

THE ARC
Ascension Parish
Donaldsonville, LA

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SECTION 02112 - SELECTIVE DEMOLITION

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for selective demolition. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Demolition and removal of selected portions of building or structure.
 - b. Demolition and removal of selected site elements.
 - c. Salvage of existing items to be reused or recycled.

C. Definitions

1. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.
2. Remove and Salvage: Detach items from existing construction and deliver them to Owner ready for reuse, **as directed**.
3. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.
4. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

D. Materials Ownership

1. Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to Owner that may be encountered during selective demolition remain Owner's property. Carefully remove and salvage each item or object in a manner to prevent damage and deliver promptly to Owner.
 - a. Coordinate with Owner's archaeologist **OR** historical adviser, **as directed**, who will establish special procedures for removal and salvage.

E. Submittals

1. Qualification Data: For demolition firm, professional engineer, refrigerant recovery technician, **as directed**.
 2. Schedule of Selective Demolition Activities: Indicate the following:
 - a. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's building manager's and other tenants' on-site operations are uninterrupted.
 - b. Interruption of utility services. Indicate how long utility services will be interrupted.
 - c. Coordination for shutoff, capping, and continuation of utility services.
 - d. Use of elevator and stairs.
 - e. Locations of proposed dust- and noise-control temporary partitions and means of egress, including for other tenants affected by selective demolition operations.
 - f. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
 - g. Means of protection for items to remain and items in path of waste removal from building.
 3. Inventory: After selective demolition is complete, submit a list of items that have been removed and salvaged.
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4. Pre-demolition Photographs or Videotapes: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by selective demolition operations. Submit before Work begins.
5. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.
 - a. Comply with submittal requirements in Division 01 Section "Construction Waste Management".

F. Quality Assurance

1. Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project.
2. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.
3. LEED Requirements for Building Reuse:
 - a. Credit MR 1.1 and 1.2, **as directed**: Maintain existing building structure (including structural floor and roof decking) and envelope (exterior skin and framing, excluding window assemblies and nonstructural roofing material) not indicated to be demolished; do not demolish such existing construction beyond indicated limits.
 - b. Credit MR 1.3: Maintain existing interior nonstructural elements (interior walls, doors, floor coverings, and ceiling systems) not indicated to be demolished; do not demolish such existing construction beyond indicated limits.
 - c. Credit MR 1.2 and 1.3, **as directed**: Maintain existing nonshell, nonstructural components (walls, flooring, and ceilings) not indicated to be demolished; do not demolish such existing construction beyond indicated limits.
4. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
5. Standards: Comply with ANSI A10.6 and NFPA 241.
6. Pre-demolition Conference: Conduct conference at Project site. Review methods and procedures related to selective demolition including, but not limited to, the following:
 - a. Inspect and discuss condition of construction to be selectively demolished.
 - b. Review structural load limitations of existing structure.
 - c. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
 - d. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
 - e. Review areas where existing construction is to remain and requires protection.

G. Project Conditions

1. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
2. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
 - a. Before selective demolition, items will be removed as directed by the Owner.
3. Notify the Owner of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
4. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
 - a. Hazardous materials will be removed by Owner before start of the Work **OR** have been removed by Owner under a separate contract, **as directed**.
 - b. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify the Owner. Owner will remove hazardous materials under a separate contract.

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5. Hazardous Materials: It is unknown whether hazardous materials will be encountered in the Work.
 - a. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify the Owner. Owner will remove hazardous materials under a separate contract.
 6. Hazardous Materials (if asbestos abatement is part of Work of this Contract): Hazardous materials are present in construction to be selectively demolished. A report on the presence of hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present.
 - a. Hazardous material remediation is specified elsewhere in the Contract Documents.
 - b. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.
 7. Storage or sale of removed items or materials on-site is not permitted.
 8. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
 - a. Maintain fire-protection facilities in service during selective demolition operations.

H. Warranty

1. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties.

1.2 PRODUCTS (Not Used)

1.3 EXECUTION

A. Utility Services And Mechanical/Electrical Systems

1. Existing Services/Systems: Maintain services/systems indicated to remain and protect them against damage during selective demolition operations.
2. Service/System Requirements: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.
 - a. the Owner will arrange to shut off indicated services/systems when requested by Contractor.
 - b. Arrange to shut off indicated utilities with utility companies.
 - c. If services/systems are required to be removed, relocated, or abandoned, before proceeding with selective demolition provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
 - d. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.
 - 1) Where entire wall is to be removed, existing services/systems may be removed with removal of the wall.

B. Preparation

1. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
2. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 - a. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
 - b. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.

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- c. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
 - d. Cover and protect furniture, furnishings, and equipment that have not been removed.
 - e. Comply with requirements for temporary enclosures, dust control, heating, and cooling.
3. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
- a. Strengthen or add new supports when required during progress of selective demolition.

C. Selective Demolition, General

- 1. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
 - a. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
 - b. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
 - c. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 - d. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
 - e. Maintain adequate ventilation when using cutting torches.
 - f. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 - g. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
 - h. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 - i. Dispose of demolished items and materials promptly. Comply with requirements in Division 01 Section "Construction Waste Management".
- 2. Reuse of Building Elements: Project has been designed to result in end-of-Project rates for reuse of building elements as follows. Do not demolish building elements beyond what is indicated on Drawings without the Owner's approval.
 - a. Building Structure and Shell: 75 **OR** 100, **as directed**, percent.
 - b. Non-shell Elements: 50 percent.
- 3. Removed and Salvaged Items:
 - a. Clean salvaged items.
 - b. Pack or crate items after cleaning. Identify contents of containers.
 - c. Store items in a secure area until delivery to Owner.
 - d. Transport items to Owner's storage area on-site **OR** off-site **OR** designated by Owner **OR** indicated on Drawings, **as directed**.
 - e. Protect items from damage during transport and storage.
- 4. Removed and Reinstalled Items:
 - a. Clean and repair items to functional condition adequate for intended reuse. Paint equipment to match new equipment.
 - b. Pack or crate items after cleaning and repairing. Identify contents of containers.
 - c. Protect items from damage during transport and storage.

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- d. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
 - 5. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by the Owner, items may be removed to a suitable, protected storage location during selective demolition and cleaned, **as directed**, and reinstalled in their original locations after selective demolition operations are complete.
- D. Selective Demolition Procedures for Specific Materials
- 1. Concrete: Demolish in small sections. Cut concrete to a depth of at least 3/4 inch (19 mm) at junctures with construction to remain, using power-driven saw. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete indicated for selective demolition. Neatly trim openings to dimensions indicated.
OR
Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals, using power-driven saw, then remove concrete between saw cuts.
 - 2. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.
 - 3. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.
 - 4. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI-WP and its Addendum.
 - a. Remove residual adhesive and prepare substrate for new floor coverings by one of the methods recommended by RFCI.
 - 5. Roofing: Remove no more existing roofing than can be covered in one day by new roofing and so that building interior remains watertight and weathertight. Refer to Division 07 for new roofing requirements.
 - a. Remove existing roof membrane, flashings, copings, and roof accessories.
 - b. Remove existing roofing system down to substrate.
 - 6. Air-Conditioning Equipment: Remove equipment without releasing refrigerants.
- E. Disposal Of Demolished Materials
- 1. General: Except for items or materials indicated to be recycled, **as directed**, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.
 - a. Do not allow demolished materials to accumulate on-site.
 - b. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 - c. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
 - d. Comply with requirements specified in Division 01 Section "Construction Waste Management".
 - 2. Burning: Do not burn demolished materials.
OR
Burning: Burning of demolished materials will be permitted only at designated areas on Owner's property, **as directed**, provided required permits are obtained. Provide full-time monitoring for burning materials until fires are extinguished.
 - 3. Disposal: Transport demolished materials and dispose of at designated spoil areas on Owner's property.
OR
Disposal: Transport demolished materials off Owner's property and legally dispose of them.
- F. Cleaning

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1. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

G. Selective Demolition Schedule

1. Existing Items **OR** Construction, **as directed**, to Be Removed, as directed by the Owner.
2. Existing Items to Be Removed and Salvaged, as directed by the Owner.
3. Existing Items to Be Removed and Reinstalled, as directed by the Owner.
4. Existing Items to Remain, as directed by the Owner.

END OF SECTION 02112

SECTION 02003 – AGGREGATES

PART 1 -- GENERAL

1.1 THE REQUIREMENT

- A. The CONTRACTOR shall provide aggregates as specified herein and elsewhere required by the Contract Documents.

1.2 CONTRACTOR SUBMITTALS, SAMPLING, AND TESTING

- A. The CONTRACTOR shall provide submittals, samples for testing, and testing of materials in accordance with Section 01010 – General Requirements and Section 01030 – Submittals, Sampling and Testing Plan.

1.3 REFERENCE STANDARDS

- A. American Association of State Highway and Transportation Officials (AASHTO) AASHTO

T96	Standard Method of Test for Resistance to Degradation of Small Size Aggregate by Abrasion and Impact in the Los Angeles Machine
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AASHTO T104	Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
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- B. ASTM International

ASTM D4791	Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate
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- C. Louisiana Department of Transportation and Development (DOTD)

DOTD AML	Louisiana DOTD Approved Materials List
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TR 111	Abrasion of Lightweight Coarse Aggregate
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TR 428	Determining the Atterberg Limits of Soils
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1.4 QUALITY CONTROL

- A. The CONTRACTOR shall locate, select, and place material conforming to specification requirements and requirements shown on the drawings. The CONTRACTOR shall control his processes, including performing tests and making adjustments as necessary to result in a uniform product meeting all the requirements of the drawings and specifications.

PART 2 -- PRODUCTS

2.1 GENERAL REQUIREMENTS FOR AGGREGATES

- A. Aggregates shall be environmentally acceptable for the intended use and shall be from a source acceptable to the ENGINEER. For an aggregate source to be approved, each

sample shall comply with the general requirements within this subsection and requirements for specific aggregate applications contained within this section and other specifications sections.

- B. **Soundness Loss:** The soundness loss of recycled Portland cement concrete and aggregates listed in the LDOTD AML (formerly QPL2) shall not exceed 15 percent when subjected to 5 cycles of the magnesium sulfate soundness test in accordance with AASHTO T 104.
- C. **Abrasion Loss:** Coarse aggregate listed in the LDOTD AML (formerly QPL 2), and recycled Portland cement concrete, except for lightweight aggregate, shall show an abrasion loss of not more than 40 percent when tested in accordance with AASHTO T96. Lightweight aggregate shall be expanded clay or expanded shale and shall show an abrasion loss of not more than 40 percent when tested in accordance with DOTD TR 111.
- D. **Recycled Portland Cement Concrete:** Recycled Portland cement concrete shall be approved in dedicated stockpiles and shall be free of asphaltic concrete overlay material, reinforcing steel, joint material, or other debris. After processing, recycled Portland cement concrete shall comply with the requirements specified herein. When a stockpile has been accepted, no other material shall be added without the approval of the ENGINEER.
- E. **Reclaimed Asphalt Concrete Pavement:** Reclaimed asphaltic pavement shall be cold planed or crushed. Reclaimed asphalt pavement shall be approved either at the time of removal from the roadway or in stockpiles. Stockpiled material shall be uniform and reasonably free of lightweight aggregate, debris, soil, or other foreign matter.
- F. **Friction Ratings:** Where specified herein or in other specifications sections, aggregates shall comply with the requirements for friction ratings as defined in the table below and as indicated on the LDOTD AML (formerly QPL 2).

<u>Friction Rating</u>	<u>Description</u>
I	Aggregates that have a Polish Value of greater than 37 or demonstrate the ability to retain acceptable friction numbers for the life of the pavement.
II	Aggregates that have a Polish Value of 35 to 37 or demonstrate the ability to retain acceptable friction numbers for the life of the pavement.
III	Aggregates that have a Polish Value of 30 to 34 or demonstrate the ability to retain acceptable friction numbers for the life of the pavement
IV	Aggregates with a Polish Value of 20 to 29.

2.2 AGGREGATES FOR PORTLAND CEMENT CONCRETE AND MORTAR

- A. All aggregates for use in Portland cement concrete shall comply with the General Requirements for Aggregates detailed above and the requirements below.

- B. **Fine Aggregate for Portland Cement Concrete:** Sand shall be a natural silica sand from a source listed in the LDOTD AML (formerly QPL 2). The percentages of deleterious materials shall not exceed the following values:

MAXIMUM DELETERIOUS MATERIALS – FINE AGGREGATES FOR PORTLAND CEMENT CONCRETE	
Property	Percent, Max
Coal and Lignite	0.25
Clay Lumps	0.05
Clay Lumps and Friable Particles	3.00

Fine aggregate for Portland cement concrete shall comply with the following gradations:

GRADATION REQUIREMENTS – FINE AGGREGATES FOR PORTLAND CEMENT CONCRETE	
Concrete Sand	
U.S. Sieve	Percent Passing
3/8 inch	100
No. 4	95-100
No. 16	45-90
No. 50	7-30
No. 100	0-7
No. 200	0-3
Mortar Sand	
U. S. Sieve	Percent Passing
No. 4	100
No. 8	95-100
No. 100	0-25
No. 200	0-10

- C. **Coarse Aggregate for Portland Cement Concrete:** The maximum amounts by weight of deleterious materials for coarse aggregate shall be as follows:

MAXIMUM DELETERIOUS MATERIALS – COARSE AGGREGATE FOR PORTLAND CEMENT CONCRETE	
<u>Property</u>	<u>Percent, Max</u>
Clay Lumps	0.05
Total Clay Lumps and Friable Particles	3.0
Iron Ore	2.0

Glassy Particles in Slag	10.0
Flat and Elongated Particles (5:1) (ASTM D4791)	10.0
Coal and Lignite	1.0
Wood (Wet)	0.05
Total Clay Lumps and Friable Particles, Iron Ore, Coal and Lignite, Wood	5.0

When used in Portland cement concrete for bridge decks, coarse aggregates for Portland cement concrete shall have a friction rating of I, II, or III.

1. **Uncrushed Coarse Aggregate for Portland Cement Concrete:** Uncrushed coarse aggregate for Portland cement concrete shall comply with the table below:

GRADATIONS FOR PORTLAND CEMENT CONCRETE COURSE AGGREGATES					
U.S. Sieve	Grade A (Size 57)	Grade B (Size 467)	Grade D (Size 357)	Grade F ---	Grade P (Size 67)
2 1/2 inch	---	---	100	---	---
2 inch	---	100	90-100	---	---
1 1/2 inch	100	85-100	---	---	---
1 inch	90-100	---	35-70	---	100
3/4 inch	---	35-70	---	100	80-100
1/2 inch	25-60	---	10-30	90-100	---
3/8 inch	---	10-30	---	---	20-55
No. 4	0-10	0-5	0-5	15-60	0-10
No. 8	0-5	---	---	0-15	0-5
No. 16	---	---	---	0-5	---
No. 200	0-1	0-1	0-1	0-1	0-1

2. Crushed coarse aggregates for Portland cement concrete shall comply with the uncrushed coarse aggregate gradations except that when the material finer than the No. 200 sieve consists of the dust fraction from crushing, essentially free from clay, this percentage shall be 0 – 2 percent. When the total material passing the No. 200 sieve from the coarse and fine aggregates does not exceed 5 percent, the percent passing the No. 200 sieve from the crushed coarse aggregate may be increased to 3 percent.

2.3 AGGREGATES FOR SURFACE COURSES

- A. All aggregates for use in Portland cement concrete shall comply with the General Requirements for Aggregates detailed above and the requirements below.
- B. **Stone for Surface Courses:** This material shall consist of 100 percent stone and shall comply with the gradation specified below. The fraction of stone passing the No. 40 sieve shall have a maximum liquid limit of 25 and a maximum plasticity index of 4.

GRADATION FOR STONE FOR SURFACE COURSES	
U.S. Sieve	Percent Passing
1 – ½ inch	100
¾ Inch	50 – 100
No. 4	35 – 65
No. 40	10 – 32
No. 200	3 – 15

- C. **Sand – Clay – Gravel for Surface Courses:** This material shall be a mixture of sand, clay, and siliceous gravel, stone or recycled Portland cement concrete. The mixture shall be reasonably free from foreign matter as determined by visual inspection. The mixture, prior to treatment shall comply with the gradation specified below. The fraction passing the No. 4 sieve shall have a maximum liquid limit of 40 and a plasticity index greater than 4 and less than 15. Stone and recycled Portland cement concrete in the mixture shall be in conformance with the general requirements for aggregates specified herein.

GRADATION FOR SAND – CLAY - GRAVEL FOR SURFACE COURSES	
U.S. Sieve	Percent Passing
1 – ½ Inch	95 - 100
No. 4	40 - 65
No. 40	---
No. 200	10 - 25

- D. **Recycled Portland Cement Concrete for Surface Courses:** Recycled Portland cement concrete for surface courses shall be crushed Portland cement concrete and will be permitted in combination with other approved stone for surface courses. After being crushed the recycled Portland cement concrete or a combination of stone and recycled Portland cement concrete shall comply with the following gradation.

GRADATION FOR RECYCLED PORTLAND CEMENT CONCRETE FOR SURFACE COURSES	
U.S. Sieve	Percent Passing
1 – ½ inch	100
¾ Inch	50 – 100
No. 4	35 – 65
No. 40	10 – 32
No. 200	3 – 15

- E. **Reclaimed Asphaltic Pavement for Surface Courses:** Reclaimed asphaltic pavement shall comply with the general requirements specified above and the gradation specified below.

GRADATION FOR RECLAIMED ASPHALTIC PAVEMENT FOR SURFACE COURSES	
U.S. Sieve	Percent Passing
2 – ½ Inch	100
No. 4	35 - 75

- F. **Crushed Slag for Surface Courses:** Crushed slag shall be 100 percent crushed slag and shall comply with the general requirements specified above and the gradation requirements specified below. The fraction of slag passing the No. 40 sieve shall be non – plastic.

GRADATION FOR CRUSHED SLAG FOR SURFACE COURSES	
U.S. Sieve	Percent Passing
1 – ½ inch	100
¾ Inch	50 – 100
No. 4	35 – 65
No. 40	10 – 32
No. 200	3 – 15

2.4 AGGREGATES FOR BEDDING MATERIAL

- A. All aggregates for use in bedding material shall comply with the General Requirements for Aggregates detailed above and the requirements below.
- B. Bedding materials shall consist of stone, recycled Portland cement concrete, or a mixture of either recycled Portland cement concrete, gravel, crushed slag, or stone as specified herein.
- C. **Stone for Bedding Material:** Stone for bedding material shall be 100% stone and shall comply with the general requirements specified above and the gradation requirements specified below. The fraction of stone passing the No. 4 sieve shall have a maximum liquid limit of 25 and a maximum plasticity index of 4.

GRADATION FOR STONE FOR BEDDING MATERIAL	
U.S. Sieve	Percent Passing
1 – ½ inch	100
¾ Inch	50 – 100
No. 4	35 – 65
No. 40	10 – 32
No. 200	3 – 15

- D. **Recycled Portland Cement Concrete Pavement for Bedding Material:** Recycled Portland cement concrete shall be crushed Portland cement concrete and will be permitted in combination with other approved stone for surface courses. After being

crushed the recycled Portland cement concrete or a combination of stone and recycled Portland cement concrete shall comply with the following gradation.

GRADATION FOR RECYCLED PORTLAND CEMENT CONCRETE PAVEMENT FOR BEDDING MATERIAL	
U.S. Sieve	Percent Passing
1 – ½ inch	100
¾ Inch	50 – 100
No. 4	35 – 65
No. 40	10 – 32
No. 200	3 – 15

- E. **Sand – Aggregate for Bedding Material:** The sand-aggregate material shall be a natural or artificial mixture of sand and gravel, crushed slag, recycled Portland cement concrete, or other approved aggregate listed in this subsection. Material passing the No. 40 (425 µm) sieve shall be non-plastic. The mixture shall be free of foreign matter as determined by visual inspection and shall comply with the following gradation prior to placement.

GRADATION FOR SAND - AGGREGATE FOR BEDDING MATERIAL	
U.S. Sieve	Percent Passing
1 – ½ inch	95 – 100
No. 4	30 – 50
No. 10	20 – 45
No. 200	0 – 10

2.5 AGGREGATES FOR BACKFILL MATERIAL

- A. **Stone (Type “A” Backfill) for Backfill Material:** This material shall consist of 100 percent stone and shall comply with the gradation specified below. To facilitate meeting these gradation requirements, a calcium carbonate additive approved by the Materials and Testing Section may be added to the stone. The additive shall be thoroughly blended with the stone by approved methods prior to placement on the project. When tested according to DOTD TR 428, the fraction passing the No. 40 (425 µm) sieve, including any additive, shall have a liquid limit no greater than 25, and a plasticity index of no greater than 4.

GRADATION FOR STONE (TYPE “A” BACKFILL) FOR BACKFILL MATERIAL	
U.S. Sieve	Percent Passing
1 – ½ Inch	100
1 Inch	90 – 100
¾ Inch	70 – 100
No. 4	35 - 65
No. 40	12 – 32
No. 200	5 - 12

- B. **Recycled Portland Cement Concrete (Type “A” Backfill) for Backfill Material:**
 Recycled portland cement concrete shall be crushed portland cement concrete. After being crushed, recycled portland cement concrete may contain a minimal amount of other base course materials resulting from normal construction methods and shall conform to the gradation specified below. The fraction of recycled Portland cement concrete passing the No. 40 sieve shall be non – plastic.

GRADATION FOR RECYCLED PORTLAND CEMENT CONCRETE (TYPE “A” BACKFILL) FOR BACKFILL MATERIAL	
U.S. Sieve	Percent Passing
1 – ½ Inch	100
1 Inch	90 – 100
¾ Inch	70 – 100
No. 4	35 – 65
No. 40	12 – 32
No. 200	0 - 8

PART 3 -- EXECUTION

3.1 GENERAL

- A. Execution requirements for aggregates are contained within the specific specifications sections for the WORK into which the aggregates are being incorporated.

- END OF SECTION -

SECTION 02200 - EARTHWORK

PART 1 -- GENERAL

1.1 THE REQUIREMENT

- A. The CONTRACTOR shall perform earthwork indicated and required for construction of the WORK, complete and in place, in accordance with the Contract Documents.

1.2 REFERENCE STANDARDS

- A. ASTM International (ASTM)

ASTM D3787	Standard Test Method for Bursting Strength of Textiles
ASTM D4491	Standard Test Methods for Water Permeability of Geotextiles by Permeability
ASTM D4533	Standard Test Method for Trapezoid Tearing Strength of Geotextiles
ASTM D4632	Standard Test Method for Grab Breaking Load and Elongation of Geotextiles
ASTM D4751	Standard Test Methods for Determining Apparent Opening Size of a Geotextile
ASTM D4833	Standard Test Method for Index Puncture Resistance of Geomembranes and Related Products
ASTM G154	Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials

- B. Code of Federal Regulations (CFR)

29 CFR 1926	Safety and Health Regulations for Construction
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- C. Louisiana Department of Transportation and Development (LDOTD)

AML	Approved Materials List (formerly QPL)
TR 401	Determination of In Place Density
TR 403	Determination of Moisture Content
TR 415	Field Moisture – Density Relationships
TR 418	Moisture Density Relationships
TR 429	Resistivity Values of Soil and Water
TR 430	Determination of pH of Water or Soil

1.3 CONTRACTOR SUBMITTALS, SAMPLING, AND TESTING

- A. The CONTRACTOR shall provide submittals, samples for testing, and testing of materials in accordance with Section 01010 – General Requirements and Section 01030 – Submittals, Sampling and Testing Plan.

1.4 QUALITY ASSURANCE

- A. The CONTRACTOR shall locate, select, and place material conforming to specification requirements and requirements shown on the drawings. The CONTRACTOR shall control his processes, including performing tests and making adjustments as necessary to result in a uniform product meeting all the requirements of the drawings and specifications.
- B. All sheeting, shoring, and bracing of excavations shall conform to requirements necessary to comply with local codes and authorities having jurisdiction. Impact pile driving and sheet pile installations will cause vibrations that may affect existing residences or underground utilities in the vicinity of the proposed force main. Peak particle velocities due to pile driving should be monitored at critical locations with a seismograph during the installation of test piles, job piles and sheet piles. The record of peak particle velocities will provide information in assessing the need for changes in driving operations and the types of changes best suited for the project requirements. Monitoring will be performed by an independent testing lab retained by the OWNER.

PART 2 -- PRODUCTS

2.1 SOIL USAGE

- A. Soils which do not meet Liquid Limit or Plasticity Index requirements shall not be blended to reduce Liquid Limit or Plasticity Index. Soils may be treated with Lime to reduce plasticity index only with the approval of the ENGINEER.

2.2 USABLE SOILS

- A. Useable soils shall have a maximum PI of 25 and a maximum organic content of 5 percent. Soils with a silt content of 50 percent or greater and also a PI of 10 or less will not be allowed.

2.3 SELECT SOILS

- A. Selected soils are defined as natural soils with a maximum plasticity index of 20, maximum liquid limit of 35, and a maximum organic content of 5 percent. Soils with a silt content of 50 percent or greater and a PI of 10 or less will not be allowed.

2.4 PLASTIC SOIL BLANKET

- A. Plastic soil blanket shall consist of soils having a minimum PI of 11, maximum PI of 35, a maximum silt content of 65 percent, and a pH not less than 5.5 or greater than 8.5, and a minimum organic content of 3 percent. The CONTRACTOR will be allowed to blend organic materials to achieve the minimum 3 percent organic content. The plastic soil blanket shall support a satisfactory stand of grass upon visual inspection. The minimum thickness of the soil blanket will be 12 inches (300 mm). Areas requiring a plastic soil

blanket shall be approved prior to placement of the plastic soil blanket. After materials are placed and spread, lumps, stones, roots and other foreign matter shall be removed from the area. Soil blanket material shall be spread and rolled in a manner that leaves a uniform surface. Any remaining ridges or grooves, including cleat tracks from the dozer, will be parallel to the roadway during the period of time between placement and seeding.

2.5 TYPE "A" BACKFILL FOR DRAINAGE AND UTILITY PIPE

- A. Type "A" Backfill for drainage and/or utility pipe shall be aggregate material as specified in Section 02003 – Aggregates.

2.6 TYPE "B" BACKFILL FOR DRAINAGE AND UTILITY PIPE

- A. Type "B" Backfill for drainage and or utility pipe shall be granular material as specified in Section 02003 or Select Soil as specified herein. Type "A" backfill material may be substituted for Type "B" material.

2.7 BEDDING MATERIAL

- A. Bedding material shall be an aggregate material as specified in Section 02003 – Aggregates.

2.8 TOPSOIL

- A. When available, topsoil shall be existing surface soil stripped and stockpiled. When additional topsoil is required beyond the available topsoil from the stripping operation, topsoil shall be delivered and amended as recommended by soil tests. Soil tests shall be provided prior to delivery of topsoil to the site. The tests shall determine the quantities and type of soil amendments required to meet local growing conditions for the seed species provided. Delivered topsoil, existing soil in smooth graded areas, and stockpiled topsoil shall be tested for particle size, pH, organic content, textural class, chemical composition and soluble salts. Topsoil shall be free from slag, cinders, stones, lumps of soil, sticks, roots, trash or other material over 1 ½ inches diameter. Topsoil shall be free from viable plants and plant parts. Topsoil shall also be free from debris, noxious weeds, toxic substances, or other materials harmful to plant growth. Topsoil shall have a minimum PI of 4, a maximum PI of 12, a pH of 5.5-8.0, a minimum organic content of 2 percent, and shall be capable of supporting adequate vegetation.
- B. Soil amendments to be blended with the topsoil shall be delivered to the site either in the original, unopened containers bearing the manufacturer's chemical analysis, or in bulk. A chemical analysis shall be provided for bulk deliveries.
- C. Existing topsoil meeting the above requirements within construction limits may be used. If agricultural lime or organic matter is added to a soil to bring topsoil into conformance with these specifications, it shall be at the expense of the CONTRACTOR.

2.9 GEOTEXTILE FABRIC

- A. Geotextile fabric shall be composed of at least 85 percent by weight (mass) of polyolefins, polyesters, or polyamides. Fabric shall be resistant to chemical attack, rot, and miler and shall have no tears or defects which adversely alter its physical properties. When required, fabric shall contain stabilizers and/or inhibitors added to the base materials to make filaments resistant to deterioration due to ultraviolet and heat exposure. Edges of geotextile shall be finished to prevent the outer yarn from pulling

away from the fabric. Fibers of other composition may be woven into the geotextile fabric for reinforcing purposes.

- B. Geotextile fabric rolls shall be furnished with an opaque, waterproof wrapping for protection against moisture and extended ultraviolet exposure prior to placement. Each roll shall be labeled with the manufacturer's name, date of manufacture, lot number, and name of product.
- C. All geotextile fabric shall be a product listed on the Louisiana Department of Transportation and Development Approved Materials List at the time of incorporation into the WORK.
- D. Geotextile classes and materials requirements shall be as defined in the table below:

Property	Test Method	Class and Requirements						
		A	B	C	D	S	F	G
AOS, Metric Sieve, μm, Max	ASTM D4751	300	300	212	600	850	850	850
Grab Tensile, N, Min.	ASTM D4632	330	400	580	800	800	400	400
% Elongation at Failure, Min.	ASTM D4632	--	--	50	50	--	--	--
% Elongation at 200N, Max.	ASTM D4632	--	--	--	--	--	--	50
Burst Strength, N, Min	ASTM D3787	440	620	930	1290	1390	--	--
Puncture, N, Min.	ASTM D4833	110	130	180	330	330	--	--
Trapezoid Tear Strength, N, Min.	ASTM D4533	110	130	180	220	220	--	--
Permittivity, Sec^{-1}, Min.	ASTM D4491	1.0	1.0	1.0	1.0	0.2	0.01	0.01
Grab Tensile Strength, Retained after Weathering 150H, UVA lamps, %, Min.	ASTM D4491, ASTM G154	70	70	70	70	70	--	--
Grab Tensile Strength, Retained after Weathering 500H, UVA lamps, %, Min	ASTM D4491, ASTM G154	--	--	--	--	--	70	70

2.10 MATERIALS FOR SHEETING, SHORING, AND BRACING

- A. Wood for shoring and sheeting shall be green, rough-cut hardwood (i.e. oak or hickory). Planking for sheeting and foundation lumber shall have a minimum thickness of 2 inches. CONTRACTOR shall be responsible for the design and installation of all wood sheeting unless wood shoring is indicated on the plans.
- B. Steel sheet piling shall be a continuous interlock design. The sheet piling must be in good condition and shall provide a tight interlocking connection, which will retard the infiltration of ground water. Cofferdams shall be provided when constructing wet wells at pump station sites. The CONTRACTOR shall be responsible for the design and installation of all cofferdams.
- C. Trench boxes and shields shall be in good, sound condition and shall comply with all applicable OSHA requirements. Installation, use, and removal of trench shields or boxes shall be in accordance with the manufacturer's recommendations. CONTRACTOR shall be responsible for the design and installation of all trench boxes or shields and the use thereof shall be depicted within the CONTRACTOR's sheeting, shoring and bracing plan.

PART 3 -- EXECUTION

3.1 GENERAL

- A. Except when specifically provided to the contrary, excavation shall include the removal of materials, including obstructions that would interfere with the proper execution and completion of the WORK. The removal of such materials shall conform to the lines and grades indicated or ordered. Unless otherwise indicated, the entire Site shall be stripped of vegetation and debris and shall be grubbed, and such material shall be removed from the Site prior to performing any excavation or placing any fill.

3.2 SHEETING, SHORING, AND BRACING

- A. The CONTRACTOR shall furnish, place, and maintain supports and shoring that may be required for the sides of all excavations regardless of type. The CONTRACTOR shall be solely responsible for the stability and safety of all excavations, regardless of type.
- B. Excavations shall be sloped or otherwise supported in a safe manner in accordance with applicable State safety requirements and the requirements of OSHA Safety and Health Standards for Construction (29CFR1926).
- C. 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.

3.3 EXCLUSION OF WATER

- A. The CONTRACTOR shall remove and exclude water, including storm water, groundwater, irrigation water, and wastewater, from excavations. Dewatering wells, well- points, sump pumps, or other means shall be used to remove water and continuously maintain groundwater at a level at least 2 feet below the bottom of excavations before the excavation WORK begins at each location. Water shall be removed and excluded until backfilling is complete and field soils testing has been completed.

3.4 OVER – EXCAVATION

- A. **Indicated:** Where areas are indicated to be over-excavated, excavation shall be to the depth indicated, and backfill shall be installed to the grade indicated.
- B. **Not Indicated:** When ordered to over-excavate areas deeper and/or wider than required by the Contract Documents, the CONTRACTOR shall over-excavate to the dimensions ordered and backfill to the indicated grade.
- C. **Neither Indicated nor Ordered:** Any over-excavation carried below the grade ordered or indicated shall be backfilled and compacted to the required grade with granular material or non – plastic embankment as part of the WORK.

3.5 DISPOSAL OF EXCESS MATERIAL

- A. Unless otherwise indicated, excess excavated material shall be the property of the CONTRACTOR. The CONTRACTOR shall be responsible for the removal and disposal of excess excavated material. Material shall be disposed of at an off-Site location arranged by the CONTRACTOR in accordance with laws and regulations regarding disposal of such material.

3.6 EMBANKMENT AND HEADERS

- A. Where indicated on the drawings, or where directed by the ENGINEER, the CONTRACTOR shall place and compact embankment and headers as specified within this Section 02200 – Earthwork
- B. Prior to beginning excavation, grading or embankment operations in an area, all necessary clearing and grubbing in that area shall have been completed. Prior to any embankment operations in an area, all corresponding roadside ditches shall be cut to facilitate drainage in that area. Embankment materials shall not be placed or spread on Portland cement concrete or asphaltic concrete pavements. Pavement surfaces, edges, and joints shall not be damaged during embankment operations.
- C. Final excavation and embankment slope lines shall be uniform in appearance. Measurements shall be made as necessary to assure that the elevations at the top, bottom, and intermediate breaks in the slope are such that a minimum acceptable slope is achieved. The slopes shall be straight without valleys or humps, as determined by visual inspection.
- D. Embankments shall be constructed of select soils and shall be placed in uniform layers not exceeding 12 inches of uncompacted thickness. Each layer shall be placed for the full width of embankment, blended as necessary to obtain a uniform material, brought to a uniform moisture content, and compacted by approved methods to a minimum of 95.0 percent of maximum dry density before the next layer is placed. Maximum dry density will be determined in accordance with DOTD TR 415 or TR 418 and percent in-place density in accordance with DOTD TR 401. If base course or roadway is to be constructed on the embankment, the density of the embankment shall be such that the required base course compaction can be met. The moisture content at the time of compaction, tested in accordance with DOTD TR 403, shall be within a range of ± 2.0 percent of optimum moisture established in accordance with DOTD TR 415 or TR 418 or the lifts shall be reprocessed and recompacted until these requirements are met. Operations shall be conducted to prevent lamination between lifts. Laminations between lifts shall be corrected prior to placing additional lifts. Surfaces of excavated areas and

embankments shall be smooth and uniform. Material outside construction limits shall not be disturbed.

- E. The CONTRACTOR shall be responsible for the stability of embankments until final acceptance. Construction activities, which may lead to subsequent embankment damage will not be permitted.
- F. When embankments are constructed on a surface sloping more than 6:1 from the horizontal, the slope of the ground on which the embankment is to be placed shall be cut into steps, as directed, before fill is placed.
- G. When an embankment is to be constructed to a height of less than 5 feet, heavy sod and objectionable vegetation shall be removed from the area on which the embankment is to be placed. The area shall be scarified to a depth of approximately 9 inches. This area shall be recompacted to at least 95.0 percent of maximum dry density. Maximum dry density will be determined in accordance with DOTD TR 415 or TR 418 and percent in- place density in accordance with DOTD TR 401. When height of fill is 5 feet or more, removal of sod will not be required but the area on which embankment is to be placed shall be disked to the satisfaction of the ENGINEER and recompacted before construction of embankment.
- H. When embankment material is to be deposited only on one side of structures or culvert head walls, the area immediately adjacent to the structure shall not be compacted to the extent that it will cause excessive pressure against the structure. Fill adjacent to the end bent of a bridge shall not be placed higher than the top of the substructure until the superstructure is in place. When the embankment is to be deposited both sides of a concrete wall or similar structure, operations shall be conducted so that the embankment is always at approximately the same elevation on both sides of the structure. Backfilling of structures shall be as specified herein.
- I. When embankments are constructed in lakes, streams, swamps or other unstable areas and unstable material cannot be removed or the area drained, the requirement for placing material in layers as outlined above may be waived. When this requirement is waived, the embankment shall be placed by end dump or other approved methods to an elevation where normal construction methods can begin. Embankments placed above this elevation shall be constructed in layers as specified above. When a wave of unsuitable material is forced up in front of the end dumping operation, it shall become the property of the CONTRACTOR and be removed as necessary, and will not be allowed to be trapped and be incorporated in the embankment except as part of plastic soil for slopes.
- J. **Cut Area Preparation:** If base course or roadway is to be constructed on the cut area, the density of the embankment shall be such that the required base course compaction can be met. When unstable soils are encountered, the ENGINEER will determine the limits to be undercut. The CONTRACTOR shall excavate to a stable foundation or to the depth required by the ENGINEER and backfill to existing grade. When stable foundation cannot be reached, the embankment materials shall be "bridged-in" and the remaining embankment constructed to grade as specified.
- K. **Plastic Soil Blanket:** The outside layer of each roadway embankment and header will consist of a plastic soil blanket as specified. Plastic soil blanket shall be placed in a timely manner to prevent erosion.

3.7 DRAINAGE AND UTILITY PIPELINE EXCAVATION

- A. **General:** Unless otherwise indicated or ordered, excavation for pipelines and utilities shall be open-cut trenches with minimum widths as indicated.
- B. **Trench Bottom:** Except where pipe bedding is required, the bottom of the trench shall be excavated uniformly to the grade of the bottom of the pipe. Excavations for pipe bells and welding shall be made as required. Where pipe bedding is required, the bottom of the trench shall be excavated uniformly to the grade of the bottom of the pipe bedding.
- C. **Open Trench:** The maximum amount of open trench permitted in any one location shall be 500-feet or the length necessary to accommodate the amount of pipe installed in a single Day, whichever is greater. Trenches shall be fully backfilled at the end of each day or, in lieu thereof, shall be covered by heavy steel plates adequately braced and capable of supporting vehicular traffic in those locations where it is impractical to backfill at the end of each Day. These requirements for backfilling or use of steel plate will be waived in cases where the trench is located further than 100-feet from any traveled roadway or occupied structure. In such cases, however, barricades and warning lights meeting appropriate safety requirements shall be provided and maintained.
- D. Where pipelines are to be installed in embankments, fills, or structure backfills, the fill shall be constructed to a level at least one foot above the top of the pipe before the trench is excavated. Upon completion of the embankment or structural backfill, a trench conforming to the appropriate detail may be excavated and the pipe may be installed.
- E. Where moveable trench shield is used during excavation operations, the trench width shall be wider than the shield so that the shield is free to be lifted and then moved horizontally without binding against the trench sidewalls and causing sloughing or caving of the trench walls. If the trench walls cave or slough, the trench shall be excavated as an open excavation with sloped sidewalls or with trench shoring.
- F. If a moveable trench shield is used during excavation, pipe installation, and backfill operations, the shield shall be moved by lifting the shield free of the trench bottom or backfill and then moving the shield horizontally. The CONTRACTOR shall not drag trench shields along the trench causing damage or displacement to the trench sidewalls, the pipe, or the bedding and backfill.

3.8 DRAINAGE AND UTILITY PIPELINE BACKFILL AND COMPACTION

- A. Prior to backfilling, pipes found to be damaged or out of alignment or grade shall be removed and reinstalled or replaced as directed by the ENGINEER.
- B. **Paved Areas:** Cross and side drains in paved areas subject to traffic loads such as roadway travel lanes, shoulders, and turnouts shall be backfilled with Type A material. Type B backfill material shall be used in all other paved areas including driveways, detour roads and similar installations. Selected soils will not be allowed as backfill material. Placement and compaction shall be as specified below
- C. **Non – Paved Areas:** Backfill material, except for plastic pipe, shall be Type B backfill material placed by approved methods and compacted to the density of surrounding soil. Plastic pipe shall be backfilled with granular material or Type A backfill Material.
- D. **Placement and Compaction:**

1. When corrugated metal pipe is used, the backfill material shall be tested and shall have a resistivity greater than 1500 ohm-cm and a pH greater than 5 when tested in accordance with DOTD TR 429 and DOTD TR 430 respectively.
 2. If the top of pipe is even with or below the top of the trench, backfill material shall be brought up evenly on both sides of pipe for its full length to an elevation of 12 inches (300 mm) above the top of pipe [or to subgrade if less than 12 inches (300 mm)] or to natural ground elevation, whichever is greater.
 3. When the top of the pipe is above the top of the trench, backfill material shall be brought up evenly on both sides of pipe for its full length to 12 inches (300 mm) above the top of pipe or to subgrade if less than 12 inches (300 mm). Material in the trench and above the top of the trench for a distance on each side of the pipe equal to the horizontal outside diameter for corrugated metal or plastic pipe and 18 inches (450 mm) for concrete pipe, and to 12 inches (300 mm) above the top of pipe or to subgrade if less than 12 inches (300 mm) shall be backfill material.
 4. Unless otherwise authorized by the ENGINEER where headroom is limited, embankment shall be constructed to a minimum of 24 inches (600 mm) over the pipe before heavy construction equipment is allowed to cross the installation. Where practical, installations with less than 24 inches (600 mm) of cover over the top of the pipe shall be constructed after heavy hauling is completed over the pipe location. After completion of hauling operations, the CONTRACTOR shall remove excess cover material. Pipe damaged by hauling and backfilling operations shall be removed and reinstalled, or replaced, at no additional cost to the OWNER.
- E. **Backfill Methods:** Compaction of backfill for drainage pipe shall be as indicated below. Compaction by flooding will not be allowed unless authorized by the ENGINEER.
1. **Selected Soils:** Backfill shall be placed at or near optimum moisture content determined in accordance with DOTD TR 415 or TR 418 in layers not exceeding 8 inches (200 mm) compacted thickness. Backfill material shall be thoroughly compacted under the haunches of the pipe. Each layer shall be compacted by approved methods to at least 95 percent of maximum dry density prior to placement of a subsequent layer.
 2. **Granular Material:** Backfill shall be placed at or near optimum moisture content determined in accordance with DOTD TR 415 or TR 418. Backfill material shall be thoroughly compacted under the haunches of the pipe and then compacted in layers not exceeding 12 inches (300 mm) compacted thickness. Each layer shall be compacted by approved methods to at least 95 percent of maximum dry density prior to placement of a subsequent layer. Exposed slopes at the pipe ends shall be covered by at least 12 inches (300 mm) compacted thickness of plastic soil blanket.
 3. **Flowable Fill:** Flowable fill shall be installed in accordance with Section 02710 – Flowable Fill.
 4. **Stone or Recycled Portland Cement Concrete:** Backfill shall be placed at or near optimum moisture content determined in accordance with DOTD TR 415 or TR 418. Backfill material shall be thoroughly compacted under the pipe haunches and then compacted in layers not exceeding 8 inches (200 mm) compacted thickness. With approval of the ENGINEER, layer thickness may be increased to 12 inches (300 mm) with verification of satisfactory installation and performance. Each layer shall be compacted by approved methods to at least 95 percent of maximum dry density prior to placement of a subsequent layer. The CONTRACTOR shall control

placement operations so as not to damage protective coatings on metal pipes. The CONTRACTOR shall repair damaged coatings at no additional cost to the OWNER.

3.9 BEDDING MATERIAL

- A. **Placement of Bedding:** Unless otherwise noted on the drawings, geotextile fabric shall be placed in accordance with plan details prior to placing bedding material. Care shall be taken to prevent damage to geotextile fabric during placement of bedding material. Materials shall be placed in lifts, shaped, and uniformly compacted to 75 percent of relative density.
- B. Adjacent rolls of fabric will be overlapped or sewn. When rolls are overlapped, the overlap shall be a minimum of 18 inches, including the ends of the rolls. The top layer of the fabric shall be parallel with adjacent rolls and in the direction of bedding materials placement. When rolls are sewn, the CONTRACTOR shall join adjacent rolls by sewing with polyester, or Kevlar thread. Field sewing shall employ the "J" seam or "Butterfly" seam with the two pieces of geotextile fabric mated together, turned in order to sew through 4 layers of fabric and sewn with 2 rows of Type 401, two-threaded locking chain stitch. Factory seams other than specified may be submitted to the ENGINEER for approval. When the ground is covered with water or supersaturated soil, sewing of the fabric will be required.
- C. Damaged fabric shall be either removed and replaced with new fabric or covered with a second layer of fabric extending 2 feet in each direction from the damaged area.

3.10 EXCAVATION AND BACKFILL FOR STRUCTURES

- A. Except where otherwise indicated for a particular structure or where ordered by the ENGINEER, excavation shall be carried to an elevation 6-inches below the bottom of the footing or slab and brought back to grade with compacted materials acceptable for placement beneath structures. Where indicated or ordered, areas beneath structures shall be over-excavated. When such over-excavation is indicated, both over-excavation and subsequent backfill to the required grade shall be performed by the CONTRACTOR.
- B. Excavations shall be backfilled with granular material compacted in lifts. Backfill fill material shall be placed and spread evenly in approximately horizontal layers. Each layer shall be moistened or aerated as necessary. Unless otherwise approved by the ENGINEER, no layer shall exceed 6-inches of compacted thickness. The embankment and fill shall be compacted to a minimum of 95 percent of maximum dry density.
 - 1. Each layer backfill materials as defined herein, where the material is graded such that 10 percent or more passes a No. 4 sieve, shall be mechanically compacted to the indicated percentage of density. Equipment that is consistently capable of achieving the required degree of compaction shall be used, and each layer shall be compacted over its entire area while the material is at the required moisture content.
 - 2. Each layer of coarse granular backfill materials with less than 10 percent passing the No. 4 sieve shall be compacted by means of at least 2 passes from a vibratory compactor that is capable of obtaining the required density in 2 passes and that is acceptable to the ENGINEER.
- C. Fill on reservoir and structure roofs shall be deposited not sooner than 30 Days after the concrete roof slab has been placed. Equipment weighing more than 10,000 pounds when loaded shall not be used on a roof. A roller weighing not more than 8,000 pounds shall be used to compact fill on a roof.

- D. Flooding, ponding, and jetting shall not be used for fill on roofs, backfill around structures, backfill around reservoir walls, for final backfill materials, or aggregate base materials.
- E. Equipment weighing more than 10,000 pounds shall not be used closer to walls than a horizontal distance equal to the vertical depth of the fill above undisturbed soil at that time. Hand operated power compaction equipment shall be used where use of heavier equipment is impractical or restricted due to weight limitations.

3.11 GEOTEXTILE FABRIC

- A. Unless noted otherwise, on the drawings or elsewhere in the Contract Documents, the geotextile fabric shall be utilized as follows:

Application		Geotextile Class (as defined in Section 2.1)
<i>Drainage or Sewerage</i>	Underdrains	A, B, C, or D
	Pipe and Precast Manhole Joints	A, B, C, or D
	Weepholes	A, B, C, or D
	Bedding Fabric	B, C, or D
	Geocomposite Drainage Systems	B, C, or D
<i>Stabilization</i>	Bulkheads	C or D
	Flexible Revetments	C or D
	Rip Rap	D
	Railroad Crossings	D
	Base Course	D
	Subgrade Layer	D
	Soil Stabilization	C, D, or S
<i>Paving</i>	Paving Fabric	B or C
<i>Silt Fencing</i>	Self Supported Silt Fencing	F
	Wire Supported Silt Fencing	G

- B. Rolls of geotextile fabric shall be kept covered and protected from ultraviolet degradation at all times until use. Geotextile fabric that has been installed shall be covered with embankment within 7 calendar days. When ultraviolet damage occurs, the geotextile fabric shall be removed and replaced. The geotextile fabric shall be placed at the

locations shown on the plans or as directed. Adjacent rolls of geotextile fabric will be overlapped or sewn. When rolls are overlapped, the overlap shall be a minimum of 18 inches (450 mm), or as specified in the plans, including the ends of the rolls. The top layer of the geotextile fabric shall be parallel with adjacent rolls and in the direction of embankment placement. When rolls are sewn, the CONTRACTOR shall join adjacent rolls by sewing with polyester or Kevlar thread. Field sewing shall employ the "J" seam or "Butterfly" seam with the two pieces of geotextile fabric mated together, turned in order to sew through 4 layers of fabric and sewn with 2 rows of Type 401, two-thread chain stitch. Factory seams other than specified may be submitted to the Materials and Testing Section for approval. Where the ground is covered with water or soil is saturated, sewing of the geotextile fabric will be required.

- C. The geotextile fabric shall be placed as smooth as possible with no wrinkles or folds, except in curved road sections. For curved road sections, the geotextile fabric shall be folded to accommodate the curve. The fold shall be in the direction of construction and pinned or stapled. Ruts that occur during construction shall be filled and compacted prior to placement of geotextile fabric.
- D. Damaged geotextile fabric shall be either removed and replaced with new geotextile fabric or covered with a second layer of geotextile fabric extending 2 feet (0.6 m) in each direction from the damaged area

3.12 TOPSOIL

Areas to receive topsoil shall be scarified as directed. Topsoil shall be uniformly spread over the areas to a depth of 6 inches and rolled to a uniform surface with a cultipacker or other suitable equipment.

- END OF SECTION -

SECTION 02201 - SITE PREPARATION

PART 1 -- GENERAL

1.1 THE REQUIREMENT

- A. The WORK of this Section includes measures required during the CONTRACTOR's initial move onto the Site to protect existing fences, houses and associated improvements, streets, and utilities downslope of construction areas from damage due to boulders, trees or other objects dislodged during the construction process; clearing, grubbing and stripping; and regrading of certain areas to receive embankment fill.

1.2 REFERENCE STANDARDS

- A. Commercial Standards:

AAN

American Association of Nurserymen

1.3 CONTRACTOR SUBMITTALS, SAMPLING, AND TESTING

- A. The CONTRACTOR shall provide submittals, samples for testing, and testing of materials in accordance with Section 01010 – General Requirements and Section 01030 – Submittals, Sampling and Testing Plan.

1.4 QUALITY CONTROL

- A. NOT USED

1.5 SITE INSPECTION

- A. Prior to moving onto the Site, the CONTRACTOR shall inspect the Site conditions and review maps of the existing plant site, existing utilities, and facilities or other items delineating the OWNER's property and right-of-way lines.

PART 2 -- PRODUCTS

2.1 BACKFILL

- A. Material utilized for backfill shall be in accordance with Section 02200 – Earthwork.

PART 3 -- EXECUTION

3.1 PRIMARY CONSTRUCTION SITE ACCESS

- A. The CONTRACTOR shall develop any necessary access to the Site, including access barriers to prohibit entry of unauthorized persons.
- B. **Utility Interference:** Where existing utilities interfere with the WORK, notify the utility owner and the ENGINEER before proceeding in accordance with the General Conditions.

3.2 CLEARING AND GRUBBING

- A. The ENGINEER will designate trees, shrubs, plants and other items to remain. The CONTRACTOR shall preserve the items designated to remain. Equipment, materials and supplies shall not be stored in proximity of items designated to remain. Trees shall be removed without damaging items marked to remain. The CONTRACTOR shall, at no direct pay, use a licensed landscape arborist to repair damage to bark, trunks, limbs or roots of vegetation marked to remain using horticultural and tree surgery practices published by the American Association of Nurseryman (AAN). Trees shall not be felled outside of the right-of-way. Damage outside the right-of-way caused by the CONTRACTOR's operations shall be the CONTRACTOR's responsibility.
- B. Clearing and grubbing shall be done within the construction limits and to a point in fills 15 feet (4.5 m) beyond the toes of foreslopes and in cuts 15 feet beyond the tops of backslopes, when width of right of way permits, or to the limits shown on the plans; also from areas required for outfall ditches and channel changes. Trees, stumps, roots and other protruding vegetative obstruction not designated to remain shall be cleared and grubbed (including mowing when required by the ENGINEER). Some loose limbs and roots approximately 2 inches x 2 feet and smaller may be allowed to remain however excessive amounts will not be allowed.
- C. Explosives shall not be used.
- D. Stump holes and other holes left from clearing and grubbing shall be filled by blading the area or backfilling with existing materials or soil complying with Subsection 203.06(a) and compacted to at least the density of the surrounding soils.
- E. Burning of material shall not be permitted without the approval of the OWNER and ENGINEER. If burning is allowed, of material shall be under the constant care of watchmen. Burning of materials shall not jeopardize anything designated to remain on the right-of-way, the surrounding forest cover, or other adjacent property. The CONTRACTOR shall be responsible for burning in accordance with all local, state, and federal laws and ordinances, including, but not limited to, the current regulations of the Louisiana Department of Environmental Quality (LDEQ).
- F. Materials and debris which cannot be burned and materials which are not burned shall be removed from the right-of-way and disposed of in accordance with Section 02200 – Earthwork.
- G. Merchantable timber in the area to be cleared, which has not been removed from the area of Construction prior to the beginning date stipulated in the Notice to Proceed, shall become the property of the CONTRACTOR.
- H. Low hanging branches and unsound or unsightly branches on trees or shrubs designated to remain shall be removed as directed. Branches of trees extending over the roadbed shall be trimmed to a height of 20 feet (6.0 m) above the pavement. Trimming shall be done in accordance with accepted horticultural and tree surgery practices published by AAN.

- END OF SECTION -

SECTION 02202 – DEMOLITION AND REMOVAL OF STRUCTURES AND OBSTRUCTIONS

PART 1 -- GENERAL

1.1 THE REQUIREMENT

- A. The CONTRACTOR shall demolish facilities as indicated and shall remove and/or relocate structures and obstructions as indicated, all in accordance with the Contract Documents.

1.2 REFERENCE STANDARDS

- A. Code of Federal Regulations
49 CFR, Parts 172-180 Regulations for Hazardous Materials
- B. Louisiana Administrative Code (LAC)
LAC Title 33, Part V, Chapter 38, Section 3813
LAC Title 33, Part V, Chapter 38
- C. Louisiana Department of Transportation and Development (LDOTD)
Water Well Rules, Regulations, and Standards, State of Louisiana
- D. Louisiana Department of Environmental Quality (LDEQ)
UST Regulations Regulations for Underground Storage Tanks

1.3 CONTRACTOR SUBMITTALS, SAMPLING, AND TESTING

- A. The CONTRACTOR shall provide submittals, samples for testing, and testing of materials in accordance with Section 01010 – General Requirements and Section 01030 – Submittals, Sampling and Testing Plan.

PART 2 -- PRODUCTS - NOT USED

PART 3 -- EXECUTION

3.1 GENERAL

- A. The CONTRACTOR shall take precautions to avoid damage to adjacent facilities and to limit the WORK activities to the extent indicated. If reconstruction beyond the scope indicated is required, the CONTRACTOR shall obtain approval from the ENGINEER prior to commencing.

3.2 PROTECTION OF EXISTING FACILITIES

- A. Before beginning any reconstruction, the CONTRACTOR shall carefully survey the existing facilities and examine the Specifications and Drawings to determine the extent of reconstruction and coordination with the WORK. Existing facilities not subject to

reconstruction shall be protected and maintained. Damaged existing facilities shall be repaired to the previous condition or replaced.

- B. Persons shall be afforded safe passages around areas of demolition.
- C. Structural elements shall not be overloaded. The CONTRACTOR shall be responsible for shoring, bracing, or adding new supports as may be required for adequate structural support as a result of WORK performed under this Section. The CONTRACTOR shall remove temporary protection when the WORK is complete or when so authorized by the ENGINEER.
- D. The CONTRACTOR shall carefully consider bearing loads and capacities before placement of equipment and material on Site. In the event of any questions as to whether an area to be loaded has adequate bearing capacity, the CONTRACTOR shall consult with the ENGINEER prior to the placement of such equipment or material.

3.3 DEMOLITION AND REMOVAL OF STRUCTURES AND OBSTRUCTIONS

- A. **Pipe:** Pipe to be re-laid shall be removed and stored so that there will be no loss or undue damage before relaying. The CONTRACTOR shall replace sections lost from storage or unduly damaged at no direct pay. When specified, pipe not to be re-laid and considered usable shall be salvaged, cleaned of soils or other materials, stored and stacked.
- B. **Bridges and Drainage Structures:** Bridges, including approach slabs, and drainage structures in use by traffic shall not be removed until satisfactory arrangements have been made to accommodate traffic. Unless otherwise directed or shown on the plans, substructures shall be removed to natural stream bottom and those parts outside the stream shall be removed to 1 foot below natural ground surface. Existing structures within the limits of a new structure shall be removed as necessary to accommodate construction of the new structure. Steel or wood bridges to be salvaged shall be dismantled without unnecessary damage. Dismantling shall include stripping all hardware. Structural members shall be match-marked before dismantling. Explosives, if approved, shall be utilized in accordance with Section 01010. Blasting or other operations necessary for removal of an existing structure or obstruction, which may damage new construction, shall be completed prior to placing the new work.

3.4 REMOVING ENVIRONMENTALLY SENSITIVE MATERIALS

- A. When removal or remediation of any environmentally sensitive or contaminated sites is required during construction, the CONTRACTOR's operations shall be coordinated through the appropriate agency having jurisdiction. If the CONTRACTOR fails to follow the guidelines of the agency having jurisdiction and subsequently causes or increases harm or damage to the environment, then all resulting fines and clean-up costs shall be the responsibility of the CONTRACTOR.
- B. **Non-Friable Asbestos:** When a structure contains non-friable asbestos, the CONTRACTOR shall carefully remove the asbestos without excessive breakage or crushing before removal, relocation or demolition of the structure. The non-friable asbestos material shall be disposed of at an approved industrial landfill.
- C. **Friable Asbestos:** When a structure contains friable asbestos, the CONTRACTOR shall immediately notify the Department of Environmental Quality (DEQ), Air Quality Division and request that DEQ provide a confirmation letter with an Asbestos Disposal Verification Form (ADVF). The CONTRACTOR shall complete the ADVF within 90

calendar days from the date of issue. When this information is available, the Department will indicate on the plans which structures contain friable asbestos. Only entities certified by DEQ as Asbestos Abatement Entities shall remove friable asbestos from structures. The asbestos removal shall be performed before removal, relocation or demolition of the structure. Friable asbestos removal, handling and disposal shall be performed in accordance with the latest requirements for asbestos abatement of the DEQ, Air Quality Division. The CONTRACTOR shall maintain, and furnish to the ENGINEER, within 21 calendar days, Chain of Custody verification records for the friable asbestos from the work site to the disposal site. These records will become part of the permanent project records.

- D. **Underground Fuel Tanks:** Before removal, underground fuel tanks shall be registered with the DEQ by the ENGINEER as abandoned underground storage tanks. The CONTRACTOR shall notify the ENGINEER in writing at least 45 calendar days prior to removal of tanks. All site activities, including the collection of closure samples and tank removal, as defined in the latest DEQ Underground Storage Tank (UST) regulations, shall be performed by a DEQ approved CONTRACTOR. Closure test results, all documentation, and all necessary forms shall be submitted by the CONTRACTOR to DEQ. The CONTRACTOR and/or the subcontractor shall note that all contact and/or coordination with the DEQ is to be the responsibility of the ENGINEER. The CONTRACTOR shall take all necessary precautions to prevent the infiltration of water into tanks and tank excavations during the work. During routine site closure, the removal, transportation and disposal of tanks, and the handling of contaminated soil and contaminated fluid shall be in accordance with all local, state, and federal laws and regulations. Limits of excavation and quantities of contaminated soil and contaminated fluid to be removed, transported and disposed shall be as specified. When underground storage tanks (UST) have been filled with concrete, sand, or other such material and are designated on the plans for removal, the CONTRACTOR or certified UST subcontractor shall remove, transport and dispose of such tanks in accordance with the recommendations of the American Petroleum Institute (API) and the requirements of the Louisiana Department of Environmental Quality (DEQ) or other regulatory agency of jurisdiction. When such UST are discovered during construction and removal is necessary to achieve soil compaction or to meet other construction requirements, the CONTRACTOR shall stop construction activity in the immediate vicinity of the UST and notify the project ENGINEER in accordance with this subsection. The DOTD Materials and Testing Section will verify the closure status of such filled UST discovered during construction prior to any UST site activity by the CONTRACTOR or certified UST subcontractor. The CONTRACTOR or certified UST subcontractor shall collect and submit for laboratory analysis, a representative sample of the storage tank fill material for landfill acceptance. The results of the laboratory analysis shall be used to determine the disposition of the UST fill material. The CONTRACTOR or certified UST subcontractor shall provide a copy of all laboratory analyses to the ENGINEER for verification prior to profiling materials for landfill acceptance.
- E. **Contaminated Soils:** Soil contaminated with Benzene, Toluene, Ethyl Benzene, Xylene (BTEX), Total Petroleum Hydrocarbons- Gasoline (TPH-G), Total Petroleum Hydrocarbons-Diesel (TPH- D), Total Petroleum Hydrocarbons-Oil (TPH-O), or other identified toxic materials, in areas of underground fuel tanks or other areas, at levels above the regulatory limits and is non-protective of groundwater shall be excavated by the CONTRACTOR as shown on the plans or as directed. Determination of groundwater protection shall be through the use of the Synthetic Precipitation Leachate Procedure (SPLP) or as directed. The CONTRACTOR shall remove the overburden above the contaminated soil to the dimensions shown on the plans or as directed. The CONTRACTOR shall also excavate the contaminated soil at the locations shown on the

plans or as directed. The contaminated soil shall be loaded into approved hauling vehicles by the CONTRACTOR and be disposed of in a disposal site approved by the Department of Environmental Quality. The CONTRACTOR shall furnish the ENGINEER, within 21 calendar days, Chain of Custody verification records for the contaminated soil. The Materials and Testing Section will verify that all contaminated soil has been removed. While the excavation is open, the CONTRACTOR shall construct and maintain a soil berm around the excavation to prevent surface water runoff from entering the excavation. The removed overburden may be used to construct the berm and backfill the excavation. Removal and disposal of contaminated soils will be in accordance with all local, state and federal laws and regulations.

- F. **Contaminated Fluids:** Contaminated fluid in underground fuel tanks, in areas of underground fuel tanks or other areas as shown on the plans or as directed shall be removed and disposed of by the CONTRACTOR. The CONTRACTOR shall pump the contaminated fluid into approved hauling vehicles. Contaminated fluid in underground fuel tanks shall be removed before tank removal. The contaminated fluid shall be disposed of in a disposal site approved by the Department of Environmental Quality. The CONTRACTOR shall furnish the ENGINEER, within 21 calendar days, Chain of Custody verification records for the contaminated fluid. The ENGINEER will verify the removal of the contaminated fluid. The Removal and disposal of contaminated fluids will be in accordance with all local, state and federal laws and regulations.
- G. **Paint Containing Lead or Other Hazardous Materials on Metal Surfaces:** Steel members of structures protected by paint containing lead or other hazardous materials as shown on the plans or as discovered in the field shall be removed and prepared for transport by methods approved by the ENGINEER. Such steel members shall be delivered to a licensed recycling center capable of processing steel members coated with paint identified by the Resource Conservation and Recovery Act (RCRA) as hazardous. Prior to removal, transport, treatment or disposal of any steel members, the CONTRACTOR shall submit the following to the ENGINEER.
- 1) Plan of removal of steel members.
 - 2) Plan for transport of steel members.
 - 3) Name and address of the licensed recycling center.

All steel members shall be transported in accordance with all federal, state and local laws. Certificates of Disposal, Chain of Custody forms, or other applicable documents shall be provided within 21 calendar days following each shipment.

- H. **Treated Timber:** Creosoted and other treated timber or lumber shown on the plans or discovered in the field shall be removed and prepared for transport by methods approved by the ENGINEER. All materials that are not designated to be salvaged by the OWNER or salvaged by the CONTRACTOR are to be disposed of in an appropriate landfill. Certificates of Disposal, Chain of Custody forms, or other applicable documents shall be provided within 21 calendar days following each shipment.
- I. **Universal Wastes:** Universal wastes are hazardous wastes defined in LAC Title 33, Part V, Chapter 38, Section 3813 to include batteries, pesticides, thermostats, lamps and antifreeze. Universal wastes shall be removed by the CONTRACTOR in accordance with the plans and shall be stored and prepared for transport as specified in LAC Title 33, Part V, Chapter 38 and herein. A lamp is the bulb or tube portion of an electric lighting device. Universal waste lamps include, but are not limited to, fluorescent, high intensity discharge, neon, mercury vapor, high pressure sodium, and metallic halide.

Such lamps shall be removed and stored in containers or packages that are structurally sound, adequate to prevent breakage, and compatible with the contents of the lamps. Such containers shall remain closed and lack evidence of leakage, spillage or damage that could cause releases of mercury or other hazardous constituents to the environment under reasonably foreseeable conditions. The containers shall be clearly labeled or marked with the words "Universal Waste – Lamps" and with the earliest date that any lamp in the container was discarded as waste. If a container develops a leak, it shall be placed into an over-pack container. The CONTRACTOR shall immediately clean up any leakage and place in a container any lamp that shows evidence of breakage, leakage, or damage. Universal waste lamps will not be allowed to accumulate for a period longer than one year from the date the lamps were discarded. The waste lamps shall be delivered to a universal waste disposal site or destination facility by a Universal Waste Transporter in accordance with the applicable U.S. Department of Transportation Regulations, 49 CFR, Parts 172-180. The CONTRACTOR shall be responsible for informing all employees who handle universal wastes of the proper handling and emergency procedures appropriate to the type of waste.

- END OF SECTION –

SECTION 02204 - TEMPORARY ENVIRONMENTAL CONTROLS

PART 1 -- GENERAL

1.1 THE REQUIREMENT

- A. The CONTRACTOR shall comply with federal, state, and local laws and regulations controlling pollution of the environment, including air, water, and noise. The CONTRACTOR shall take precautions to prevent pollution of waters and wetlands with fuels, oils, asphalts, chemicals, or other harmful materials.

1.2 REFERENCE STANDARDS

- A. Louisiana Department of Environmental Quality (LDEQ)
 - LAR 100000 Master General Permit for Discharges of Storm Water from Construction Activities – Five Acres or More
 - LAR 200000 Storm Water General Permit for Small Construction Activities
- B. Occupational Safety Hazard Administration (OSHA)
 - Part 1926 Safety and Health Regulations for Construction
- C. United States Environmental Protection Agency (US EPA)
 - Storm Water Management for Construction Activities

1.3 CONTRACTOR SUBMITTALS

- A. The CONTRACTOR shall provide submittals, samples for testing, and testing of materials in accordance with Section 01010 – General Requirements and Section 01030 – Submittals, Sampling and Testing Plan.

1.4 DUST ABATEMENT

- A. The CONTRACTOR shall prevent its operation from producing dust in amounts damaging to property, cultivated vegetation, or domestic animals, or causing a nuisance to persons living in or occupying buildings in the vicinity of the Site. The CONTRACTOR shall be responsible for any damage resulting from dust originating from its operations. Dust abatement measures shall be continued until the CONTRACTOR is relieved of further responsibility by the ENGINEER.
- B. **Active Areas of Site:** The CONTRACTOR shall water active construction areas and unpaved roads as needed and as directed by ENGINEER.
- C. **Inactive Areas of Site:** The CONTRACTOR shall apply non-toxic soil stabilizers according to manufacturer's specifications to inactive construction areas, or water as needed to maintain adequate dust control.

- D. **Vehicle Loads:** The CONTRACTOR shall cover or maintain at least 2-feet of freeboard vertical distance between the top of the load and the top of the trailer sides on trucks hauling dirt, sand, soil, or other loose materials off the Site.
- E. **Roads:** When there is visible track-out onto a paved public road, the CONTRACTOR shall install wheel washers where the vehicles exit and enter onto the paved roads and wash the undercarriage of trucks and any equipment leaving the Site on each trip. The CONTRACTOR shall sweep the paved street at the end of each shift with a water spray pick-up broom-type street sweeper as necessary or as directed.
- F. **Vehicle Speeds:** If watering of unpaved roads is not sufficient to control dust. The CONTRACTOR shall reduce vehicle speeds as required for control of dust.

1.5 SEDIMENTATION ABATEMENT

- A. For work disturbing one acre or less, no Storm Water Pollution Prevention Plan is required. CONTRACTOR shall be responsible for collecting, storing, hauling, and disposing of spoil, silt, and waste materials in compliance with applicable federal, state, and local rules and regulations and the Contract Documents.
- B. The CONTRACTOR shall install and maintain erosion and sediment control measures, such as swales, grade stabilization structures, berms, dikes, waterways, filter fabric fences, and sediment basins.
- C. The CONTRACTOR shall filter fabric barrier systems, if used, shall be installed in such a manner that surface runoff will percolate through the system in sheet flow fashion and allow sediment to be retained and accumulated.
- D. The CONTRACTOR shall remove and dispose of sediment deposits at the designated spoil area. If a spoil area is not indicated, dispose of sediment off-Site at a legally permitted disposal facility. Sediment to be placed at the spoil area should be spread evenly, compacted, and stabilized. Sediment shall not be allowed to flush into a stream, drainage structure, or drainage way.
- E. Maintain erosion and sediment control measures until final acceptance or until directed by the ENGINEER to remove it.

1.6 STORMWATER POLLUTION PREVENTION PLAN

- A. The CONTRACTOR shall prepare and maintain a Storm Water Pollution Prevention Plan (SWPPP), for work disturbing one acre or greater. The plan shall describe in specific details the CONTRACTOR's program to prevent contamination of the storm water collection system for this project. A suggested Template and Sample SWPPP Inspection Report, as well as other valuable information can be found at EPA's website: <http://cfpub.epa.gov/npdes/stormwater/swppp.cfm>
- B. The CONTRACTOR'S Storm Water Pollution Prevention Plan shall be comprised of all relevant components specified in the U.S. Environmental Protection Agency document entitled, "Storm Water Management for Construction Activities".
- C. The CONTRACTOR shall implement, maintain, and inspect all erosion and sediment controls identified in the SWPPP. The program shall address both common construction activities and extraordinary events. The CONTRACTOR shall remove all temporary SCMs, such as silt fences, catch basin filters, wash areas, etc. at the end of construction.

- D. The CONTRACTOR shall include Water Pollution Control Drawings (WPCD) in the SWPPP to illustrate the locations, applications, and deployment of the Storm Water Control Measures (SCMs) identified in the SWPPP. The WPCDs shall be included as an attachment to the SWPPP.
- E. **Storm Water Control Measures (SCMs):** The Storm Water Control Measures (SCMs) are techniques, processes, activities, or structures used to reduce the pollutant content of a storm water or non-storm water discharge. SCMS may include simple, non- structural methods such as good housekeeping, staff training, and preventative maintenance. Additionally, SCMs may include structural modifications such as the installation of berms, canopies, or treatment control.
- F. The CONTRACTOR shall comply with laws, rules, and regulations of the State of Louisiana and agencies of the United States Government prohibiting the pollution of lakes, wetlands, streams, or river waters from the dumping of contaminants, refuse, rubbish, or debris.
- G. The CONTRACTOR shall submit copies of the SWPPP a minimum of 10 working days prior to beginning construction, to the ENGINEER. The CONTRACTOR shall update the SWPPP as necessary during the work to prevent contamination of the storm water collection system.
- H. Before the start of work, the CONTRACTOR shall train all employees and Subcontractors on the approved SWPPP and related WPCD and provide the ENGINEER with written documentation of said training.
- I. For work disturbing one acre or less, Storm Water Control Measures (SCMs) must be in place. There shall be no Notice of Intent (NOI) required. The CONTRACTOR shall complete inspection reports and submit copies to OWNER. The CONTRACTOR and the INSPECTOR shall keep a copy of the report on file.
- J. For work disturbing one to five acres, Storm Water Control Measures (SCMs) must be in place. The CONTRACTOR must prepare SWPPP and post prominently on the job site. The CONTRACTOR must have the LAR 200000 General Permit posted on the job site. There shall be no Notice of Intent (NOI) required. The CONTRACTOR shall complete all required reports and submit them to OWNER.
- K. For work disturbing five acres or more, Storm Water Control Measures (SCMs) must be in place. The CONTRACTOR must have Notice of Intent (NOI) completed, sent to DEQ, and posted. The CONTRACTOR must prepare a SWPPP and post prominently on the site. The CONTRACTOR shall have the LAR 100000 General Permit posted on site with DEQ permit number for specific site. The CONTRACTOR must complete a Notice of Termination (NOT) and submit it to DEQ.

1.7 RUBBISH CONTROL

- A. During the progress of the WORK, the CONTRACTOR shall keep the Site and other areas for which it is responsible in a neat and clean condition and free from any accumulation of rubbish. The CONTRACTOR shall dispose of rubbish and waste materials of any nature and shall establish regular intervals of collection and disposal of such materials and waste. The CONTRACTOR shall also keep its haul roads free from dirt, rubbish, and unnecessary obstructions resulting from its operations. Disposal of rubbish and surplus materials shall be off the Site in accordance with local codes and ordinances governing locations and methods of disposal and in conformance with

applicable safety laws and the particular requirements of Part 1926 of the OSHA Safety and Health Standards for Construction.

1.8 CHEMICALS

- A. Chemicals used on the WORK or furnished for facility operation, whether defoliant, soil sterilant, herbicide, pesticide, disinfectant, polymer, reactant, or of other classification, shall show approval of either the U.S. Environmental Protection Agency or the U.S. Department of Agriculture. Use of such chemicals and disposal of residues shall be in strict accordance with the printed instructions of the manufacturer.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION (NOT USED)

- END OF SECTION -

SECTION 02701 – CULVERTS AND STORM DRAIN SYSTEMS

PART 1 -- GENERAL

1.1 THE REQUIREMENT

- A. The CONTRACTOR shall provide, and construct culverts and storm drains, drainage manholes, catch basins, and/or end treatments as specified herein.

1.2 REFERENCE STANDARDS

- A. American Association of State Highway and Transportation Officials (AASHTO)

AASHTO M36	Standard Specification for Corrugated Steel Pipe
AASHTO M85	Standard Specification for Portland Cement
AASHTO M91	Standard Specification for Sewer and Manhole Brick
AASHTO M196	Standard Specification for Corrugated Aluminum Pipe
AASHTO M198	Standard Specification for Gray Iron Castings
AASHTO M218	Standard Specification for Steel Sheet, Zinc – Coated, For Corrugated Steel Pipe
AASHTO M245	Standard Specification for Corrugated Steel Pipe, Polymer Pre-coated, for Sewers and Drains
AASHTO M270	Standard Specification for Structural Steel for Bridges
AASHTO M294	Standard Specification for Corrugated Polyethylene Pipe
AASHTO M306	Standard Specification for Drainage, Sewer, and Utility Related Castings
AASHTO M315	Standard Specifications for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets

- B. ASTM International (ASTM)

ASTM A27	Standard Specification for Steel Castings, Carbon, for General Application
ASTM A47	Standard Specification for Ferritic Malleable Iron Castings
ASTM A148	Standard Specification for Steel Castings, High Strength, for Structural Purposes
ASTM A153	Standard Specification for Zinc Coating (Hot – Dip) on Iron and Steel Hardware
ASTM A536	Standard Specification for Ductile Iron Castings

ASTM A743	Standard Specification for Castings, Iron – Chromium, Iron – Chromium Nickel, Corrosion Resistant, for General Application
ASTM B633	Standard Specification for Electrodeposited Coatings of Zinc and Iron on Steel
ASTM B695	Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel
ASTM C76	Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
ASTM C139	Standard Specification for Concrete Masonry Units for Construction of Catch Basins and Manholes
ASTM C465	Standard Specification for Processing Additions for Use in the Manufacture of Hydraulic Cements
ASTM C506	Standard Specification for Reinforced Concrete Arch Culvert, Storm Drain, and Sewer Pipe
ASTM C655	Standard Specification for Reinforced Concrete D-Load Culvert, Storm Drain, and Sewer Pipe
ASTM C1433	Standard Specification for Precast Reinforced Concrete Monolithic Box Sections for Culverts, Storm Drains, and Sewers
ASTM D1640	Standard Test Methods for Drying, Curing, or Film Formation of Organic Coatings
ASTM D1784	Standard Specification for Rigid PolyVinyl Chloride (PVC) Compounds and Chlorinated PolyVinyl Chloride (CPVC) Compounds
ASTM D2369	Standard Test Method for Volatile Content of Coatings
ASTM F794	Standard Specification for PVC Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter
ASTM F949	Standard Specification for PVC Corrugated Sewer Pipe with Smooth Interior and Fittings
C. Louisiana Department of Transportation and Development (LDOTD)	
AML	Approved Materials List
LSSRB	Louisiana Standard Specifications for Roads and Bridges

1.3 CONTRACTOR SUBMITTALS, SAMPLING, AND TESTING

- A. The CONTRACTOR shall provide submittals, samples for testing, and testing of materials in accordance with Section 01010 – General Requirements and Section 01030 – Submittals, Sampling and Testing Plan.

PART 2 -- PRODUCTS

2.1 PIPE

- A. Pipe shall be as specified in Section 15000 – Piping, General.

2.2 JOINT GASKET MATERIALS

- A. Rubber gaskets for pipe joints shall comply with AASHTO M 315. The rubber gaskets and lubricant shall be approved products listed in the LDOTD AML (formerly QPL 4). Each rubber gasket shall be identified with a batch or lot number. Flexible plastic gaskets for pipe joints shall comply with AASHTO M 198. The hydrostatic test shall be performed using AASHTO M 315. Flexible plastic gasket material and primer shall be approved products listed in the LDOTD AML (formerly QPL 4).

2.3 SPLIT COUPLING BANDS

- A. Split coupling bands shall be one piece and composed of the same material as the pipe. The bands shall be the same thickness as the base pipe. The width of the band shall be equal to one-half the diameter of the pipe but shall be a minimum of 12 inches wide. The band shall be secured to the pipe with a minimum of five stainless steel or other approved corrosion resistant circumferential bands.

2.4 PORTLAND CEMENT

- A. Portland cement shall be from an approved source listed in the LDOTD AML (formerly QPL 7) and shall comply with AASHTO M 85.
- B. **Chemical Requirements:** The chemical requirements shall be as specified in AASHTO M85. Alkali content calculated as sodium oxide equivalent shall not exceed 0.60 percent by weight for all types of cement.
- C. Process Additions: Process additions may be used in amounts not to exceed 3 percent by weight of portland cement clinker provided it meets the requirements for the cement portion of ASTM C 465 and the test results are submitted to the Department for review and approval.

2.5 MORTAR SAND

- A. Sand shall be a natural silica sand from a source listed in the LDOTD AML (formerly QPL 2). The percentages of deleterious materials shall not exceed the following values:

Property	Percent, Max
Coal and Lignite	0.25
Clay Lumps	0.05
Clay Lumps and Friable Particles	3.00

2.6 MORTAR

- A. Mortar shall consist of one part Portland cement, two parts mortar sand, and water as required for proper consistency. Mortar shall be used within thirty (30) minutes after mixing.

2.7 SEWER BRICK

- A. Sewer brick shall be made from clay, shale or concrete. Brick made from clay or shale for use in junction boxes, catch basins, arches, manholes and for backings shall comply with AASHTO M 91, Manhole Brick, Grade MM. Concrete brick shall comply with ASTM C 139, except that the minimum thickness of each unit shall not be less than 3 5/8 inches.

2.8 ASPHALTIC VARNISH

- A. **Material:** Asphaltic varnish shall be composed of hard native asphalts or asphaltites, run (fluxed) and blended with properly treated drying oils, and thinned with suitable solvents with the necessary amount of dryers.
- B. **Appearance:** The film shall be smooth and homogeneous, when thoroughly mixed sample is poured and examined on a clean, clear, glass plate and placed in a vertical position until the excess varnish has drained off. The film will be examined by transmitted light.
- C. **Color:** Color shall be jet black when examined by reflected light.
- D. **Nonvolatile Matter:** Nonvolatile matter shall be not less than 40 percent by weight (mass) when tested in accordance with ASTM D 2369.
- E. **Drying of Film:**
 - 1. **Set to Touch:** Film shall set to touch in not more than 8 hours when tested in accordance with ASTM D 1640.
 - 2. **Dry Through:** Film shall dry through in not more than 36 hours when tested in accordance with ASTM D 1640.
- F. **Working Properties and Appearance of Dried Film:** Varnish shall have good brushing, flowing, covering and leveling properties. Dried film shall be jet black, smooth and free from brush marks, blisters, pinholes and other defects.
- G. **Water Resistance:** Film shall show no whitening, dulling or other defects after a film is immersed in water for 18 hours and air dried for 2 hours.

2.9 REINFORCING STEEL

- A. Reinforcing steel shall comply with Section 03801 – Reinforcement.

2.10 GEOTEXTILE FABRIC

- A. Geotextile Fabric shall comply with Section 02200 – Earthwork

2.11 PORTLAND CEMENT CONCRETE

- A. Portland Cement Concrete shall comply with Section 03901 – Portland Cement Concrete.

2.12 PRECAST CONCRETE DRAINAGE UNITS

- A. Precast reinforced concrete drainage units shall be from a source listed on the LDOTD AML (formerly QPL 77) and shall comply with Section 03805 – Structural Concrete.
- B. For grout connections, each opening shall be $4\pm 1/2$ inches larger than the outside diameter of the pipe for which it is provided. Units shall be cast with the specified number and size of pipe openings to incorporate the unit into the drainage system.
- C. **Marking:** The name or trademark of the manufacturer, the date of casting, the structure number of the station number as shown on the plans, and the lot number shall be indented into the concrete or painted thereon with waterproof paint on each unit on the inside and outside of the unit in such a manner as to be legible at time of delivery.
- D. **Precast Reinforced Concrete Box Culverts:** Precast reinforced concrete box culverts shall be approved products listed on the LDOTD AML (formerly QPL 77). The compressive strength of box culverts shall comply with ASTM C 76. Precast reinforced concrete box culverts shall comply with ASTM C 1433 amended as follows:
 - 1. Table 1 shall be used.
 - 2. No modified designs will be allowed
 - 3. Joints shall comply with the following:
 - a. Joint Gasket materials shall comply with Subsection 1006.06.
 - b. **Type 1 Joints (T1):** These joints shall provide a soil tight joint.
 - c. **Type 2 Joints (T2):** These joints shall pass the 5 psi (35 kPa) hydrostatic pressure test.
 - d. **Type 3 Joints (T3):** These joints shall pass the 10 psi (70 kPa) hydrostatic pressure test.
 - 4. Inside horizontal and vertical dimensions shall not vary by more than \pm percent with a maximum of $\pm 1/2$ inch (± 13 mm) from design dimensions.
 - 5. Sides of each box section shall not vary from being perpendicular to the top and bottom by more than $1/2$ - inch (± 13 mm) when measured diagonally between opposite interior corners of each end.
 - 6. Culvert units shall be cured by one of the methods listed in ASTM C 1433. The selected method shall be approved by the Construction Section.
- E. **Precast Reinforced Concrete Manholes, Catch Basins, Junction Boxes, and Safety Ends:** Precast reinforced concrete manholes, catch basins, junction boxes, and safety ends shall comply with the dimensions shown on the plans, and shall meet the following requirements:
 - 1. **Reinforcement:** Reinforcement shall be as shown on the plans, and shall not vary more than $1/4$ inch from the positions shown, except at pipe connections. At pipe connections no variance from the positions shown is allowed. Cover on reinforcement shall not be less than that shown on the plans.

2. **Workmanship:** Units shall be true to shape, and surfaces shall be smooth, dense and uniform in appearance. Units will be rejected for defeats in workmanship for any of the following:
- a. Fractures or cracks passing through the wall, except for a single end crack that does not exceed the depth of the joint.
 - b. Surface defects indicating honeycombed or open texture that would adversely affect the function of the unit.
 - c. Damaged or cracked ends, where such damage would prevent making a satisfactory joint.
 - d. Any continuous crack having a surface width of 0.01 inch or more and extending for a length of 12 inches or more, regardless of position.

When approved, minor surface cavities or irregularities which do not impair the service value of the unit and which can be corrected without marring its appearance shall be pointed with approved patching material listed in the LDOTD AML (formerly QPL 49) as soon as forms are removed.

2.13 STEEL CASTINGS

- A. Steel castings for highway bridges shall comply with ASTM A 27, Grade 70-36.
- B. High strength steel castings shall comply with ASTM A 148.
- C. Chromium alloy steel castings shall comply with ASTM A 743, Grade CA-15.

2.14 IRON CASTINGS

- A. Castings shall be true to pattern in form and dimensions and free from pouring faults, sponginess, cracks, blowholes and other defects in positions affecting their strength and value for the services intended. Castings shall be boldly filleted at angles, and rises shall be cleaned of scale and sanded to a smooth, clean and uniform surface.
- B. Gray Iron Castings shall comply with AASHTO M 306.
- C. Malleable Castings shall comply with ASTM A 47, Grade 32510. Ductile Iron Castings shall comply with ASTM A 536, Grade 60-40-18. Castings weighing more than 1,000 pounds shall be ultrasonically tested for voids. If voids are found, the casting will be rejected.

PART 3 -- EXECUTION

3.1 GENERAL

- A. The CONTRACTOR shall install products in accordance with manufacturer's written instructions.

3.2 EXCAVATION

- A. The bottom of the trench shall be excavated to a minimum width of 18 inches on each side for all pipe. Surplus material shall be satisfactorily disposed of in accordance with Section 02200 – Earthwork.

3.3 FORMING PIPE BED

- A. When bedding material is specified additional excavation shall be performed below established grade and bedding material placed. When a suitable foundation cannot be obtained, unstable soil below established grade shall be removed and replaced with granular material or bedding material constructed in accordance with Section 02200 – Earthwork.

3.4 LAYING PIPE

- A. Pipe laying shall begin at the downstream end of the line. The pipe shall be in contact with the foundation throughout its length. Bell or groove ends of pipe and outside circumferential lapse of riveted metal pipe shall be placed facing upstream. Riveted seam metal pipe shall be placed with longitudinal laps at sides. Pipes in each continuous line shall have the same wall thickness. Metal pipes provided with lifting lugs shall be handled only by these lugs.
- B. After pipe has been laid and before backfill is placed, the ENGINEER will inspect the pipe for alignment, grade, integrity of joints, and coating damage.

3.5 JOINING PIPE

- A. **Joint Usage:**
 - 1. Type 1 (T1) joints shall be used for side drains under drives and similar installations.
 - 2. Type 2 (T2) joints shall be used for cross drains under roadways, including turnouts.
 - 3. Type 3 (T3) joints shall be used for closed storm drain systems, flumes and siphons.
- B. **Concrete Pipe:** Concrete pipe may be either bell and spigot, or tongue and groove. The method of joining pipe sections shall be such that ends are fully entered and inner surfaces are flush and even. An approved mechanical pipe puller shall be used for joining pipes over 36 inches (900 mm) in diameter. For pipe 36 inches (900 mm) or less in diameter, any approved method for joining pipe may be used which does not damage the pipe. Joints shall be as specified herein and shall be sealed with gasket material installed in accordance with the manufacturer's recommendations. Types 2 and 3 joints shall be wrapped with geotextile fabric for a minimum of 12 inches on each side of joint for pipe 36 inches or less in diameter and a minimum of 18 inches on each side of the joint for pipe greater than 36 inches in diameter. Ends of the fabric shall be lapped at least 10 inches. The edges and ends of fabric shall be suitably secured for the entire circumference of the pipe.
- C. **Metal Pipe:** Metal pipe shall be firmly joined by coupling bands. Bands shall be centered over the joint. For type 1 joints, approved gasket material shall be placed in one corrugation recess on each side of the joint at the coupling band and on each band connection in such manner to prevent leakage. When Type 2 or 3 joints are specified, joining of metal pipe sections shall conform to the following provisions:

1. **General:** Band joints shall be sealed with gasket material. Gasket material shall be placed in accordance with the plan details. The joint shall be wrapped with geotextile fabric for a minimum of 12 inches (300 mm) on each side of the connecting band for pipe diameters 36 inches (900 mm) or less and a minimum of 18 inches (450 mm) on each side of the connecting band for pipe diameters greater than 36 inches (900 mm). Ends of fabric shall be lapped at least 10 inches (250 mm). The edges and ends of fabric shall be suitably secured for the entire circumference of the pipe.
 2. **Circular Section:** Connecting bands shall be of an approved design and shall be installed in accordance with plan details.
 3. **Arch Section:** Connecting bands shall be a minimum of 12 inches (300 mm) wide for pipe arch less than 36 inches (900 mm) round equivalent diameter, and a minimum of 21 inches (525 mm) wide for 36 inches (900 mm) round equivalent diameter pipe arch and greater. Bands shall be connected at the ends by approved angle or strap connections. Connecting bands used for 36 inches (900 mm) round equivalent diameter pipe arch and above shall be 2-piece bands.
- D. **Plastic Pipe:** Joints for plastic pipe shall be either bell and spigot or split coupling bands. Types 2 and 3 joints shall be wrapped with geotextile fabric for a minimum of 12 inches (300 mm) on each side of the joint for pipes 36 inches (900 mm) or less in diameter and for a minimum of 18 inches (450 mm) on each side of the joint for pipes greater than 36 inches (900 mm) in diameter. The ends of the fabric shall be lapped at least 10 inches (250 mm). The edges and ends of the fabric shall be suitably secured for the entire circumference of the pipe.
1. **Bell and Spigot Type Joint System:** The method of joining pipe sections shall be such that ends are fully entered, and inner surfaces are reasonably flush and even. An approved mechanical pipe puller shall be used for joining pipes over 36 inches (900 mm) in diameter. For pipe 36 inches (900 mm) or less in diameter, any approved method for joining pipe may be used which does not damage the pipe. Joints shall be approved and shall be sealed with a gasket system utilizing gasket material complying with Subsection 1006.06(a).
 2. **Split Coupling Type Joint System:** Split coupling bands shall comply with all dimensional and material requirements of Subsection 1006.07. The bands shall be centered over the joint. The split coupling band shall be secured to the pipe with a minimum of five stainless steel or other approved corrosion resistant bands.
 3. Joints shall be approved and shall be sealed with gasket materials. Gasket material shall be placed in the first two corrugation recesses on each side of the pipe connections. Gasket material shall also be placed on each band connection to prevent leakage. When flexible plastic gasket material is used, it shall be a minimum of 1/2 inch (13 mm) in size. The bands shall be tightened to create overlap of the band and shall adequately compress the gasket material.
- E. **Connections:** Approved connections shall be used when joining new pipes to existing pipes. When concrete collars are required in order to extend the ends of existing pipes that have been damaged or to join different types or sizes of pipes, the concrete collars

shall be constructed in accordance with plan details, the applicable requirements of Section 03901 – Portland Cement Concrete.

3.6 RELAYING PIPE

- A. If specified or directed, existing pipes shall be removed and suitable sections re-laid as specified for new pipes.

3.7 BACKFILLING

- A. Backfilling shall be per the plans and Section 02200 – Earthwork.

3.8 INSPECTION OF PIPES

- A. After completion of embankment and prior to roadway surfacing, the ENGINEER shall inspect pipes for proper alignment and integrity of joints. Any misaligned pipe or defective joints shall be corrected by the CONTRACTOR at no direct pay.
- B. **Plastic Pipe:** Installed plastic pipe shall be tested to ensure that vertical deflections do not exceed 5.0 percent. Maximum allowable deflections shall be governed by the mandrel requirements stated herein. Deflection tests shall be performed no sooner than 30 calendar days after installation and compaction of backfill. The pipe shall be cleaned and inspected for offsets and obstructions prior to testing. For pipe 36 inches and less in diameter, a mandrel shall be pulled through the pipe by hand to ensure that maximum allowable deflections have not been exceeded. The mandrel shall be approved or modified after approval will invalidate the test. If the mandrel fails to pass, the pipe is over-deflected. Unless otherwise permitted, over-deflected pipe shall be uncovered and, if not damaged, reinstalled. Damaged pipe shall not be installed, but shall be removed and replaced with new pipe. Any pipe subjected to any method or process other than removal, which attempts, even successfully, to reduce or cure any over-deflection, shall be removed and replaced with new pipe. For pipe larger than 36 inches (900 mm) in diameter, deflection shall be determined by a method approved by the ENGINEER. If a mandrel is selected the minimum diameter, length, and other requirements shall conform to the above requirements. Mandrel testing shall be conducted by the contractor in the presence of the ENGINEER. Mandrel testing shall be at no direct pay.
- C. **Metal Pipe:** If the inside diameter of metal pipe or rise dimensions of metal pipe arch deflects more than 5.0 percent from original dimensions, they shall be removed and reinstalled, unless they do not rebound or are damaged. Pipe or pipe arch which are damaged or do not rebound shall be removed and replaced at no direct pay. Measurement of deflection will be made by the ENGINEER away from rerolled ends.

3.9 CLEANING PIPES

- A. **Existing Pipes:** Pipes designated to be cleaned shall be cleaned of soil, debris, and other materials to the invert of the pipe. Designated pipes shall be cleaned by approved methods that will not damage the pipes. Any damage caused by the CONTRACTOR'S operations shall be satisfactorily repaired at no direct pay. Removed soil, debris and other materials shall be disposed of in accordance with Section 02200 – Earthwork, or as otherwise approved in writing.
- B. **Contractor Installed Pipes:** Prior to final acceptance, pipes shall be cleaned of all debris and soil to the invert of the pipe at no direct pay. Removed soil, debris, and other

materials shall be disposed of in accordance with Section 02200 – Earthwork, or as otherwise approved in writing.

3.10 STUBBING AND PLUGGING PIPES

- A. When it is required that pipes be plugged, such plugs shall be constructed of Class R concrete complying with Section 03901 – Portland Cement Concrete. Thickness of plug and method of construction shall be as directed.
- B. When new pipes are to be stubbed into new or existing pipes or other structures, the connection shall be made with approved mortar as specified herein.

3.11 MANHOLES, JUNCTION BOXES, AND CATCH BASINS

- A. Concrete construction shall conform to Section 03805 – Structural Concrete, and the plans. Joints shall be full mortar joints not more than 1/2 inch wide. When specified, outside faces of structures shall be plastered with 1/2-inch thick cement-sand mortar. Exposed surfaces of concrete and masonry shall be cured in accordance with Section 03805 – Structural Concrete.
- B. Precast concrete units shall be cast with specified number and size of pipe openings required for the drainage system; however, if additional pipe is required during construction for which no openings have been provided, the CONTRACTOR may make such openings provided any damaged units are replaced or satisfactorily repaired. Precast units shall be set to established grade within $\pm 1/2$ inch. Joints for sectional precast units shall be sealed with flexible plastic gasket material installed as to form a watertight seal. The joints of precast units shall be wrapped with geotextile fabric a minimum of 18 inches on each side of the joint. Ends of the fabric shall be lapped at least 10 inches. The edges and ends of the cloth shall be suitably secured.
- C. Metal frames shall be set in a full mortar bed. Conduit sections shall be flush on the inside of structure wall and project outside sufficiently for proper connection with the next conduit section. Masonry shall fit neatly and tightly around conduit.
- D. When grade adjustments of existing structures are specified, frames, covers and gratings shall be removed and walls reconstructed as required. Cleaned frames shall be reset at required elevation. Metal parts shall be thoroughly cleaned and placed in good repair. In lieu of adjusting structures, the CONTRACTOR may adjust structures by means of approved metal adjustment rings.
- E. New structures shall be cleaned of silt, debris or other foreign matter, and non - galvanized metal parts of new or adjusted structures shall be coated with asphaltic varnish as specified herein.
- F. The structure shall be backfilled with granular material in accordance with Section 02200 – Earthwork.
- G. Excavated material not satisfactory for backfill and surplus material shall be disposed of in accordance with Section 02200 – Earthwork.

- END OF SECTION -

SECTION 02713 – TEMPORARY TRAFFIC CONTROLS

PART 1 -- GENERAL

1.1 THE REQUIREMENT

- A. The CONTRACTOR shall be responsible for the design, development, and implementation of a temporary traffic control device plan for all phases and portions of the WORK. The traffic control device plan will provide for safe and expeditious movement of traffic and pedestrians through the area of construction.
- B. The CONTRACTOR shall furnish, install, maintain, and remove temporary construction barricades, lights, signals, pavement markings and signs, and flaggers as indicated in his plan or as directed by the ENGINEER.
- C. Appropriate signs for special conditions shall be furnished and installed as required or as directed.
- D. Requirements for proper signs, barricades, barriers, channelizing devices, or other safety precautions promulgated by the CONTRACTOR's insurers will not be negated by these specifications.
- E. The CONTRACTOR shall assign one or more authorized Traffic Control Supervisors (TCS) to provide traffic control management for the execution of the WORK. If more than one TCS is assigned, then the CONTRACTOR shall provide a weekly schedule identifying who will be in charge of providing traffic control management on a daily basis. If the CONTRACTOR utilizes a subcontractor to provide traffic control management, the subcontractor's TCS shall meet all requirements set forth herein.

1.2 REFERENCE STANDARDS

- A. American Traffic Safety Services Association (ATSSA)

ATSSA	Quality Guidelines for Temporary Traffic Control Devices and Features
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- B. ASTM International (ASTM):

ASTM B209	Standard Specification for Aluminum and Aluminum Alloy Sheet and Plate
ASTM D4956	Standard Specification for Retroreflective Sheeting for Traffic Control
- C. Federal Highway Administration (FHWA):

MUTCD	Manual for Uniform Traffic Control Devices
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- D. Louisiana Department of Transportation and Development (LDOTD):

AML	Approved Materials List
TTC-00 (C)	Temporary Traffic Control General Notes

TTC-00 (D)	Layout for Placement of Road Work Next “XX” Miles and End Road Work Signs
TTC-01	Layout for Work Less than 15 Feet from the Traveled Way
TTC-02	Layout for Work Less than 15 Feet from the Traveled Way
TTC-03	Layout for Lane Closures on Two Lane Roads with Two Way Traffic Less Than 1600 Feet from Intersection
TTC-04	Layout for Lane Closures on Two Lane Roads with Two Way Traffic Greater Than 1600 Feet from Intersection
TTC-05	Layout for On - Site Diversion with Two Lane Traffic
TTC-06	Layout for Lane Closure on Four – Lane Undivided Highways
TTC-07	Layout for Lane Closure of Two Adjacent Lanes on Four – Lane Undivided Highways
TTC-08	Layout for Median Crossover on Divided Highways
TTC-09	Layout for One Lane Closure on Divided Highways
TTC-10	Layout for Lane and Sidewalk Closures in Urban Areas with Speed Limit Less than or Equal to 40 Miles per Hour
TTC-11	Layout for Lane Closure Using Temporary Barrier Rail on Divided Highways
TTC-12	Layout for Lane Closures Through Ramp Entrance and Exit Tapers
TTC-13	Layout for Lane Closure of Two Lanes on a Multi – Lane Highway
TTC-14	Layout for “Louisiana Left” on Interstate or Other Divided Highways
TTC-15	Layout for Short Duration Closure of Divided Highways
TTC-16	Layout for Temporary Road Closures
TTC-17	Layout for Moving Operations on Interstate or Other Multi – Lane Roadways
TTC-18	Layout for Moving Operations on Two – Way Two – Lane Roadways
TTC-19	Layout for Traffic Signal Installation and Maintenance at an Intersection
E. National Cooperative Highway Research Program (NCHRP)	
NCHRP 350	Recommended Procedures for the Safety Performance Evaluation of Highway Features

1.3 CONTRACTOR SUBMITTALS, SAMPLING, AND TESTING

- A. The CONTRACTOR shall provide submittals, samples for testing, and testing of materials in accordance with Section 01010 – General Requirements and Section 01030 – Submittals, Sampling and Testing Plan.

1.4 QUALITY CONTROL

- A. See Part 3 – Execution for Quality Control Requirements.

PART 2 -- PRODUCTS

2.1 GENERAL

- A. All Category I, II, and III portable work zone traffic control devices shall be crashworthy as determined by evaluations through NCHRP 350 for Test Level 3.
 - 1. **Category 1 Devices:** Category I devices are low mass, single piece traffic cones, tubular markers, single piece drums and flexible delineators and are, by definition, considered crashworthy devices meeting NCHRP 350 Criteria for Test Level III. Drum and light combinations with Type A or C warning lights and fastener hardware consisting of vandal-resistant ½ inch diameter cadmium plated steel bolts and nuts used with 1 1/2 inch diameter by ¾ cup washers are included as Category I devices. In lieu of testing for crashworthiness, acceptance of Category I devices for compliance with NCHRP 350 will be allowed based upon self – certification by the supplier. The supplier shall certify that the product is crashworthy in accordance with the evaluation criteria of NCHRP 350. Certification may be a one – page affidavit signed by the supplier, with supporting documentation kept on file to be furnished if requested.
 - 2. **Category 2 Devices:** Category II devices include other low mass traffic control devices such as portable barricades, either with or without lights and/or signs, portable sign stands, portable vertical panel assemblies, and drums with lights not meeting the drum and light combination requirements for Category I. Individual crash testing is required for Category II devices. FHWA letters of approval shall serve as verification that these devices comply with the crash testing requirements of NCHRP Report 350, Test Level III. The CONTRACTOR shall provide to the ENGINEER a listing of all the Category II Devices to be used, including a reference to the FHWA Work Zone letter number for each device. The CONTRACTOR shall certify that each device has been crash tested and meets the NCHRP 350 requirements.
 - 3. **Category 3 Devices:** NOT USED

2.2 BARRICADE WARNING LIGHTS

- A. Type A, B, and C barricade warning lights shall be in compliance with the MUTCD and shall be an approved product listed on the Louisiana Department of Transportation and Development Approved Materials List.

2.3 DRUMS, CONES, AND TUBULAR MARKERS

- A. **Drums and Super Cones:** Plastic drums shall be an approved product listed on the LDOTD AML. The design of drums and super cones shall comply with LDOTD TTC-00

(C). Reflective sheeting for drums and super cones shall be a minimum of six inches wide and shall meet the requirements of ASTM D4956, Type III, and the Supplementary Requirement S2 for reboundable sheeting as specified in ASTM D4956. Sheeting for drums shall be an approved material listed on the LDOTD AML.

- B. **Traffic Cones:** The design of plastic traffic cones shall comply with LDOTD TTC-00 (C). Reflective sheeting for cone collars shall be a minimum of six inches wide and shall meet the requirements of ASTM D4956, Type IV. Sheeting for plastic traffic cones shall be an approved material listed on the LDOTD AML. All traffic cones shall be a minimum of 36 inches in height.
- C. **Tubular Markers:** The design of tubular markers shall comply with LDOTD TTC-00 (C). Reflective sheeting for tubular markers shall meet the requirements of ASTM D4956, Type III. Sheeting for tubular markers shall be an approved material listed on the LDOTD AML. All tubular markers shall be a minimum of 28 inches in height.

2.4 TEMPORARY SIGNS, VERTICAL PANELS & BARRICADES

- A. **General:** All signs used for temporary traffic control shall comply with the MUTCD, the LDOTD Temporary Traffic Control Standards, and the CONTRACTOR's traffic control device plan. The design of temporary barricades and vertical panels shall comply with LDOTD TTC – 00 (C). Only Type III barricades will be allowed. The design of vertical panels shall comply with LDOTD TTC – 00 (C).
- B. **Substrate:** Substrate for barricade panels shall be either wood or rigid thermoplastic. Substrate for portable signs shall be aluminum, wood, or plastic. Substrate for post mounted signs shall be aluminum, wood, rigid thermoplastic, or aluminum clad low density polyethylene plastic.
 - 1. **Aluminum:** Aluminum Substrate shall be 0.080-inch thick sheeting complying with ASTM B209, Alloy 6061-T6 or Alloy 5052-H38.
 - 2. **Wood:** Wood substrate shall be plywood sheeting of exterior type grades High Density Overlay or Medium Density Overlay. Panels shall be a minimum of 5/8-inch thick and shall comply with the latest American Plywood Association specifications and shall be identified with the APA edge mark or back stamp to verify inspection and testing. Prior to application of the reflective sheeting, the surface shall be sanded with steel wool or fine sandpaper and wiped thoroughly clean. The surface shall be allowed to dry for eight (8) hours prior to the application of sheeting. Cut edges of plywood panels shall be sealed with aluminum pigmented polyurethane sealer.
 - 3. **Plastic:** Plastic substrate for barricade panels and signs shall be as follows:
 - a. **Fiber Reinforced Vinyl (PVC):** The substrate shall have a nominal composite thickness of 0.04 inches and shall be bonded to an approved retroreflective material by the manufacturer.
 - b. **Rigid Thermoplastic:** Rigid thermoplastic substrate shall consist of either High Density Polyethylene (HDPE) or High Density Polycarbonate (HDPC). The rigid thermoplastic for barricade panels shall be hollow core HDPE or HDPC with a minimum thickness of 0.625-inch thick blow molded substrate. The thermoplastic for sign panels shall be either 0.4000inch thick thin wall, fluted substrate or 0.625-inch thick blow molded substrate. Substrates shall be sufficiently rigid to maintain a flat face and shall be capable of attachment to the

sign mounting in such a manner as not to crush or otherwise deform the substrate. Reflectorized sheeting applied to rigid thermoplastic shall have its manufacturer's approval for use on the substrate.

- c. **Aluminum Clad Low Density Polyethylene (AL/LDPE) Plastic:** Aluminum clad low density polyethylene plastic shall be 0.080-inch thick. The substrate shall be sufficiently rigid to maintain a flat face and shall be capable of attachment to the sign mounting in such a manner as not to crush or otherwise deform the substrate. Reflectorized sheeting applied to aluminum clad low density polyethylene shall have its manufacturer's approval for use on the substrate.
- C. **Reflective Sheeting:** Reflective sheeting for temporary signs and barricades shall be an approved material listed on the LDOTD AML, and shall comply with the requirements of ASTM D4956, Type III. On the main line of freeways and expressways, the initial advance warning sign shall be fabricated using sheeting complying with the requirements of ASTM D4956, Type X (Fluorescent Orange).

PART 3 -- EXECUTION

3.1 GENERAL

- A. Temporary signs, barricades, and related devices shall be required when the WORK is in progress or when work is suspended. During such times that temporary signs, barricades, and related devices are not in place, appropriate existing regulatory signs shall be maintained by the CONTRACTOR. WORK shall not begin until signs, barricades, and other devices have been erected.
- B. When signs to be furnished and erected by the CONTRACTOR are in place, the CONTRACTOR's Traffic Control Supervisor (TCS) shall cover any standard signs that are in conflict with the temporary signs.
- C. When placing signs, the CONTRACTOR shall coordinate with the ENGINEER in covering OWNER's signs or signs owned by other entities so that all appropriate signs remain in place.
- D. Signs shall remain in place and be maintained by the CONTRACTOR, supplemented by other signs as required, throughout the execution of the WORK. When previously used signs are to be utilized on the project, the ENGINEER will review and approve these signs prior to installation. The ENGINEER will require any sign with reduced reflectivity or excessive fading to be removed from the work zone. In the case of a dispute over a rejected used sign, the ENGINEER may at his discretion require measurements to be taken or review reflectivity or color data obtained by the CONTRACTOR to determine if the sign meets minimum standards for new materials. Signs that do not meet the minimum standards for new materials shall be replaced by the CONTRACTOR at his expense.
- E. Signs, barricades, and related devices furnished and placed by the CONTRACTOR shall, upon removal, remain property of the CONTRACTOR.
- F. When a work area has been established on one side of the roadway only, there shall be no conflicted operations or parking on the opposite shoulder within 500 feet of the work area.

- G. Parking of vehicles or unattended equipment, or storage of materials within the clear zone shall not be permitted. If the clear zone is not defined on the plans, the ENGINEER will inform the CONTRACTOR of the clear zone.
- H. Sight distance shall be considered when placing traffic control devices.
- I. **Advanced Warning Area and Flashing Arrow Board:** When specified, advance warning arrow panels for temporary traffic control shall be provided. Panels shall be one of the specified types complying with the MUTCD. If none is specified, Type C panels shall be provided. Flashing arrow boards shall be 4 feet by 8 feet.

3.2 MINIMUM REQUIREMENTS FOR TRAFFIC CONTROL SETUP

- A. General: Minimum traffic control devices shown on reference standards shall be the minimum, and it shall be the CONTRACTOR's responsibility to ensure that appropriate devices are employed and maintained during the duration of construction.
- B. Minimum Traffic Control Device Layout for various construction situations shall be as indicated in the table below. These minimum requirements are the minimum required, and it shall be the CONTRACTOR's responsibility to supplement the minimum arrangements as required. The use of these minimum layouts does not relieve the CONTRACTOR from the responsibility of submitting a traffic control device plan sealed by a licensed professional engineer.

Minimum Requirement	Reference Layout
Layout for Placement of Road Work Next "XX" Miles and End Road Work Signs	LDOTD TTC – 00 (D)
Layout for Work Less than 15 Feet from the Traveled Way	LDOTD TTC – 01
Layout for Work Less than 15 Feet from the Traveled Way	LDOTD TTC – 02
Layout for Lane Closures on Two Lane Roads with Two Way Traffic Less Than 1600 Feet from Intersection	LDOTD TTC – 03
Layout for Lane Closures on Two Lane Roads with Two Way Traffic Greater Than 1600 Feet from Intersection	LDOTD TTC – 04
Layout for On - Site Diversion with Two Lane Traffic	LDOTD TTC – 05
Layout for Lane Closure on Four – Lane Undivided Highways	LDOTD TTC – 06
Layout for Lane Closure of Two Adjacent Lanes on Four – Lane Undivided Highways	LDOTD TTC – 07

Layout for Median Crossover on Divided Highways	LDOTD TTC – 08
Layout for One Lane Closure on Divided Highways	LDOTD TTC – 09
Layout for Lane and Sidewalk Closures in Urban Areas with Speed Limit Less than or Equal to 40 Miles per Hour	LDOTD TTC – 10
Layout for Lane Closure Using Temporary Barrier Rail on Divided Highways	LDOTD TTC – 11
Layout for Lane Closures Through Ramp Entrance and Exit Tapers	LDOTD TTC – 12
Layout for Lane Closure of Two Lanes on a Multi – Lane Highway	LDOTD TTC – 13
Layout for “Louisiana Left” on Interstate or Other Divided Highways	LDOTD TTC – 14
Layout for Short Duration Closure of Divided Highways	LDOTD TTC – 15
Layout for Temporary Road Closures	LDOTD TTC – 16
Layout for Moving Operations on Interstate or Other Multi – Lane Roadways	LDOTD TTC – 17
Layout for Moving Operations on Two – Way Two – Lane Roadways	LDOTD TTC – 18
Layout for Traffic Signal Installation and Maintenance at an Intersection	LDOTD TTC – 19

3.3 DROP – OFFS

- A. Minimum temporary traffic control devices for Drop – offs shall be as indicated on LDOTD TTC-00 (C)

3.4 CHANNELIZING DEVICES

- A. Tubular markers, drums, super cones, vertical panels, and traffic cones may be utilized as channelizing devices. During nighttime operations, 36 – inch traffic cones will not be allowed.
- B. Retroreflective material pattern used on super cones shall match that used on drums.

C. Tangent Areas:

1. **Standard Spacing:** Standard spacing shall be as indicated on LDOTD TTC – 00 (C).

2. **Daylight Operations:** Drums and super cones shall be spaced at standard spacing. All other devices shall be spaced at ½ of standard spacing.
3. **Nighttime Operations:** Drums and super cones at standard spacing shall be the only devices allowed.

D. Taper Areas:

1. Standard Spacing: Standard spacing shall be as indicated on LDOTD TTC – 00 (C).
 2. Daylight Operations: Drums and shall be spaced at standard spacing. All other devices shall be spaced at ½ of standard spacing.
 3. Nighttime Operations: Drums at standard spacing shall be the only devices allowed.
- E. Type C Steady Burn Lights shall be used on all channelizing devices in the taper and on the first two devices in the tangent at night.
- F. Typical channelizing device lateral placement (do not include when it is used as a divider for opposing directions of traffic) shall be two feet off the lane line of the closed lane or two feet off the shoulder.
- G. Devices may be adjusted laterally to accommodate ongoing work in the immediate vicinity but must be returned to the closed lane after work activity has moved.
- H. Channelizing devices in the tangent area shall be of the same type.
- I. Channelizing devices in the taper area shall be of the same type.

3.5 TYPE III BARRICADES

- A. Only Type III Barricades may be utilized.
- B. When used for overnight closures, two Type B High Intensity lights shall supplement all barricades that are placed in a closed lane or that extend across a highway.
- C. When signs and lights are mounted to a barricade, they must meet NCHRP Report 350 and MASH requirements.
- D. A truck with a truck – mounted attenuator may be substituted for a barricade when workers are present.
- E. Barricades, at a minimum, shall be placed:**
1. At the beginning of a closed lane or shoulder and at 1,000 foot intervals where no active work is ongoing and the lane must remain closed. A minimum of two (2) barricades shall be placed if the lane or shoulder closure is less than 2,000 feet (One barricade shall be placed at the beginning of the lane closure after the buffer space and one shall be placed in the middle of the lane closure);
 2. Before each or group of unfilled holes or holes filled with temporary material;
 3. Before uncured concrete;

4. In the closed lane on each side of every intersection and crossover (do not block sight distance);
5. In front of piles of material (dirt, aggregate, broken concrete), culverts, and equipment which is near the work zone.

3.6 SIGNS

- A. One Type B high intensity light shall be used to supplement the first sign or pair of signs that gives a warning about a lane closure during nighttime operations.
- B. CONTRACTOR shall use caution not to damage existing signs which remain in place. Any such signs damaged shall be replaced at the cost of the CONTRACTOR.
- C. All signs shall be covered with a strong, lightweight material when not applicable. Burlap will not be acceptable for covering signs.
- D. When portable sign frames are used, they shall be moved to an area inaccessible to traffic and not visible to drives.
- E. Left side mounted signs will not be required for roadways with a center left turn lane and for undivided roadways.
- F. Vinyl roll up signs may be used if work zone is in place for 12 hours or less, there are no more than 2 lanes in each direction, and if signs meet all size, color, retro reflectivity, and NHCRP 230 Report or MASH requirements.
- G. One foot portable sign stands may be used if work zone is in place for 12 hours or less, the pre – construction posted speed limit is less than 45 miles per hour, and there are no more than 2 lanes in each direction.
- H. All signs shall be visible to the drivers. No obstructions such as on – street parking or other traffic control devices shall block the sign.
- I. On divided highways, signs shall be placed on the right and the left.

J. Sign Posts:

1. Signs measuring 10 square feet or less shall be mounted on 1 rigid post.
 2. Signs measuring over 10 square feet shall be mounted on two (2) rigid posts.
 3. Signs measuring over 20 square feet shall be mounted on at least three (3) rigid posts.
 4. Allowable lap splices for U – channel posts shall be as indicated on LDOTD TTC -00 (C).
- K. Sign height and offset from roadway shall be per LDOTD TTC – 00 (C).

3.7 FLAGGING

- A. All flaggers shall be qualified. The CONTRACTOR shall be responsible for training or assuring that all flaggers are qualified to perform flagging duties.

- B. A qualified flagger is one that has completed courses such as those offered by ATSSA, Association of General Contractors, or other courses as approved by the LDOTD Work Zone Task Force.
- C. When utilized, flaggers shall use a minimum 18-inch octagonal shape sign on minimum 6-foot stop/slow paddle and wear ANSI Class 2 Lime Green Vest during daytime operations and ANSI Class 3 Lime Green Ensemble during night operations.
- D. In all flagging operations, the flagger must be visible from the flagger advance warning sign.

3.8 FLASHING ARROW BOARDS

- A. Flashing arrow boards should be placed on the shoulder. When there is no shoulder or median area, the arrow board shall be placed within the closed lane behind the channelizing devices and as close to the beginning of the taper as practical.
- B. Flashing arrow boards shall be delineated with retroreflective devices.
- C. At no time shall the arrow board encroach upon the traveled way. When flashing arrow boards are not in use, they shall be shielded by a guard rail or barriers or removed.
- D. Arrow boards shall only be used for lane reduction tapers and shall not be used for lane shifts.

3.9 DUTIES OF THE TRAFFIC CONTROL SUPERVISOR (TCS)

- A. The CONTRACTOR's TCS's responsibility shall be traffic control management, and the TCS shall be available to the ENGINEER to address traffic control issues as required. The following duties shall be the primary responsibilities of the CONTRACTOR's TCS:
 - 1. The TCS shall personally provide traffic control management and supervision services at the site of the WORK. The TCS may have other duties, but shall be readily available at all times to provide TCS duties as required. A minimum of one TCT shall be required on site during all working hours.
 - 2. The TCS shall be responsible for observing and evaluating both the day and night time performance of all traffic control devices installed on the project, in accordance with the traffic control plan to ensure that the devices are performing effectively as planned for both safety and traffic operations. This shall be done upon the initial installation of traffic control devices and when any modifications and/or changes are made, in addition to regular inspection requirements as specified herein.
 - 3. The TCS shall be responsible for the training of flagging personnel. This training shall ensure that all flagging is in compliance with the MUTCD, Part VI and the Louisiana Work Zone Traffic Control Details.
 - 4. The TCS shall coordinate all traffic control operations for the duration of the contract, including those of subcontractors, utility companies, and suppliers, to ensure that all traffic control is in place and fully operational prior to the commencement of any work. The ENGINEER recognizes that the TCS does not have direct control over the traffic control operations of utility companies. The coordination required by the TCS when dealing with utility companies is specifically for the purpose of coordinating concurrent utility traffic control with any other construction traffic control to avoid conflicts.

5. The TCS shall coordinate, in writing, all project activities with the appropriate law enforcement, fire control agencies, and other appropriate public entities as determined at the pre – construction conference. The TCS shall also invite the above agencies to the pre – construction conference.
 6. The TCS shall prepare and submit statements concerning road closures, delays, and other project activities to the OWNER or ENGINEER when directed by the ENGINEER.
 7. The TCS shall be responsible for notifying the ENGINEER of all vehicular accidents and/or incidents related to the project traffic control. The time and date of the notification shall be documented in the traffic control diary. The TCS shall also monitor and document queues that occur.
 8. The TCS assigned to the project shall attend the pre – construction conference and all project meetings.
 9. The TCSA shall be responsible for the maintenance, cleanliness, and removal of traffic control plan during working and non – working hours.
- B. **Traffic Control Diary:** The TCS shall maintain a project traffic control diary in a bound book. The CONTRACTOR shall obtain sufficient number of the diaries from the Louisiana Association of General Contractors (LAGC). The TCS shall keep the traffic control diary on a daily basis and shall sign each daily entry. Entries shall be made in ink, and there shall be no erasures or white – outs. Incorrect entries shall be struck out and then replaced with the correct text. Photographs and videotapes may be used to supplement written text. The diary shall be available at all times to the ENGINEER and a copy shall be submitted to the ENGINEER on a monthly basis. Failure to submit the diary will result in requests for payments being withheld until the past due copies of the diary are submitted. The traffic control diary shall become property of the ENGINEER at the completion of the WORK.
- C. **Traffic Control Plan Revisions:** Where revisions are made to the traffic control plan, regardless of whether or not the changes were promulgated by the CONTRACTOR, OWNER, or ENGINEER, a revised traffic control device plan shall be submitted by the CONTRACTOR.
- D. **Inspection of Traffic Control:** The TCS shall be responsible for the inspection of all traffic control devices every calendar day that traffic control devices are in use. This inspection may be delegated to the TCT. The “Quality Guidelines for Work Zone Traffic Control Devices” shall be used to evaluate the condition of the traffic control devices to determine if acceptable for use. The TCS shall provide for the immediate repair, cleaning, or replacement of any traffic control devices not functioning as required to ensure the safety of motorists, pedestrians, and construction personnel and/or not meeting the ATSSA standard. Inspection of traffic control devices shall be conducted by the TCS at the beginning and end of each workday, and as directed by the ENGINEER during the workday. The traffic control devices shall be inspected by the TCS on weekends, holidays, or other non – workdays at least once per day. Traffic control devices shall be inspected by the TCS at least once per week during nighttime periods and the same night after any modifications or changes have been made in the traffic control devices.
- E. **Traffic Control Officer:** In some cases, and with the agreement of the ENGINEER, a Traffic Control Officer (TCO) may be utilized onsite where equipment is in or near to a roadway to assist in alerting or directing traffic near the work area. If required by the

OWNER, responsibility of payment for the TCO shall be the responsibility of the OWNER. If required by the CONTRACTOR's traffic control plan, responsibility of payment for the TCO shall be the responsibility of the CONTRACTOR.

3.10 FAILURE TO COMPLY WITH TRAFFIC CONTROL PLAN

- A. The ENGINEER may suspend all or part of the CONTRACTOR's operation(s) for failure to comply with the reviewed traffic control plan or for failure to correct unsafe traffic conditions within a reasonable period of time after such notification is given to the CONTRACTOR in writing.
- B. In the event that the CONTRACTOR does not take appropriate action to bring the deficient traffic control into compliance with the traffic control plan or to correct unsafe traffic conditions, the OWNER and ENGINEER may employ others to correct the unsafe traffic conditions. Such costs will be deducted from payments due the CONTRACTOR.

- END OF SECTION -

SECTION 02716 – VEGETATIVE AND FIBER MULCH

PART 1 -- GENERAL

1.1 THE REQUIREMENT

- A. The CONTRACTOR shall furnish and place an approved vegetative or fiber mulch with a tacking agent on seeded areas to promote seed germination and growth, while temporarily protecting the soil from erosion.

1.2 REFERENCE STANDARDS

- A. Louisiana Department of Transportation & Development
AML Approved Materials List
- B. Texas Transportation Institute
Field Performance Testing of Erosion Control Products

1.3 CONTRACTOR SUBMITTALS, SAMPLING, AND TESTING

- A. The CONTRACTOR shall provide submittals, samples for testing, and testing of materials in accordance with Section 01010 – General Requirements and Section 01030 – Submittals, Sampling and Testing Plan.

1.4 QUALITY ASSURANCE

- A. NOT USED

1.5 DELIVERY, STORAGE, AND HANDLING:

- A. Vegetative and fiber mulch shall be delivered in bales or bags of uniform size. Storage of mulching materials shall be in accordance with the supplier's recommendations. Mulch stockpiles shall be protected from the weather.

PART 2 -- PRODUCTS

2.1 GENERAL

- A. The contractor shall notify the engineer at least 7 calendar days in advance of commencing operations so that the mulch can be inspected and approved prior to use.

2.2 TACKED VEGETATIVE MULCH

- A. Vegetation shall consist of pine straw, stems or stalks of oats, rye, rice, or other approved straws. The contractor may also use hay obtained from various legumes and grasses such as lespedezas, clover, vetches, soybeans, Bermuda, Dallis, carpet sedge, fescue or other approved legumes or grasses of any combination thereof. Straw or hay shall be reasonably dry and free from mold, Johnson grass or other noxious weeds.
- B. Vegetative mulch shall be tacked with one of the following:

1. Approved emulsified asphalt;
2. An approved tacking agent for vegetative mulch listed in the Qualified Products List (QPL 72). The minimum allowable vegetation density for source approval of tacked vegetative mulch shall be 70 percent for clay soils and 60 percent for sandy soils when evaluated in accordance with the Texas Transportation Institute (TTI) Field Performance Testing Procedure of Selected Erosion Control Products.

2.3 FIBER MULCH PRODUCTS

- A. Fiber mulch products shall be listed in the LDOTD AML (Formerly QPL 72) and consist of organic fiber mulches. The minimum allowable vegetation density for source approval of fiber mulch products shall be 70 percent for clay soils and 60 percent for sandy soils when evaluated in accordance with the TTI Field Performance Testing Procedure of Selected Erosion Control Products.

PART 3 -- EXECUTION

3.1 GENERAL

- A. Mulching shall follow seeding operations within 48 hours. Mulch shall not be sprayed on structures. All stains resulting from the mulch or the tacking agent shall be removed, and the surface left in acceptable condition. During windy conditions the contractor shall make adjustments in operations to ensure uniform spreading.
- B. Damage to seeded areas shall be repaired and re-seeded at no additional cost to the OWNER.

3.2 TACKED VEGETATIVE MULCH

- A. Vegetative mulch shall be distributed uniformly over the seeded area by blowing it simultaneously with an approved tacking agent. Jet nozzles in the muzzle of the blower shall be spaced to provide a uniform coating of the mulch as it is blown through the nozzles. The tacked vegetative mulch shall be loose enough to allow air to circulate, but compact enough to partially shade the ground and reduce the impact of rainfall on the soil surface. Mulching shall begin at the top of the slopes and extend downward. Blower pipe extensions shall be used where slopes cannot be reached by the blower.

3.3 FIBER MULCH

- A. The application equipment shall have a built in agitation system with an operating capacity sufficient to agitate, suspend, and homogeneously mix the fiber mulch, water and any tacking agent that is part of the fiber mulch system. The fibers shall be kept in uniform suspension throughout the mixing and distribution cycles. The slurry distribution lines shall be large enough to prevent stoppage. Hydraulic spray nozzles in the discharge line shall provide uniform distribution of the slurry.

3.4 SPREADING RATES

- A. Tacked Vegetative Mulch: Vegetative mulch shall be applied at a rate of 1 1/2 to 2 tons of mulch per acre simultaneously with the tacking agent. Final application rates for the tacking agent shall be in accordance with the application rate shown in the LOTD AML (Formerly QPL 72) for the particular type of vegetative mulch being used.

- B. Fiber Mulch: Fiber mulch shall be applied as a slurry at a rate of 1 to 1 1/2 tons per acre based on dry weight of the fibers. The application rate of the tacking agent, if not pre-blended with the fibers by the manufacturer, shall be in accordance with the application rate shown in the LOTD AML (Formerly QPL 72) for the particular type of fiber being used.

3.5 MANUAL SPREADING

- A. In order to prevent defacing structures, mulch shall be manually spread around structures. When manual spreading is performed, mulch shall be placed in a shredded condition, after which the tacking agent shall be sprayed over the mulch at the specified rate.

- END OF SECTION –

SECTION 02717 – SEEDING

PART 1 -- GENERAL

1.1 THE REQUIREMENT

- A. The CONTRACTOR shall prepare seed beds and furnish and show grass seed on the area shown on the plans or as directed.
- B. Unless otherwise specified, seed shall be applied mechanically in a dry condition.
- C. The CONTRACTOR shall obtain the services of an established soil testing entity to coordinate soil sampling, perform testing and analyses, and prepare recommendations for materials and procedures to be used during the pre-planting phase of new turf establishment. When practicable, soil testing shall be performed early enough to permit agricultural lime or other additives (if required) to be applied sufficiently in advance of planting so that the soil pH adjustment will occur before planting. Samples shall be tested and analyzed to determine pH and fertility conditions. The test results and recommendations shall be used to determine the quantities of agricultural lime and fertilizer required for pre-planting applications. A copy of the test report with recommendations shall be furnished to the ENGINEER. Testing will be at no direct pay. Agricultural lime recommendations shall consider probable time of application.

1.2 REFERENCE STANDARDS

- A. NOT USED

1.3 CONTRACTOR SUBMITTALS, SAMPLING, AND TESTING

- A. The CONTRACTOR shall provide submittals, samples for testing, and testing of materials in accordance with Section 01010 – General Requirements and Section 01030 – Submittals, Sampling and Testing Plan.

1.4 QUALITY ASSURANCE

- A. NOT USED

1.5 DELIVERY, STORAGE, AND HANDLING:

- A. NOT USED

PART 2 -- PRODUCTS

2.1 TOPSOIL

- A. Topsoil, if required, shall be per Section 02200.

2.2 FERTILIZER

- A. Fertilizer shall be as specified in Section 02718 – Fertilizer and Agricultural Lime.

2.3 AGRICULTURAL LIME

- A. Agricultural Lime shall be as specified in Section 02718 – Fertilizer and Agricultural Lime.

2.4 SEED

- A. Seed shall comply with requirements of Louisiana law. minimum percentage of pure live seed and the maximum percentage of weed seed permitted shall be in accordance with the table below:

Variety	Minimum Percent of Pure Live Seed (Purity Times Germination Including Hard Seed by Count)	Maximum Percent of Weed Seed by Count
Hulled Bermuda	83	1
Pensacola Bahia	81	2
Crimson Clover	78	1
Kentucky 31 Fescue	80	1
Unhulled Bermuda	80	1
Ball Clover	80	1
Vetch	80	1
Lespedeza	80	1
Annual Rye	80	1
Browntop Mullet	80	1

- B. Each variety of seed shall be furnished and delivered in separate bags or other containers. Each bag or container shall bear an analysis tag which is a minimum No. 6 standard shipping tag having all information required by the Louisiana Seed Law.
- C. Seed furnished shall be the previous season's crop (the last crop year for the crop kind in question) and the date of analysis shown on each tag shall be within 5 months (excluding the month in which the test is completed) of the time of delivery to the project. Noxious weeds shall be interpreted to mean that list of weeds, except Bermuda, which has been adopted by the Louisiana Seed Commission as being noxious in Louisiana. Noxious weed seeds shall not exceed the limitations prescribed in the regulations and in no case shall they exceed 500 per pound. Analysis tags shall be removed from each bag or container only by the ENGINEER or an authorized representative.

PART 3 -- EXECUTION

3.1 SOIL AREAS AND SEED SELECTION

- A. The CONTRACTOR's seed supplier shall recommend and select seed mixture on the basis of the five general areas described below and the time of planting. Seed mixtures, soil areas, and planting and establishment dates are detailed in the table below.

- 1) Area 1 – Alluvial Soils of Mississippi and Red River Bottoms
- 2) Area 2 – Mississippi Terraces and Loessial Soils
- 3) Area 3 – Coastal Plain Soils
- 4) Area 4 - Coastal Prairie Soils
- 5) Area 5 - Ouachita River Bottom

Type	Seed Mixture	Minimum Pounds per Acre (Respectively)	Soil Area	Planting Dates	Establishment Period
A	Hulled Bermuda	30	1,2,3,4,5	Mar – Sep	Mar – Dec
B	Hulled Bermuda, Crimson Clover	20, 25	1,2,3,5	Feb – Mar	Feb – Jun
C	Kentucky 31 Fescue, Unhulled Bermuda	25,20	1,2,3,4,5	Sep – Feb	Sep – May
D	Unhulled Bermuda, Crimson Clover	20, 40	1,2,3,4,5	Sep – Feb	Sep – May
E	Pensacola Bahia	25	1,2,3,5	Mar – Sep	Mar – Dec
F	Ball Clover, Unhulled Bermuda	25, 20	1,2,3,4,5	Feb – Mar	Feb – Jun
G	Vetch, Unhulled Bermuda	40, 20	1,2,3,4,5	Sep – Oct	Sep – Jan
H	Annual Rye	30	1,2,3,4,5	Sep – Jan	Sep – Apr

3.2 PREPARATION OF SEED BED

- A. Seed beds shall be prepared by disking, harrowing or other approved methods. Soil on slopes of 3- horizontal-to-1-vertical and flatter shall be tilled to a minimum of 4 inches depth. On slopes between 3-horizontal-to-1-vertical and 1- horizontal-to-1 vertical, the soil shall be tilled to a minimum of 2 inches depth by scarifying with heavy rakes, or other methods. Rototillers may be used where soil conditions and length of slope permit. On slopes 1- horizontal-to-1-vertical and steeper, no tillage is required. Drainage patterns shall be maintained as indicated on the plans. Areas compacted by construction operations shall be completely pulverized by tillage. Soil used for repair of surface erosion or grade deficiencies shall conform to topsoil requirements. The pH adjuster, fertilizer, and soil conditioner may be applied during this procedure. The prepared surface shall be a maximum 1 inch below the adjoining grade of any surfaced area. New surfaces shall be blended to existing areas. The prepared surface shall be completed with a light raking to remove debris.
- B. **Lawn Area Debris:** Debris and stones over a maximum of 5/8- inch in any dimension shall be removed from surfaces designated on the plans as lawn areas or as directed by the ENGINEER.
- C. **Field Area Debris:** Debris and stones over a maximum of 3-inches (75 mm) in any dimension shall be removed from the surface
- D. **Protection:** Prepared surface areas shall be protected from compaction or damage by vehicular or pedestrian traffic and surface erosion.

3.3 PERMANENT SEEDING

- A. Seed shall be planted within the dates specified above, unless otherwise directed or permitted by the ENGINEER.

3.4 TEMPORARY SEEDING

- A. During construction, temporary seeding shall be placed as directed. Temporary seeding may be any of the types specified above. Annual rye grass shall be the only acceptable grass for winter cover.

3.5 WATERING

- A. When deemed necessary due to dry conditions, seeded areas shall be periodically watered until final acceptance at no direct pay.

3.6 SEED ESTABLISHMENT PERIOD

- A. Turf will be considered to be established and completed when the areas to be turfed have produced Bermuda grass stems or runners which overlap adjacent Bermuda grass growth over a minimum of 85 percent of the entire area as determined by the ENGINEER by random sampling on a square yard basis and when the areas to be turfed have no spots greater than 4 square feet that are void of Bermuda grass.
- B. Acceptance of the entire turfed area will be based on the ENGINEER's visual inspection and determination of the required coverage. Acceptance will be based on coverage by Bermuda grass only. Dying or dead turf and eroded areas will not be accepted. Partial

areas will not be accepted unless determined by the ENGINEER to be in the best interest of the OWNER.

3.7 HYDROSEEDING

- A. Hydro-seeding shall consist of mixing and applying seed, commercial fertilizer, lime, polyacrylamide tackifier, and mycorrhizal inoculum with paper or wood fiber and water. Seed and commercial fertilizer shall be uniformly spread over the area at the rates specified in Table 717-1 and Table 718-1. Paper or wood fiber shall be mixed and applied with the seed in accordance with the manufacturer's recommendations and as approved by the ENGINEER. The CONTRACTOR will be permitted to include fertilizer and lime in the seeding slurry for application during hydro-seeding operations.
- B. The application rate for pellet-inoculated seed shall be determined using the seed mass exclusive of inoculant materials.
- C. The materials and the quantities thereof to be mixed with water will be specified. The quantity of water shall be mixed as needed for application.
- D. Mixing of materials for application with hydro-seeding equipment shall be performed in a tank with a built-in continuous agitation system with sufficient operating capacity to produce a homogeneous mixture, and with a discharge system that will apply the mixture at a continuous and uniform rate. The tank shall have a minimum capacity of 962 gallons (3700 L). The ENGINEER may authorize use of equipment of smaller capacity if it is demonstrated that the equipment is capable of performing all operations satisfactorily.
- E. A dispersing agent may be added to the mixture provided evidence is furnished showing that the additive will not affect germination. Any material considered detrimental, as determined by the ENGINEER, shall not be used.
- F. Any mixture containing polyacrylamide tackifier during rainy weather, or when soil temperatures are below 41°F (5°C) or if the wind speed is above 20 miles per hour (32 km/h). Pedestrian traffic or equipment shall not be permitted to enter areas where hydro-seeding has been applied.

- END OF SECTION -