
Technical Specifications

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MOBILIZATION

MOBILIZATION SHALL BE PAID ***ONCE FOR EACH WORK ORDER***, EVEN IF THE WORK ORDER HAS MORE THAN ONE SITE. MOBILIZATION WILL BE 10% OF THE SUM OF ALL PAY ITEMS FOR THE WORK ORDER.

MORE THAN ONE MOBILIZATION CHARGE WILL BE ALLOWED ***ONLY*** WHEN RE-MOBILIZATION IS DUE TO ACTION OF THE CITY OF SLIDELL.

IT IS THE CONTRACTOR'S RESPONSIBILITY TO CHECK WORK SITES PRIOR TO MOBILIZING WORK FORCE TO ENSURE SITE IS READY FOR WORK TO BE DONE.

SECTION 1: ROADWAY

FIBER-REINFORCED PORTLAND CEMENT CONCRETE ROADWAYS

This item covers the furnishing of all materials and installation of PCC roadway pavements for thickness as shown.

Mix for 1 C.Y. of Fiber-Reinforced Concrete

28-day strength	4000 psi
Cement (ASTM C-150, Type I/II)	4.64 sacks (436 lbs.)
Fly Ash (ASTM C-618)	1.16 sacks(109 lbs.)
Gravel (ASTM C-33, Grade A)	1775 lbs.
Sand (ASTM C-33)	1226 lbs.
Water (potable)	30 gallons (250 lbs.)
Type A Water Reducer (ASTM C-494)	16.35 lbs.
Air entrainment	5% by volume, use per manufacturers specifications
Fiber reinforcement	As specified below or approved equal

Fiber reinforcement for all concrete roadways shall be Fibermesh 650, or approved equal, applied throughout the concrete mixture. Macro synthetic fibers shall provide a minimum average residual strength per ASTM C 1399 of 162 psi at three pounds per cubic yard, and 216 psi at four pounds per cubic yard of concrete. Alternate products shall be preapproved by the city engineer in writing. Fibrillated and self-fibrillating fibers are specifically prohibited from use.

Macro fiber dosage rate shall be:

- Collector streets at 4.5 pounds per cubic yard of concrete.
- Residential (minor streets) at three pounds per cubic yard of concrete.

Fiber reinforcement shall be applied **at the plant**. The bags must be broken before mixing. Bag size shall be one (1) pound.

Damaged, missing, and/ or new dowel bars (longitudinal/ transverse) and Starlugs shall be replaced, 1-1/8" x 18" painted smooth dowel bars on 12" centers shall be used unless directed otherwise by the City Engineer. The bars shall be drilled and doweled the existing pavement by drilling 1½" holes to a depth of 9" and filling with an approved epoxy grout before insertion of the dowel bars. Any deformed bars for longitudinal joints or welded wire fabric will be

incidental to the bid unit prices under this item. All costs incurred for this task will be incidental to bid unit prices under concrete paving. Bid prices shall also include adequate curing of the concrete placed and the proper sealing of contraction and expansion joints.

The Contractor is advised that the work along roadways will necessarily be done with a split-paving method. It will be important to have at least one side of the roadway open to traffic when workers are not present.

Bid prices should include all costs for labor, equipment, and materials necessary to provide finished Portland Cement Concrete paving, in place, as described under this item of the proposal. All required jointing materials should be included in price bid under each item. Method of jointing shall be the same as the existing joints in the area of work.

Bid prices under this item shall also include cost of providing engineering/ surveying for alignment, grade, profile, survey stakes, and topography when necessary and as required to improve the roadway alignment, curb and gutter layout, drain line installation, etc. Compensation for this shall be incidental to corresponding bid items in the maintenance contract. There is no other compensation. This includes new road, extension of existing road, and turning lanes, parking lots, bike, and walking trails, etc. All layouts shall be the responsibility of the contractor. The Contractor shall be responsible for disposal of all construction materials.

Concrete pavement shall be cured seven (7) days unless otherwise approved by the City Engineer. If Contractor uses "high early" strength concrete (3-day curing period) at his discretion, without the approval of the City Engineer, payment shall be made under the regular (7-day curing) concrete paving item. Contractor shall be responsible for proper oversight and protection of the pavement during the initial curing time until the concrete is sufficiently set to resist marring or vandalism.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
1	FIBER REINFORCED 8" THICK OR GREATER, PORTLAND CEMENT CONCRETE PAVING FOR ROADWAYS, IN PLACE	SQ. YD.
2	HIGH EARLY STRENGTH FIBER REINFORCED 8" THICK OR GREATER PORTLAND CEMENT CONCRETE PAVING FOR ROADWAYS, IN PLACE	SQ. YD.

ASPHALTIC PAVEMENTS

When not otherwise specified herein, all work and materials shall conform to the requirements of the Louisiana Department of Transportation and Development, Standard Specifications for Roads and Bridges, 1992 edition. Both wearing and binder course shall be the "DPW Type I" mix or appropriate current mix available.

The Contractor shall accomplish and maintain one of the following prior to paving:
On a prepared, graded and compacted non-paved road bed: Apply a "prime coat" to surface.
On an existing paved surface: Apply a "tack coat" to edges of existing surface where new asphalt will be applied. Contractor will not be required to tack the base under new asphalt. There will be no curing time requirement for the tack coat. Tack coat for edges shall be no direct pay.

DPW Type I Mixture requirements:

"DPW Type I"

BINDER COURSE AND WEARING COURSE

<u>U.S. SIEVE</u>	<u>% Passing</u>
1 1/2"	---
1" 100	
3/4"	100
1/2"	95-100
3/8"	---
No. 4	60-75
No. 10	32-55
No. 40	16-35
No. 80	8-20
No. 200	3-9
Extracted Asphalt %	
Mix Temperature	
% Crushed Ret. On No. 4 (8)	85 Min.
Course Aggregate (1)	A, B, C
Marshall Stab (lbs)	
No. of Blows	75
Average of 4 Tests	
Design (2)	1400
Minimum	1200
Individual Test (Min.)	1000
Mar. Flow (1/100")	6-15
% Voids	3-5
% VFA	70-80

Bid prices for this item are to include all cost of labor, equipment and materials necessary to provide finished asphaltic concrete pavement in place as described in the above mentioned specification manuals.

All survey, initial and final lay out of roadway re-construction is incidental to bid items. There is no separate compensation for this work.

The accepted quantities of asphaltic concrete will be paid for at the contract unit price per ton (2,000 pound). No other type of mix will be allowed without prior approval of the City Engineer. Haul and/ or loading tickets will be issued for each truckload of asphalt delivered by vendor's trucks and placed on the job.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
3	BITUMINOUS HOT-MIX ASPHALT	TON

ASPHALTIC TACK COAT

This work consists of preparing and treating existing asphaltic or concrete surface with asphaltic material in accordance with these specifications.

Tack coat shall be emulsified asphalt (Grade CRS – 2 or SS-1) conforming to Section 504 and Section 1002 of the Louisiana Department of Transportation and Development, Standard Specifications for Roads and Bridges, Latest Edition. Asphaltic tack coat shall not be applied on a wet surface or when the ambient air temperature is below 40° F.

The Contractor shall provide equipment for applying asphaltic material and preparation of the surface to be tacked. The surface shall be cleaned by sweeping or other approved methods. Edges of existing pavements, which will form joints with new pavement, shall be satisfactorily cleaned before tack coat is applied.

Asphalt shall be uniformly applied to a clean dry surface with no bare areas, streaks or puddles with an asphalt distributor at a rate in accordance with Table 3 in Section 504 of the Louisiana Department of Transportation and Development, Standard Specifications for Roads and Bridges, Latest Edition. The rates in Table 3 may be raised or reduced as directed by the City Engineer.

Tack coats shall be applied in such a manner as to cause the least inconvenience to traffic. The Contractor will be permitted to apply the tack coat one (1) calendar day prior to the mixture laydown; however, when tack coat has been damaged by traffic pick-up or contaminated by dirt, dust or mud, the surface shall be cleaned and retacked prior to the mixture laydown at no direct pay. Tacked surfaces exposed to traffic for more than 24 hours or damaged due to inclement weather shall be retacked at no direct pay.

Payment for the asphaltic tack coat shall be included in asphalt pay item.

ROADWAY EXCAVATION

The contractor shall furnish all materials, labor, and equipment necessary to remove all earth, rock, water, debris, and other materials to the extent required by the City Engineer, in preparation for roadway base and/or subbase. Excavation will be paid by cubic yard truck measure loaded at the job site or by computing theoretical hole volume at the approval of the City Engineer. Disposal of excavated material shall be paid under the “Disposal of Unsuitable Material” pay item in the Miscellaneous Work section.

Should the City desire; the Contractor will dump excavated material at a disposal site designated by the City at no added cost. Additionally, should the City desire, the Contractor will load excavated material onto City trucks at the work site at no added cost, provided that the City trucks are present at the work site at the time of excavation and cause no unreasonable delay in progress of the work. However, the ultimate responsibility for disposal of all of the excavated material to satisfy all local, state, and federal regulation rests with the Contractor.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
4	ROADWAY EXCAVATION BY TRUCK MEASURE	CU. YD.
5	ROADWAY EXCAVATION BY THEORETICAL VOLUME	CU. YD.

GEOTEXTILE FABRIC

This work consists of furnishing and installing Geotextile Fabric in locations designated and/or directed by the City Engineer, in conformity with the requirements of Section 1019 of the Louisiana Standard Specifications for Roads and Bridges, latest edition and revisions. Installation must be in strict accordance with manufacturer’s instructions and requirements.

Geotextile fabric will be paid for per square yard, which includes furnishing all equipment, labor, materials and incidentals necessary to complete the work as described below.

- A. Furnish and install Fabric Membrane in conjunction with overlay.
- B. Furnish and install Fabric Membrane on/under roadbed surface.
- C. Furnish and install Geogrid for base or sub-base reinforcement.

Bid prices for this item are to include all costs for labor, materials and equipment necessary to install protective fabric membrane approved by the city engineer. Installation shall be in accordance with the manufacturer's specifications, instruction and procedures.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
6	GEOTEXTILE FABRIC	SQ. YD.

SAW CUT PVMT. – ASPHALT OR PCC CONC.

Bid prices for this item shall include all costs for labor, material, and equipment necessary to machine cut either Portland Cement Concrete or Asphaltic Pavements. Payment shall be paid at the unit per inch of depth per linear foot of cut multiplied by the depth cut for the type of pavement. All saw cutting shall be pre-approved by the City Engineer and measured in the field.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
7	SAW CUT ASPHALT PAVEMENT	PER INCH OF DEPTH PER L.F.
8	SAW CUT PCC CONCRETE PAVEMENT	PER INCH OF DEPTH PER L.F.

REMOVE AND RESTORE COMBINATION CONC. CURB & GUTTER

Bid prices should include all costs for labor, equipment and material necessary to remove existing combination conc. curb & gutter and the replacement of the concrete curb and gutter. All of the excavated material and broken curb shall be hauled off from the job site, if it is not needed by the City. Disposal of excavated material shall be paid under the “Disposal of Unsuitable Material” pay item in the Miscellaneous Work section.

Care must be exercised so that jointing materials and pavement structures adjacent to the concrete curb and gutter to be removed shall not be damaged. Any pavement structure damaged by the Contractor as a result of negligence, either willful or accidental, will be replaced at the Contractor's expense

The Portland Cement Concrete Mixture for curb and gutter construction shall be a minimum of 4000-psi and also will provide proper workability, curb and gutter strength, and minimum contraction cracking. PCC Curbing may be placed by extruding machine or by forming and hand placement at Contractor's option and will be bonded to holding surface in a manner approved by the City Engineer, which may include dowelling and/ or an approved bonding agent.

The accepted quantities for curb and gutter will be paid for at the contract unit price per linear foot, including all labor, equipment and materials incidental to the work.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
9	REMOVE AND RESTORE COMBINATION CONC. CURB AND GUTTER	LF

PORTLAND CEMENT CONCRETE REMOVAL

These items cover work generally associated with breaking up, and removing existing Portland Cement Concrete Pavements. **Breaking up of PCC Pavement shall be done with a pneumatic pavement breaker. Use of brute force and pounding with excavation buckets will not be an acceptable means of breaking pavement.** Where concrete to be removed has been overlaid with asphalt, the asphaltic thickness is to be added to the concrete thickness and paid as

concrete removal. Should the City desire, the Contractor will dump the broken concrete at a disposal site designated by the City at no extra cost. Also should the City desire, the Contractor will load the broken concrete into City trucks at the work site at no extra cost, provided that the City trucks are present at the work site and cause no unreasonable delay in the work

The accepted quantities of concrete removed shall be paid for at the contract unit price per square yard for the thickness measured at the site. Bid prices should include all costs for labor, equipment, and materials necessary to remove existing PCC Pavement. Disposal of excavated material shall be paid under the “Disposal of Unsuitable Material” pay item in the Miscellaneous Work section.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
10	ROADWAY CONCRETE REMOVAL 6” THICK OR LESS	SQ. YD.
11	ROADWAY CONCRETE REMOVAL GREATER THAN 6” THICK	SQ. YD.

ASPHALT REMOVAL

These items cover work generally associated with breaking up, and removal of an existing Asphaltic Pavement in order to eliminate a badly deteriorated and/ or failed section of roadway. **Breaking up of asphaltic pavement shall be done with a pneumatic pavement breaker. Use of brute force and pounding with excavation buckets will not be an acceptable means of breaking pavement.** Should the City desire, the Contractor will dump the broken asphalt at a disposal site designated by the City at no extra cost. Also should the City desire, the Contractor will load the broken asphalt into City trucks at the work site at no extra cost, provided that the City trucks are present at the work site and cause no reasonable delay in the progress of the work.

The accepted quantities of asphalt removed will be paid for at the contract unit price per square yard for the thickness measured at the site. Bid prices should include all costs for labor and equipment necessary to remove existing Asphaltic Pavement for thickness shown. Disposal

of excavated material shall be paid under the “Disposal of Unsuitable Material” pay item in the Miscellaneous Work section.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
12	ASPHALT REMOVAL - 6” THICK OR LESS	SQ. YD.
13	ASPHALT REMOVAL - GREATER THAN 6” THICK	SQ. YD.

GRANULAR MATERIAL BASE COURSE

Specifications for base course shall be in accordance with referenced section in the Louisiana Standard Specifications for Roads and Bridges, latest edition and revisions, Section 1003. Granular material shall conform to the following requirements:

Liquid limit (maximum)	25% (percent)
Plasticity index (max.)	6% (percent)

Granular material will be paid for by the cubic yard truck measure. The bid price shall include all costs for material, labor, equipment, hauling, placing, spreading, compacting and grading for this item. This pay item shall be used for repairs to roadway base and for patching roadway base.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
14	FURNISH AND PLACE GRANULAR BASE COURSE	CU. YD.

LIMESTONE BASE COURSE

Specifications for limestone shall be in accordance with Louisiana Standard Specifications for Roads and Bridges, current edition, and referenced sections, under “Stone”. In addition, the material shall be calcitic or dolimitic with calcium carbonate not less than 85

percent and the silica content (impurities) not to exceed 5 percent. Limestone used on asphalt pavement shoulder shall be comparable to Mexican limestone in color and gradation.

The material shall conform to the following gradation:

<u>U.S. Sieve</u>	<u>Percent Passing</u>
1 1/2"	100
3/4"	50-100
No. 4	35--65
No.40	10--32
No.200	3--15

Aggregate shall conform to LA DOTD approved materials. The fraction of stone passing the No. 40 sieve shall be non-plastic.

Limestone material will be paid for by the cubic yard truck measure. The bid price shall include all costs for material, labor, equipment, hauling, placing, spreading, compacting and grading for this item. This pay item shall be used for repairs to roadway base and for patching roadway base.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
15	FURNISH AND PLACE LIMESTONE BASE COURSE	CU. YD.

CRUSHED CONCRETE BASE COURSE

Recycled Portland Cement Concrete shall be used from approved stockpiles. Stockpiles of crushed concrete shall be uniform and free from solid reinforcing steel, debris, excessive amount of asphaltic materials, and other foreign matter. Material sampling shall be in accordance with the requirements for Stone by the Louisiana Department Of Transportation And Development Standard Specifications for Roads and Bridges, latest edition and revisions and all applicable sections of the materials sampling manual. Crushed concrete shall conform to the abrasion and soundness requirements of the Standard Specifications for Roads and Bridges and conform to the following gradation:

Class I

<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	5-16

Aggregate passing the no. 40 sieve shall have a maximum liquid limit of 25 and a maximum plasticity index of 6.

Class II

Crushed concrete in class II gradation shall have 100% passing through 4-inch mesh and a maximum of 20 percent passing through 2-inch mesh.

Class I and II crushed concrete shall be bid under item for crushed concrete.

Crushed concrete will be paid for by the cubic yard truck measure. The bid price shall include all costs for material, labor, equipment, hauling, placing, spreading, compacting and grading for this item. This pay item shall be used for repairs to roadway base and for patching roadway base.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
16	FURNISH AND PLACE CRUSHED CONCRETE BASE COURSE	CU. YD.

LIQUID POURED ASPHALT TYPE SEALANT, APPLIED PER GAL.

This item is to provide general sealing of cracks and/or joints in existing pavement. This work would usually be done in areas contiguous to a paving project being done under this contract. Bid prices should include all costs for labor, materials, and equipment required to apply an approved liquid poured sealant of the asphalt type as specified under section 1005.02 of LA DOTD Standard Specifications for Roads and Bridges, latest edition and revisions. Cracks

and/or joints shall be cleaned and chipped if necessary in accordance with generally accepted procedures prior to pouring the sealant.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
17	LIQUID POURED ASPHALT TYPE SEALANT, APPLIED PER GALLON	GAL.

EXTRUDED CURBS

The Portland Cement Concrete mixture for curb construction shall be a minimum of 4000 psi at 28 days concrete and also provide proper workability, curb strength, and minimum contraction cracking. PCC curbing may be placed by extruding machine or by forming and hand placement at Contractor's option and will be bonded to holding surface in a manner approved by the City Engineer, which may include dowelling and/ or an approved bonding agent.

The accepted quantities of curbs will be paid at the contract unit price per linear foot per type, including all labor, equipment, and materials incidental to the work.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
18	EXTRUDED BARRIER PCC CURB W/ CURB DOWELS	LF
19	EXTRUDED ROLL OVER PCC CURB W/ CURB DOWELS	LF

SECTION 2: MAINTENANCE - EQUIPMENT

DUMP TRUCK WITH OPERATOR

Bid prices should include all costs for hourly rental of a dump truck, tandem/ trailer, 12/ 24 cubic yard minimum capacity with driver, including fuel. Rental of this vehicle will be for work under control of the City Engineer. The use of tandem/ trailer dump trucks by the Contractor in the performance of items of work as listed elsewhere under this contract will not be billed separately as under this item.

Pay item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
20	DUMP TRUCK, TANDEM, 12 CU./ YD. MIN. CAP, & DRIVER	HR
21	DUMP TRUCK, TRAILER, 24 CU./ YD. MIN. CAP, & DRIVER	HR

DOZER/ D-3 OR EQUAL WITH OPERATOR

Bids should include all costs for hourly rental of a dozer class d3, or equal, with operator, including fuel and delivery charges to the site. Rental of this equipment will be for work under control of the City Engineer. The use of a dozer by the contractor in the performance of items of work as listed elsewhere under this contract will not be billed separately as under this item.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
22	DOZER/ D3 OR EQUAL AND OPERATOR	HR

COMBINATION VACUUM TRUCK

Bids should include all costs for hourly rental of a combination vacuum truck with operator, including fuel and delivery charges to the site. Rental of this equipment will be for work under control of the City Engineer. The use of a combination vacuum truck by the contractor in the performance of items of work as listed elsewhere under this contract will not be billed separately as under this item.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
23	COMBINATION VACUUM TRUCK	HR

SECTION 3: MISCELLANEOUS WORK

EXPLORATORY EXCAVATION

The contractor shall furnish all materials, labor, and equipment necessary to remove all earth, rock, water, debris, and other materials to the extent required by the City Engineer for exploratory purposes. Excavation will be paid by cubic yard truck measure loaded at the job site or by computing theoretical hole volume at the approval of the City Engineer.

Should the City desire; the Contractor will dump excavated material at a disposal site designated by the City at no added cost. Additionally, should the City desire, the Contractor will load excavated material onto City trucks at the work site at no added cost, provided that the City trucks are present at the work site at the time of excavation and cause no unreasonable delay in progress of the work. However, the ultimate responsibility for disposal of all of the excavated material to satisfy all local, state, and federal regulation rests with the Contractor. Disposal of excavated material shall be paid under the "Disposal of Unsuitable Material" pay item in the Miscellaneous Work section.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
24	EXPLORATORY EXCAVATION BY TRUCK MEASURE	CU. YD.
25	EXPLORATORY EXCAVATION BY THEORETICAL VOL.	CU. YD.

BACKFILL WITH EXCAVATED MATERIAL

This item shall be used when excavated material is suitable for reuse as backfill and when directed by the City Engineer. Fill material must generally meet A4 criteria.

Payment for backfill will be made at contract unit price bid per cubic yard, in place measure (i.e., volume of trench or other location backfilled).

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
26	BACKFILL WITH EXCAVATED MATERIAL	CU. YD.

DISPOSAL OF UNSUITABLE MATERIAL

This item consists of the removal and disposal of the unsuitable materials encountered in the excavation of roadways and utilities or the cleaning of drainage pipe. Bid prices should include all costs for labor, materials, and equipment necessary to dispose of unsuitable materials.

Payment for disposal of unsuitable materials shall be made at the contract unit price bid per cubic yard, truck measure.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
27	DISPOSAL OF UNSUITABLE MATERIAL, TRUCK MEASURE	CU. YD

REMOVAL OF CONCRETE WALKS AND DRIVES

These items cover work generally associated with breaking up and removing existing concrete sidewalks and drives. Bid prices should include all costs for labor and equipment necessary to remove existing concrete walks and drives. **Breaking up of PCC Pavement shall be done with a pneumatic pavement breaker. Use of brute force and pounding with excavation buckets will not be an acceptable means of breaking pavement.** Should the City desire, the contractor will dump the broken sidewalks and drives at a site designated by the city at no extra cost. Also should the City desire, the Contractor will load the broken sidewalks and drives into City trucks at the work site at no extra cost, provided that the City trucks are present at the work site and cause no unreasonable delay in progress of the work.

The accepted quantities of sidewalks and drives removed will be paid for at the contract unit price per square yard measured at the site.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
28	REMOVAL OF CONCRETE WALKS & DRIVES	SQ YD.

FIBER-REINFORCED PORTLAND CEMENT CONCRETE DRIVEWAYS & SIDEWALKS

This item covers the furnishing of all materials and installation of PCC driveway and sidewalk pavements for thickness as shown.

Mix for 1 C.Y. of Fiber-Reinforced Concrete

28-day strength	4000 psi
Cement (ASTM C-150, Type I/II)	4.64 sacks (436 lbs.)
Fly Ash (ASTM C-618)	1.16 sacks(109 lbs.)
Gravel (ASTM C-33, Grade A)	1775 lbs.
Sand (ASTM C-33)	1226 lbs.
Water (potable)	30 gallons (250 lbs.)
Type A Water Reducer (ASTM C-494)	16.35 lbs.
Air entrainment	5% by volume, use per manufacturers specifications
Fiber reinforcement	Novamesh, or equal (approved in writing by the City Engineer)

Fiber reinforcement for all concrete driveways and sidewalks shall be micro polypropylene fibers, applied to the concrete mixture at the rate of one and one-half pounds per cubic yard of concrete. Cellulose (treated or untreated), AR glass, nylon, and polyester fibers are specifically prohibited from use. Polypropylene fiber reinforcement shall be applied **at the plant**. The bags must be broken before mixing. Bag size shall be one (1) pound.

Exposed aggregate sidewalk shall be reinforced with 6x6 welded wire fabric, supported such that it is mid-depth in the finished slab. Cost of exposed aggregate sidewalk shall include furnishing and placing solid brick pavers as sold by St. Joe Brick Works, Inc. or approved equal. Color of brick and exposed aggregate surface shall match existing sidewalk, if applicable.

Bid prices should include all costs for labor, equipment, and materials necessary to provide finished Portland Cement Concrete paving, in place, as described under this item of the proposal. All required jointing materials should be included in price bid under each item. Method of jointing shall be the same as the existing joints in the area of work.

Bid prices under this item shall also include cost of providing engineering/ surveying for alignment, grade, profile, survey stakes, topography when necessary and as required to improve the roadway alignment, curb and gutter layout, drain line installation, etc. Compensation for this shall be incidental to corresponding bid items in the maintenance contract. There is no other compensation. All layouts shall be the responsibility of the contractor. The Contractor shall be responsible for disposal of all construction materials.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
29	FIBER REINFORCED 4" THICK PCC PAVING, IN PLACE FOR SIDEWALK	SQ. YD.
30	FIBER REINFORCED 6" THICK PCC PAVING, IN PLACE FOR DRIVEWAYS (OR SIDEWALKS, IF SPECIFIED IN WORK ORDER)	SQ. YD.
31	4"THK EXPOSED AGGREGATE SIDEWALK INCLUDING BRICK BORDER	SQ. YD.

STRUCTURAL CONCRETE

This item covers all materials, equipment, and labor required to furnish, place, finish, and cure structural reinforced Portland cement concrete for headwalls, abutments, etc. as directed by the City Engineer. Items for structural concrete include Portland cement with aggregate and admixtures as well as reinforcing steel. Structural concrete shall be as specified in section 805 of LA DOTD Standard Specifications for Roads and Bridges, latest edition and revisions. Reinforcing steel shall be grade 60 steel, conforming to section 1009 of LA DOTD Standard Specifications for Roads and Bridges, latest edition and revisions.

Mix for concrete shall be as listed below or as otherwise approved by the City Engineer.

Mix for 1 C.Y. of Portland Cement Concrete

28-day strength	4000 psi
Cement (ASTM C-150, Type I/II)	4.64 sacks (436 lbs.)
Fly Ash (ASTM C-618)	1.16 sacks(109 lbs.)
Gravel (ASTM C-33, Grade A)	1775 lbs.
Sand (ASTM C-33)	1226 lbs.
Water (potable)	30 gallons (250 lbs.)
Type A Water Reducer (ASTM C-494)	16.35 lbs.
Air entrainment	5% by volume, use per manufacturers specifications

Bid prices should include all costs for labor, equipment, and materials necessary to furnish, place, finish, and cure reinforced Portland Cement Concrete, in place, as described under this item of the proposal. Providing, installing, and removing all required forms shall be included at no direct pay. All layouts shall be the responsibility of the contractor. Layout is also included at no direct pay. The Contractor shall be responsible for disposal of all construction materials.

Concrete shall be cured seven (7) days unless otherwise approved by the City Engineer. If Contractor uses "high early" strength concrete (3-day curing period) at his discretion, without the approval of the City Engineer, payment shall be make under the regular (7-day curing) concrete paving item. Contractor shall be responsible for proper oversight and protection of the concrete during the initial curing time until the concrete is sufficiently set to resist marring or vandalism.

Contractor shall supply the City Engineer with manufacturer's literature or specification sheet for reinforcing steel which can be used to convert size and length of steel into pounds.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
32	STRUCTURAL CONCRETE	CU. YD.
33	REINFORCING STEEL	LB.

HANDICAP RAMPS

Contractor shall furnish all materials, labor, and equipment needed to construct handicap ramps, at intersections, medians, or as directed by the City Engineer. The concrete used to construct the ramps shall be six (6") inch thick 4000-psi at 28 days. Where necessary or as directed by the City Engineer, existing sidewalk shall be removed and replaced with new Portland Cement Concrete sidewalk and truncated dome tile, as stipulated according to American Disability Act requirement.

Truncated dome tile shall be minimum ¼-inch thick with embedded truncated domes, 3-inches on center through entire length of tile. Tile surface shall be covered with protective plastic sheeting. Each handicap ramp shall consist of only one tile, which shall be anchored into the concrete.

Removal of existing sidewalks will be paid for under removal of walks and drives. Disposal of excavated material shall be paid under the "Disposal of Unsuitable Material" pay item in the Miscellaneous Work section.

Payment for handicap ramp shall be measured per each and include excavation (if required), sand base, fiber-reinforced concrete, and truncated dome tile with anchoring system.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
34	HANDICAP RAMP	EACH

ST. AUGUSTINE GRASS SOD/ CENTIPEDE SOD

This work consists of furnishing, hauling, planting, rolling, watering, and maintaining live grass sod at locations directed by the City Engineer. Approved sod shall be either field grown or nursery grown grass. Sod should be St. Augustine or Centipede unless otherwise directed by the City Engineer.

The handling, planting, rolling, and watering should be in accordance with the appropriate section of the Louisiana Standard Specifications for Roads and Bridges, latest edition and revisions, Section 714.

Payment for this item shall be made at the contract unit price bid per square yards.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
35	ST. AUGUSTINE GRASS SOD/ CENTIPEDE SOD	SQ. YD.

SEEDING

This work consists of preparing seedbeds and furnishing and sowing grass seed on the areas designated by the City Engineer. Grass shall be an approved quick-growing species suitable to the area and season, providing a temporary cover, which will not compete with permanent grasses. Seed shall be in accordance with the appropriate section of the Louisiana Standard Specifications for Roads and Bridges, latest edition and revisions, Section 717.

Payment for seeding shall be made at the contract unit price bid per pound.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
36	SEED	LB

FERTILIZER

This work consists of furnishing and applying commercial fertilizer on the areas designated by the city engineer. The fertilizer shall be an 8-8-8 mix of an approved brand conforming to the Louisiana department of agriculture and forestry. The fertilizer shall be in accordance with the appropriate section of the Louisiana Standard Specifications for Roads and Bridges, latest edition, Section 718.

Payment for fertilizer should be made at the contract bid price per pound.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
37	8 – 8 – 8 GRANULAR FERTILIZER	LB

FENCING

This item covers all labor, materials, and equipment necessary for the removal and replacement of existing fence or installation of new fencing as directed by the City Engineer. Requirements for new fence height shall be 4', 6', or 8' to match existing.

New chain link fence material shall be as follows:

Chain link fabric shall be 9-gauge steel hot dip galvanized-after-weaving chain link wire woven in a 2-inch mesh-fabric.

Zinc coating to be not less in weight than 2.0 Oz./ Sq. Ft. of bare wire surface and shall conform to ASTM A392 latest revision, class 2.

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

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

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

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

Fence posts shall be hot dip galvanized or use 2 3/8-inch O.D. schedule 40 pipe 3.65 lbs per ft.

Gate post shall be hot dip galvanized 4" O.D. schedule 40 pipe 5.79 lbs per lb. Gate frame shall be hot dip galvanized 1-7/8" O.D. schedule 40 pipe 2.72 lbs per ft. Gates shall be included in the linear foot measure of fencing installed

All chain link fences shall be installed with a top rail and bottom tension wire. Posts shall be spaced no more than 10 feet apart, on center. The fabric shall be placed on the outside face of the posts, stretched taut and securely fastened to the top rail, posts and the bottom tension wire.

The top edge of the fabric shall be placed flush with top rail and the bottom edge of the fabric shall be located approximately two inches above the ground surface. High points in the ground between posts shall be excavated so that the tension wire maintains a straight alignment. Filling of depressions will not be allowed. Corner posts shall be installed wherever changes in line or grade exceed a deflection angle of 30.

All board fence shall be cedar or pressure-treated wood fence. The 4-ft and 6-ft board fence may be built with two rails; however, 8-ft board fence must have three rails. Corner post, if required, shall be included in the linear foot pay item for fencing.

If any portion of the existing fence is damaged in the removal then it shall be replaced with new fence material, *at no cost to the Owner*.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
38	REMOVE EXISTING 4-FT HIGH CHAIN LINK FENCE	LF
39	INSTALL NEW 4-FT HIGH CHAIN LINK FENCE	LF
40	INSTALL NEW 4-FT WIDE, 6-FT HIGH CHAIN LINK GATE	EACH
41	INSTALL NEW 6-FT WIDE, 6-FT HIGH CHAIN LINK GATE	EACH
42	REMOVE EXISTING 6-FT HIGH CHAIN LINK FENCE	LF
43	INSTALL NEW 6-FT HIGH CHAIN LINK FENCE	LF
44	INSTALL NEW 4-FT WIDE, 8-FT HIGH CHAIN LINK GATE	EACH
45	INSTALL NEW 6-FT WIDE, 8-FT HIGH CHAIN LINK GATE	EACH
46	REMOVE EXISTING 8-FT HIGH CHAIN LINK FENCE	LF
47	INSTALL NEW 8-FT HIGH CHAIN LINK FENCE	LF
48	INSTALL NEW 4-FT WIDE, 6-FT HIGH BOARD FENCE GATE	EACH
49	INSTALL NEW 6-FT WIDE, 6-FT HIGH BOARD FENCE GATE	EACH
50	REMOVE EXISTING 6-FT HIGH BOARD FENCE	LF
51	INSTALL NEW 6-FT HIGH BOARD FENCE	LF
52	INSTALL NEW 4-FT WIDE, 8-FT HIGH BOARD FENCE GATE	EACH
53	INSTALL NEW 6-FT WIDE, 8-FT HIGH BOARD FENCE GATE	EACH
54	REMOVE EXISTING 8-FT HIGH BOARD FENCE	LF
55	INSTALL NEW 8-FT HIGH BOARD FENCE	LF

TREE REMOVAL

This work consists of all equipment, labor, and materials required to remove and dispose of existing tree.

If tree is within 100 feet of developed property, a state licensed and insured arborist must remove tree. If beyond 100 feet of developed property, the contractor may bulldoze the tree.

Payment for tree removal shall be according to tree diameter. Diameter of tree shall be measured at 4 ft above grade. This is consistent with the common measurement known in forestry as "DBH".

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
56	TREE REMOVAL, LESS THAN 6" DIAMETER	EACH
57	TREE REMOVAL, 6" TO 12" DIAMETER	EACH
58	TREE REMOVAL, GREATER THAN 12" DIAMETER	EACH

STUMP REMOVAL

This work consists of all equipment, labor, and materials required to remove and dispose of an existing stump.

Payment for stump removal shall be according to stump diameter.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
59	STUMP REMOVAL, 6" TO 12" DIAMETER	EACH
60	STUMP REMOVAL, GREATER THAN 12" DIAMETER	EACH

TEMPORARY FENCING

This work consists of all equipment, labor, and materials required to furnish and install temporary fencing until permanent fence is installed. Also included in this item is removal of temporary fencing once removed. Temporary fence shall be sufficiently secure to contain pets or children.

Payment for temporary fencing shall be per linear foot installed.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
61	TEMPORARY FENCING	L.F.

WELL POINTING

Well pointing shall be used when directed by the City Engineer to facilitate proper construction techniques. Well points shall include providing, setting up, operating, and removing a properly-sized pump, header pipes, and well points. If the well points are operated twenty-four (24) hours a day, the motors shall be equipped with super silencers, unless otherwise approved by the City Engineer.

The item Well Pointing (Set-Up) shall include:

1. a minimum of four (4) well points operated for a period of eight hours, at a maximum depth of twenty (20) feet and forty (40) feet of header pipe, plus
2. sufficient pumping capacity to dewater the construction site.

If additional well point pumping is required, it shall be measured and paid per each eight-hour period.

Additional well points may be installed to dewater the construction area, as safety dictates. The header pipe shall be measured per linear foot and shall include one well point for each 3-feet of header. No additional payment will be made for increased pumping capacity, if required.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
62	WELL POINTING (INITIAL SET-UP)	EACH
63	WELL POINT PUMPING PER EIGHT HOURS	EACH
64	ADDITIONAL HEADER	L.F.

BY PASS PUMPING

This item includes all equipment, labor, and materials necessary for bypass pumping from one manhole to the next or around a manhole. The Contractor shall supply the necessary pumps, conduits, or other equipment to divert the flow of sewage around the section on which work is to be performed. The Contractor will be responsible for furnishing the necessary labor and supervision to set up and operate the bypassing pumping system. All engines shall be equipped with super silencers. The Contractor shall be responsible for correcting any problems that arise as a result of bypassing pumping operations.

All Set-up costs and four (4) hours of pumping will be paid under the item Bypass pumping Setup for each size pump. Additional pumping if required shall be paid per four hour period under the item additional bypass pumping for the size pump used.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
65	3" BYPASS PUMPING SET-UP	EA
66	ADDITIONAL 3" BYPASS PUMPING (4 HOUR PERIOD)	EA
67	4" BYPASS PUMPING SET-UP	EA
68	ADDITIONAL 4" BYPASS PUMPING (4 HOUR PERIOD)	EA

SHEETING, SHORING, AND BRACING

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

All sheeting shall be steel piles fabricated in accordance with Section 807 of the latest La. DOTD Standard Specifications for Roads and Bridges.

All sheeting, shoring, and bracing of excavations shall conform to requirements necessary to comply with all federal, state, and local codes and authorities having jurisdiction. Impact pile

driving and sheet pile installations will cause vibrations which may affect existing residences or underground utilities in the vicinity of the work. Peak particle velocities due to pile driving should be monitored at critical locations with a seismograph during the installation of test piles, job piles and sheet piles. The record of peak particle velocities will provide information in assessing the need for changes in driving operations and the types of changes best suited for the project requirements. Monitoring will be performed by an independent testing lab retained by the Owner.

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

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

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

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

Measurement for this pay item shall be per square foot of sheeting measured by calculating length by width.

Pay Item

<u>Item No</u>	<u>Item</u>	<u>Unit</u>
69	SHEETING/SHORING	SF

W-BEAM GUARD RAIL

This item consists of furnishing and constructing W-beam type highway guard rail in accordance with Section 704, Louisiana Standard Specifications for Roads and Bridges, current edition.

Included in the linear foot pay item for guard rail are the posts, metal beam guard rail, and all hardware, concrete, and other materials, labor, and equipment required to install the guard rail complete, as described in the work order.

End treatment shall be the flared end or rounded end type only and shall meet the criteria specified in the Louisiana Standard Specifications for Roads and Bridges, current edition. A combination of end treatments on the same project will not be acceptable. The contractor shall submit to the City Engineer the system name, and the manufacturer of the end treatment system.

The contractor shall install all components of the guard rail end treatment system such as posts, blocks, and hardware in accordance with the manufacturer's recommendations. Under no circumstances shall any component of the guard rail end treatment system be modified without written approval from the City Engineer.

All end treatments shall be furnished with a retroreflective sheeting at the terminal end.
No separate pay will be made for retroreflective sheeting.

Linear foot measurement of guard rail shall be along the face of the rail.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
70	W-BEAM GUARD RAIL	L.F.
71	GUARD RAIL END TREATMENT	EACH

FLOWABLE FILL GROUT FOR FILLING ABANDONED PIPE

This work includes all equipment, labor, and materials to furnish and install flowable fill inside abandoned pipe. The mix design for flowable fill shall be either Rheocell[®] Rheofill, Mix 2 or other mix design submitted at least 3 business days in advance of planned placement and approved by the City Engineer prior to placement.

When specified by the City Engineer (generally, when line is not under a roadway), air holes shall be dug every 200 feet to avoid airlocks.

Flowable fill shall be produced and delivered at a minimum temperature of 50° F. Do not place flowable fill if ambient air temperature of 35° F or less is anticipated within the 24-hour period following placement. Water shall not be added to the mixture after batching.

All pipes, manholes, catch basins, and other areas not intended to be filled shall be tightly sealed prior to placement.

Payment for flowable fill shall be made per cubic yard of flowable fill placed. All preliminary testing, furnishing mix design, pump, cleanup, and other materials, equipment or labor necessary to complete the work as described in the work order shall be included in the flowable fill item and will not be paid for separately.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
72	FLOWABLE FILL GROUT	C.Y.

SECTION 4: WASTEWATER COLLECTION SYSTEM

SEWER EXCAVATION AND BACKFILL

Excavation, backfill, and compaction for sewer work (pipe, manholes, point repairs, etc.) shall be paid by the cubic yard (theoretical volume), for the various depths, as listed in the bid items. These items shall include all labor, materials, and equipment necessary to complete excavation and backfill involved in the sewer work. All excavated material shall be hauled away by the Contractor.

Granular material shall be used for backfill unless otherwise approved by the City Engineer. Granular backfill material shall conform to the following requirements:

Liquid limit (maximum)	25% (percent)
Plasticity index (max.)	6% (percent)

Granular material will be paid for by the cubic yard, truck measure. Disposal of excavated material shall be paid under the “Disposal of Unsuitable Material” pay item in the Miscellaneous Work section.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
73	EXCAVATE FOR SEWER WORK (0-6' DEPTH)	CU. YD.
74	EXCAVATE FOR SEWER WORK (6'1"-8' DEPTH)	CU. YD.
75	EXCAVATE FOR SEWER WORK (8'1"-10' DEPTH)	CU. YD.
76	EXCAVATE FOR SEWER WORK (10'1"-12' DEPTH)	CU. YD.
77	EXCAVATE FOR SEWER WORK (12'1"-14' DEPTH)	CU. YD.
78	EXCAVATE FOR SEWER WORK (14'1"-16' DEPTH)	CU. YD.
79	EXCAVATE FOR SEWER WORK (16'1"-18' DEPTH)	CU. YD.

80	BACKFILL AND COMPACTION FOR SEWER WORK (0'-6' DEPTH)	CU. YD.
81	BACKFILL AND COMPACTION FOR SEWER WORK (6'1"-8' DEPTH)	CU. YD.
82	BACKFILL AND COMPACTION FOR SEWER WORK (8'1"-10' DEPTH)	CU. YD.
83	BACKFILL AND COMPACTION FOR SEWER WORK (10'1"-12' DEPTH)	CU. YD.
84	BACKFILL AND COMPACTION FOR SEWER WORK (12'1"-14' DEPTH)	CU. YD.
85	BACKFILL AND COMPACTION FOR SEWER WORK (14'1"-16' DEPTH)	CU. YD.
86	BACKFILL AND COMPACTION FOR SEWER WORK (16'1"-18' DEPTH)	CU. YD.

GRAVITY SEWER PIPE

All Polyvinyl Chloride sewer pipe with a diameter of six inches (6") or larger, including pipe for house connections, shall be specifically designed to carry domestic sewage by gravity flow and shall meet the requirements of ASTM D 3034-81 with a maximum SDR equal to 35 and a minimum F/ AY stiffness of 45 psi when tested in accordance with ASTM D 2412.

All joints shall consist of an integral bell with a factory installed "locked in" elastomeric gasket. The spigot end of each joint shall be factory beveled.

All fittings shall be standard manufactured fittings that meet the requirements of ASTM D 3034-81 and shall be produced by the same company that furnished the PVC sewer pipe.

Connectors and adaptors shall be especially made for joining pipes of different materials and diameters. Pipe connectors between two different types of pipes shall be similar to donuts or flexible couplings as manufactured by Fernco Joint Sealer Company. Donuts and couplings must comply with the requirements of C5 225 and ASTM C 425.

Metallic marking tape shall be placed in all trenches above new sanitary sewer gravity lines. Tape shall be three inches (3") wide metallic tape, green in color, with the words "Caution Sewer Line Buried Below" printed on it. No additional compensation will be allowed for supplying or installing this tape.

The gravity sewer pipe shall be measured and paid under a separate item for the size and type pipe furnished and installed.

Payment for excavation, backfill, and compaction for gravity sewer pipe shall be paid under applicable sewer excavation and backfill items. Replacement of pavement, sod, and other incidentals necessary to return topside to original conditions shall be paid under applicable separate bid item.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
87	FURNISH & INSTALL 8 INCH GRAVITY SEWER PIPE (SDR 35)	L.F.
88	FURNISH & INSTALL 10 INCH GRAVITY SEWER PIPE (SDR 35)	L.F.
89	FURNISH & INSTALL 12 INCH GRAVITY SEWER PIPE (SDR 35)	L.F.
90	FURNISH & INSTALL 15 INCH GRAVITY SEWER PIPE (SDR 35)	L.F.
91	FURNISH & INSTALL 18 INCH GRAVITY SEWER PIPE (SDR 35)	L.F.
92	FURNISH & INSTALL 21 INCH GRAVITY SEWER PIPE (SDR 35)	L.F.
93	FURNISH & INSTALL 24 INCH GRAVITY SEWER PIPE (SDR 35)	L.F.

DIRECTIONAL DRILL SEWER FORCE MAIN

This item shall include all labor, equipment, and materials necessary to directional drill sewer force main as indicated in the work order, including high-density polyethylene (HDPE) pipe. Directional drilling and pipe installation shall be done only by a Contractor experienced in directional drilling. The pipe supplier shall certify in writing that the Contractor is qualified to join, lay, and pull the pipe or a representative of the pipe manufacturer shall be on site to oversee the pipe joining. No direct pay will be allowed for supplier certification or on site representative.

All piping system components shall be products of one manufacturer and shall conform to the latest edition of ASTM D1248, ASTM 3350, and ASTM F714. Installation shall be in accordance with ASTM D2321. Pipe exterior shall be green in color or contain green striping. Sanitary sewer pipe interior shall be light in color for internal video inspection.

Shipping lengths shall be assembled into one continuous length at the job site by thermal butt-fusion, in accordance with the manufacturer's recommendations. The resultant joint shall be as strong as the intervening lengths. Each length of pipe shall be inspected and cleaned as necessary to be free of debris immediately prior to joining. Pipe lengths to be joined shall be of the same type, grade, and class of polyethylene compound and supplied from the same raw material supplier. Jointing of pipe and installation of outlets shall be in accordance with the pipe manufacturer's written recommendations. Installation of polyethylene pipe in areas where flotation is probable (whether on land or a subaqueous location) shall conform with manufacturer's recommendation.

Mechanical connections of the polyethylene pipe to auxiliary equipment shall be through flanged connections, which shall consist of polyethylene "sub end" shall be thermally butt-fused to the ends of the pipe; provide ASTM A240, Type 304 stainless steel backing flange, 125-pound, ANSI B16.1 standard, and gaskets as required by the manufacturer; and stainless steel bolts and nuts of sufficient length to show a minimum of three complete threads when the joint is made and tightened to the manufacturer's standard. Retorque the nuts after 4 hours.

Polyethylene pipe shall not be crimped in any way during construction. Deflection of polyethylene pipe after installation and backfilling shall not exceed 5 percent. Fabricated polyethylene bends shall be manufactured by the pipe manufacturer. SDR of fabricated polyethylene bends shall be equal to SDR of connecting pipe.

When connecting polyethylene pipe to manholes, provide a rubber ring water seal between pipe and manhole.

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

Open ends of all sections of pipe shall be plugged at night to prevent animals or foreign material from entering the pipe. Stuffing cloth or paper in the open ends of pipe will not be acceptable.

The piping shall be assembled in a manner that does not obstruct adjacent roadways or public activities. The Contractor shall erect temporary fencing around the entry and exit pipe staging areas. *No direct payment shall be made for this temporary fencing.* The pipe shall be hydrostatically tested after joining into continuous lengths prior to installation and again after installation. Testing procedure shall be the same as that described in the section entitled “UNRESTRAINED PVC SEWER FORCE MAIN (SDR 26)” of these specifications.

Erosion prevention procedures shall be used during removal and discharge of the water. Acquisition of water for testing will be at no direct pay; however, if city water is available, it may be used at no cost.

During the drilling, reaming, or pullback operations, the Contractor shall make adequate provisions for handling the drilling fluids or cuttings at the entry and exit pits. To the greatest extent practical, these fluids must not be discharged into the waterway. When the Contractor’s provisions for storage of the fluids or cuttings on site are exceeded, these materials shall be hauled away to a suitable legal disposal site, at no direct pay. The Contractor shall conduct his directional drilling operation in such a manner that drilling fluids are not forced through the subbottom into the waterway. After completion of the directional drilling work, the entry and exit pit locations shall be restored to original conditions.

After the pipe is in place, cleaning pigs shall be used to remove residual water and debris. After cleaning, the Contractor shall provide and run a sizing pig to check for anomalies in the form of buckles, dents, excessive out-of-roundness, and any other deformations. The sizing pig run shall be considered acceptable if the survey results indicate that there are no sharp anomalies (e.g., buckles, gouges, and internal obstructions) greater than 2 percent of the nominal pipe diameter, or excessive ovality greater than 5 percent of the nominal pipe diameter. Pipe ovality shall be measured as the percent difference between the maximum and minimum pipe diameters.

Payment for directional drilling sewer force main shall include all pipe, pipe fittings, and appurtenances required and all equipment, materials, and labor necessary to completely install the pipe as required in the work order and restore the top side to original conditions. All

required cleaning and testing shall also be included in this item. Measurement will be per linear foot of pipe installed.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
94	DIRECTIONAL DRILL SEWER FORCE MAIN, 6" DIAMETER OR LESS	L.F.
95	DIRECTIONAL DRILL SEWER FORCE MAIN, 8" TO 12" DIAMETER	L.F.

JACK AND BORE GRAVITY SEWER OR FORCE MAIN PIPE WITH CASING

Boring and jacking shall consist of the furnishing and installation of pipe or casing by boring with special equipment and jacking the pipe or casing into place. The cost of furnishing and installing carrier pipe shall be included in the unit price per linear foot of the type and size of jacked or bored sewer pipe with which the carrier pipe is used.

These items include furnishing and transporting material, excavation, installation, bracing, dewatering, sealing or grouting, backfill and surface cleanup. Also included is the construction of pits, paving the invert if required, and the installation of carrier pipe inside the casing, all in accordance with the specifications and in conformity with the line and grade shown on the plans or established by the City Engineer.

Installation of pipe casings under state roadways by jacking or boring methods shall conform to all requirements of section 728 of the latest edition of the Louisiana Department of Transportation and Development Standard Specifications for Roads and Bridges. Subsection 728.03a, third and fourth paragraph shall be superseded by the following requirements:

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

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

The Owner shall be responsible to secure all permits required for the jack and bore under state highways or under railroads and meet all LA DOTD or railroad requirements. The contractor shall not be required to obtain bonds from LaDOTD for jack or bores under State Highways. All bonds and permits will be obtained by the City of Slidell for both State Highways and Railroads.

The contractor shall submit for review and acceptance details of the following to the City Engineer:

1. Subcontractor
2. Jacking pit bracing designed by a professional engineer licensed in Louisiana
3. Steel casing mill certificates and jacking head.
4. Experience of contractor or subcontractor in jacking or boring in the area.
5. Welders certification.
6. Equipment planned.

Steel casing to be jacked and within which pipe is to be installed shall be steel pipe conforming to ASTM: A139, Grade B, no Hydro, minimum yield strength 35,000 psi, rolled and welded steel pipe from new and unused plate, mid welds allowed, bare. The Contractor is fully responsible for the sufficiency of the casing provided.

The method used to construct the pits shall be determined by the Contractor and submitted to the City Engineer for review and approval. The method of securing bore pit wall, whether using shoring and sheeting, tightly placed timber, shores, bracing, steel sheeting or other devices shall be adequate to resist the pressures surrounding the excavation. All applicable OSHA requirements shall be satisfied for pit construction.

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

Where force mains are permitted to be bored, the force main shall be installed by means of a boring machine or auger and hydraulic jacks, or by other means satisfactory to the City Engineer. In the event subsurface operations result in damage to the pavement, or the surface is otherwise disturbed or broken due to the contractor's operations, he shall repair or replace same at his own expense without further compensation.

The diameter of the bored hole shall not be greater than 1" more than the outside diameter of the casing pipe.

Except as otherwise specified, the methods and equipment used in jacking casing shall be optional with the contractor, provided that the proposed method is first approved by the City Engineer. Such approval, however, shall in no way relieve the contractor of the responsibility for making a satisfactory installation meeting the criteria set forth herein.

The Contractor may expect stumps and/or wood pilings in the path of each jacked casing. The Contractor may have to stop operations to remove obstacles and no additional compensation will be given for these stoppages.

The leading section of casing may be equipped with a jacking head. This jacking head must be secured to the casing to prevent wobbling which may cause the alignment to vary beyond the tolerances mentioned below. Excavation shall be carried out entirely within the jacking head or pipe. Excavated material shall be removed from conduit as excavation progresses, and no accumulation of such material within the casing will be permitted.

Upon completion of the jacking operations, all voids created around the casing shall be filled by pressure grouting. Fully operational pressure grouting equipment and material shall be on site prior to any commencement of pipe jacking. The grout or soil cement, which is used to plug and fill voids, shall be a mixture of three parts Portland Cement Concrete and one part High Grade Bentonite as manufactured by Baroid Co. Or approved equal.

The alignment shall be the responsibility of the Contractor. Variation beyond 1' per 100' from the planned alignment must be approved by the City Engineer in writing prior to acceptance of the finished bore. If a casing alignment is observed as being a potential danger to a roadway or railroad, the casing should be abandoned and a new casing location should be chosen by the City Engineer and the contractor. Any abandoned casings should be filled with 2000 psi concrete.

Each connection between the segments of the casing shall be a full penetration butt weld performed by certified welders of steel pipe.

No over cuffing of the outside diameter of the casing will be allowed. Casing lubricants may be applied on the outside surface of the casing to reduce friction forces. Lubricants shall be applied in such a manner as to avoid the creation of voids and crevices between the casing pipe

and soil. Squaring the ends of the casing and the bearing surface will be allowed provided no voids or cavities wound the outside of the casing we created.

On completion, both ends of each casing conduit shall be packed to prevent entrance of earth and excessive flow of ground water, but to allow some drainage. Each end of the casing shall be closed in by brick and mortar as detailed on the plans. Following the installation of the casing, the pipe shall be assembled and jacked or pulled through the casing.

All carrier pipe for either gravity sewer or sewer force main shall be HDPE, minimum one-half inch wall thickness, and compatible with the connector pipe. Adapters at each end of the carrier pipe shall be included in the cost of the Jack and Bore. Carrier pipe shall be permanently secured in position in the steel casing pipe at the proper line and grade and clearance as indicated on the drawings. Other methods, besides the use of wood skids, to facilitate the installation of the carrier pipe shall be allowed provided the conditions of the specifications are met. Carrier pipe shall be secured in such a manner so as to prevent flotation or any subsequent change in line and grade. All sewer force main carrier pipe shall have restrained joints throughout the length of the casing pipe and the joints shall be restrained as specified.

Excavated materials may be used to backfill the pits in unpaved areas only. If granular material is required, no separate pay will be allowed for that material. The backfill material shall be placed in layers not to exceed 12 inches in thickness and shall be compacted with power tamper to a density equal to that to the surrounding natural ground.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
96	4" JACK AND BORE GRAVITY SEWER PIPE W/ 8" CASING	LF
97	6" JACK AND BORE GRAVITY SEWER PIPE W/ 12" CASING	LF
98	8" JACK AND BORE GRAVITY SEWER PIPE W/ 14" CASING	LF
99	10" JACK AND BORE GRAVITY SEWER PIPE W/ 16" CASING	LF
100	12" JACK AND BORE GRAVITY SEWER PIPE W/ 16" CASING	LF
101	15" JACK AND BORE GRAVITY SEWER PIPE W/ 18" CASING	LF
102	18" JACK AND BORE GRAVITY SEWER PIPE W/ 24" CASING	LF

103	4" JACK AND BORE SEWER FORCE MAIN W/ 8" CASING	LF
104	6" JACK AND BORE SEWER FORCE MAIN W/ 12" CASING	LF
105	8" JACK AND BORE SEWER FORCE MAIN W/ 14" CASING	LF
106	10" JACK AND BORE SEWER FORCE MAIN W/ 16" CASING	LF
107	12" JACK AND BORE SEWER FORCE MAIN W/ 16" CASING	LF
108	15" JACK AND BORE SEWER FORCE MAIN W/ 18" CASING	LF
109	18" JACK AND BORE SEWER FORCE MAIN W/ 24" CASING	LF

UNRESTRAINED PVC SEWER FORCE MAIN (SDR 26)

Sewer force main shall be SDR 26 pipe laid at the location and depths determined by the City Engineer. If it is determined by the City Engineer that a portion of the force main laid should be restrained, the cost for mechanical joint retainer glands shall be paid under the bid item entitled "PVC/DUCTILE IRON MEGALUG RESTRAINTS", priced per LB.

Excavation, backfill, and compaction required for the installation of the force main shall comply with the requirements of other sections of these specifications. Granular material will be used for backfill, as directed by the City Engineer. Excavation and backfill shall be paid under applicable sewer excavation and backfill items.

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

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

The installation of force main pipe shall be strictly in accordance with the manufacturer's technical data and instructions. Proper implements, tools and facilities shall be provided and used by the contractor for the safe and convenient prosecution of the work. All pipe, fittings, and appurtenances shall be carefully lowered into the trench piece by piece by means of a derrick,

ropes, or other suitable tools or equipment in such a manner as to prevent damage to materials and protective coatings and linings. Under no circumstances shall materials be dropped or dumped into the trenches.

Every precaution shall be taken to prevent foreign material from entering the pipe while it is being placed in the line. If the pipe laying crew cannot put the pipe into the trench and in place without getting earth into it, a heavy, tightly woven canvas bag of suitable size shall be placed over each end and left there until the connection is to be made to the adjacent pipe. During the laying operations, no debris, tools, clothing or other material shall be placed in the pipe.

All force mains shall be field-tested. The Contractor shall supply all labor, equipment, material, gages, pumps, and incidentals required for testing. The test pressure shall be two (2) times the working pressure unless noted otherwise. The test pressure shall be measured at the highest point along the test section. Testing shall be conducted after backfilling has been completed and before placement of permanent surface. Testing procedure shall be as follows:

Fill line slowly with water. Maintain flow velocity less than two feet (2') per second. Expel air completely from the line during filling and again before applying test pressure. Air shall be expelled by means of taps at points of highest elevation. Apply test pressure. Measure the quantity of water that must be pumped into the line to maintain pressure within 5 PSI of the test pressure for a period of two (2) hours. This quantity is defined as leakage. Carefully examine any exposed pipe, fittings, and joints during the test.

The following shall be determined at the discretion of the City Engineer.

- 1) Minimum test pressure of 75 psig unless otherwise noted.
- 2) Test duration shall be a minimum of two hours.
- 3) All visible leaks are to be repaired regardless of the amount of leakage. If any test of pipe laid discloses leakage greater than that allowed, the Contractor shall, at his own expense, locate and repair the cause of leakage and retest the line. The method of repair must be approved by the City Engineer. All visible leaks are to be repaired regardless of the amount of leakage.
- 4) Scheduling of testing: the contractor shall **notify the city engineer at least 24 hours prior to each testing**. Pipe may be subjected to pressure testing and leakage testing at any convenient time after partial completing of backfill.

Metallic marking tape shall be placed in all trenches above new sanitary sewer force main lines. Tape shall be three inches (3") wide metallic tape, green in color, with the words "Caution Sewer Line Buried Below" printed on it. Tracer wire shall also be placed on the pipe for future locates. No additional compensation will be allowed for supplying or installing this tape or tracer wire.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
110	FURNISH & INSTALL 4" PVC SEWER FORCE MAIN (SDR 26)	LF
111	FURNISH & INSTALL 6" PVC SEWER FORCE MAIN (SDR 26)	LF
112	FURNISH & INSTALL 8" PVC SEWER FORCE MAIN (SDR 26)	LF
113	FURNISH & INSTALL 10" PVC SEWER FORCE MAIN (SDR 26)	LF

RESTRAINED JOINT FORCE MAIN PIPE REPAIR AND REPLACEMENT (DUCTILE IRON)

The contractor shall furnish all labor, materials, equipment and incidentals required to install Ductile Iron Pipe, and Ductile Iron Fittings for buried piping.

Except as modified or otherwise provided herein, the manufacture of Ductile Iron Pipe shall be governed by AWWA C151, latest revision.

All pipe manufacturers to be considered shall be experienced in producing pipe of the type, size and quality specified herein, with a minimum of at least five (5) years successful performance.

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

Each pipe shall be subjected to a hydrostatic pressure test at the point of manufacture to a minimum of 75% of the yield strength for 18" and larger pipe.

Where restrained joint pipe is required, "Lok-Ring" as manufactured by American Ductile Iron Pipe, "Tri-Flex" as manufactured by U.S. Pipe, or approved equal shall be used. The length of restrained pipe shall be as tabulated or noted on the plans. Restrained joints shall be rated for a working pressure of 250-psi minimum. The manufacturer shall furnish test results showing that restrained joints in the sizes specified have been successfully tested to at least twice the specified pressure rating of the joint without leakage or failure. Tests shall be performed on pipe with metal thickness less than or equal to that specified for the project.

Ductile Iron Fittings shall conform to the latest revisions of ANSI/AWWA C110/A21.10. Lining and coating for fittings shall be the same as specified for Ductile Iron Pipe. All fittings shall be Ductile Iron.

All pipe, fittings, and accessories shall be installed and tested in accordance with the latest revision of AWWA C600.

All pipe and fittings shall be manufactured in the United States.

All ductile iron pipe and fittings shall have an asphaltic coating on the exterior in accordance with ANSI/AWWA C151/A21.51.

All Ductile Iron Pipe and fittings shall have a high build protective lining on the interior consisting of a polyethylene or Ceramic Epoxy Material. The material used for lining the pipe and fittings must have been in general use for a minimum of 10 years for protecting pipelines in sewer service.

All surface areas to be lined must be blast cleaned. Prior to abrasive blasting, the entire areas which will receive the protective compound shall be inspected for oil, grease, etc. Any areas where oil, grease or any substance which can be removed by solvent is present shall be solvent cleaned using the guidelines outlined in SSPC-1 solvent cleaning. After the surface has been made free of grease, oil or other substances, all areas to receive the protective compounds shall be abrasive blasted using compressed air nozzles with sand or grit abrasive media. The entire surface to be lined shall be struck with the blast media so that all rust, loose oxides, etc., are removed from the surface. Only slight stains and tightly adhering annealing oxide may be left

on the surface. Any area where rust reappears before coating must be re-blasted to remove all rust.

The interior of pipe and fittings shall receive a minimum 40 mils dry film thickness of the protective lining. The lining must cover the inner surface of the pipe and fittings extending from the spigot end to the gasket socket. The spigot and socket surfaces exposed to the sewer effluent must be coated with a non-coal tar, non-toxic epoxy to a nominal dry film thickness of 8 mils.

The interior barrel of all pipe must be thoroughly tested after lining for holidays using a high voltage spark tester as per ASTM G-62 method B. The holiday test must be witnessed at the factory by an independent third party inspector. The minimum voltage must be at least 8000 volts as calculated by the formula described in ASTM G-62 method B using a nominal thickness of 40 mils. Pinholes located with this test must be repaired. Random spark tests may also be performed at the site and all pinholes must be repaired in the field.

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

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

All buried piping shall be installed in accordance with recommendations of the pipe manufacturer and as specified herein. Polyethylene encasement shall be installed on the pipe prior to its placement in the trench in accordance with ANSI/ AWWA C150/A21.5-93, "Polyethylene Encasement For Ductile Iron Pipe Systems".

Care shall be taken in handling, storage, and installation of pipe and fittings to prevent injury to the pipe or coatings. All pipe and fittings shall be examined before laying, and no piece shall be installed which is found to be defective. All damage to the pipe coatings shall be repaired according to the manufacturer's recommendations.

All pipe and fittings shall be kept clean and shall be thoroughly cleaned before laying. Pipe shall be laid to lines and grades as required with bedding and backfill as required. Blocking under the pipe will not be permitted. Under no circumstances shall the pipe or accessories be dropped into the trench.

Bell holes shall be formed at the ends of the pipe to prevent point loading at the bells and to facilitate installation. Excavation shall be made as needed outside the normal trench section at field joints to permit adequate access for the joints for connection operations and for application of coating on field joints.

Each section of pipe shall be laid in the order and position shown on the laying schedule. In laying pipe, it shall be laid to the setline and grade, within approximately one inch plus or minus. On grades of zero slope, the intent is to lay to grade.

Where necessary to raise or lower the pipe due to unforeseen obstructions or other causes, the city engineer may change the alignment and/or the grades. Such change shall be made by the deflection of joints, by the use of bevel adapters, or by the use of additional fittings. However, in no case shall the deflection in the joint exceed the maximum deflection recommended by pipe manufacturer. No joint shall be misfit any amount that will be detrimental to the strength and water tightness of the finished joint.

Remove all lumps of clay, mud, cinders, etc., on pipe surface prior to installation of Polyethylene Encasement. Prevent soil or embedment material from becoming trapped between pipe and polyethylene.

Fit Polyethylene Film to contour of pipe to affect a snug, but not tight fit, encase with minimum space between polyethylene and pipe. Provide sufficient slack in contouring to prevent stretching polyethylene where it bridges irregular surfaces, such as bell-spigot interfaces, bolted joints, or fittings, and to prevent damage to Polyethylene due to backfilling operations. Secure overlaps and ends with adhesive tape to hold polyethylene encasement in place until backfilling operations are complete.

Cover bends, reducers, offsets, valves, fittings and other pipe-shaped appurtenances with polyethylene in same manner as pipe. Repair any cuts, tears, punctures, or damage to polyethylene with adhesive tape or with short length of polyethylene sheet wrapped around pipe to cover damaged area and secure in place.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
114	RESTRAINED JOINT FORCE MAIN PIPE REPAIR AND REPLACEMENT (DUCTILE IRON); 4" – 8" DIAMETER PIPE	LF

115	RESTRAINED JOINT FORCE MAIN PIPE REPAIR AND REPLACEMENT (DUCTILE IRON); 10" – 15" DIAMETER PIPE	LF
116	RESTRAINED JOINT FORCE MAIN PIPE REPAIR AND REPLACEMENT (DUCTILE IRON); 16" –18" DIAMETER PIPE	LF

RESTRAINED JOINT SEWER FORCE MAIN PIPE REPAIR & REPLACEMENT (SDR 26)

The contractor shall furnish and install the polyvinyl chloride (PVC) pipe along with all labor, materials and equipment necessary for installation in accordance with the plans and specifications.

All PVC pipe shall be SDR 26 extruded from PVC meeting the requirements of cell classification 12454-B as defined in ASTM 1784.

Polyvinyl chloride (PVC) pipe shall be restrained using the series 1100 PV or 1100 HV Megalug mechanical joint thrust restraint as manufactured by EBAA Iron, Inc. Or approved equal.

The EBAA Iron series 1100 PV or 1100 PV Megalug assembly shall be cast completely of closely controlled Ductile Iron conforming to ASTM A536, latest revision, and furnished with Silicone Bronze IFI140 grade 655 bolts. All glands and bolts shall be coated with two (2) coats of coal tar epoxy, Koppers 300-m bitumastic or approved equal, with a minimum dry film thickness of eight (8) mils per coat.

Both types of restraining glands shall be wrapped with an eight (8) mil thick polyethylene tube for additional protection. The polyethylene wrap shall extend a minimum of two (2) feet in either direction from the gland and secured on the end with circumferential turns of tape.

All restrained joints shall be inspected at the job site after installation. Field touch-up and repair if needed shall be made by the contractor under the supervision and inspection of a representative of the coating supplier.

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

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
117	RESTRAINED JOINT SFM PIPE REPAIR & REPLACEMENT (SDR26): 4" – 8" DIAMETER PIPE	LF
118	RESTRAINED JOINT SFM PIPE REPAIR & REPLACEMENT (SDR26): 10" – 15" DIAMETER PIPE	LF
119	RESTRAINED JOINT SFM PIPE REPAIR & REPLACEMENT (SDR26): 16" – 18" DIAMETER PIPE	LF

RESTRAINED JOINT FORCE MAIN PIPE FITTING REPAIR & REPLACEMENT (DUCTILE IRON)

Fittings shall meet the requirements of ANSI/ AWWA c110. Rubber gaskets shall conform to ANSI A21.11 mechanical and push – on type joints.

All ductile iron pipe and fittings less than 12" in diameter shall have cement mortar lining and bituminous seal coat on the inside in accordance with AWWA C104, and coal tar enamel coat on the outside in accordance with ANSI A21.4.

All Ductile Iron Pipe and Fittings 12" in diameter and larger shall have polyethylene lining on the inside and a coal tar enamel coating on the outside. Polyethylene shall comply with ASTM D1248, compounded with carbon black to provide resistance to ultra violet rays during ground storage. The polyethylene shall be 40 mils thick and shall be bonded to the interior of the pipe and fittings by a heat process. The coal tar enamel outside coating shall be in accordance with ANSI A21.4.

Restrained joint pipe and fittings for 12" and smaller diameter pipe shall be "Mechanical Joint With Retainer Gland" as manufactured by American Cast Iron Pipe Company, "Lok – Tyton" as manufactured by U.S. Pipe Company, "Super – Lock" as manufactured by Clow Corporation, or equal. Restrained joint pipe and fittings for 14" and larger diameter pipe shall be "Lok – Tyton" as manufactured by U.S. Pipe company, "Super – Lock" as manufactured by Clow Corporation, or equal. Where bolts are required, they shall be of Silicon Bronze.

Payment for furnishing and installing ductile iron fittings will be made at the unit price bid per pound and shall constitute full compensation for all labor, materials, and equipment necessary to complete this item of work. Prior to invoice, Contractor shall submit the manufacturer's literature on the weight for each fitting used.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
120	RESTRAINED JOINT FORCE MAIN PIPE FITTING REPAIR & REPLACEMENT (DUCTILE IRON); 4" – 18" DIAMETER PIPE	LB

RESETTING EXISTING MANHOLE RINGS & COVERS

This item includes the removal and cleaning of the existing frame and cover, the exposed concrete surface to insure a good bonding surface, resetting and grouting the ring grout, and resetting the cover.

Resetting existing manhole rings and covers shall be paid for at the contract unit price bid per each which shall include grouting/ sealing and any other material, labor, equipment, and incidentals necessary to complete this item.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
121	RESETTING EXISTING MANHOLE RINGS & COVERS	EA

FURNISH & INSTALL NEW MANHOLE RINGS & COVERS

Manhole frames and covers shall be Vulcan foundry, Denham springs, Louisiana; Dews Foundry, Hattiesburg, Mississippi; or approved equal. Frame and cover shall weigh not less than three hundred twenty (320) pounds for the standard type.

Casting for manhole frames, covers and all other iron castings required should be tough gray iron free from injurious defects. The annular bearing planes shall be ground or machined so they will not rock or rattle when crossed by traffic. Allowance shall be made in the patterns so that grinding or machining will not reduce the thickness required. Covers shall fit the frame accurately in any position.

Furnishing and installing new manhole rings and covers shall be paid for at the contract unit price bid per each which shall include grouting/ sealing and any other material, labor, equipment, and incidentals necessary to complete this item. If roadway removal and replacement are required, they will be paid under separate items.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
122	FURNISH & INSTALL NEW MANHOLE RINGS & COVERS	EA

FURNISH AND INSTALL SEWER MANHOLE

Precast manholes shall conform to the requirements of ASTM C-478 and shall be furnished with Ram-Nek or approved equal gaskets. All precast manholes shall be cast with Kor-N-Seal I Boot as manufactured by Fernco for connecting sanitary sewer pipes to manholes.

All joints in precast concrete manholes shall be wrapped tightly with a three-foot (3') band of filter cloth. The cloth shall lap by its width. Filter cloth shall be Mirafi 700x or an approved equal. An approved non-shrink grout shall be used for grouting service lines into manholes.

Fiberglass reinforced polyester manholes may be specified if installation is not within a roadway. Fiberglass manhole shall be a one piece unit manufactured to meet or exceed all specifications of ASTM D-3753 and shall be designed for the loadings and environment of the installation.

For any sewer manhole where the vertical distance from the flow line of the outgoing sewer to the invert of the incoming sewer exceeds two feet (2'), drop pipe shall be built for the incoming sewers. Typical drop pipes for eight-inch (8") sewers entering sewers of any size will be eight inches (8") in diameter. Drop pipe for sewers of other size will be as detailed.

Manhole frames and covers shall be Vulcan Foundry, Denham Springs, Louisiana; Dews Foundry, Hattiesburg, Mississippi; or approved equal. Frame and cover shall weigh not less than three hundred twenty (320) pounds for the standard type. Frame and cover shall be included in price for manhole.

Castings for manhole frames, covers and all other iron castings required shall be of tough gray iron free from injurious defects. The annular bearing planes shall be ground or machined so they will not rock or rattle when crossed by traffic. Allowance shall be made in the patterns so that the thickness required will not be reduced by grinding or machining. Covers shall fit the frame accurately in any position.

No steps shall be installed in manholes.

Payment for installed manholes shall be made at the contract unit price bid per each manhole. The pay item for the required size and depth of manhole shall include all testing, labor, equipment, and materials (including, but not limited to, gaskets, boots, filter cloth wrap, drop pipe, castings, risers and cones, and non-shrink grout) to complete manhole installation as specified. Excavation and backfill shall be paid under applicable sewer excavation and backfill items.

All sixty-inch (60") manholes are to be installed the same as forty-eight inch (48") manholes.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
123	FURNISH & INSTALL 48" CONCRETE SEWER MANHOLE – 0' – 6' CUT	EA
124	FURNISH & INSTALL 48" CONCRETE SEWER MANHOLE – 6'1" – 8' CUT	EA
125	FURNISH & INSTALL 48" CONCRETE SEWER MANHOLE – 8'1" – 10' CUT	EA
126	FURNISH & INSTALL 48" CONCRETE SEWER MANHOLE – 10'1" – 12' CUT	EA
127	FURNISH & INSTALL 48" CONCRETE SEWER MANHOLE – 12'1" – 14' CUT	EA
128	FURNISH & INSTALL 60" CONCRETE SEWER MANHOLE – 0' – 6' CUT	EA
129	FURNISH & INSTALL 60" CONCRETE SEWER MANHOLE – 6'1" – 8' CUT	EA
130	FURNISH & INSTALL 60" CONCRETE SEWER MANHOLE – 8'1" – 10' CUT	EA
131	FURNISH & INSTALL 60" CONCRETE SEWER MANHOLE – 10'1" – 12' CUT	EA
132	FURNISH & INSTALL 60" CONCRETE SEWER MANHOLE – 12'1" – 14' CUT	EA
133	FURNISH & INSTALL 48" FIBERGLASS SEWER MANHOLE – 0' – 6' CUT	EA
134	FURNISH & INSTALL 48" FIBERGLASS SEWER MANHOLE – 6'1" – 8' CUT	EA
135	FURNISH & INSTALL 48" FIBERGLASS SEWER MANHOLE – 8'1" – 10' CUT	EA
136	FURNISH & INSTALL 48" FIBERGLASS SEWER MANHOLE – 10'1" – 12' CUT	EA
137	FURNISH & INSTALL 48" FIBERGLASS SEWER MANHOLE – 12'1" – 14' CUT	EA
138	FURNISH & INSTALL 60" FIBERGLASS SEWER MANHOLE – 0' – 6' CUT	EA
139	FURNISH & INSTALL 60" FIBERGLASS SEWER MANHOLE – 6'1" – 8' CUT	EA
140	FURNISH & INSTALL 60" FIBERGLASS SEWER MANHOLE – 8'1" – 10' CUT	EA
141	FURNISH & INSTALL 60" FIBERGLASS SEWER MANHOLE – 10'1" – 12' CUT	EA
142	FURNISH & INSTALL 60" FIBERGLASS SEWER MANHOLE – 12'1" – 14' CUT	EA

REPAIR MANHOLE/ LINE CONNECTION

The repair manhole/ line connection shall be paid for at the contract unit price bid per each which shall include testing, wrapping, and sealing with grout and any other material, labor, equipment, and incidentals necessary to complete this item.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
143	REPAIR MANHOLE/ LINE CONNECTION	EA

REMOVE & REPLACE MANHOLE WALL, MANHOLE CONE

Precast manholes, wall sections, or cones shall conform to the requirements of ASTM C-478 and shall be furnished with Ram – Nek or approved equal gaskets.

All joints in precast concrete manholes shall be wrapped tightly with a three-foot (3') band of filter cloth. The cloth shall lap by its width. Filter cloth shall be Mirafi 700 x or an approved equal.

An approved non – shrink grout shall be used for grouting and service lines into manholes.

Remove and replace manhole wall and manhole cone shall be paid for at the contract unit price bid per vertical foot or per each which shall include grouting/ sealing and any other material, labor, equipment, and incidentals necessary to complete this item.

The remove and replace manhole wall item shall be paid for at the contract unit price bid per vertical foot which shall include testing and sealing with grout and any other material, labor, equipment, and incidentals necessary to complete this item. The bid item for remove and replace manhole cone shall be paid for at the contract unit price bid per each which shall include testing, wrapping, and sealing with grout and any other material, labor, equipment, and incidentals necessary to complete this item.

Pay items shall include all testing, labor, equipment, and materials (including, but not limited to, gaskets, boots, filter cloth wrap, drop pipe, castings, risers and cones, and non-shrink

grout) to complete manhole wall or cone installation as specified. Excavation and backfill shall be paid under applicable sewer excavation and backfill items.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
144	REMOVE & REPLACE MANHOLE WALL	VFT
145	REMOVE & REPLACE MANHOLE CONE	EA

REHABILITATE MANHOLE BENCH/ TROUGH

The material used for construction shall be a quick setting cementitious material, and is to be mixed and applied according to manufacturer’s recommendations and shall have the following minimum requirements:

- | | |
|--|------------------|
| 1. Compressive strength (ASTM C – 190) | 6 hrs. 1400 psi |
| 2. Shrinkage (ASTM C – 596) | 0% at 90% R.H. |
| 3. Bond (ASTM C – 321) | 28 days, 150 psi |
| 4. Density, when applied | 105 +(-) pcf |

Repair shall be performed on all inverts with visible damage or infiltration. After blocking flow through the manhole, and thoroughly cleaning the invert, the quick setting patch mix shall be applied to the invert in an expeditious manner. The mix shall be troweled uniformly onto the damaged invert to repair the bench/ trough to insure a smooth flow without creating and ledges that will trap solid material. The finished invert surfaces shall be smooth and free of ridges. The flow may be re-established in the manhole within 30 minutes after placement of the mix.

Rehabilitation of manhole bench/ trough will paid at the contract unit price per each which shall include all materials, labor, incidentals, and equipment needed to construct manholes benches and troughs as specified herein and as directed by the City Engineer.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
146	REHABILITATE MANHOLE BENCH/ TROUGH	EA

MANHOLE OR WET WELL COATING

Sewer manhole or wet well shall be coated with a polymer lining systems (epoxy and polyurethane type systems). Approved products include the Tnemec Poly Spec Tuf-Rez Product, the Warren 100% solids System, Raven Lining Systems, Sprayroq, Spectrashield. An equal product may be used, if approved by the City Engineer prior to work. The finished system shall provide 250 mils minimum cover. During application, a wet film thickness gage shall be used to ensure a monolithic coating and uniform thickness.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
147	SEWER MANHOLE/ WET WELL COATING	SQ. FT.

FURNISH AND INSTALL MANHOLE INSERTS

Manhole inserts shall be installed at locations as directed by the city engineer. Manhole inserts shall be Rainstopper as manufactured by Southwestern Packing and Seals or an approved equal. The Rainstopper insert and components shall be manufactured of materials resistant to corrosion from atmospheres containing hydrogen sulfide and dilute sulfuric acid.

The insert body shall be manufactured of 304 stainless steel with a thickness of not less than 18 gage. The insert shall have a straight side design to allow a loose fit into ring for easy removal. The insert manufacturer must furnish a "load test verification" showing load test failure in excess of 300 lbs. for added strength, no less than three (3) ribs shall be stamped in the bottom of the dish.

The gasket shall be molded form a special formulated silicone and urethane for long term wear and resistance to gases associated with wastewater. The gasket shall be installed by the

manufacture and must be compatible with the insert material to form a long lasting bond in wet or dry conditions.

The gas relief valve shall be designed to release at a pressure of 0.5 to 1.5 psi and have a water leak down rate no greater than 5 gallons per 24 hours. The valve shall be installed in the insert by means of a hole tapped in the insert by the manufacturer. The valve shall be made of nitrile for prevention of corrosion from contact with hydrogen sulfide, dilute sulfuric acid and other gases associated with wastewater collection systems.

The dish shall have a handle of 3/16" plastic coated stainless steel cable installed on the body of the dish. The handle shall be attached with a #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.

A PVC vacuum valve shall be installed by the manufacturer using a nitrile grommet. The valve shall have an EPDM backflow prevention tube extending above the depth of dish. The manhole frame rim shall be free of all dirt and debris prior to the installation of the Rainstopper insert. The Rainstopper insert should be fully seated around the manhole frame rim to insure against water seepage between the insert and manhole frame rim. A generous coating of grease on the gasket is helpful in seating and prevents rust.

Manhole inserts will be paid for at the contract unit price bid for each insert properly installed. Payment shall include all material, labor, and incidentals necessary to properly install inserts in manholes in accordance with manufacturer's recommendation.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
148	FURNISH & INSTALL MANHOLE INSERTS	EA

REPAIR/ ADJUST CLEANOUT

A repair and adjustment of the necessary sewer cleanout installation shall consist of all pipe, fittings, adapters, and castings and or cover boxes.

Sewer cleanouts are to be repaired as indicated on the standard detail sheet 4, so that the sewer cleanout plug fitting and cover are flush with the grade line.

Sewer cleanout frame and cover are to be adjusted flush with the grade line. The frame is to be encased in a four (4) inch thick square concrete footing extending three (3) inches around the cleanout frame.

Remove/ adjust sewer clean - out shall be paid for at the contract unit price bid per each which shall include all material, labor, equipment, and incidentals necessary to complete this item.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
149	REPAIR/ ADJUST CLEANOUT	EA

INSTALLATION OF SEWER CLEANOUT

A sewer cleanout installation shall consist of all pipe, fittings, adapters, and castings and/or cover boxes.

Sewer cleanouts are to be installed as indicated on the attached detail sheet 4. Sewer cleanout piping is to be installed from the depth of the service lateral to the existing grade line, so that the sewer cleanout plug fitting and cover are flush with the grade line.

Install sewer cleanout shall be paid for at the contract unit price bid per each, which shall include all material, labor, equipment, and incidentals necessary to complete this item.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
150	FURNISH & INSTALL SEWER CLEANOUT	EA

ADJUSTING SEWER MANHOLE

If grade adjustments of existing manholes are required, frames and covers shall be removed and structure walls reconstructed as specified for new work. Frames and covers shall be cleaned and placed in good repair (or replaced, if specified). Structures may also be adjusted

by means of metal adjusting rings connected to existing ring by either welding at least 30% of circumference or by using an epoxy system designed for metal – to – metal adhesion.

After removal of existing manhole cover, a suitable temporary cover shall be placed over manhole to prevent debris from entering manhole and to provide for safety of workman and the public until new manhole cover is in place.

If rubble and debris fall into a “live” manhole during adjustment operations, the contractor shall not allow his personnel to enter manhole to remove debris, but shall immediately notify the city engineer who will arrange for city maintenance personnel to clear manhole of debris and the cost thereof will be deducted from payments for the work.

If existing sanitary sewer manhole is equipped with an inverter pan to prevent intrusion of storm water, pan shall be removed and reinstalled after completion of manhole adjustment.

Adjusting sewer manhole shall be paid for at the contract unit price bid per each, which shall include all material, labor, equipment, and incidentals necessary to complete this item.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
151	ADJUST SEWER MANHOLE	EA

SEWER POINT REPAIR

A point repair consists of exposing the specified length of sewer line, making the necessary repairs, backfilling, and returning the surface area to conditions that existed prior to construction.

Excavation and backfill for point repairs will be paid under excavation and backfill items for sewer work. The contractor is advised that all excavated material shall be hauled from the site and granular material will be used for backfill, unless otherwise approved by City Engineer. Disposal of excavated material shall be paid under the “Disposal of Unsuitable Material Item” in the Miscellaneous Work section.

The sewer pipe (service line, gravity main, or force main) used in the repair shall be paid per linear foot under the bid item for sewer pipe, size and type as required. Replacement of

pavements, sod, and other incidentals necessary to return topside to original conditions shall be paid under applicable separate bid items.

All materials used shall conform to the applicable sections of these specifications.

If a point repair is performed on a mainline sewer with a sewer house connection, the contractor will be responsible for reconnecting this service line to the mainline sewer. The depth of the service line at the point of connection for each property owner shall be sufficient to permit connection to existing private sewer lines at a minimum grade of one eighth inch (1/8") per foot. The Contractor shall verify house connections during excavation. Sewer service lines shall be connected to existing private lines at the back of the sidewalk with an approved adapter. The location of installation of service lines to accommodate future development may be directed by the City Engineer. Lines installed for future use shall be plugged with an approved adapter behind the cleanout that can be removed without damage to the pipe bells.

All sewer service lines shall join the main sewer at a wye. When the installation of a service line connection to an existing PVC main is required, the use of an approved saddle type connection will be permitted. All metal parts on saddle type connectors must be stainless steel.

Should the contractor encounter cleanouts on the existing services during their replacement, new cleanouts shall be installed in accordance with the details on the drawings. The cleanouts shall be measured and paid for per each under the separate item for a cleanout. In the event that a sewer cleanout location is in a driveway, parking lot, etc., the contractor will install a cast iron cleanout cover. The cleanout cover will be Vulcan Foundry Model V-8504 or an approved equal.

The bid items for "SEWER MAIN POINT REPAIR FITTINGS" and "SEWER SERVICE POINT REPAIR FITTINGS" shall include removing and replacing any and all fittings required to complete the point repair and shall be paid per each fitting used. If required, plugging and transition couplings shall be included at no direct pay.

New four-inch (4") or six-inch (6") PVC sewer service lines shall be installed from the wye's in all main sewers to a point approximately at the right of way of the street. Unless otherwise directed by the City Engineer, new service lines shall follow the line and grade of the existing service, which will, in most cases, ensure removal of the old services from the ground.

Payment for service line installation shall be paid per linear foot using the appropriate separate pay item.

Payment for sewer wye shall be made at the appropriate contract unit price bid per each, depending on size or location.

Flex-Seal adjustable repair coupling shall be as manufactured by Mission Rubber Company, or equal. Coupling shall have a stainless steel shear ring with a sealing “O” ring under each sealing clamp band. Payment shall be per each coupling installed.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
152	SEWER MAIN POINT REPAIR FITTINGS	EACH
153	SEWER SERVICE POINT REPAIR FITTINGS	EACH
154	4" SEWER SERVICE LINE	LF
155	6" SEWER SERVICE LINE	LF
156	SEWER SERVICE LINE WYE	EACH
157	SEWER WYE FOR 8" DIAMETER MAIN	EACH
158	SEWER WYE FOR 10" DIAMETER MAIN	EACH
159	SEWER WYE FOR 12" DIAMETER MAIN	EACH
160	FLEX-SEAL ADJUSTABLE REPAIR COUPLING	EACH

SECTION 5: WATER SYSTEM

All PVC, Ductile Iron Pipe, and HDPE pipe shall be installed and tested according to the following test procedures.

The sections and completed pipe line shall be subjected to a hydrostatic test of no less than one and one-half (1.5) times the normal operating pressure of that line. This test pressure shall be maintained with no drop in pressure for at least two (2) hours or for such longer time as the city engineer may require. The contractor shall furnish all materials, equipment, and personnel for the test.

The sections and completed pipeline shall be subjected to pressure tests conforming to AWWA standard C-600-87, section 4 and shall successfully pass the leakage test as determined by the following formula:

In preparation for the pressure testing, the following minimum steps shall be taken:

- A. The pipeline shall be backfilled to the extent that it will be restrained from movement under pressure.
- B. All thrust blocks shall be constructed to withstand test pressure. Temporary bracing shall not be used except at test ends.
- C. If test ends are used, the open end may be sealed with a line cap and shall be adequately braced with a temporary thrust block or timber bracing.
- D. Scheduling of testing: the contractor shall **notify the city engineer at least 24 hours prior to each testing**. Pipe may be subjected to pressure testing and leakage testing at any convenient time after partial completing of backfill. Segments of water lines to be connected to existing water lines shall be chlorinated, flushed and checked for absence of bacteria before the new section of line is pressure tested. The contractor may at his option pressure test the line before chlorination, provided the new line is not connected to the existing line during the pressure test. This procedure is set forth to prevent contaminated water or water with high chlorine content from begin forced into a line in service through a faulty valve or other device during pressure tests.

Where excessive leakage exists, the necessary repairs or replacements shall be made at no extra cost to the owner and test shall be repeated as specified above.

After the water main has been completed and a satisfactory hydrostatic test has been made, the contractor shall sterilize the water mains. Mains shall be thoroughly flushed before introduction of the chlorinating materials.

All new mains and repaired portions of, or extensions to, existing mains shall be chlorinated so that a chlorine residual of not less than 25 ppm remains in the water after twenty-four (24) hours standing in the pipe.

- A. Rate of application- water from the existing distribution system or other source of supply shall be controlled so as to flow slowly into the newly laid pipeline during the application of chlorine. The rate of chlorine mixture flow shall be in such proportion to the rate of water entering the pipe that the chlorine dose applied to the water entering the newly laid pipe shall produce a residual at least 25 ppm after twenty-four (24) hours standing.
- B. Prevention of reverse flow - valves shall be manipulated so that the strong chlorine solution in the line being treated will not flow back into the line supply water. Check valves may be used if desired.
- C. Retention period - treated water shall be retained in the pipe long enough to destroy all non-spore-forming bacteria. This period shall be at least twenty-four (24) hours and should produce a residual not less than 25 ppm at the retention period.

If the circumstances are such that a shorter retention period must be used, the chlorine concentration shall be increased accordingly. For instance, for a contact period of one (1) hour, a 100 ppm chlorine concentration is required. Under these conditions special care should be taken to avoid attack on pipe, valves, hydrants and other appurtenances.

- D. Chlorinating valves and hydrants - in the process of chlorinating newly laid pipe, all valves or other appurtenances shall be operated while the pipeline is filled with the chlorinating agent.
- E. Final flushing and test - following chlorinating, all treated water shall be thoroughly flushed from the newly laid pipeline at its extremities. The replacement water throughout its length shall, upon test, be proved comparable in quality to the water served the public from the existing water supply system and approved by the public health authority having jurisdiction.
- F. Repetition of procedures should the initial treatment fail to result in the condition specified; the original chlorination procedure shall be repeated until satisfactory results are obtained.

All pressure testing, flushing and sterilization shall be done by the contractor at no additional compensation.

Non-metallic or non-conductive (current) water lines must be installed with a non-corrosive metallic wire or tape placed directly over and on the center of the facility for its entire length. This applies to both parallel installations and crossings. Wire or tape must be connected to all facilities and appurtenances. The tape shall have a 3" width and the words "buried waterline" should be printed on it along its entire length. Tape shall be detect tape as manufactured by the Allen Systems, Inc., or approved equal. Cost of wire or tape shall be included in the cost of the pipe.

WATER SYSTEM EXCAVATION AND BACKFILL

Excavation, backfill, and compaction for water system work (pipe, fire hydrants, valves, point repairs, etc.) shall be paid by the cubic yard for the various depths, as listed in the bid items. These items shall include all labor, materials, and equipment necessary to complete excavation and backfill involved in the water system work. All excavated material shall be hauled away by the contractor. Granular material shall be used for backfill unless otherwise approved by the City Engineer. Granular backfill material shall conform to the following requirements:

- Liquid limit (maximum) 25% (percent)
- Plasticity index (maximum) 6% (percent)

Granular material will be paid for by the cubic yard truck measure. Disposal of excavated material shall be paid under the "Disposal of Unsuitable Material" pay item in the Miscellaneous Work section.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
161	EXCAVATE FOR WATER SYSTEM WORK (0'-6' DEPTH)	CU. YD.
162	EXCAVATE FOR WATER SYSTEM WORK (6'1"-8' DEPTH)	CU. YD.
163	BACKFILL AND COMPACTION FOR WATER SYSTEM WORK (0'-6' DEPTH)	CU. YD.
164	BACKFILL AND COMPACTION FOR WATER SYSTEM WORK (6'1"-8' DEPTH)	CU. YD.

FURNISH AND INSTALL PVC WATER PIPE (C-900 CLASS 160)

PVC water lines shall be blue in color, (City of Slidell Standard); class 150 polyvinyl chloride pipe manufactured in accordance with AWWA C900 (latest edition) and shall be U.L. listed. Pipe shall be furnished in standard lengths (minimum 20 feet) with integrally cast bells or couplings using elastomeric gaskets which meet the requirements of ASTM D1869 and F477. All necessary adapters and retaining glands for connection to fittings shall be provided.

Metallic marking tape shall be placed in all trenches above new water lines. Tape shall be three inches (3") wide metallic tape, blue in color, with the words "Caution Water Line Buried Below" printed on it. Tracer wire shall also be placed on the pipe for future locates. No additional compensation will be allowed for supplying or installing this tape or tracer wire.

Payment for this work shall be made at the contract unit price bid per linear foot and shall include all labor, materials, marking tape, testing, etc. required to complete the installation.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
165	FURNISH & INSTALL PVC WATER PIPE – 4” (C900 CLASS 160)	LF
166	FURNISH & INSTALL PVC WATER PIPE – 6” (C900 CLASS 160)	LF
167	FURNISH & INSTALL PVC WATER PIPE – 8” (C900 CLASS 160)	LF
168	FURNISH & INSTALL PVC WATER PIPE – 10” (C900 CLASS 160)	LF
169	FURNISH & INSTALL PVC WATER PIPE – 12” (C900 CLASS 160)	LF
170	FURNISH & INSTALL PVC WATER PIPE – 16” (C900 CLASS 160)	LF

DIRECTIONAL DRILL WATER MAIN

This item shall include all labor, equipment, and materials necessary to directional drill water main as indicated in the work order, including high-density polyethylene (HDPE) pipe. Directional drilling and pipe installation shall be done only by a Contractor experienced in directional drilling. The pipe supplier shall certify in writing that the Contractor is qualified to

join, lay, and pull the pipe or a representative of the pipe manufacturer shall be on site to oversee the pipe joining. No direct pay will be allowed for supplier certification or on site representative.

All piping system components shall be products of one manufacturer and shall conform to the latest edition of ASTM D1248, ASTM 3350, and ASTM F714. Installation shall be in accordance with ASTM D2321. Pipe exterior shall be blue in color or contain blue striping.

Shipping lengths shall be assembled into one continuous length at the job site by thermal butt-fusion, in accordance with the manufacturer's recommendations. The resultant joint shall be as strong as the intervening lengths. Each length of pipe shall be inspected and cleaned as necessary to be free of debris immediately prior to joining. Pipe lengths to be joined shall be of the same type, grade, and class of polyethylene compound and supplied from the same raw material supplier. Jointing of pipe and installation of outlets shall be in accordance with the pipe manufacturer's written recommendations. Installation of polyethylene pipe in areas where flotation is probable (whether on land or a subaqueous location) shall conform with manufacturer's recommendation.

Mechanical connections of the polyethylene pipe to auxiliary equipment shall be through flanged connections, which shall consist of polyethylene "sub end" shall be thermally butt-fused to the ends of the pipe; provide ASTM A240, Type 304 stainless steel backing flange, 125-pound, ANSI B16.1 standard, and gaskets as required by the manufacturer; and stainless steel bolts and nuts of sufficient length to show a minimum of three complete threads when the joint is made and tightened to the manufacturer's standard. Re-torque the nuts after 4 hours.

Polyethylene pipe shall not be crimped in any way during construction. Deflection of polyethylene pipe after installation and backfilling shall not exceed 5 percent. Fabricated polyethylene bends shall be manufactured by the pipe manufacturer. SDR of fabricated polyethylene bends shall be equal to SDR of connecting pipe.

When connecting polyethylene pipe to manholes, provide a rubber ring water seal between pipe and manhole.

Pipe shall be handled in such a manner that it is not over stressed or damaged by dragging over or dropping onto sharp and cutting objects. Ropes, fabric, or rubber-protected slings and straps shall be used when handling pipes. Chains, cables, or hooks inserted into the pipe ends **shall not be used**. Two slings spread apart shall be used for lifting each length of

pipe. Slings shall be positioned at butt-fused joints. Sections of the pipes with cuts and gouges exceeding 10 percent of the pipe wall thickness or kinked sections shall be removed and the ends rejoined.

Open ends of all sections of pipe shall be plugged at night to prevent animals or foreign material from entering the pipe. Stuffing cloth or paper in the open ends of pipe will not be acceptable.

The piping shall be assembled in a manner that does not obstruct adjacent roadways or public activities. The Contractor shall erect temporary fencing around the entry and exit pipe staging areas. *No direct payment shall be made for this temporary fencing.* The pipe shall be hydrostatically tested after joining into continuous lengths prior to installation and again after installation. Testing procedure shall be the same as that described at the beginning of this section.

Erosion prevention procedures shall be used during removal and discharge of the water. Acquisition of water for testing will be at no direct pay; however, if city water is available, it may be used at no cost.

During the drilling, reaming, or pullback operations, the Contractor shall make adequate provisions for handling the drilling fluids or cuttings at the entry and exit pits. To the greatest extent practical, these fluids must not be discharged into the waterway. When the Contractor's provisions for storage of the fluids or cuttings on site are exceeded, these materials shall be hauled away to a suitable legal disposal site, at no direct pay. The Contractor shall conduct his directional drilling operation in such a manner that drilling fluids are not forced through the subbottom into the waterway. After completion of the directional drilling work, the entry and exit pit locations shall be restored to original conditions.

After the pipe is in place, cleaning pigs shall be used to remove residual water and debris. After cleaning, the Contractor shall provide and run a sizing pig to check for anomalies in the form of buckles, dents, excessive out-of-roundness, and any other deformations. The sizing pig run shall be considered acceptable if the survey results indicate that there are no sharp anomalies (e.g., buckles, gouges, and internal obstructions) greater than 2 percent of the nominal pipe diameter, or excessive ovality greater than 5 percent of the nominal pipe diameter. Pipe ovality shall be measured as the percent difference between the maximum and minimum pipe diameters.

Payment for directional drilling water main shall include all pipe, pipe fittings, and appurtenances required and all equipment, materials, and labor necessary to completely install the pipe as required in the work order and restore the top side to original conditions. All required cleaning and testing shall also be included in this item. Measurement will be per linear foot of pipe installed.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
171	DIRECTIONAL DRILL WATER MAIN, 6" DIAMETER OR LESS	L.F.
172	DIRECTIONAL DRILL WATER MAIN, 8" TO 12" DIAMETER	L.F.

FURNISH AND INSTALL DUCTILE IRON PIPE

Ductile iron water lines shall be U.S. Pipe Tyton Joint 350 Class pipe or approved equal. Pipe shall be furnished in standard lengths (minimum 20 feet) with integrally cast bells or couplings using elastomeric locking gaskets.

Payment for this work shall be made at the contract unit price bid per linear foot and shall include all labor, materials, marking tape, testing, etc. required to complete the installation.

Pressure testing may be required and should be included in at no direct pay.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
173	FURNISH & INSTALL DUCTILE IRON PIPE – 4"	LF
174	FURNISH & INSTALL DUCTILE IRON PIPE – 6"	LF
175	FURNISH & INSTALL DUCTILE IRON PIPE – 8"	LF
176	FURNISH & INSTALL DUCTILE IRON PIPE – 10"	LF
177	FURNISH & INSTALL DUCTILE IRON PIPE – 12"	LF
178	FURNISH & INSTALL DUCTILE IRON PIPE – 16"	LF

FURNISH AND INSTALL DUCTILE FITTINGS (ALL TYPES)

Fittings for water lines of 4" diameter and larger shall be seal coated ductile iron with mechanical joint ends. Mechanical joints shall be recommended by the manufacturer for use with AWWA C-900 pipe. Fittings shall be manufactured in accordance with AWWA C-110.

Payment for this work shall be made at the contract unit price bid per pound and shall include all marking tape, testing, etc. Prior to invoice, Contractor shall submit the manufacturer's literature or specification sheet on the weight for each fitting used.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
179	FURNISH & INSTALL DUCTILE FITTINGS (ALL TYPES)	LB

FURNISH AND INSTALL PVC/ DUCTILE IRON MEGALUG RESTRAINTS

This item covers locked mechanical joint retainer glands of adequate strength to prevent movement may be used. Locked mechanical joint retainer glands shall be ductile iron retainer glands equipped with hardened, cupped end set screws. Assembly shall be designed for minimum pressure of 250 psi.

Payment for all ductile iron fittings and retainer glands shall be made at the contract unit price bid per pound. Prior to invoice, Contractor shall submit the manufacturer's literature or specification sheet on the weight for each fitting used.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
180	FURNISH & INSTALL PVC/ DUCTILE IRON MEGALUG RESTRAINTS	LB

FURNISH AND INSTALL WATER VALVE

Water line valves shall be resilient seat gate valves complying with the requirements of AWWA C 509 "Standard for Resilient-Seated Gate Valve for Water and Sewerage Systems." valves shall be Mueller, m & h or approved equal. Valves shall be finished with a non-rising stem, 0-ring seal, standard 2" square, operating nut, and shall open by turning the operating nut counter-clockwise. Valve shall be interior coated with protective epoxy coating meeting AWWA C 550. Valve ends shall be flanged and/or mechanical joint as required. Mechanical joints shall be recommended by the manufacturer for use with AWWA C-900 PVC pipe. Bolts to be of type recommended by pipe supplier of material with a minimum 45,000 psi tensile strength with semi-finished heavy nuts in accordance with ANSI/AWWA C111/A 211.11. Valves 2" and smaller shall be bronze gate valves with rising stems.

Payment for installed water valves shall be made at the contract unit price bid per each valve and shall include all testing.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
181	FURNISH & INSTALL WATER VALVE – 3/4" – 2"	EA
182	FURNISH & INSTALL WATER VALVE – 4"	EA
183	FURNISH & INSTALL WATER VALVE – 6"	EA
184	FURNISH & INSTALL WATER VALVE – 8"	EA
185	FURNISH & INSTALL WATER VALVE – 10"	EA
186	FURNISH & INSTALL WATER VALVE – 12"	EA

FURNISH AND INSTALL WATER VALVE BOX (ALL SIZES AND DEPTHS)

Valve boxes shall be of cast or ductile iron as manufactured by Mueller, Kennedy, M & H or approved equal. Covers shall be cast or ductile iron with a designation of "Water" embossed on the top side and shall be of the screw down type. Valve boxes shall be the two-piece type, adjustable in length and suitable for installation in roadway surfaces.

Payment for valve boxes shall be made at the contract unit price bid per each box and shall include all labor, and materials required to complete the installation.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
187	FURNISH & INSTALL WATER VALVE BOX (ALL SIZES AND DEPTHS)	EA

FURNISH AND INSTALL/ TEST/ TAP SS SLEEVE

Install, test and tap shall include furnishing the full circle all stainless steel tapping sleeve, Romac Industries "SST" or pre-approved equal, testing according to the manufacturer's recommendation and tapping the carrier pipe in a sanitary manner recognized by AWWA, and the Louisiana Department Of Health & Hospitals.

Payment for this work shall be made at the contract unit price bid per each and shall include all labor, and materials required to complete the installation.

Pay Item

<u>ITEM NO.</u>	<u>ITEM</u>	<u>UNIT</u>
188	FURNISH & INSTALL/ TEST/ TAP SS SLEEVE – 2" X ALL SIZES	EA
189	FURNISH & INSTALL/ TEST/ TAP SS SLEEVE – 4" X ALL SIZES	EA
190	FURNISH & INSTALL/ TEST/ TAP SS SLEEVE – 6" X ALL SIZES	EA
191	FURNISH & INSTALL/ TEST/ TAP SS SLEEVE – 8" X ALL SIZES	EA
192	FURNISH & INSTALL/ TEST/ TAP SS SLEEVE – 10" X 10"	EA
193	FURNISH & INSTALL/ TEST/ TAP SS SLEEVE – 10" X 8"	EA
194	FURNISH & INSTALL/ TEST/ TAP SS SLEEVE – 10" X 6"	EA
195	FURNISH & INSTALL/ TEST/ TAP SS SLEEVE – 10" X 4"	EA
196	FURNISH & INSTALL/ TEST/ TAP SS SLEEVE – 12" X 12"	EA
197	FURNISH & INSTALL/ TEST/ TAP SS SLEEVE – 12" X 10"	EA
198	FURNISH & INSTALL/ TEST/ TAP SS SLEEVE – 12" X 8"	EA
199	FURNISH & INSTALL/ TEST/ TAP SS SLEEVE – 12" X 6"	EA
200	FURNISH & INSTALL/ TEST/ TAP SS SLEEVE – 12" X 4"	EA

FURNISH AND INSTALL WATER SERVICES

Water service lines shall be PE-3408 black tubing of nominal sizes from ¾" through 2", all with CTS (copper tubing size) outside diameter and a 200 psi rating at 73.4° F. All water

service tubing shall comply with ASTM D2737, SDR 9. Installation of tubing shall be in accordance with manufacturer's recommendation. Care shall be exercised and proper procedures followed in tubing terminations, with tools approved by the manufacturer for this purpose. C-900 water pipe will be acceptable for pipe sizes 2 inches and greater.

Corporation stops at a main and water meter shall be Ford or approved equal of the appropriate type and size. The stops shall be installed in the main in accordance with pipe manufacturer's recommendations. Care should be taken to not over or under tighten the stops at points where they enter the main.

Payment for water services shall be made at the contract unit price bid per linear foot and shall include all labor, testing, taps, corporation stops, marking tape, and any other materials required to complete the installation.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
201	FURNISH & INSTALL WATER SERVICES – 3/4”	L.F.
202	FURNISH & INSTALL WATER SERVICES – 1”	L.F.
203	FURNISH & INSTALL WATER SERVICES – 2”	L.F.
204	FURNISH & INSTALL WATER SERVICES – 4”	L.F.
205	FURNISH & INSTALL WATER SERVICES – 6”	L.F.
206	FURNISH & INSTALL WATER SERVICES – 8”	L.F.

FURNISH AND INSTALL FIRE HYDRANT – 5 ¼”, 3-WAY

New fire hydrants shall be a three-way Mueller Centurion No. A 423, Kennedy Guardian, American Darling B-84-B, or approved equal with 5 ¼" valve opening. The length of the lower section of each hydrant shall be appropriate for the depth of the water main. All new hydrants shall be painted chrome yellow. No existing fire hydrant in the vicinity of a new hydrant shall be removed from service until the new hydrant has been installed, tested, and water system pressure is on the hydrant. Lubricate caps and threads with approved lubricant.

Payment for installed fire hydrants shall be made at the contract unit price bid per each hydrant and shall include all labor, equipment, and materials required to complete the installation.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
207	FURNISH & INSTALL FIRE HYDRANT – 5 1/4", 3 – WAY	EA

SECTION 6: DRAINAGE SYSTEM

DRAINAGE EXCAVATION AND BACKFILL

Excavation, backfill, and compaction for drainage work (pipe, catch basins, point repairs, etc.) shall be paid by the cubic yard for the various depths, as listed in the bid items. These items shall include all labor, materials, and equipment necessary to complete excavation and backfill involved in the drainage work. All excavated material shall be hauled away by the Contractor. Disposal of excavated material shall be paid under the "Disposal of Unsuitable Material" pay item in the Miscellaneous Work section.

Except for point repairs, granular material shall be used for backfill unless otherwise approved by the City Engineer. Granular backfill material shall conform to the following requirements:

Liquid limit (maximum)	25% (percent)
Plasticity index (maximum)	6% (percent)

Limestone for point repair backfill shall be in accordance with Louisiana Standard Specifications for Roads and Bridges and referenced sections, under "Stone". In addition, the material shall be calcitic or dolimitic with calcium carbonate not less than 85 percent and the silica content (impurities) not to exceed 5 percent.

Limestone material shall conform to the following gradation:

<u>U.S. Sieve</u>	<u>Percent Passing</u>
1 1/2"	100
3/4"	50-100
No. 4	35--65
No.40	10--32
No.200	3--15

Aggregate shall conform to LA DOTD approved materials. The fraction of stone passing the No. 40 sieve shall be non-plastic.

Granular and limestone backfill material will be paid for by the cubic yard truck measure.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
208	EXCAVATE FOR DRAINAGE WORK (0-6' DEPTH)	CU. YD.
209	EXCAVATE FOR DRAINAGE WORK (6'1"-8' DEPTH)	CU. YD.
210	EXCAVATE FOR DRAINAGE WORK (8'1"-10' DEPTH)	CU. YD.
211	EXCAVATE FOR DRAINAGE WORK (10'1"-12' DEPTH)	CU. YD.
212	GRANULAR BACKFILL AND COMPACTION FOR DRAINAGE WORK (0-6' DEPTH)	CU. YD.
213	GRANULAR BACKFILL AND COMPACTION FOR DRAINAGE WORK (6'1"-8' DEPTH)	CU. YD.
214	GRANULAR BACKFILL AND COMPACTION FOR DRAINAGE WORK (8'1"-10' DEPTH)	CU. YD.
215	GRANULAR BACKFILL AND COMPACTION FOR DRAINAGE WORK (10'1"-12' DEPTH)	CU. YD.
216	LIMESTONE BACKFILL AND COMPACTION FOR DRAINAGE WORK (0-6' DEPTH)	CU. YD.
217	LIMESTONE BACKFILL AND COMPACTION FOR DRAINAGE WORK (6'1"-8' DEPTH)	CU. YD.
218	LIMESTONE BACKFILL AND COMPACTION FOR DRAINAGE WORK (8'1"-10' DEPTH)	CU. YD.
219	LIMESTONE BACKFILL AND COMPACTION FOR DRAINAGE WORK (10'1"-12' DEPTH)	CU. YD.

CULVERT INSTALLATION

The type and size of pipe to be installed will be determined by the City Engineer prior to beginning of job.

Excavation, backfill, and compaction for drainage culvert pipe shall be paid under the drainage excavation and backfill items. Disposal of excavated material shall be paid under the "Disposal of Unsuitable Material" pay item in the Miscellaneous Work section. Culvert installation bid prices should include all cost of labor, materials, and equipment necessary to install drainpipe as described in this section. Replacement of sod, pavement, and other incidentals necessary to return topside to original conditions shall be paid under applicable separate bid items. Where necessary, sheeting and shoring will be paid for under separate pay items. All workmanship, construction methods, and material shall be in accordance with

Louisiana Standard Specifications for Roads and Bridges, latest edition and revision, Section 701.

Each joint shall be wrapped with filter cloth 36" wide and overlapped no less than 1/2 of the pipe diameter. **The cost of the filter cloth wrap shall be included in the cost of the pipe.** The filter cloth shall be fastened to prevent movement during backfilling. Filter cloth fabric shall be an approved geotextile filter fabric capable of retaining the soil. The filter fabric shall be Mirafi 700 X 4 oz. or an approved equal (except on non-gasketed joints, which shall be 8 oz.).

All pipes shall be installed true to line and grade, or as established by the City Engineer and free from crack or defects. The interior of the pipe shall be free from all dirt, excess water, and other foreign materials as the pipe laying progresses, and left clean at the completion of the installation. All labor, equipment, and materials required to establish lines and grades will be provided at no direct pay.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
220	FURNISH & INSTALL 15" RCP, CLASS III	LF
221	FURNISH & INSTALL 18" RCP, CLASS III	LF
222	FURNISH & INSTALL 21" RCP, CLASS III	LF
223	FURNISH & INSTALL 24" RCP, CLASS III	LF
224	FURNISH & INSTALL 30" RCP, CLASS III	LF
225	FURNISH & INSTALL 36" RCP, CLASS III	LF
226	FURNISH & INSTALL 42" RCP, CLASS III	LF
227	FURNISH & INSTALL 48" RCP, CLASS III	LF
228	FURNISH & INSTALL 18" – 11" RCPA, CLASS III	LF
229	FURNISH & INSTALL 22" – 13" RCPA, CLASS III	LF
230	FURNISH & INSTALL 29" – 18" RCPA, CLASS III	LF
231	FURNISH & INSTALL 36" – 23" RCPA, CLASS III	LF
232	FURNISH & INSTALL 44" – 27" RCPA, CLASS III	LF
233	FURNISH & INSTALL 51" – 31" RCPA, CLASS III	LF
234	FURNISH & INSTALL 58" – 36" RCPA, CLASS III	LF
235	FURNISH & INSTALL 15" COATED CORRUGATED METAL PIPE	LF
236	FURNISH & INSTALL 18" COATED CORRUGATED METAL PIPE	LF
237	FURNISH & INSTALL 24" COATED CORRUGATED METAL PIPE	LF

238	FURNISH & INSTALL 30" COATED CORRUGATED METAL PIPE	LF
239	FURNISH & INSTALL 36" COATED CORRUGATED METAL PIPE	LF
240	FURNISH & INSTALL 42" COATED CORRUGATED METAL PIPE	LF
241	FURNISH & INSTALL 48" COATED CORRUGATED METAL PIPE	LF
242	FURNISH & INSTALL 15" EQUIV. COATED CORRUGATED METAL PIPE ARCH	LF
243	FURNISH & INSTALL 18" EQUIV. COATED CORRUGATED METAL PIPE ARCH	LF
244	FURNISH & INSTALL 24" EQUIV. COATED CORRUGATED METAL PIPE ARCH	LF
245	FURNISH & INSTALL 30" EQUIV. COATED CORRUGATED METAL PIPE ARCH	LF
246	FURNISH & INSTALL 36" EQUIV. COATED CORRUGATED METAL PIPE ARCH	LF
247	FURNISH & INSTALL 42" EQUIV. COATED CORRUGATED METAL PIPE ARCH	LF
248	FURNISH & INSTALL 48" EQUIV. COATED CORRUGATED METAL PIPE ARCH	LF
249	FURNISH & INSTALL 4" PLASTIC PIPE (PVC/A2000)	LF
250	FURNISH & INSTALL 6" PLASTIC PIPE (PVC/A2000)	LF
251	FURNISH & INSTALL 8" PLASTIC PIPE (PVC/A2000)	LF
252	FURNISH & INSTALL 10" PLASTIC PIPE (PVC/A2000)	LF
253	FURNISH & INSTALL 12" PLASTIC PIPE (PVC/A2000)	LF
254	FURNISH & INSTALL 15" PLASTIC PIPE (PVC/A2000)	LF
255	FURNISH & INSTALL 18" PLASTIC PIPE (PVC/A2000)	LF
256	FURNISH & INSTALL 24" PLASTIC PIPE (PVC/A2000)	LF
257	FURNISH & INSTALL 4" PERFORATED PIPE UNDERDRAIN	LF
258	FURNISH & INSTALL 6" PERFORATED PIPE UNDERDRAIN	LF
259	FURNISH & INSTALL 8" PERFORATED PIPE UNDERDRAIN	LF
260	FURNISH & INSTALL 10" PERFORATED PIPE UNDERDRAIN	LF
261	FURNISH & INSTALL 4" NON - PERFORATED PIPE UNDERDRAIN	LF
262	FURNISH & INSTALL 6" NON - PERFORATED PIPE UNDERDRAIN	LF
263	FURNISH & INSTALL 8" NON - PERFORATED PIPE UNDERDRAIN	LF
264	FURNISH & INSTALL 10" NON - PERFORATED PIPE UNDERDRAIN	LF

CLEAN DRAINAGE PIPE OR STRUCTURE

This item shall include all labor, equipment, and materials to clean drainage piping or catch basin, junction box, conflict box, or manhole. Material removed from the pipe shall be removed from the site. Disposal of material shall be paid under the “Disposal of Unsuitable Material” pay item in the Miscellaneous Work section.

Measurement of pipe cleaned shall be per linear foot. Measurement of drainage catch basin, junction box, conflict box, or manhole cleaned shall be per each.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
265	CLEAN 12-INCH DIAMETER DRAINAGE PIPE	LF
266	CLEAN 15-INCH DIAMETER DRAINAGE PIPE	LF
267	CLEAN 18-INCH DIAMETER DRAINAGE PIPE	LF
268	CLEAN 24-INCH DIAMETER DRAINAGE PIPE	LF
269	CLEAN 30-INCH DIAMETER DRAINAGE PIPE	LF
270	CLEAN DRAINAGE CATCH BASIN, JUNCTION BOX, CONFLICT BOX, OR MANHOLE	EACH

REMOVE DRAINAGE PIPE OR STRUCTURE

This item shall include all labor, equipment, and materials to remove drainage piping or catch basin, junction box, conflict box, or manhole. All excavated concrete, debris, etc. removed during this work shall be taken from the site. Disposal of material shall be paid under the “Disposal of Unsuitable Material” pay item in the Miscellaneous Work section.

Measurement of pipe removed shall be per linear foot. Measurement of drainage catch basin, junction box, conflict box, or manhole removed shall be per each.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
271	REMOVE DRAINAGE PIPE (LESS THAN 24”)	LF
272	REMOVE DRAINAGE PIPE (24” OR GREATER)	LF
273	REMOVE DRAINAGE CATCH BASIN, JUNCTION BOX, CONFLICT BOX, OR MANHOLE	EACH

FURNISH AND INSTALL REINFORCED CONCRETE BOX CULVERT

This item covers the extension of existing concrete box culverts or the construction of new box culverts. The type and size of box culvert to be installed will be determined by the City Engineer prior to beginning of job.

Ends of existing boxes to be extended shall be cleaned of dirt and other foreign matter and shall be dry. Dowel bars shall be drilled and grouted in the existing box to provide adequate bonding and support.

All workmanship and materials shall conform to all of the applicable subsections of Section 805 of the Louisiana Standard Specifications for Roads and Bridges, latest edition and revisions.

Excavation and backfill for box culvert installation shall be paid under the drainage excavation and backfill items. Disposal of excavated material shall be paid under the "Disposal of Unsuitable Material" pay item in the Miscellaneous Work section. Replacement of pavement, sod, and other incidentals necessary to return topside to original conditions shall be paid under applicable separate bid items. The box culvert bid items in this section shall include cost of filter fabric wrap and all labor, materials, and equipment necessary to completely install culvert including establishing lines and grades specified by the City Engineer. Sheeting or shoring where required, will be paid for under separate pay item.

Box culvert shall be installed true to line and grade, or as established by the City Engineer and free from crack or defects. The interior of the box culvert shall be free from all dirt, excess water, and other foreign materials as the culvert laying progresses, and left clean at the completion of the installation. All labor, equipment, and materials required to establish lines and grades will be provided at no direct pay.

The box culvert shall be measured and paid per linear foot of culvert for the applicable size measured from end to end of culvert. All workmanship, construction methods, and material shall be in accordance with Louisiana Standard Specifications for Roads and Bridges, latest edition and revision, Section 701.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
274	FURNISH & INSTALL 4' X 3' REINFORCED CONCRETE BOX CULVERT	LF
275	FURNISH & INSTALL 4' X 4' REINFORCED CONCRETE BOX CULVERT	LF
276	FURNISH & INSTALL 5' X 4' REINFORCED CONCRETE BOX CULVERT	LF
277	FURNISH & INSTALL 5' X 5' REINFORCED CONCRETE BOX CULVERT	LF

DRAIN PIPE POINT REPAIR

Drainage pipe point repairs shall consist of excavation to completely expose work area required for repair, installation of a collar completely around the leaking joint constructed with either grout or brick, wrapping joint with 3-ft wide filter cloth, and backfilling to the top of pipe with limestone.

Excavation and backfill for point repairs shall be paid under the drainage excavation and backfill items. Disposal of excavated material shall be paid under the "Disposal of Unsuitable Material" pay item in the Miscellaneous Work section. The drainage pipe, if required for repair, shall be paid per linear foot under the bid item for drainage pipe, size and type as required. Limestone backfill by separate bid item above.

Restoration of roadways, driveways, sidewalks, ground cover (sod) and other incidentals associated with the work shall be paid under applicable separate bid item. All materials used shall conform to the applicable sections of these specifications.

If a point repair is performed on a drainage line with side connections, the contractor will be responsible for reconnecting the connection to the main drain line at no direct pay.

Pay items below for drainage pipe point repairs below shall be paid per each repair and shall include all labor, equipment, and materials to build brick or grout collar and the filter cloth.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
278	DRAINAGE PIPE POINT REPAIR 0'-6' (15"-21")	EACH
279	DRAINAGE PIPE POINT REPAIR 6'-1"-8' (15"-21")	EACH

280	DRAINAGE PIPE POINT REPAIR 0'-6' (24"-36")	EACH
281	DRAINAGE PIPE POINT REPAIR 6'1"-8' (24"-36")	EACH
282	DRAINAGE PIPE POINT REPAIR 0'-6' (42"-54")	EACH
283	DRAINAGE PIPE POINT REPAIR 6'1"-8' (42"-54")	EACH

DRAINAGE MANHOLES, JUNCTION BOXES, CONFLICT BOXES, AND CATCH BASINS

The type of drainage manhole, junction box, conflict box, or catch basin to be constructed at each location will be determined by the City Engineer prior to beginning of job.

Excavation, backfill, and compaction for the installing, removing, repairing, or adjusting a manhole, junction box, conflict box, or catch basin shall be paid under the drainage excavation and backfill pay items. All excavated material will be hauled away. Disposal of excavated material shall be paid under the "Disposal of Unsuitable Material" pay item in the Miscellaneous Work section.

Installation of catch basin, curb inlets, drop inlets, yard drains and drain manholes shall be paid per cubic foot volume of the entire box. Measurements shall be from inside of walls, slab, or top of structure.

If work is repairing a manhole, junction box, conflict box, or catch basin, the actual repair work shall be paid one per each location on the structure repaired. Repair shall include excavating and exposing all outside walls, repairing as needed, then mortar grouting inside and out and wrapping outside with filter cloth. All workmanship, construction methods, and material shall be in accordance with Louisiana Standard Specifications for Roads and Bridges, latest edition and revision, Section 702.

Inside and outside of manhole, junction box, conflict box, or catch basin shall be sealed with grout. After grouting, each structure shall be completed wrapped with filter cloth around all walls. **The cost of the grouting and filter cloth wrap shall be included in the cost of the structure or repair work.** The filter cloth shall be fastened to prevent movement during backfilling. Filter cloth fabric shall be an approved geotextile filter fabric capable of retaining the soil. The filter fabric shall be Mirafi 700 X 4 oz. or an approved equal (except on non-gasketed joints, which shall be 8 oz.).

Casing for conflict pipe shall be schedule 40 equivalent or better and shall extend to outside edges of box. **No separate pay will be allowed for casing material.**

Drainage manhole frames and covers shall be Vulcan Foundry, Denham Springs, Louisiana; Dews Foundry, Hattiesburg, Mississippi; or approved equal. Frame and cover shall weigh not less than three hundred twenty (320) pounds for the standard type. Frame for cover shall be included in price for manhole.

Castings for manhole frames, covers, and all other iron castings required shall be of tough gray iron free from injurious defects. The annular bearing planes shall be ground or machined so they will not rock or rattle when crossed by traffic. Allowance shall be made in the patterns so that the thickness required will not be reduced by grinding or machining. Covers shall fit the frame accurately in any position. **Drainage manhole cover shall have the word "DRAIN" imprinted on top.**

Drainage structures shall be installed true to line and grade, as established by the city engineer. The interior of the structure shall be free from all dirt, excess water, and other foreign materials and left clean at the completion of the installation. All labor, equipment, and materials required to establish lines and grades will be provided at no direct pay.

Bid prices shall include all cost of filter fabric, grouting, labor, materials, equipment, etc. necessary to completely install the manhole, junction box, conflict box, or catch basin as specified. Sheeting or shoring, where required, will be paid for under separate pay item.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
284	FURNISH & INSTALL CATCH BASIN - DROP INLET	CU. FT.
285	FURNISH & INSTALL CATCH BASIN - CURB INLET	CU. FT.
286	FURNISH & INSTALL NEW 24" FRAME & GRATE	EACH
287	FURNISH & INSTALL NEW 30" FRAME & GRATE	EACH
288	FURNISH & INSTALL NEW 36" FRAME & GRATE	EACH
289	FURNISH & INSTALL NEW CURB INLET FRAME	EACH
290	RESET EXISTING GRATING AND/OR FRAME	EACH
291	FURNISH & INSTALL CONFLICT BOX	CU. FT.
292	FURNISH & INSTALL DRAIN MANHOLE/JUNCTION BOX	CU. FT.

293	FURNISH & INSTALL DRAINAGE MANHOLE LID	EACH
294	ADJUSTING DRAIN MANHOLES, INLETS, AND JUNCTION BOXES	CU. FT.
295	REPAIR CATCH BASIN	EA
296	REPAIR CURB DRAIN	EA

FURNISH AND INSTALL RIP RAP

The work under this item consists of the placing rip rap at the location, depth, and dimensions as directed by the City Engineer.

All work shall conform to the Louisiana Department of Transportation and Development's Standard Specifications For Roads And Bridges, latest edition and revisions section 711.

Broken concrete used as rip rap shall contain no rebar and shall be broken into max 55 lb pieces.

Payment for installed Rip Rap shall be made at the contract unit price bid per cubic yard, truck measure.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
297	FURNISH & INSTALL 10-LB RIP RAP	CU. YD.
298	FURNISH & INSTALL 30-LB RIP RAP	CU. YD.
299	FURNISH & INSTALL 55-LB RIP RAP	CU. YD.

SECTION 7: TESTING

CONCRETE TESTING

This item covers all work associated with the testing of concrete both structural and pavement. The Contractor shall hire an independent testing laboratory to perform the following tests. The testing laboratory must be approved by the Owner prior to any work being done:

1. Slump: ASTM C 143; one test for each set of compressive strength test specimens.
2. Air Content: ASTM C 231; one test for each set of compressive strength test specimens.
3. Compression Test Specimen: ASTM C 31; one set of 4 standard cylinders for each compressive strength test.
4. Compressive Strength Tests: ASTM C 39; one specimen tested at 7 days, 2 specimens tested at 28 days, and one specimen retained in reserve for later testing if required.

After the completion of testing, test reports shall be issued in the following format:

1. Test results shall be reported in writing on same day that tests are made.
2. The Materials Engineering Laboratory shall promptly process and distribute all required copies of test reports and related instructions to insure all necessary testing, retesting or replacement of materials are performed with the least possible delay to progress of the work. Submit copies of each report to the following:
 - a. Owner (two copies)
 - b. Contractor (one copy)

The reports shall include:

- a. Date issued
- b. Project title and number
- c. Materials Engineering Laboratory, name, address, and telephone number
- d. Name of laboratory inspector
- e. Location of sample or test on the project
- f. Type of inspection or test
- g. Date and time of sampling and/ or inspection
- h. Record of temperature and weather conditions
- i. Date of tests

- j. Location of concrete batch in structure
- k. Concrete type and class
- l. Concrete mix proportions and materials
- m. Design compressive strength at 28 days
- n. Compressive breaking strength and type of break for both 7-day tests and 28-day tests
- o. Results of tests and compliance with Contract Documents

The number of test to be done for a concrete pour will be established by the City Engineer prior to construction.

The measurement will be per set of four cylinders including all slump tests, air content tests, making cylinders, compression tests, and reports. Payment will be at the contract unit price bid per set, which while include all labor, materials, equipment, and tests necessary to complete this item.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
300	CONCRETE TESTING	EACH

ASPHALT TESTING

This item covers all work associated with asphalt paving as listed below. The Contractor shall retain a qualified testing laboratory to perform all testing work done under this item. The testing laboratory must be approved by the Owner prior to any work being done. The tests to be done under this item are as follows:

1. Extraction and Gradation Test: ASTM D2172 per each
2. Field-in-Place Density Test: ASTM D1188 per each
3. Density Test on Cut Cores: ASTM D2726 per each

After the completion of testing, a test reports shall be issued in the following format:

1. Test results shall be reported in writing on same day that tests are made.

2. The Materials Engineering Laboratory shall promptly process and distribute all required copies of test reports and related instructions to insure all necessary testing, retesting or replacement of materials are performed with the least possible delay to progress of the work. Submit copies of each report to the following:
 - a. Owner (two copies)
 - b. Contractor (one copy)
3. The reports shall include:
 - a. Date issued
 - b. Project title and number
 - c. Materials Engineering Laboratory, name, address, and telephone number
 - d. Name of laboratory inspector
 - e. Location of sample or test on the project
 - f. Type of inspection or test
 - g. Date and time of sampling and/ or inspection
 - h. Record of temperature and weather conditions
 - i. Date of tests
 - j. Results of tests and compliance with Contract Documents

The number and type of test to be done shall be determined per job. The measurement for Extraction and Gradation, Field-in-Place Density, and Core Sample –Laboratory Test shall be per each. Payment will be made at the contract unit price bid per each, which shall include all labor, materials, and equipment necessary to complete this item.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
301	EXTRACTION AND GRADATION	EACH
302	FIELD-IN-PLACE DENSITY	EACH
303	CORE SAMPLE	EACH

SOIL TESTING

This item covers all work associated with soil testing required by this contract. The Contractor shall retain the services of an independent testing laboratory to perform all testing work done under this item. The testing laboratory must be approved by the Owner prior to any work being done.

The tests to be done are as follows:

1. Optimum Moisture – Maximum Density Curve (Proctor ASTM D698) per each.
2. Field Density Test (Nuclear, ASTM D2922 or Sand Cone, ASTM D1556) at frequency per layer of fill or backfill placed in lift depths as specified per each.
3. Perform Gradation Analysis for material per each.
4. Perform Atterburg Limit Test as required per each.

After the completion of testing, a test reports shall be issued in the following format:

1. Test results shall be reported in writing on same day that tests are made.
2. The Materials and Engineering Laboratory shall promptly process and distribute all required copies of test reports and related instructions to insure all necessary testing, retesting or replacement or materials are performed with the least possible delay to progress of the work. Submit copies of each report to the following:
 - a. Owner (two copies)
 - b. Contractor (one copy)
3. The reports shall include:
 - a. Date issued
 - b. Project title and number
 - c. Materials Engineering Laboratory, name, address, and telephone number
 - d. Name of laboratory inspector
 - e. Location of sample or test on the project
 - f. Type of inspection or test
 - g. Date and time of sampling and/ or inspection
 - h. Record of temperature and weather conditions
 - i. Date of tests
 - j. Results of tests and compliance with Contract Documents

The number and type of test to be done and the locations will be determined per job. The measurement for Optimum Moisture-Maximum Density Curve, Field Density Test, Gradation, and the Atterburg Limit Tests shall be per each. Payment will be made at the contract unit price bid per each, which shall include all labor, materials, and equipment necessary to complete the work under this item.

Pay Item

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
304	OPTIMUM MOISTURE – MAXIMUM DENSITY	EACH
305	FIELD DENSITY TEST	EACH
306	GRADATION ANALYSIS	EACH
307	ATTERBURG LIMIT TESTS	EACH