not to be in compliance with the Specifications shall be removed and replaced at the Contractor's expense.
- C. The fencing shall have uniform properties throughout the installation and shall be supplied by a single manufacturer. Fencing exhibiting unacceptable variation shall be subject to rejection and replacement at the Contractor's expense.

1.04 UNIT PRICES

- A. Method of Measurement:
 - 1. New Fence: Measured by the linear foot between outside of end posts for each continuous run of fence, exclusive of gates.
 - 2. Single Gate: Measured per each single gate installed of the type indicated.
 - 3. Double Gate: Measured per each double gate installed of the type indicated.
- B. Basis of Payment:
 - 1. New Fence: Payment shall be by the linear foot.
 - 2. Single Gate: Paid for by the single gate.
 - 3. Double Gate: Paid for by the double gate.
 - 4. Payment for each item shall constitute full compensation for all labor, material, supervision, equipment, and other appurtenances necessary to complete the installation of the item in accordance with these Specifications and as shown on the Drawings.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Chain Link Fencing:

1. Chain link fabric shall be either aluminum coated conforming to the requirements of ASTM-A491-74 or hot galvanized conforming to the requirements of ASTM-A392-74, Class 2 coating. Fabric shall be woven from 9 gauge (coated size) wire in a 2-inch mesh. Fabric shall be knuckled at one selvage and twisted and barbed at the other selvage.
2. Posts and rails shall be roll formed, open seam, self draining shapes, hot dip galvanized in conformance to the requirements of ASTM-A123-73 or galvanized standard weight pipe conforming to the requirements of ASTM-A120-73.
3. Line posts shall be C-Section roll formed from steel conforming to ASTM-A570-72, Grade E, 2.25" x 1.70" with minimum bending strength of 316 pounds under a 6-foot cantilever load, or 2 3/8" O.D. standard weight galvanized pipe with minimum bending strength of 201 pounds under a 6-foot cantilever load.
4. Top and brace rails shall be roll formed section of 1.625" x 1.25" channel shaped rail with minimum vertical bending strength of 192 pounds on 10-foot span or 1.66" O.D. standard weight galvanized pipe with minimum vertical bending strength of 202 pounds on 10-foot span. Top rail couplings 6 inches minimum in length shall be spaced at maximum 21-foot centers and 9 gauge minimum fabric tie wires shall be spaced at 24-inch maximum centers.
5. All end, corner, and pull posts and gate posts for gate leaves 6'0" wide and less shall be roll formed section 3.5" x 3.5" with minimum bending strength of 453 pounds on 6-foot cantilever load or 2 7/8" O.D. galvanized standard weight pipe with minimum bending strength of 381 pounds on 6-foot cantilever load.
6. Gate posts for gate leaves over 6'0" wide shall be standard weight pipe complying with ASTM-A120 of diameters as recommended by the gate manufacturer.
7. Attachment of chain link fabric to roll formed terminals shall be made by weaving directly into integral lock loops formed in the post.
8. Attachment of chain link fabric to tubular terminal posts shall be made with minimum 1/4" x 3/4" tension bar and 12 ga. x 1" wide clamps using minimum 3/8" diameter carriage bolts.
9. Gate frames shall be tubular shaped, 1.90 inch outside diameter with welded or steel fitted corners. Braces and trusses shall be furnished when necessary.

10. Hardware shall be of adequate design and strength to provide satisfactory operation of gate.
11. All gate components shall be galvanized or aluminum coated as specified herein for fencing components.
12. Locking hasps with locks keyed to the LUS Sewer Department master shall be furnished on gates.
13. All fittings shall be pressed steel or malleable iron and shall be hot dip galvanized conforming to the requirements of ASTM-A153-73.
14. Tie wires shall be minimum 9 gauge aluminum or 11 gauge galvanized steel.
15. Line and terminal posts to be of sufficient lengths to allow for approximate 36-inch settings into concrete footings. Diameter of footings to be 10 inches for line post, and 12 inches for terminal posts.
16. All dimensions and gauges of material are subject to accepted industry tolerance standards.
17. Concealment slatting shall be installed in chain link fence where indicated on the Plans to create a visual barrier. Slatting shall be designed and manufactured specifically for vertical insertion in chain link fencing fabric and shall self-lock in place in the fabric. The slatting shall have a 25 year limited warranty provided by the manufacturer against color fading and breakage of components.

B. Wood Fencing:

1. Lumber: The fencing lumber shall be #1 Grade Cedar at a standard 1" thick x 6" width dimension, unless otherwise stated on plans. Boards shall be fastened with 10d screw shank galvanized nails.
2. Rails: Wood fence rails shall be a maximum of 7.5 feet in length and a standard 2" x 4" in size. There shall be a minimum of three (3) rails between posts. Rails shall be No. 1 grade, treated pine placed 6" from the top and bottom as well as in the center of the fence. Rails shall be attached to posts by ¼" by 4" long galvanized bolts.
3. Posts:

- a. Line posts shall be galvanized 2" diameter tubular steel; galvanizing shall be in accordance with ASTM A-120-73. Line posts shall be placed no farther than 8' O.C. Footings shall be a minimum 2 1/2' in depth and 12" in diameter with 2500 p.s.i. concrete used as encasement.
 - b. Corner posts shall be galvanized 2 1/2" diameter tubular steel while gate posts shall be galvanized 4" diameter tubular steel. Footings and concrete shall be the same as the line posts.
 - c. If treated wood posts are approved for use, 4" x 4" size posts shall be used for line posts and 4" x 6" treated wood posts shall be used for corner posts.
4. Hardware: All fittings shall be galvanized steel conforming to the requirements of ASTM A-153-73.
 5. Gates:
 - a. Gates frames shall be tubular shaped galvanized steel with welded or steel fitted corners.
 - b. Hardware shall be of adequate design and strength to provide satisfactory operation of gate.
 - c. All gate components shall be galvanized or aluminum coated as specified herein for fencing components.
 - d. Locking hasps with locks keyed to the L.U.S. Sewer Department master shall be furnished on gates.

C. Concrete:

1. Concrete for setting posts shall be Class R concrete in accordance with DOTD Standard Specification Section 901.

PART 3 EXECUTION

3.01 GENERAL CONSTRUCTION REQUIREMENTS

- A. All clearing and grubbing necessary for fence installation shall be performed prior to laying out of fence.
- B. The Contractor's operation shall be confined to the area adjacent to right-of-way lines and construction servitudes.

- C. Where breaks in a run of fencing are required, and at intersections with existing fences, appropriate adjustment in post spacing shall be made for the type closure indicated.
- D. Wood posts shall be placed with small end up. When posts, braces, or anchors are to be embedded in concrete, the contractor shall install temporary braces as required to hold posts in proper position until concrete has set sufficiently to hold posts. No material shall be installed on posts or strain placed on bracing set in concrete for 72 hours after concrete has been placed.
- E. Tops of posts shall be set to required grade and alignment. Cutting of wood post tops will be allowed only when approved. Cut ends shall be treated with two applications of the same type preservative used for post treatment. Wire shall be stretched taut.
- F. Ground rods shall be installed along each segment of new or rebuilt fence, regardless of type fence post used, at maximum 500 foot intervals. Ground rod installation will not be measured for payment.

3.02 REBUILT FENCE

- A. When specified, the Contractor shall take down, move back and rebuild existing fence. Fence shall be rebuilt in the same manner as specified for new fence. Rebuilt ornamental fence, picket fence, or other special type fence shall be equal in all respects to existing fence.

3.03 GATES

- A. Gates shall be of rigid construction and after erection shall not show any sag or warp.

3.04 CHAIN LINK FENCE AND GATES

- A. Concrete Post Anchorage:
 1. Posts shall be anchored in Class R concrete footings.
 2. Hand mixing of concrete shall be permitted for small quantities.
 3. Tops of footings shall extend slightly above ground and shall be steel troweled to a smooth finish sloped to drain away from posts.
 4. Posts shall be centered in footings.
 5. Excess excavation from footings shall be disposed of in a satisfactory manner.

B. Fence Erection:

1. Pull posts shall be placed not more than 200 feet apart in straight runs and at each vertical angle greater than 20 degrees. Corner posts shall be placed at each horizontal angle greater than 20 degrees. Corner and pull posts shall have a horizontal brace and tie rod on each side of posts. The horizontal brace and tie rod shall be connected to adjacent line posts.
2. Posts shall be permanently positioned, anchorages firmly set, and top rail or tension wires satisfactorily secured to posts before fabric is placed. Ends of fabric shall be secured by stretcher bars threaded through loops of fabric and secured to posts by clamps with bolts and nuts.
3. Fabric shall be placed by securing one end and applying sufficient tension to remove all slack before making attachments elsewhere. The degree of tensioning shall be commensurate with air temperatures at time of installation to prevent undue sagging or tensioning of fabric due to changing temperature. Fabric shall be fastened to line posts at approximately equal spaces and to top rail and bottom tension wire with tie wires or bands as specified.

C. Gate Erection:

1. Gate installation shall include gate frames, stretcher bars, filler fabric, latches, stops, locking devices, padlocks, hinges, gate posts with braces, tie rods, turnbuckles, caps, and all fittings as specified or required for complete installation.
2. Clamps for attaching hardware shall be tightened.
3. Bottom of gates shall clear the ground at least 3 inches at all points in its swing. The Contractor shall grade the area if necessary to meet this requirement.
4. Stops with latches or other approved means for holding the gate open shall be provided, placed to prevent damage to gate or fence by over swing.
5. Unless otherwise directed, stops shall be provided at the centerline of fence to arrest the swing of a closed gate.

D. Repair of Protective Coatings:

1. After completion of fence and gate installation, any damaged protective coatings shall be satisfactorily repaired by approved methods.

E. Concealment Slating:

1. If called for in the Plans, the Contractor shall install concealment slatting in chain link fencing fabric of the color and type installed.
2. Slatting shall be installed according to manufacturer's recommendations.
3. Damaged slatting shall be replaced at the Contractor's expense.

3.05 WOOD FENCING

- A. Posts: Line posts shall be placed on centers not exceeding 8'. Posts shall be anchored according to Section 3.04.A.
- B. Fence Erection:
 1. Horizontal 2" x 4" rails shall be bolted to posts.
 2. Lumber shall be accurately cut and framed to a close fit in such a manner that the joints will have an even bearing over the entire contact surface.
 3. Abutting runners shall be connected with galvanized steel connectors.
 4. Galvanized, rib shank nails shall be used to secure the fence boards to the railings.
 5. Fencing boards that are deemed unacceptable by the Engineer, whether by poor workmanship and poor quality, shall be replaced at the Contractor's expense.

HYDROSEEDING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Preparation of Ground Surface.
- B. Hydroseeding
- C. Water
- D. Maintenance

1.02 DEFINITIONS

- A. Noxious Weeds: Noxious weeds are interpreted to mean the list of weeds, except Bermuda, which have been adopted by the Louisiana Seed Commission as being noxious in Louisiana.

1.03 COORDINATION

- A. Coordinate work in this Section with other construction operations to minimize damage to seeded areas.
- B. Apply hydroseeding as soon as practical in order to avoid unnecessary erosion at the site.

1.04 MAINTENANCE

- A. Maintain hydroseeded areas immediately after application until grass is well established and exhibits a vigorous growing condition.
- B. If grass is well established and exhibits a vigorous growing condition prior to final acceptance, maintain until time of final acceptance.

1.05 UNIT PRICES

- A. Method of Measurement and Payment:
 - 1. Hydroseeding: Measured by the acre actually applied.
 - 2. Water: Water for Hydroseeding will not be measured for payment.
- B. Basis of Payment:

1. Hydroseeding: Paid for at the contract unit price per acre actually applied as directed by the Engineer.

PART 2 PRODUCTS

2.01 MATERIALS AND PACKAGING

A. Seed:

1. Conform to all requirements, rules, and regulations of Louisiana Revised Statutes. The minimum percentage of pure live seed and the maximum percentage of weed seed to be as follows:

<u>Kind</u>	<u>Min. Percent of Pure Live Seed (Purity times Germination Including Hard Seed)</u>	<u>Max. Percent of Weed Seed</u>
Hulled Bermuda	83	1
Carpet Grass	76	2
Dixie Crimson Clover	78	1
Kentucky 31 Fescue	80	1

2. Furnish from previous season's crop (the last crop year for the crop kind in question).
3. Limit noxious weed seeds as prescribed in the regulations, but in no case shall they exceed 500 seeds per pound.

B. Fertilizer:

1. Provide commercial type conforming to the commercial fertilizer laws in effect as regulated by the Louisiana Department of Agriculture.
2. Fertilizer used shall have specified chemical composition indicated by a 3-number sequence representing minimum percentages by weight, respectively of nitrogen (N), available phosphoric acid (P₂O₅) and soluble potash (K₂O).
3. Allowable chemical compositions: 8-8-8, 12-12-12, 13-13-13, 16-16-16, 26-6-9.

C. Water: Clean, fresh and free of substances or matter which could inhibit vigorous growth of grass.

PART 3 EXECUTION

3.01 INSPECTION

- A. Engineer or his authorized representative shall receive verification of quality of seeds and type of fertilizer.
- B. Verify that prepared soil base is ready to receive the work of this Section.

3.02 PREPARATION OF GROUND SURFACE

- A. Prepare ground surface areas by removing foreign materials, stones, waste materials, weeds, and undesirable plants and their roots. Remove contaminated soils.
- B. Grade to eliminate uneven areas, soft or low spots, and to ensure proper drainage. Maintain lines, levels, profiles and contours. Make changes in grade gradual. Blend slopes into level areas.
- C. Finish grade and rake to an even and properly compacted condition.
- D. Prepare seed beds by disking, harrowing, or other approved methods to a minimum depth of 3 inches and thoroughly pulverize for the 3 inch preparation depth.

3.03 HYDROSEEDING

- A. Mulch for Hydroseeding shall be “HYDRO 2000”, manufactured by CONWED, Inc. or “REFIBER WOOD w/TAC”, manufactured by Wood Recycling, Inc. A minimum of 1800 pounds per acre (dry weight) of mulch material shall be applied.
- B. Distribute seed, fertilizer, mulch, water and tackifier in one operation.
- C. Apply seeded slurry at the rates of:

1. March thru September

Hulled Bermuda	70lbs./acre
Fertilizer (13-13-13)	300 lbs./acre
“or”	
Hulled Bermuda	35 lbs./acre
Kentucky 31 Fescue	35 lbs./acre
Fertilizer (13-13-13)	300 lbs./acre

2. September thru March

Rye Grass	50 lbs./acre
Unhulled Bermuda	70 lbs./acre
Fertilizer (13-13-13)	300 lbs./acre
“or”	
Rye Grass	50 lbs./acre
Unhulled Bermuda	35 lbs./acre
Kentucky 31 Fescue	35 lbs./acre
Fertilizer (13-13-13)	300 lbs./acre

- D. “Fiber Plus” Tackifier at the rate of 30 pounds per acre shall be utilized on areas where slopes are greater than 2:1 or as directed by Engineer.
- E. Distribute in two intersecting directions, with a hydraulic seeder.
- F. In highly erodible soil areas, contractor shall use an approved erosion control matting in conjunction with hydroseeding.

3.04 MAINTENANCE

- A. If vigorous growth occurs before final acceptance, cut grass at regular intervals to maintain at a maximum height 2 ½ inches. Do not cut more than 1/3 of grass blade at any one mowing.
- B. Water on a regular basis to promote growth and to prevent grass and soil from drying out. Water at other times as directed by the Engineer.
- C. Immediately reseed areas which show bare spots.
- D. Repair to re-establish the grade and reseed surfaces which have become gullied due to erosion.

3.05 SCHEDULE

- A. Hydroseed ground surface areas within the Site as follows:
 - 1. Areas within limits of construction as designated in the Drawings.
- B. Hydroseed ground surface areas affected outside the limits of construction by construction operations.

FILL-CRETE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fill-Crete for backfilling of trenches.

1.02 UNIT PRICES

- A. Method of Measurement:

- 1. Fill-Crete: Measured by the in-place cubic yard as set forth by the limits designated in the Drawings.
- 2. Design quantities will only be adjusted if the Engineer authorizes changes to adjust to field conditions or if design changes are made. Fill-crete required due to unauthorized excess trench excavation shall not be measured for payment.

- B. Basis of Payment:

- 1. Fill-Crete: Paid for by the in-place cubic yard which includes furnishing and placing all materials.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Portland Cement: Portland Cement shall conform to ASTM Designation: C150.
- B. Sand: Sand shall conform to ASTM Designation C33. The percentages of foreign matter shall not exceed the following values:

	PERCENT
Coal or Lignite	0.25
Clay Lumps	3.0

Sand shall conform to the following gradation:

<u>SIEVE SIZE</u>	<u>PERCENT PASSING (BY WEIGHT)</u>
3/8"	100
No. 4	95 to 100
No. 16	45 to 90
No. 50	7 to 30
No. 100	0 to 7
No. 200	0 to 3

C. Water: Water shall be clean and not detrimental to concrete.

2.02 FILL-CRETE MIX

A. Mix cement, sand and water in the following proportions to yield one (1) cubic yard of mixture:

Portland Cement	-	188 lbs.
Sand	-	3,010 lbs.
Water	-	46.2 gal.

PART 3 EXECUTION

3.01 PROTECTION

A. Protect adjacent structures and surfaces during fill-crete placement operations.

3.02 BACKFILLING

A. Fill-crete shall be used to entirely backfill trenches cut through roadways and in areas directed by the Engineer to the limits designated in the Drawings.

3.03 SCHEDULE

A. Place fill-crete at locations and to the limits designated in the Drawings and in areas directed by the Engineer.

CONSTRUCTION VIDEO

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Furnishing video at locations designated herein.

1.02 UNIT PRICES

- A. Method of Measurement
 - 1. Measurement will be by the lump sum.
- B. Basis of Payment
 - 1. Paid for at the contract lump sum price.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

- A. Video
 - 1. Video to be taken prior to beginning construction.
 - 2. Video to include all surface features of construction area and shall include, but not be limited to the following items: roadways, pavements, curbs, driveways, sidewalks, culverts, headwalls, buildings, landscaping, trees and fences.
 - 3. Identify by audio each parcel with project name, property owner, street name, approximate location, date and time.
 - 4. Video tape shall be of the ½ inch VHS format and shall produce sharp, clear pictures.
 - 5. Tape(s) shall be indexed with the project name, street names and location.

ELECTRICAL AND CONTROL

PART 1 GENERAL

1.01 GENERAL

- A. The General Conditions are a part of this specification and the Contractor shall consult them in detail for instructions pertaining to his work. He shall also consult all other sections to determine if any other work is to be performed.
- B. All work shall be done in accordance with the 2002 National Electrical Code and with local and state ordinances governing this class of work.
- C. The current Lafayette Utilities System (LUS) Material Specifications shall govern.
- D. The Contractor shall comply with the Standards and Procedures of LUS.

1.02 SCOPE OF WORK

- A. Provide and install all conduit with conduit seals as indicated on the riser diagram.
- B. Install, connect and place in operation with following equipment:
 - 1. Pump motor power and control cables.
- C. Install, connect and place in operation the following equipment furnished by LUS:
 - 1 Pump Control Panel.
 - 2 Ultrasonic level transducer.
 - 3 Tip float switches
 - 4 Other type of level transducer, if required.
 - 5 UPS, Radio and Yagi antenna, if applicable.
- D. Provide and install all other cable.
- E. Provide and install the hot dip galvanized (after fabrication) steel equipment support frame.
- F. Provide and install the fusible safety switch, or circuit breaker, the non-fusible double throw switch 4 pole as specified on the drawings, and the generator power receptacle.

- G. Provide and install the 7.5 kVA dry type transformer (480 VAC service only).
- H. Provide and install the area lighting fixture and switch.
- I. Provide and install the NEMA-4X junction boxes (JB-1, JB-2 & JB-3) with breather adjacent to wet well.
- J. Install the meter can provided by the utility company. Provide and install the service conductors, [service pole] and grounding. Coordinate the service installation with the power company. Refer to LUS Electric Services Manual.
- K. If required, provide and install the antenna support pole, mast and grounding.
- L. If required, provide and install the conduit for the radio coaxial cable.

1.03 VARIOUS RESPONSIBILITIES

- A. The pumps are being furnished by the Contractor under the Section III-3 “Detailed Specifications for Submersible Sewage Pump Station”. The pump control panel, [the radio/UPS system and Yagi antenna], tip float switches (non-mercury) and the ultrasonic level transducer are being furnished by the Owner, LUS.
- B. LUS will furnish a new pump control panel recently manufactured and tested and a new level transducer.
- C. The Contractor is responsible for proper operation of all of these components after installation as well as their operation as a complete integrated system.
- D. The Contractor shall furnish and install all hardware, brackets, supports, cable, etc. necessary for a complete installation.
- E. The Contractor (with assistance of the pump supplier and manufacturer) will be expected to assume the responsibility for proper pump operation with the control panel and integration of the various parts of the system.
- F. The Contractor shall test and check out the completed system and shall troubleshoot problems during start-up and check-out, as necessary. LUS will be available for consultation and assistance.
- G. Refer to the Section III-3 “Detailed Specifications for Submersible Sewage Pump Station” for additional information.

1.04 SUBMITTALS – SHOP DRAWINGS

- A. Submit shop drawings for the Engineer's approval prior to proceeding with the work and within thirty (30) days of awarding of the contract. Included and in particular are shop drawings for the area lighting luminaire, generator receptacle, [transformer] and the fusible double throw (on-off-on) switch. The contractor shall submit all other such drawings as the Engineer may require. Review and approval of any drawings by the Engineer shall not release the Contractor from responsibility from errors and omissions in such drawings. Wiring configuration drawings shall adhere to the Plan details.

1.05 SUBMITTALS – FINAL DOCUMENTATION

- A. Prior to acceptance of the project, three copies of all shop drawings, descriptive data, schematics, printed installation instructions, operating and maintenance instructions and parts lists for the pump control panel shall be neatly bound in three (3) hard-cover D-ring binders and turned over to the Engineer.

1.06 REFERENCES

- A. Standards of the following organizations and the individual standards named shall be followed as though they were part of this Specification (unless otherwise noted):

- Underwriters Laboratories Inc. (UL)
- Southern Standard Building Code
- State Fire Marshall's Act
- Institute of Electrical and Electronic Engineers
- National Board of Fire Underwriters
- National Electrical Code
- National Electrical Manufacturers Association
- Edison Electric Institute
- Insulated Power Cable Engineers Association
- American National Standards Institute
- American Society for Testing Materials
- National Electrical Safety Code
- National Fire Protection Association
- Applicable Rules and Regulations of the local utility companies providing services.

1.07 REGULATORY REQUIREMENTS

A. Observe and comply with all applicable federal, state and local laws, municipal ordinances, codes and the rules and regulations of all authorities having jurisdiction over construction of the project.

B. Adhere to the following standards, where applicable:

NEMA ICS-1-1983 General Standards for Industrial Control and Systems

NEMA ICS-2-1983 Industrial Control Devices, Controllers and Assemblies

NEMA ICS-3-1983 Industrial Systems

NEMA ICS-4-1983 Terminal Blocks for Industrial Use

NEMA ICS-6-1983 Enclosures for Industrial Control and Systems

NFPA 70E Electrical Safety Requirements for Employee Workplaces

NFPA 79 Electrical Standards for Industrial Machinery

NFPA 328 Flammable and Combustible Liquids and Gasses in Manholes, Sewers
And Similar Underground Structures

NFPA 820 Standard for Fire Protection in Wastewater Treatment and Collection
Facilities

ANSI B 286-74 (R-1985) Copper Conductors for Use in Hookup Wire for
Electronic Equipment

IEEE 74-1958 Standard Test Code for Industrial Control

ISA RP60.1 Control Center Facilities

DIN (Deutsches Institut fur Normung – German National Standard)

1.08 ELECTRICAL SERVICE

A. Provide and install the service as called for in the Plans. The Contractor shall consult with the power company when preparing the bid. All equipment, materials, metering, labor and utility charges shall be included in his bid. No additional compensation will be allowed after bid opening for any failure on the part of the contractor with respect to service acquisition.

1.09 REJECTED WORK AND MATERIAL

A. Should the Contractor introduce any materials different from the type and quality described in the specifications or shown on the plans, it must be immediately removed from the premises when requested by the Engineer.

1.10 WARRANTY

A. Contractor for this work shall be required to keep the work installed by him in repair and perfect working order for one (1) year from the date of final acceptance of the project.

1.11 HAZARDOUS AREAS

- A. Be aware that certain areas of the pump station are considered Class I, Division 1, Group C & D “hazardous” areas as defined in the National Electrical Code. Special wiring techniques, materials and equipment must be used in such areas. The Contractor is referred to Articles 500 and 501 of the 2002 NEC for detailed requirements for electrical work in hazardous areas. All equipment used in hazardous areas must be suitable for use in such areas.

PART 2 PRODUCTS

2.01 MATERIALS AND APPROVALS

- A. Base the proposal on materials as specified herein. Specific mention of a manufacturer or trade name is not intended to indicate preference but to indicate a type and standard of quality. However, where the term “prior approved equal” is used, any substitutions for materials specified herein must be submitted to the Engineer for approval seven (7) days prior to the bid date. Where the term “or approved equal” is used, the substitute product is subject to the Engineer’s approval when the shop drawings are submitted. Where the term “or equal” is used, the substitute product shall be equal to that specified and subject to the Engineer’s approval but shop drawings are not required.

2.02 RACEWAYS AND FITTINGS

- A. Galvanized Rigid Steel Conduit: This conduit shall be galvanized inside and outside by the hot-dip or electro-galvanize processes (ANSI-C80.1 and UL-6).
- B. PVC Conduit: This conduit shall be rigid schedule 40 or 80 PVC (as specified on the plans) conduit rated 90°C and UL listed (NEMA TC 2 and UL-651).
- C. Rigid Aluminum Conduit: This conduit shall be manufactured of 6063 alloy in temper designation T-1 (ANSI-C80.5 and UL-6).
- D. All wiring is to be installed in conduit.
- E. All outdoor conduit connections to junction boxes, conduit fittings, outlets, disconnect switches, etc. must be watertight.

2.03 CONDUCTORS AND WIRING

- A. All conductors shall be stranded copper.

- B. Motor circuit power conductors shall be Exane-insulated (or equal) type cable. All other conductors shall have THWN/THHN 600-V insulation. The minimum wire size shall be 14 AWG. The power conductors are to be sized according to the NEC, using rate motor FLA and voltages, along with additional voltage drop requirements.
- C. Signal cable (carrying 4-20 mA currents) shall be a twisted and shielded pair of 18 AWG insulated copper conductors. Furnish Belden No. 1120A or prior approved equal.

2.04 DOUBLE THROW SWITCH

- A. The double throw switch shall be non-fusible, shall have a cover interlock and shall be capable of being padlocked in the top, bottom and neutral positions. The switch shall be signed to select one of two sources for a single load. The switch shall be NEMA-3R and shall be furnished with the current rating, voltage rating and number of poles required in the plans. The switch must be UL listed, suitable for use as service equipment, heavy-duty rated and shall be as manufactured by Siemens, Cutler-Hammer / Westinghouse or prior approved equal.

2.05 SAFETY SWITCHES

- A. Safety switches shall be fusible or non-fusible and rated 240VAC or 480 VAC, as required, and noted on the plans.
- B. Fusible and non-fusible safety switches shall be quick-make, quick-break, with cover interlock and padlocking provisions, and shall be UL approved as rain-tight and NEMA-3R or as otherwise specified in the Plans. Approved manufacturers are Siemens and Cutler-Hammer / Westinghouse.

2.06 AREA LUMINAIRE

- A. The area luminaire shall be an Appleton p/n VPAN10125G, Cooper Crouse-Hinds or approved equal. The luminaire shall be provided with a 200-W, 130-VAC A-23 lamp.

2.07 CONDUIT SEALS

- A. Conduit seals shall be furnished where called for in the Plans. Seals shall be the type EYS as manufactured by Cooper Crouse-Hinds or Appleton and shall be installed with an explosion-proof union directly below boxes. Sealing compound shall be "Apelco" or "Chico A".

2.08 CONCRETE

- A. Where concrete is required it shall be 3000 psi minimum (standard aggregate) and shall be in accordance with American Concrete Institute (ACI) standards. All reinforcing (if required) shall be in accordance with ASTM A615 (GR40).

2.09 DRY TYPE TRANSFORMER

- A. Furnish and install a 7.5-kVA dry type transformer, if the service is 480VAC. The transformer shall be connected for a 480 VAC primary and a 120/240 VAC (single-phase) secondary. The transformer shall be NEMA-3R. Approved manufacturers include Siemens and Cutler-Hammer / Westinghouse.

2.10 CABLE SUPPORT GRIPS

- A. Properly sized cable support grips shall be provided for cables, which enter the wet well. The cable support grips shall be "Kellems Grip" as manufactured by Hubbell, p/n 07401023 / 07401025 (or equal). The Kellems shall be stainless steel.

2.11 CORD GRIP CONNECTORS

- A. Cord grip connectors shall be Cooper Crouse-Hinds type CGB or Appleton CG. The neoprene bushing shall fit tightly around the cord after being compressed and shall exclude gasses and moisture.

2.12 GENERATOR PLUG

- A. Generator service plug shall be Appleton or approved equal. The model number plug for this project shall be as follows:

[100 A plug – Appleton #ACJA 1044-150RS]
[200 A plug – Appleton #AJA 20034-250RS]

2.13 JUNCTION BOX AND BREATHER VENT

- A. Breather shall be Cooper Crouse-Hinds c/n ECD16 or approved equal. Breather to be ½-inch N.P.T. conduit fitting, made of brass with brass cap. Conduit end to be threaded type.

- B. Junction Box, JB-1, is to be 16x16x8-inch. JB-2 and JB-3 shall be 6x6x6-inch. All are to be NEMA 4X aluminum (with backplate) as manufactured by Hoffman or approved equal. The junction boxes are to be mounted with the hinge at the top. A padlock hasp is to be provided. The terminal blocks are to be as described in Section 16000-2.15.

2.14 DIN MOUNTING RAILS

- A. LUS Material Specification 33005000 – DIN (Deutsches Institut für Normung – German National Standard) mounting rails to be Phoenix Contact 08-01-73-3, Entrelec 173-220.05 or approved equal.

2.15 TERMINAL BLOCKS

- A. High Density 600 V, LUS Material Specification 33005100 – rated for 50 A. Universal foot for mounting on DIN rails, 8 mm width to accommodate 18-8 AWG wire. Phoenix Contact 30-05-01-5, Entrelec 115-118.11, plus accessory parts, or approved equal.
- B. Double Grounding, LUS Material Specification 33005130 – to be 6.2 mm wide and used for grounding purposes. Universal ground conductor foot for mounting on DIN rails and accommodates 22-10 AWG wire. Phoenix Contact 27-75-18-4 or approved equal.

2.16 SERVICE [AND ANTENNA SUPPORT] POLE

- A. If applicable, a creosote-treated southern pine wooden pole shall be furnished at the location shown in the plans. The pole shall be Class 4 or better and shall meet the requirements of the power company. Install the galvanized pipe antenna mast as shown in the plans and in the accordance with the instructions of LUS. Pole length shall be 55 ft. The service pole may also serve as the antenna pole.

PART 2 EXECUTION

3.01 INSTALLATION

- A. All electrical and control equipment installed or connected by Contractor shall be in strict accordance with the instructions of the manufacturer and with the requirements of LUS.

3.02 STANDARDS OF MATERIALS AND WORKMANSHIP

- A. All work shall present a neat and finished appearance when completed and shall be executed in a workmanlike manner. All materials furnished by the Contractor shall be new and listed by the Underwriters Laboratories Inc. (UL) as conforming to its standards. Equipment shall meet NEMA standards wherever such standards have been established.

3.03 SCHEDULE OF WORK

- A. Check for information regarding the number of days available to complete the work.
- B. Coordinate the work with the work of other trades to avoid conflicts during construction.

3.04 SITE INSPECTION

- A. Visit the site and become familiar with the difficulties that may be encountered in execution of the work.

3.05 INSPECTION, TESTING AND START-UP

- A. After completion of the work, the Contractor shall conduct an operating test for approval in the presence of the Engineer or his representative. At this time it shall be demonstrated that the equipment operates in accordance with this specification.
- B. Accurately measure the current of each phase of each pump motor, while the pump is in operation. Measure the currents using a clip-on ammeter in rapid succession, so that the pump motor load will be approximately the same for each reading. The readings shall be submitted to the Engineer.
- C. Record the name plate of each pump motor and submit the information to the Engineer.
- D. Record the setting of the overload relays. This information shall be submitted to the Engineer.
- E. Record the level settings of the “Low Water Cut Off” tip float, the “Stop All Pumps” level setting, the “Start Lead Pump” level setting, the “Start Lag Pump” level setting and the “High Level Alarm” tip float level setting. This information shall be submitted to the Engineer.
- F. Instruct the Owner’s operating personnel during startup and separate operating tests of the system.

G. Submit O&M Manuals to the Engineer.

3.06 CLEAN-UP

A. Clean the premises of all debris before leaving the site at the end of the day.

B. Any damage to adjacent surfaces or other materials caused by the Contractor shall be satisfactorily repaired.

3.07 GROUNDING

A. A 5-ohm (maximum) resistance to Earth ground is required. Refer to the Plans for additional information. The Contractor shall install additional ground rods, if required.

3.08 IDENTIFICATION

A. All wires shall be marked at each point of termination with sleeve-type wire markers with the same designation used on the pump control panel drawings.

CONTROL EQUIPMENT

PART 1 GENERAL

1.01 REQUIREMENTS

- A. The Owner will furnish the pump control panel, radio/UPS system and antenna (if required), level transducer and the two (2) non-mercury tip-float type level sensors. These are to be installed and terminated by the Contractor. The control panel manufacturer will provide start-up and technical assistance, as needed, to the Owner and Contractor. The Owner believes that the pump control panel will provide all operational and protective features necessary for reliable, safe and effective operation of the station pumps. However, it is the ultimate responsibility of the Contractor to verify that the pump control panel furnished by the Owner fulfills all requirements and is in all ways suitable for use with the pumps furnished by the Contractor.
- B. The pump control panel was designed and specified by LUS and constructed by an independent control panel manufacturer. Copies of the plans and specifications used to build the pump control panel are available for review by the Contractor and for prospective pump suppliers.
- C. By bidding this project, the Contractor certifies that the pump supplier and manufacturer of the pumps have reviewed the plans and specifications used to build the pump control panel furnished by LUS and that the control panel is in all ways acceptable for use with the pumps furnished and all warranties will be honored.
- D. The pump control panel will be newly manufactured and tested. The level transducer and non-mercury tip-float switches shall be new.
- E. All equipment being furnished by LUS will be furnished in a timely manner so as not to delay the project.
- F. It is the Contractor's responsibility to make the various pump suppliers and manufacturers aware of the conditions mentioned above and to obtain their assurances that they have reviewed and are willing to abide by these conditions.

1.02 Measurement and Payment

- A. Compensation for furnishing, installing, testing, adjusting and guaranteeing all items described or implied in this Section of the Specifications will be included in payment of the Contract Lump Sum Price Item, "Sewage Pump Station", which is described in Section 02535 of these Specifications. Such payment shall constitute full compensation

for materials, equipment, tools, labor, supervision and incidentals and the performance of all work necessary to furnish and install all items described in this Section of the Specifications and shown on the Plans.

PART 2 PRODUCTS

Not used this section.

PART 3 EXECUTION

3.01 Installation

- A. Equipment described herein shall be installed in accordance with the Plans, with Section 02535 of these Specifications, and with manufacturers' recommendations.

OWNER'S ENGINEER/ ARCHITECT
INSPECTION GUIDE - WATER

1. Visually verify that all materials meet specifications.
2. Test tapping saddle prior to connection.
3. Witness tap and/or connection to supply main. Measure tapping coupon to insure proper size.
4. Visually inspect all installed fittings, fire hydrants, valves, restraints, blocking, tracing wire, piping, and other required project appurtenances prior to backfill.
5. Witness test pressure.
6. Conduct final inspection upon completion of landscaping and paving to ensure installation are at proper grade.

OWNER'S ENGINEER/ ARCHITECT
INSPECTION GUIDE - WASTEWATER GRAVITY LINES

1. Visually verify that all materials meet specifications.
2. Witness connection to existing manholes. Manhole penetrations must be cored prior to sewer main installation and installed with a water stop.
3. Verify that sewer mains are installed at the approved slope.
4. Visually inspect all pipe materials, fittings, trench and pipe embedment, alignment, service connections and other required project appurtenances prior to backfill.
5. Witness low pressure air test. If additional utilities are installed in the proximity of the installed sewer lines, after the completed air test, then a second air test will need to be set up with Lafayette Utilities System, Wastewater Division. This will determine if the additional utilities has damage the sewer facilities during their installations.
6. Coordinate video inspection of mainlines after sufficient cleaning, with Lafayette Utilities System, Wastewater Collection Division.
7. Inspect manhole installations for groundwater infiltration. Visually verify that all pipe penetration and sections joints have been suitably sealed and that manhole inverts are correctly formed and level with the pipe grade.
8. Conduct final inspection upon completion of final grade and paving to ensure installations are at proper grade.

OWNER'S ENGINEER/ARCHITECT INSPECTION GUIDE - LIFT STATIONS

1. Verify that gate and fence is properly constructed. (Gate minimum width - 12 feet, fence minimum height - 6 feet.)
2. Verify that a proper driveway is provided to the site. (Minimum width - 10 feet.)
3. Verify that site is level, with a minimum of 8 inches of limestone and meet Lafayette Utilities System Lift Station Site Detail requirements.
4. Verify that wet-well and valve pit is constructed properly and is leak tight. Top grade of wet-well and valve pit is a minimum of one foot above final site grade.
5. Verify that valve pit is sloped properly and does not hold water. Verify that drain pipe between valve pit and wet-well is installed with required check valve.
6. Verify that pumps operate properly without leaks, vibrations or cavitations and can be pulled without restrictions.
7. All metal materials properly corrosion proofed and/or coated against rusting.
8. Verify that floats are properly installed and set correctly.
9. Verify that required 4 foot elevation exist between incoming line and top of wet-well pumps.
10. Verify that required gate valves and check valves are open and installed in the proper position.
11. Verify that vacuum and pressure gauges are installed properly.
12. Verify that required vent is installed with a rust proof screen.
13. Verify that electrical control panel meet NEMA type 3 panel rating.
14. Verify that electrical equipment is properly and safely installed.
15. Verify that the electrical system was installed as shown on the plans and meet the National Code for Class I Division and all applicable local codes.
16. Inspect pressure test of force main. Line should hold 100 psi for one hour.
17. Witness the force main connection to existing manhole. The force main connection should direct the flow of sewer into the out going manhole invert. Install as shown on LUS sewer detail drawing.

APPENDIX - J

TYPICAL WATER/WASTEWATER DETAIL DRAWINGS

ABRIDGED MATERIAL STANDARDS

TYPICAL WATER DETAIL

TYPICAL WATER SERVICE CONNECTION

3"-10" FIRE LINE DOUBLE CHECK DETECTOR ASSEMBLY

2" FIRE LINE LEAK DETECTOR

TYPICAL SEWER DETAIL

TYPICAL SUBMERSIBLE LIFT STATION DETAIL

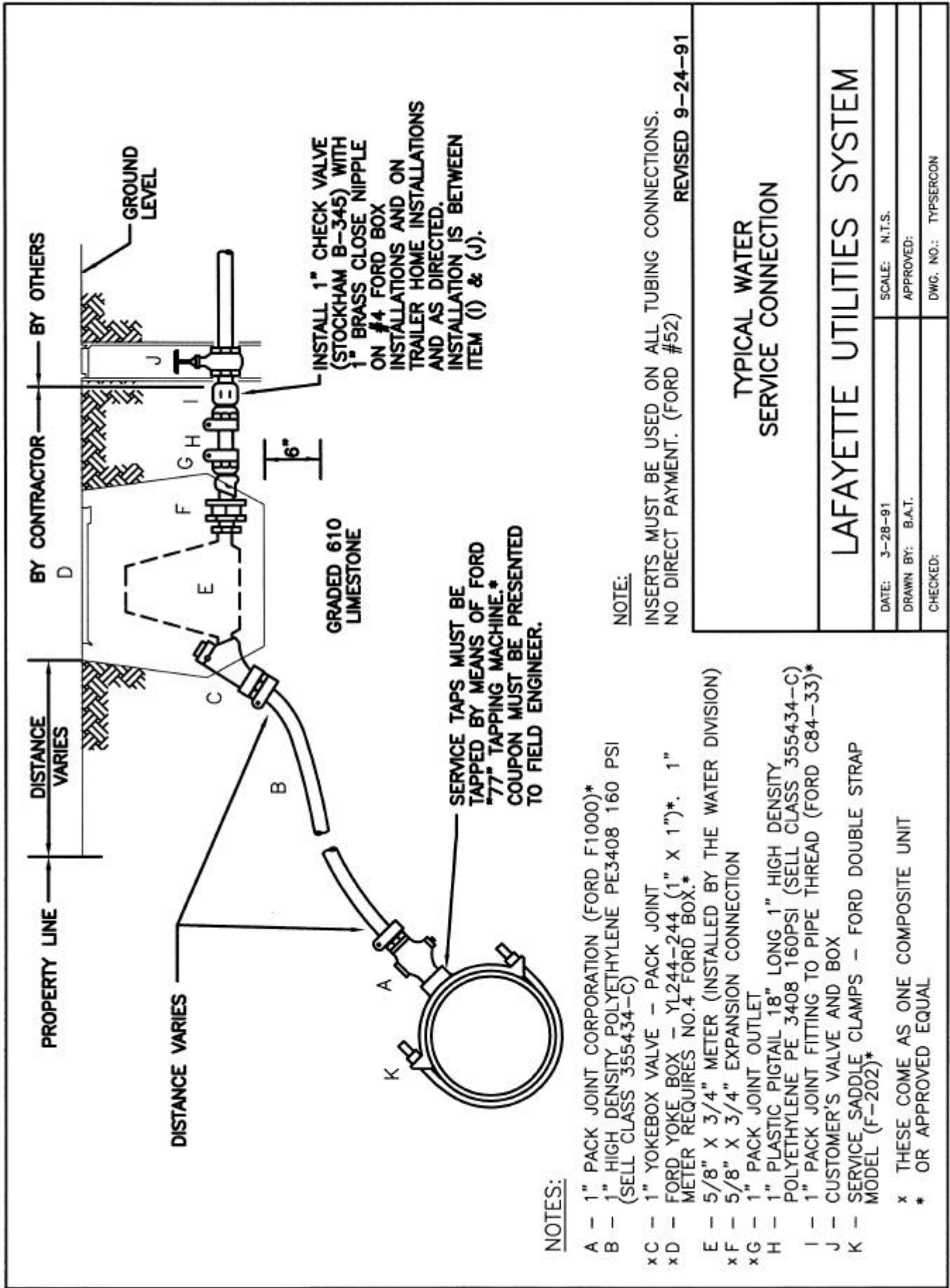
Revised 12-13-2005

WATER/WASTEWATER ABRIDGED MATERIALS STANDARDS

- 1) **Fire Hydrants** - Mueller A-423 Centurion, M&H 929 Reliant, Kennedy K-81 Guardian, Clow F2545 Medallion, American B-84-B.
- 2) **Piping**
 - A. Water Mains
 - Ductile Iron - AWWA C-151 (350 PSI)
 - PVC - AWWA C-900, SDR 18. Blue or white (with blue lettering) coloring.
 - PVC (2") - ASTM D 2241-65T, SDR 26 (160 PSI), gasketed joint. Blue or white (with blue lettering) coloring
 - P.E. - PE 3408, SDR 11.
 - P.E. (2") - PE 3408, SDR 9.
 - B. Water Service
 - P.E. (3/4", 1", 1 1/2", 2") - PE 3408, SDR 9.
 - C. Wastewater Gravity Lines
 - Ductile Iron - ASTM A 746/ANSI A 21.50 (350 PSI) with H2S resistant interior coating.
 - PVC - ASTM D 3034, SDR 35 for depths to 12'. SDR 26 Heavy Wall for depths greater than 12'
 - P.E. - PE 3408, SDR 17.
 - D. Wastewater Force Mains
 - PVC - ASTM 2241, SDR 26 (160 PSI).
 - P.E. - PE 3408, SDR 11.
- 3) **Pipe Fittings**
 - A. Water/Wastewater Mains
 - Ductile Iron - AWWA (350 PSI) C-110 standard body or AWWA (350 PSI) C-153 compact body. Cement lined.
 - P.E. - Transition with Manufacturer approved butt fused adapter.
 - B. P.E. Water Service (inserts required; glued fittings are not approved).
 - Brass Compression - AWWA C-800. Ford or approved equal.
 - C. Retainer Glands - PVC pipe - Ford UFR 1500; Ductile Iron Pipe - Ford UFR 1400.
 - D. Bell Joint Restraints - Ford UFR 1390.
- 4) **Valves** (2" square operation nuts required).
 - A. 2" Gate Valve - AWWA C-500 non-rising stem, resilient seat, standard pipe threads. Clow, M&H, Kennedy, American Flow Control or Mueller.
 - B. 4" to 12" MJ/Flanged Gate Valves - AWWA C-509 or C-515 non-rising stem, resilient seat. Clow, M&H, Kennedy, American Flow Control or Mueller.
- 5) **Manholes** - Precast concrete ASTM C-478.
- 6) **Tapping Sleeve and Valve** - Mueller H-615, Kennedy 920 or approved equal. Test valve and sleeve at 150 PSI prior to tapping.
- 7) **Fire Line Supply Leak Detector** - Watts 709 DCDA, Ames 3000 SS, Febco 856; includes by-pass meter, os&y valves and by-pass double check valve.
- 8) **Steel Casing** - ASA B 36.10 coated inside and out with bitumen compound.

Notes:

 - 1) All materials shall be new and include all accessories.
 - 2) Detection wire (TW 14 insulated solid copper wire) is required on all PVC/P.E. water mains and wastewater force mains.
 - 3) Concrete blocks used for supporting shall be of 16"x16"x3" size. Cinder blocks are not approved.



PROPERTY LINE — DISTANCE VARIES — BY CONTRACTOR — BY OTHERS — GROUND LEVEL

DISTANCE VARIES — 6" — 6" — INSTALL 1" CHECK VALVE (STOCKHAM B-345) WITH 1" BRASS CLOSE NIPPLE ON #4 FORD BOX INSTALLATIONS AND ON TRAILER HOME INSTALLATIONS AND AS DIRECTED. INSTALLATION IS BETWEEN ITEM (I) & (J).

GRADED 610 LIMESTONE — SERVICE TAPS MUST BE TAPPED BY MEANS OF FORD "77" TAPPING MACHINE.* COUPON MUST BE PRESENTED TO FIELD ENGINEER.

NOTE: — INSERTS MUST BE USED ON ALL TUBING CONNECTIONS. NO DIRECT PAYMENT. (FORD #52) REVISED 9-24-91

TYPICAL WATER SERVICE CONNECTION

LAFAYETTE UTILITIES SYSTEM

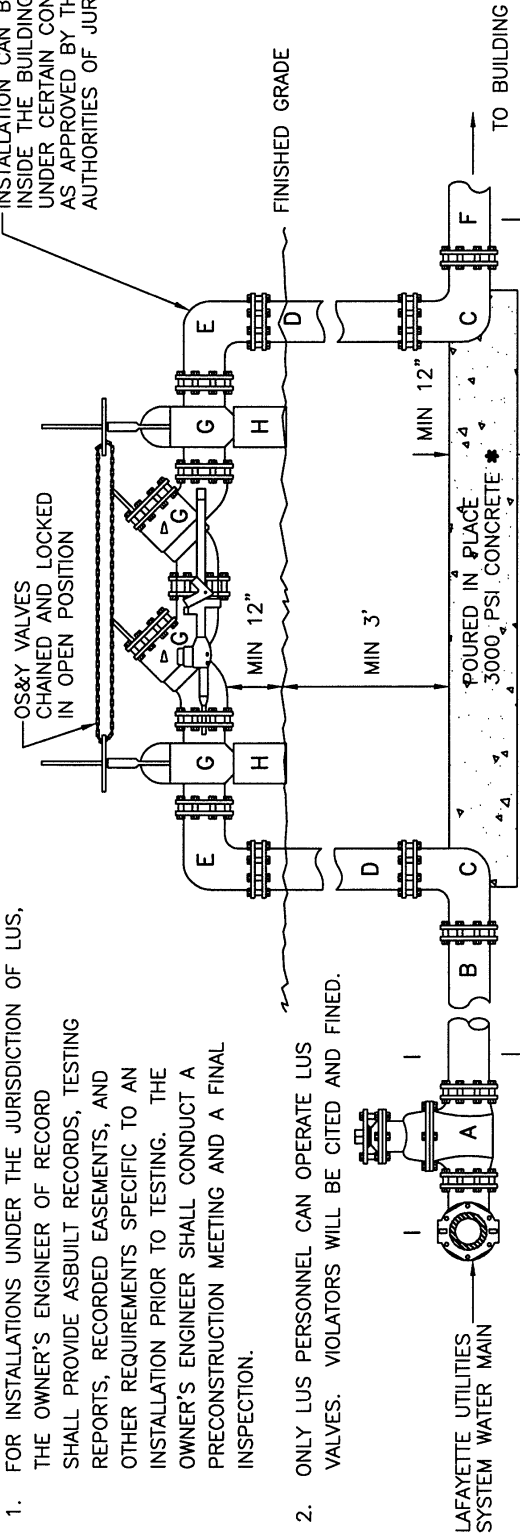
DATE: 3-28-91 SCALE: N.T.S.
 DRAWN BY: B.A.T. APPROVED:
 CHECKED: DWG. NO.: TYPSECON

- NOTES:
- A - 1" PACK JOINT CORPORATION (FORD F1000)*
 - B - 1" HIGH DENSITY POLYETHYLENE PE3408 160 PSI (SELL CLASS 355434-C)
 - x C - 1" YOKEBOX VALVE - PACK JOINT
 - x D - FORD YOKE BOX - YL244-244 (1" X 1")*. 1" METER REQUIRES NO.4 FORD BOX.*
 - E - 5/8" X 3/4" METER (INSTALLED BY THE WATER DIVISION)
 - x F - 5/8" X 3/4" EXPANSION CONNECTION
 - x G - 1" PACK JOINT OUTLET
 - H - 1" PLASTIC PIGTAIL 18" LONG 1" HIGH DENSITY POLYETHYLENE PE 3408 160PSI (SELL CLASS 355434-C)
 - I - 1" PACK JOINT FITTING TO PIPE THREAD (FORD C84-33)*
 - J - CUSTOMER'S VALVE AND BOX
 - K - SERVICE SADDLE CLAMPS - FORD DOUBLE STRAP MODEL (F-202)*
- x THESE COME AS ONE COMPOSITE UNIT
 * OR APPROVED EQUAL

LUS NOTES:

- FOR INSTALLATIONS UNDER THE JURISDICTION OF LUS, THE OWNER'S ENGINEER OF RECORD SHALL PROVIDE ASBUILT RECORDS, TESTING REPORTS, RECORDED EASEMENTS, AND OTHER REQUIREMENTS SPECIFIC TO AN INSTALLATION PRIOR TO TESTING. THE OWNER'S ENGINEER SHALL CONDUCT A PRECONSTRUCTION MEETING AND A FINAL INSPECTION.
- ONLY LUS PERSONNEL CAN OPERATE LUS VALVES. VIOLATORS WILL BE CITED AND FINED.

INSTALLATION CAN BE INSIDE THE BUILDING UNDER CERTAIN CONDITIONS AS APPROVED BY THE AUTHORITIES OF JURISDICTION



JURISDICTION OF LAFAYETTE UTILITIES SYSTEM (LUS). ALL INSTALLATIONS MUST CONFORM TO LUS POLICIES & PROCEDURES.

JURISDICTION OF METRO CODE PLUMBING AUTHORITY. INSTALLATION BY LOUISIANA LICENSED PLUMBER, ONLY. LOUISIANA STATE PLUMBING CODE (LATEST REVISION).

JURISDICTION OF CITY OF LAFAYETTE FIRE PREVENTION DIVISION. NFPA STANDARDS. FULL SIZE TESTING/FLUSHING RISER REQUIRED.

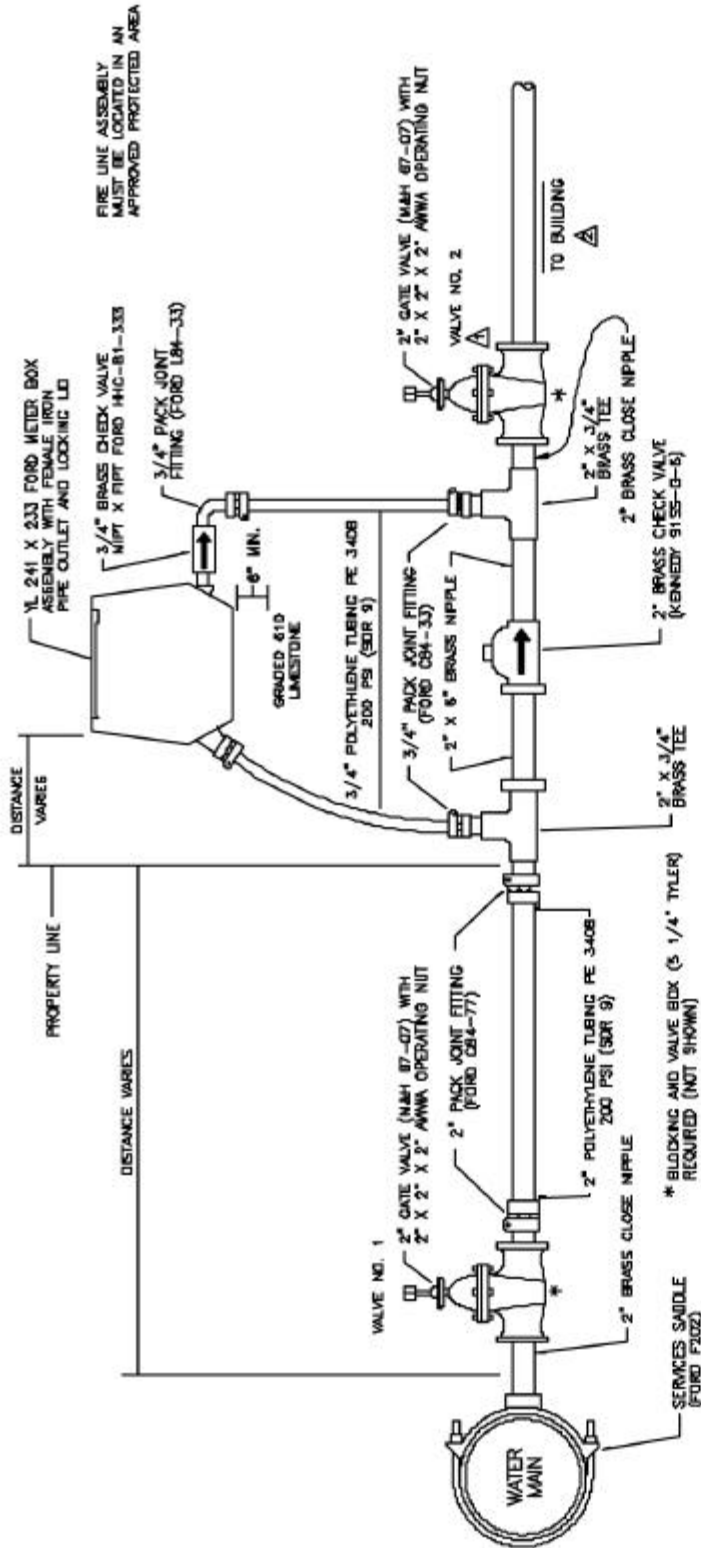
LEGEND *

- A - MJ RESILIENT GATE VALVE & BOX (INSTALLATION VARIES); TAPPING VALVE/SLEEVE-M&H 974/MUELLER H615); GATE VALVE/ANCHOR TEE-M&H (AWWA C-509) /MJ DUCTILE IRON (350 PSI) AWWA C-110/C-153; BOX-TYLER 5-1/4.
- B - AWWA CLASS 150, C-900, SDR 18, PVC PIPE
- C - 90' MJ DUCTILE IRON (350 PSI) FITTING (AWWA C-110/C-153) WITH RETAINER GLANDS (FORD UFR 1500/UFR 1400).
- D - DUCTILE IRON FLANGED BY PLAIN END PIPE (AWWA C-151).
- E - 90' FLANGED DUCTILE IRON (350 PSI) FITTING (AWWA C-110/C-153).
- F - AWWA CLASS 200, C-900, PVC PIPE.
- G - WATTS 709 DCDA ASSEMBLY/AMES 3000 SS/FEBCO 856, WITH BY-PASS METER, OS&Y VALVES, AND BY PASS DOUBLE CHECK VALVE.
- H - CONCRETE SUPPORT.
- I - ALL FITTINGS/JOINTS/VALVES/APPURTENANCES MUST BE RESTRAINED. TWO VALVES WILL BE REQUIRED WHERE THE EXISTING LUS MAIN IS EXTENDED (IE: PUBLIC ROADWAY CROSSING).

* OR PRIOR APPROVED BY AUTHORITIES OF JURISDICTION.

PROVIDE FREEZE PROTECTION ON ALL INSTALLATIONS (OUTSIDE & INSIDE) AT THE DIRECTION OF THE STATE OF LOUISIANA FIRE MARSHALL

3" - 10"	
FIRE LINE DOUBLE CHECK DETECTOR ASSEMBLY	
LAFAYETTE UTILITIES SYSTEM	
DATE: 2-19-02	SCALE: NTS
DRAWN BY: CJA	APPROVED:
CHECKED:	DWG. NO.: F.L. CHK



FIRE LINE ASSEMBLY MUST BE LOCATED IN AN APPROVED PROTECTED AREA

NOTES:

- 1) INSERTS MUST BE USED ON ALL TUBING CONNECTIONS. (FORD #51/#55)
- 2) SUBSTITUTE MATERIALS MUST BE PRIOR APPROVED.
- 3) TRACING WIRE REQUIRED ON 2" P.E. TUBING.

REQUIREMENTS

- ▲ FULL SIZE FLUSHING / TESTING RISER INSTALLED ADJACENT TO VALVE NO. 2. TESTING SHALL COMMENCE WHEN ENGINEER OF RECORD SUBMITS WRITTEN VERIFICATION THAT CONSTRUCTION WAS BUILT TO LUS STANDARDS, ASBUILT RECORD IS SUBMITTED, RECORDED FLAT OF SURVEY CONTAINING ANY NECESSARY EASEMENT IS SUBMITTED, AND ALL OTHER SPECIFIC PROJECT REQUIREMENTS HAVE BEEN COMPLETED.
- ▲ ALL UNDER GROUND CONSTRUCTION TO THE BUILDING MUST CONFORM TO NFPA STANDARDS AND APPROVED BY THE CITY OF LAFAYETTE, FIRE PREVENTION DIVISION.

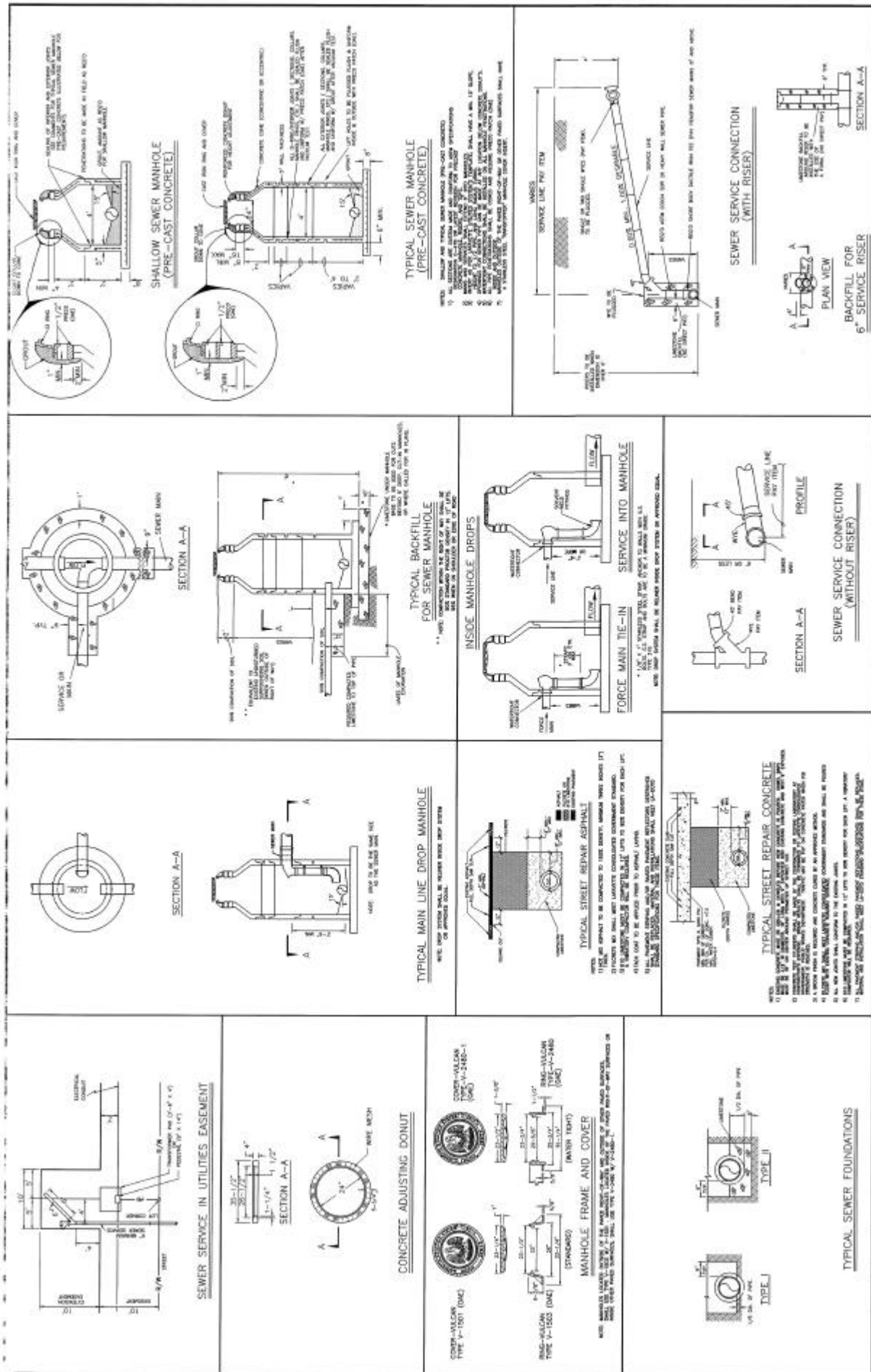
NO VALVE SHALL BE OPERATED TO ALLOW WATER TO BE TRANSMITTED FROM A LAFAYETTE UTILITIES SYSTEM SOURCE WITHOUT THE DIRECT SUPERVISION OF LUS. VIOLATORS WILL BE PROSECUTED.

GENERAL
 THE ENGINEER OF RECORD SHALL CONDUCT A PRECONSTRUCTION MEETING WITH THE INSTALLING CONTRACTOR AND LUS.
 THE ENGINEER OF RECORD SHALL CONDUCT A FINAL INSPECTION UPON THE COMPLETION OF ALL PAVING / LANDSCAPING.

**TYPICAL 2" FIRE LINE LEAK DETECTOR
 INSTALLATION**

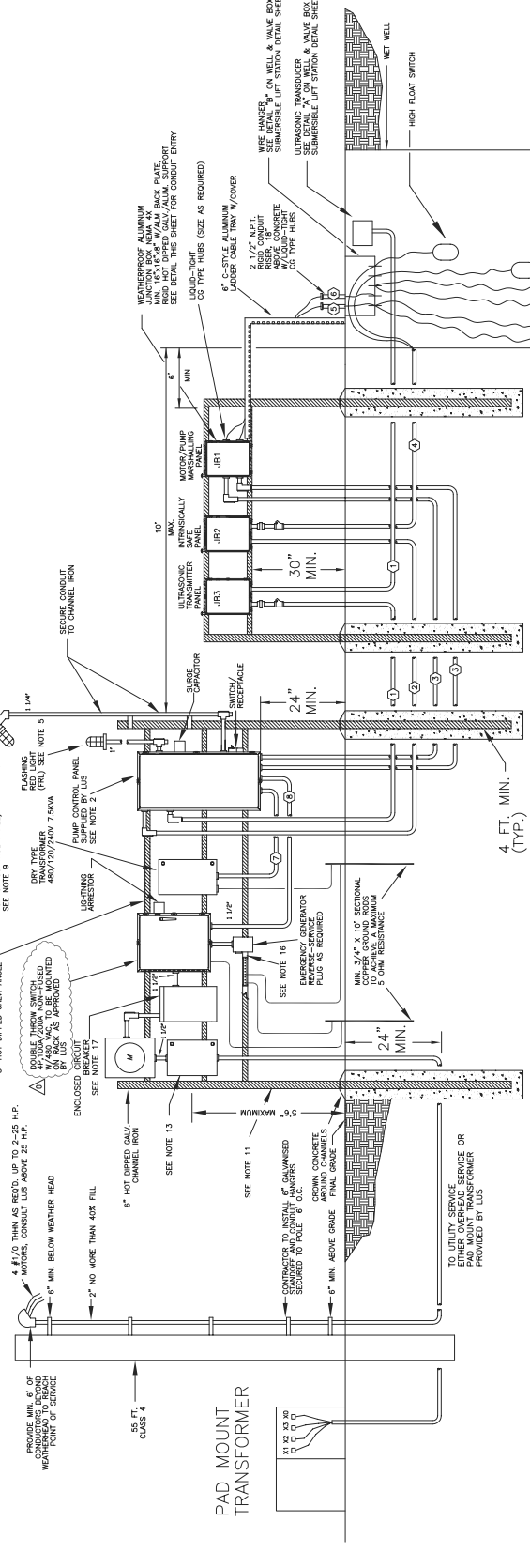
LAFAYETTE UTILITIES SYSTEM

DATE: 4-9-98	SCALE: NTS
DRAWN BY: DLT	APPROVED:
CHECKED:	DWG. NO.: M81-107



DATE: 11/27/09	SCALE: NTS	TYPICAL SEWER DETAILS
DESIGNED BY: WPL, JCL, JD	DRAWN BY: LUMS	
CHECKED BY: WPL, JCL, JD	APPROVED:	LAFAYETTE UTILITIES SYSTEM ENGINEERING DIVISION LAFAYETTE, LA
DATE: 11/27/09	SHEET: 10	
DATE: 11/27/09	SHEET: 10	NOTE: SEE OR APPROVED EQUAL.

OVERHEAD SERVICE



Motor Rating, hp	Motor HP	Motor Full Load Amps	Motor Breaker Frame Size	Motor Breaker Trip Setting	Motor Breaker Inlet Size	Motor Breaker Inlet Amps	Motor Breaker Inlet Voltage	Motor Breaker Inlet Phase	Motor Breaker Inlet Grounding	Motor Breaker Inlet Conduit Size	Motor Breaker Inlet Conduit Amps	Motor Breaker Inlet Conduit Voltage	Motor Breaker Inlet Conduit Phase	Motor Breaker Inlet Conduit Grounding	Motor Breaker Inlet Conduit Conduit Size	Motor Breaker Inlet Conduit Conduit Amps	Motor Breaker Inlet Conduit Conduit Voltage	Motor Breaker Inlet Conduit Conduit Phase	Motor Breaker Inlet Conduit Conduit Grounding	
3	4.00	6.00	14	7	1	71	30	30	30	30	30	30	30	30	30	30	30	30	30	30
5	7.00	10.00	18	10	1	100	40	40	40	40	40	40	40	40	40	40	40	40	40	40
8	10.00	15.00	24	15	1	150	50	50	50	50	50	50	50	50	50	50	50	50	50	50
10	14.00	20.00	32	20	1	200	60	60	60	60	60	60	60	60	60	60	60	60	60	60
15	20.00	28.00	40	25	1	250	75	75	75	75	75	75	75	75	75	75	75	75	75	75
20	27.00	37.00	50	30	1	300	90	90	90	90	90	90	90	90	90	90	90	90	90	90
25	34.00	47.00	60	35	1	350	105	105	105	105	105	105	105	105	105	105	105	105	105	105
30	40.00	55.00	70	40	1	400	120	120	120	120	120	120	120	120	120	120	120	120	120	120
40	52.00	72.00	90	50	1	500	150	150	150	150	150	150	150	150	150	150	150	150	150	150
50	63.00	87.00	110	60	1	600	180	180	180	180	180	180	180	180	180	180	180	180	180	180

J-8

NOTES:

- FOR TRANSUCER CONDUIT ABOVE GROUND, USE ALUMINUM COATED WITH SCOTCHPAPE 51 AND SCOTCH PIPE PRIMER, (3-M PRIMER)
- PUMP CONTROL PANEL TO BE PROVIDED BY LUS (CONTACT LUS CIVIL ENGINEERING FOR COST)
- ULTRASONIC TRANSDUCER SUPPLIED BY LUS, SUPPORT AS REQUIRED, COORDINATE LOCATION WITH LUS PRIOR TO INSTALLATION.
- TIP FLOAT SWITCHES PROVIDED BY LUS
- STATION STATUS LIGHT SHALL BE VISIBLE FROM THE ROADWAY.
- BOTH POWER AND CONTROL PUMP CABLES FURNISHED BY PUMP MFG.
- INSTALL PUMP CONTROL PANEL NO MORE THAN TEN(10) FEET FROM THE WET WELL.
- GENERATOR PLUG - USE APP. # ACIA 1044-150 RS - 100 Amps APP. # AJA 20034-250 RS - 200 Amps APP. # AJA 20034-350 RS - 350 Amps
- AREA LIGHT-200W APPLETON OUTDOOR LIGHT #PANT101256
- ALL WIRES TO BE METERS ALUMINUM TO BE BUNDLES TO EACH OTHER AND THE GROUND ROD WITH BARE WIRE ACCORDING TO THE FOLLOWING TABLE 250-66, THIS SHEET OR NEC 70-90
- FABRICATOR TO VERIFY ALL DIMENSIONS PRIOR TO CONSTRUCTION
- 100A OR 200A, 480V NON-FUSED NEMA-3R DISCONNECT SUPPLIED BY LUS AND INSTALLED BY CONTRACTOR.
- CONTRACTOR TO VERIFY ALL DIMENSIONS PRIOR TO FABRICATION.
- ERCO GROUND BAR (P/N BK54900A) BOND TO BOTH GROUND RODS & ALL WIRE TERMINATIONS SHALL USE COMPRESSION PULLUP GROUND TERMINAL WIRE TERMINATIONS SHALL USE COMPRESSION PULLUP GROUND TERMINAL WIRE TERMINATIONS SHALL USE COMPRESSION PULLUP GROUND TERMINAL GROUNDING ELECTRODE CONDUCTOR TO GROUND RODS SHALL BE SIZED ACCORDING TO 2002 NEC TABLE 250-66.
- NEMA 3R 100A OR 200A 3P 25kV INTERRUPTING, 480V.

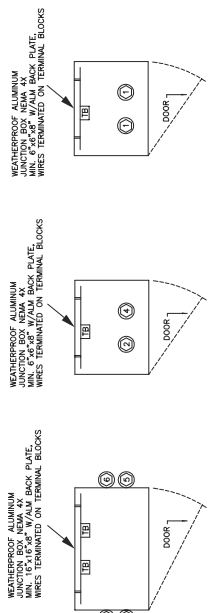
ELECTRICAL RISER

100A/200A
277/480 VAC GRD. WYE

NEC TABLE 250-66

SIZE OF WIRE OR CONDUCTOR OR EQUIVALENT AREA FOR PARALLEL CONDUCTORS	SIZE OF GROUNDING ELECTRODE CONDUCTOR
COPPER	COPPER
2 OR SMALLER	2 OR SMALLER
2/0 OR 3/0	2/0 OR 3/0
4 OR SMALLER	4
4 OR SMALLER	4

THESE DETAILS ARE GENERAL GUIDELINES FOR THE ELECTRICAL PORTION OF LIFT STATIONS. THE ENGINEER IS TO FINALIZE THE DESIGN OF THE PARTICULAR PROJECTS. THE FINAL DESIGN SHALL BE REVIEWED BY LUS. CONTACT LUS ELECTRICAL DISTRIBUTION ENGINEERING FOR AVAILABLE POWER. COMPLETE INSTALLATION SHALL COMPLY WITH THE LATEST NEC STANDARDS.



CONDUIT ENTRY TO JUNCTION BOX

LAFAYETTE UTILITIES SYSTEM - ENGINEERING DIVISION
LAFAYETTE CITY-PARISH CONSOLIDATED GOVERNMENT
LAFAYETTE, LOUISIANA



SYSTEMS, INC.
260 INDUSTRIAL PARKWAY OFF: (337) 289-4899
LAFAYETTE, LA 70508 FAX: (337) 289-0853
LEI JOB NO. 399

DATE	07/27/03	SCALE	NOT TO SCALE
DESIGNED BY	J. BAUGH	DRAWN BY	C. ANGELLE
CHECKED BY	J. BAUGH	APPROVED BY	G. WIMLOCK
WORKING DRAWING FROM REVISION TO WORKING DRAWING		DATE	02/15-41
17/17/02-ADDED SEE NOTE 2 (80)		SHEET NO.	1 OF 8