STATE OF LOUISIANA
DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT

CONSTRUCTION PROPOSAL

STATE PROJECT NOS. 005-10-0037, 006-01-0021, 006-02-0064, 006-05-0001, 006-30-0041, 063-03-0051, 063-04-0035
HUEY P. LONG BRIDGE WIDENING
(WESTBANK AND EASTBANK APPROACHES AND MAIN BRIDGE DECK WIDENING)
ROUTE US 90
JEFFERSON PARISH

NON-MANDATORY SITE VISIT AND PRE-BID MEETING

There will be a non-mandatory site visit and pre-bid meeting held on Wednesday, December 12, 2007, beginning at 10:00 a.m. at the Alario Center, 2000 Segnette Boulevard, Westwego, LA 70094, to discuss bidding requirements on the project. The site visit will begin at 10:00 a.m. and the pre-bid meeting will begin at 2:00 p.m. For questions prior to the pre-bid meeting, please contact Juan Murillo (LTM) at (225) 906-1424 or Ray Mumphrey (DOTD) at (225) 379-1067.

PART 1 OF 2

FOR INFORMATION ONLY

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NOTICE TO CONTRACTORS

Sealed bids for the following project will be received by the Louisiana Department of Transportation and Development (DOTD), 1201 Capitol Access Road, Headquarters Administration Building, Room 405-L, Baton Rouge, Louisiana 70802 until 8:00 a.m. on **Wednesday, February 20, 2008**. After 8:00 a.m., bids will be received in the Headquarters Auditorium until 10:00 a.m., at which time and place bids will be publicly opened and read. No bids will be received after 10:00 a.m. Any person requiring special accommodations shall notify the Department of Transportation and Development (DOTD) at (225) 379-1111 not less than 3 business days before bid opening.

STATE PROJECT NOS. 005-10-0037, 006-01-0021, 006-02-0064, 006-25-0001, 006-30-0041, 063-03-0051 AND 063-04-0035

DESCRIPTION: **HUEY P. LONG BRIDGE WIDENING (WB, EB APPR. & BR. DECK WIDEN.)**

ROUTE: **US 90**

PARISH: **JEFFERSON**

LENGTH: **4.914 miles.**

TYPE: **BASE BID: WB APPR. & BR. DECK WIDEN.; EB APPR. WORK INCL. RDWY, RDWY STRUCT., CONC. SLAB SPAN, P. P. C. GIRDER AND STEEL PLATE GIRDER BRIDGES AND RELATED WORK.**

LIMITS: State Project No.005-10-0037: **NORTH END OF US 90 OVERPASS TO SOUTH END OF MISSISSIPPI RIVER BRIDGE.**

LIMITS: State Project No. 006-01-0021: **EASTBANK BOUND ABUTMENT (WB) TO EASTBANK BOUND ABUTMENT (EB).**

LIMITS: State Project No. 006-02-0064: **GORE NOSE (EASTBANK BOUND/EASTBANK BOUND RAMP 1) TO BEGINNING AT JEFFERSON HIGHWAY EASTBOUND.**

LIMITS: State Project No. 006-25-0001: **END OF EASTBANK BOUND BRIDGE ABUTMENT.**

LIMITS: State Project No. 006-30-0041: **US 90/LA 48 INTERSECTION TO END OF THE JEFFERSON HIGHWAY WESTBOUND RECONSTRUCTION.**

LIMITS: State Project No. 063-03-0051: **8TH STREET TO WEGAND DRIVE.**

LIMITS: State Project No. 063-04-0035: **INTERSECTION NINE MILE POINT ROAD/US 90 TO END OF LA 18 WESTBOUND.**

ESTIMATED COST RANGE: **$400,000,000 TO $450,000,000**

PROJECT ENGINEER: **TODD, TIMOTHY, LA TIMED MANAGERS, 520 ELMWOOD PARK BOULEVARD, SUITE 115, NEW ORLEANS, LA 70123-3340, (225)906-1300.**

PROJECT MANAGER: **MURILLO, JUAN, LA TIMED MANAGERS, 6300 CORPORATE BOULEVARD, SUITE 200, BATON ROUGE, LA 70809-1000, (225) 906-1300.**

COST OF PROPOSAL FORMS: **$25.00**

COST OF PLANS: **$356.00**

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FOR INFORMATION ONLY

NOTICE TO CONTRACTORS (CONTINUED)

Bids must be submitted in accordance with Section 102 of the 2000 Louisiana Standard Specifications for Roads and Bridges as amended by the project specifications, and must include all information required by the proposal.

Draft plans and/or proposals (CD/DVDs) may be obtained by contacting cindy.henry@latimedmgrs.com.

The U. S. Department of Transportation (DOT) operates a toll free "Hotline" Monday through Friday, 8:00 a.m. to 5:00 p.m., eastern time. Anyone with knowledge of possible bid rigging, bidder collusion, or other fraudulent activities should call 1-800-424-9071. All information will be treated confidentially and caller anonymity will be respected.

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GENERAL BIDDING REQUIREMENTS (01/06): The specifications, contract and bonds governing the construction of the work are the 2000 Edition of the Louisiana Standard Specifications for Roads and Bridges, together with any supplementary specifications and special provisions attached to this proposal.

Bids shall be prepared and submitted in accordance with Section 102 of the Standard Specifications.

The plans herein referred to are the plans approved and marked with the project number, route and Parish, together with all standard or special designs that may be included in such plans.

The bidder declares that the only parties interested in this proposal as principals are those named herein; that this proposal is made without collusion or combination of any kind with any other person, firm, association, or corporation, or any member or officer thereof; that careful examination has been made of the site of the proposed work, the plans, Standard Specifications, supplementary specifications and special provisions above mentioned, and the form of contract and payment, performance, and retainage bond; that the bidder agrees, if this proposal is accepted, to provide all necessary machinery, tools, apparatus and other means of construction and will do all work and furnish all material specified in the contract, in the manner and time therein prescribed and in accordance with the requirements therein set forth; and agrees to accept as full compensation therefore, the amount of the summation of the products of the quantities of work and material incorporated in the completed project, as determined by the engineer, multiplied by the respective unit prices herein bid.

It is understood by the bidder that the quantities given in this proposal are a fair approximation of the amount of work to be done and that the sum of the products of the approximate quantities multiplied by the respective unit prices bid shall constitute gross sum bid, which sum shall be used in comparison of bids and awarding of the contract.

The bidder further agrees to perform all extra and force account work that may be required on the basis provided in the specifications.

The bidder further agrees that within 15 calendar days after the contract has been transmitted to him, he will execute the contract and furnish the Department satisfactory surety bonds.

If this proposal is accepted and the bidder fails to execute the contract and furnish bonds as above provided, the proposal guaranty shall become the property of the Department; otherwise, said proposal guaranty will be returned to the bidder; all in accordance with Subsection 103.04.

TRANSPORTATION INFRASTRUCTURE MODEL FOR ECONOMIC DEVELOPMENT (TIMED) PROJECT (06/05): This project is a Transportation Infrastructure Model for Economic Development (TIMED) project as defined in Act No. 16 of the 1989 First Extraordinary Session of the Legislature which enacted Part V of Chapter 7 of Subtitle II of Title 47 of Louisiana Revised Statutes of 1950, comprised of R.S. 47:820.1 through 820.6.

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The contractor understands and agrees that compliance with Louisiana R.S.47:820.3 is mandatory as stated below:
820.3 EMPLOYMENT OF LOUISIANA RESIDENTS
At least eighty percent of the employees employed on any Transportation Infrastructure Model for Economic Development (TIMED) project must be Louisiana residents. A "Louisiana resident" shall be defined for the purposes of this Part as a person who has resided in this state for at least one hundred eighty consecutive days at the time of initial employment, as evidenced by a valid Louisiana motor vehicle operator's license or bill for utility services.

The contractor shall maintain sufficient records to ensure compliance herewith and shall submit by the end of the first estimate period, copies of valid Louisiana Motor Vehicle Operator's License or bill for utility services for all project personnel. Proof of residency must be submitted for each new employee hired or assigned to the project until completion. The contractor shall submit proof of residency to the project engineer. The project engineer will forward proof to the Compliance Programs Section at P.O. Box 94245, Baton Rouge, LA 70804-9245.

SPECIAL NOTICES TO CONTRACTORS:

TECHNICAL SPECIFICATIONS FOR HUEY P. LONG BRIDGE WIDENING, WATER AND SEWER RELOCATION: These specifications for the Jefferson Parish water and sewer relocation will be included on compact disk, accompanying the bid package.

COORDINATION WITH SUPERSTRUCTURE CONTRACT: The widening of the Main Bridge Superstructure is currently being constructed under S. P. No. 006-01-0018, Main Bridge Superstructure Fabrication and Erection contract. The anticipated completion of the Superstructure Contract is February 25, 2012. This completion schedule defines a minimum 18-month period for the time needed for completion of the Main Decking Widening. Tie-in of the new approaches and all traffic shifts is defined in the Sequence of Construction.

COOPERATION WITH OTHER CONTRACTORS/MAINTENANCE OF TRAFFIC: If the low bidder of the base bid is not awarded the optional bid, the work associated with the additive option will be advertised and let at a later time.

Under award of just the base bid, the Contractor's responsibility for maintenance of traffic and traffic control shall end at Pier IV. However, the Contractor is required to cooperate with the future contractor for the optional work as described in subsection 105.07 of the 2000 Standard Specifications. The contractor shall also cooperate with any contractors and/or subcontractors working on previously awarded projects. The Contractor can expect that the maintenance of traffic and traffic control that will take place in the optional bid area will be the same as shown in his contract plans.

Coordination of work between contractors for the fourth phase of work includes but is not limited to the following:

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1) Maintenance of Traffic as described in Section 104 of the Special Provisions.
2) Sequence of Construction as shown in the contract plans.

All project schedules, alternate traffic schemes, and proposed sequence of construction shall be coordinated with the Project Engineer.

PROTECTION OF LEVEES: The East Jefferson Levee District, the West Jefferson Levee District, the U.S. Army Corp of Engineers and the LADOTD have control, jurisdiction and permitting authority over activities impacting the Mississippi River Levee and the Mississippi River batture on the right-of-way under portions of this project. Before proceeding with construction work adjacent to the Mississippi River levees, the contractor shall secure permits from the East Jefferson Levee District (203 Plauche St., Jefferson, LA 70123, phone 504-733-0087) and the West Jefferson Levee District (7001 River Road, Marrero, LA 70072, phone 504-340-0318). The contractor shall pay all fees or charges required and shall be responsible for conducting his operations in accordance with such permits. The contractor shall at all times during the prosecution of work which affect the levees be governed by rules and regulations of these agencies. The contractor shall maintain these facilities in safe condition and, at his expense, make all repairs and replacements thereto necessitated by his operations under this contract.

Haul roads on tops and slopes of levees shall be put in condition to withstand the construction traffic. The tops of levees shall be maintained at all times by such blading, addition of material and compaction as may be necessary to avoid damage to the levees and permit free passage of construction traffic.

The ground in the vicinity of the levees under the bridge project site consists of roadway (River Road), the Mississippi River Levee and bicycle path and the river batture. The Mississippi River Levee or River Road may not be used for the sitting of equipment or vehicles and the levee may only be crossed by vehicles or equipment at permitted roadways. The crown of the levee is paved with asphalt and is dedicated for use as a bicycle path and pedestrian walkway. No traffic (construction equipment, workers' and visitors' cars, material delivery trucks, etc.) will be allowed on crown and slopes of levees. All traffic shall be confined to ramps and then only moving traffic. No parking on ramps will be permitted. Permits from the levee boards will be predicated on the contractor furnishing a suitable parking area for employees and visitors.

In no case will excavation into existing levees be allowed for the construction of ramps. Ramps shall be constructed only by the addition of material to the existing levee crown and slopes. After use, the ramps may be left in place provided they are smoothly graded, dressed and seeded in a manner satisfactory to the Authorities having control of the levees.

As an alternative to the construction of the contractor's own levee crossing, the contractor may arrange to use the existing levee crossing roadway located on the east bank side of the river approximately 900 feet upstream of the bridge. This existing levee crossing roadway is privately owned by National Maintenance & Repair Company of La. Inc. For previous projects they have agreed to allow its use by a contractor provided they are named insured on the contractor's liability insurance policies and the road is kept in good repair. Typically, the agreement with National Maintenance & Repair Company of

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La. Inc. is for transit across the levee only and does not include use of any of their other property.

The contractor is warned and advised that all property on the unprotected side of the levee is subject to flooding and that the river batture area existing ground is wet with ponding water and is soft and may be unsuitable to support wheeled or tracked vehicles or equipment. The contractor shall make his own assessment of conditions of the river batture. A hydrograph containing the historical data of changes in river stages is included in the Contract Plans. The Contractor shall comply with all East and West Jefferson Levee District, U.S. Army Corp of Engineers, and the Department's requirements and secure any required permits or letters of no objection to build any temporary roadway, structures or berms. The contractor shall maintain during the project and return the roadway and all other property used during and at the completion of the project to a condition which is equal or superior to the condition in which the property existed prior to his occupancy or use of said property.

The contractor shall design, secure required permits from the East and West Jefferson Levee Districts, construct and remove any temporary roadways, work areas or structures required for access to the project site and on or across any portion of the river batture. Dredging of the river bed or batture will not be permitted. No direct payment will be made for Protection of Levees, but the cost thereof shall be included in the prices bid for pay items.

ELECTRONIC BIDDING (04/06). The 2000 Louisiana Standard Specifications for Roads and Bridges and supplemental specifications thereto are amended as follows.

SECTION 101 - GENERAL INFORMATION, DEFINITIONS AND TERMS:
Subsection 101.03 - Definitions.
Revise the following definitions.

Bid. The binding offer of a responsible bidder that was submitted to the Department on the bid forms or via approved electronic media, in accordance with the bidding documents.

Bid Forms. The portion of the bidding documents, either paper or electronic, required to be submitted, in accordance with the bidding documents, in order to constitute a bid.

Add the following definitions.

Bid Express. An on-line service provided by Bidx.com, an Info Tech company, which is under contract to DOTD to facilitate two-way Internet electronic bidding.

Bidx.com. The subsidiary company owned by Info Tech that provides the Bid Express service.

Electronic Bidding. The process by which the Department and the bidder can utilize the Internet to facilitate the bidding process.

Electronic Bid Bond. An instrument by which a contractor and surety can submit a bid guarantee with a bid electronically in lieu of a written, signed paper.

Electronic Signature. A secure and verifiable alpha-numeric code assigned to an individual, replacing or acting instead of a traditional signature.

Expedite. Software developed for AASHTO by Info Tech that enables and facilitates electronic bidding.

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SECTION 102 – BIDDING REQUIREMENTS.

Subsection 102.02 - Contractor's Licensing Laws.

Delete the first sentence of the third paragraph and substitute the following.

> When the estimated project cost is greater than $50,000 and no FHWA funds are involved, the contractor shall show his license number on the bid envelope unless the contractor submits the bid via the DOTD approved electronic bidding process.

Subsection 102.03 - Contents of Bidding Documents.

Amend the first paragraph to include the following.

> The prospective bidder may use the Bid Express services through Bidx.com. The use of these services will require payment by the contractor of additional fees to the service provider.

Delete the first sentence of the third paragraph and substitute the following.

> Unless the contractor properly submits the bid forms electronically, the bid forms bound with or attached to the construction proposal should be detached, completed, and returned by the bidder.

Subsection 102.04 - Issuance of Bid Documents.

Delete the first sentence of the first paragraph and substitute the following.

> The Department may refuse to issue bid documents to a bidder or allow a bidder access to Bid Express for bidding purposes, for any of the following reasons:

Subparagraphs (b), (c), (f), and (g) are reinstated.

Subsection 102.06 - Examination of Bid Documents and Site of Work.

Amend this subsection to include the following.

> Written instructions necessary to use the electronic bidding service and prepare and submit a bid electronically are provided on the Bidx.com Internet site. Fees payable to Bidx.com are required of the contractor to use the service and to establish electronic signatures. The contractor is advised to timely make all necessary arrangements with Bidx.com and to familiarize himself with system and process requirements prior to using the service to submit a bid.

Subsection 102.07 - Preparation of Bid.

Delete the first sentence of the first paragraph and substitute the following.

> For paper bids, bids shall be submitted on bid forms provided by the Department or obtained through Bidx.com.

Delete the first sentence of the second paragraph and substitute the following.

> A unit bid price, in English and U.S. dollars, shall be specified in the Schedule of Items in words or numerals, either typed or printed in ink, or computer printed in the spaces provided for each pay item or alternate pay item.

Delete the first sentence of the third paragraph and substitute the following.

> The Construction Proposal Signature and Execution Form shall be signed either with an authorized electronic signature or with ink by the individual; or a member of the partnership; or an officer of one of the firms representing a joint venture; or an officer of a corporation; or an agent of the contractor legally qualified and acceptable to the state.

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Add the following paragraph.

Bid bonds may be furnished and completed by a DOTD approved electronic bond verification service if the contractor elects to prepare and submit an electronic bid.

Subsection 102.08 - Irregular Bids.

Delete Subparagraph (a) and substitute the following.

(a) If the bid, except for legible facsimiles, is on a form other than that furnished by the Department or Bidx.com, or if the bid forms are materially altered.

Delete Subparagraph (j) and substitute the following.

(j) If the portion of the construction proposal form designated as Bid Forms is not properly executed either by hand or electronically and submitted with the bid.

Subsection 102.09 - Proposal/Bid Guaranty.

Delete the fourth paragraph and substitute the following.

All signatures required on the bid bond may be original, mechanical reproductions, facsimiles or electronic. Electronic bonds issued in conjunction with electronic bids must have Departmental approval prior to use. The Department will make a listing of approved electronic sureties providers on the Bidx.com site.

Subsection 102.10 - Delivery of Bids.

Delete this subsection and substitute the following.

Unless delivered electronically through the approved electronic bid submission service, each bid should be submitted in the envelope furnished by the Department. The blank spaces on the envelope shall be filled in correctly to clearly indicate its content. When an envelope other than the one furnished by the Department is used, it shall be the same general size and shape and be similarly marked to indicate its contents. Bids shall be received no later than the time and at the place specified in the Notice to Contractors. Paper bids received after the time set for opening bids will be returned to bidders unopened. Electronic bids shall be submitted via the Internet in accordance with Subsection 102.07. Electronic bids transmitted by the bidder, after the time set for bid opening will not be accepted.

A proposal guarantee and all other required returnables not submitted electronically with an electronic bid must be delivered by the contractor to the Department in a sealed envelope as specified above prior to the date and time of the bid opening.

Subsection 102.11 - Withdrawal or Revision of Bids.

Delete this subsection and substitute the following.

A bidder may withdraw or revise a bid after it has been deposited with the Department, provided the request for such withdrawal or revision is received by the Department in person or in writing before the time set for opening bids and at the location set forth in the Notice to Contractors. Electronic bids submitted to Bid Express may be withdrawn prior to the specified bid opening time by the authorized bidder.

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Subsection 102.12 - Public Opening of Bids.
Delete this subsection and substitute the following.

Paper or electronic bids will be publicly opened and read or presented at the time and place indicated in the Notice to Contractors.

SECTION 103 – AWARD AND EXECUTION OF CONTRACT
Subsection 103.01 - Consideration of Bids.
Delete the first paragraph and substitute the following.

After paper or electronic bids are opened and read, they will be compared on the basis of summation of the products of the quantities and the unit bid prices in the Schedule of Items. Results of such comparisons will be available to the public.

Subsection 103.04 - Return of Proposal/Bid Guaranty.
Amend this subsection to include the following.

Electronic bid bonds of unsuccessful bidders will not be returned but will be deemed by the Department to have no force or effect after sixty days.

DEFINITIONS AND TERMS (07/07): Subsection 101.03 of the Standard Specifications is amended as follows.

The definition for "Proposal/ Bid Guaranty" is deleted and following substituted.

Proposal/Bid Guaranty. The required security furnished with a bid. The only form of security acceptable is a Bid Bond.

BIDDING REQUIREMENTS (07/07) Section 102 of the Standard Specifications and the Supplemental Specifications thereto, is amended as follows.

Subsection 102.09, Proposal/Bid Guaranty is deleted and the following substituted.

102.09 PROPOSAL/BID GUARANTY. Each bid shall be accompanied by a proposal/bid guaranty in an amount not less than five percent of the total bid amount when the bidder's total bid amount as calculated by the Department in accordance with Subsection 103.01 is greater than $50,000. No proposal/bid guaranty is required for projects when the bidder's total bid amount as calculated by the Department is $50,000 or less. The official total bid amount for projects that include alternates is the total of the bidder's base bid and all alternates bid on and accepted by the Department. The proposal/bid guaranty submitted by the bidder shall be a bid bond made payable to the contracting agency as specified on the bid bond form provided in the construction proposal. No other form of security will be accepted.

The bid bond shall be on the "Bid Bond" form provided in the construction proposal, on a form that is materially the same in all respects to the "Bid Bond" form provided, or on an electronic form that has received Department approval prior to submission. The bid bond shall be filled in completely, shall be signed by an authorized officer, owner or partner of the bidding entity, or each entity representing a joint venture; shall be signed by the surety's agent or attorney-in-fact; and shall be accompanied by a notarized document granting general power of attorney to the surety's signer. The bid bond shall not contain any provisions that limit the face amount of the bond.

The bid bond will be written by a surety or insurance company that is in good standing and currently licensed to write surety bonds in the State of Louisiana by the

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Louisiana Department of Insurance and also conform to the requirements of LSA-R.S. 48:253.

All signatures required on the bid bond may be original, mechanical reproductions, facsimiles or electronic. Electronic bonds issued in conjunction with electronic bids must have written Departmental approval prior to use. The Department will make a listing of approved electronic sureties providers on the Bidx.com site.

CONTRACTORS' LICENSING LAWS: Subsection 102.02 of the 2000 Standard Specifications is hereby amended to include the following.

Prior to receiving bid forms, the prospective bidder or the prospective bidder's field painting subcontractor will be required to possess a Louisiana contractors license from the Louisiana State Licensing Board for Contractors in each of the following specialty classifications:

a) Painting and Coating (Industrial and Commercial).

b) Lead Based Paint Abatement and Removal.

AWARD OF CONTRACT: Subsection 103.02, Award of Contract, of the 2000 Standard Specifications is hereby amended to include the following.

Prior to issuance of a Notice to Proceed, the successful bidder or the bidder's field painting subcontractor will be required to submit to the Project Engineer, a copy of the current certifications from the Society for Protective Coatings (SSPC) in each of the following:

a) SSPC-QP1, "Standard Procedure for Evaluating Qualifications of Painting Contractors (Field Application to Complex Structures)".

b) SSPC-QP2, "Standard Procedure for Evaluating the Qualifications of Painting Contractors to Remove Hazardous Paint".

The above SSPC certifications must be maintained throughout the life of the project.

Failure of the successful bidder to provide satisfactory certifications will be cause for cancellation of the award and forfeiture of the proposal guaranty which shall become the property of the Department, not as a penalty, but in liquidation of damages sustained. Award may then be made to the next lowest responsible bidder or the work may be readvertised for bids, at the Department's discretion.

SCOPE OF WORK: Subsection 104.01, Intent of Contract, is amended to include the following.

(a) Covenant of Good Faith and Fair Dealing.

This contract imposes an obligation of good faith and fair dealing in its performance and enforcement.

The contractor and the Department agree from the beginning to focus on creative cooperation, to avoid adverse confrontation, and to foster mutual respect, along with a positive commitment to honesty and integrity, and agree to the following mutual duties.

(1) Each will function within the laws and statutes applicable to their duties and responsibilities.

(2) Each will communicate in an open and candid manner.

(3) Each will assist in the other's performance.

(4) Each will avoid hindering the other's performance.

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(5) Each will proceed to fulfill its obligations diligently.

(6) Each will cooperate in the common endeavor of the contract.

(b) Voluntary Partnering.

The Louisiana Department of Transportation and Development intends to encourage the foundation of a cohesive partnership with the contractor and its principal subcontractors and suppliers. This partnership will be structured to draw on the strengths of each organization to identify and achieve reciprocal goals. The objective is a cooperative approach to contract management that will reduce costs, litigation, and "stress" while completing the project in accordance with the plans and specifications.

This partnership will be bilateral in makeup, and participation in partnering will be totally voluntary and is not a requirement of the contract.

A partnering conference is to be implemented and held prior to beginning construction. The contractor's management personnel and the Project Engineer will initiate a partnering development conference. They, working with the assistance of the District Construction Engineer, will make arrangements to determine the facilitator, the attendees at the conference, agenda of the conference, duration, and location. Persons required to be in attendance will be the Project Engineer and key project personnel; the contractor's on-site project manager and key project supervision personnel of both the prime and principal subcontractors and suppliers. The project design engineers, FHWA, key company representatives, and key local government personnel will also be invited to attend as necessary. The contractor and DOTD will also be required to have Regional/District and Corporate/State level managers on the project team.

Any cost associated with effectuating this partnering will be agreed to by both parties and will be shared equally and will be paid for in accordance with Subsection 109.04. The contractor, DOTD, FHWA and all others invited to the partnering conference will be responsible for any expenses incurred by their respective employees which includes salaries, travel, and lodging.

Follow-up conferences may be held periodically throughout the duration of the contract as agreed by the contractor and the DOTD.

The establishment of a partnership charter on a project will not change the legal relationship of the parties to the contract nor relieve either party from any of the terms of the contract. This partnership charter is intended only to establish an environment of cooperation and communication between all parties involved with the completion of the project.

Subsection 104.03, Maintenance of Traffic, is amended to include the following. The contractor shall provide for and maintain through and local traffic at all times and shall conduct his operations in such manner as to minimize interference with traffic at junctions with roads, streets, and driveways.

All roadways under the bridge shall remain unobstructed for the duration of the contract. If temporary closure of a roadway beneath the bridge is necessary, the closure shall be approved by the Project Engineer.

Although occasional highway lane closures are allowed as per the Project Plans, the contractor shall make every effort to accomplish the work without closing lanes. All lane and shoulder closures shall be requested in writing to the Project Engineer. Each request shall justify the need for the closure, identify the lane to be closed, state the time, date, and duration of the closure and shall include a traffic control plan meeting the requirements of the Manual of Uniform Traffic Control Devices (MUTCD). All traffic

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control plans shall be prepared and stamped by the contractor's engineer, who shall be a registered Louisiana Professional Engineer with at least 4 years of traffic operations engineering experience. The contractor's Traffic Control Supervisor shall submit traffic control plans and all requests for lane and shoulder closures to the Project Engineer a minimum of 14 working days prior to the date of intended implementation. Each request will be subject to the approval of the Project Engineer. The Project Engineer reserves the right to deny certain lane closures due to weather, special events such as sporting events and festivals, or other special traffic circumstances.

The contractor shall maintain in a safe and usable condition the existing right-of-way, drainage, crossings, intersections with roads and businesses, streets, parking lots, residences, garages and temporary approaches, at no direct pay. If the contractor does not properly maintain areas, the LADOTD/NOPBRR reserves the right to accomplish any and all work and deduct cost for work from the contractor's payment.

Lane Closure Restrictions: The bridge lane closures that may apply to this contract are described in the Project Plans and are included to establish the criteria for lane closures in the event they are deemed necessary and approved by the Project Engineer as described above. These temporary closures are in addition to lane closures found in the sequence of construction.

All costs associated with lane and shoulder usage including traffic control plans, signing, lighting, flagmen, etc. needed to carry out the work as described under Section 713, Temporary Signs, Barricades, Barriers, and Pavement Markings shall be included in the bid price for Item No. 713(01), Temporary Signs and Barricades.

All costs associated with additional measures required for Maintenance of Traffic shall be as described under Item No. S-109, Maintenance of Traffic.

Public Notification: Notification to the public of lane restrictions or road closures shall be promulgated by the DOTD District 02 Project Coordinator based on information provided by the Project Engineer a minimum of three working days prior to the event.

Existing Bridge Deck and Joints: The contractor shall not be responsible for maintenance of the existing bridge deck and joints that are not modified by required work for the project. Maintenance of the existing bridge deck and joints that may be required during the project shall be performed by either LADOTD (District 02) personnel or by the contractor under force account.

CONTROL OF WORK: Section 105 of the 2000 Standard Specifications and the Supplemental Specifications thereto is amended as follows:

Subsection 105.02, Plans and Working Drawings is amended to include the following.

Selected drawings of substructure widening plans, original bridge plans, location of borings, and core borings and test piles are included in the contract plans as supplemental drawings to furnish the contractor with general information only, and are not to be considered as binding on the Department regarding any conditions that may be actually found to exist during the construction of this work. The contractor should visit the site, secure full information relative to the work presently under construction, and obtain such additional information as may be needed to bid the work. Complete details of the substructure construction are contained in the substructure contract plans (State Project No. 006-01-0012), and are available for examination at the office of the Bridge

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Design Engineer in Baton Rouge and at the office of Modjeski and Masters in New Orleans.

The contractor will be furnished sufficient copies of the substructure plans for his use following award of the contract.

Subsection 105.07, Cooperation Between Contractors, is amended to include the following.

This contract is third in a series of contracts for construction work on a river crossing and approaches for this project. During the progress of the work under this contract it will be necessary for other contractors to do work on the site, and this contractor will be required to cooperate with those other contractors.

The contractor shall conduct his operations so as not to impede or interfere with the work of other contractors in order that they may complete their work at the earliest possible date.

The Project Engineer will decide any disputed question regarding priority of access to and use of the site and priority of berthing area.

Subsection 105.08, Construction Stakes, Lines, and Grades, is amended as follows:

The contractor shall employ sufficient qualified engineering personnel experienced in the layout and construction of bridges to correctly establish and keep complete and comprehensive notebook records of all lines and grades necessary during construction of the superstructure, from initial layout to final acceptance, from the information provided on the project plans or revisions thereof as may be approved.

No survey data will be furnished by the Department of the final location and elevations of units of the substructure after construction of those units has been completed. As soon as any consecutive units of the substructure are completed, the contractor shall, at his expense, survey the span lengths, bridge seat elevations and anchor bolt locations, and shall furnish the Project Engineer with a drawing showing as-constructed dimensions and elevations. If there are minor deviations from plan dimensions and elevations, the contractor shall propose suitable adjustments to accommodate such deviations, subject to approval by the Project Engineer.

No direct payment will be made for performing the work required herein.

Subsection 105.17, Acceptance, is amended as follows.

Heading (b), Final Acceptance, is deleted and the following substituted.

Upon notice from the contractor of presumptive completion of the entire project, the Project Engineer will make an inspection along with the Chief Engineer of the New Orleans Public Belt Railroad or a representative designated by the Chief Engineer. When the work provided for in the contract is found satisfactorily completed by both the Project Engineer and the New Orleans Public Belt Railroad, that inspection will constitute the final inspection. The Project Engineer will make final acceptance and notify the contractor in writing of this acceptance as of the date of final inspection.

When the inspection discloses any required work, condition of New Orleans Public Belt Railroad right of way, impacted utilities, or other impacted New Orleans Public Belt Railroad facilities as indicated by the New Orleans Public Belt Railroad and/or the Project Engineer as being unsatisfactory, the Project Engineer will give the contractor instructions for correction of same. The contractor shall immediately comply with such instructions. Upon correction of the work, another inspection will be made which will constitute final inspection provided the work has been satisfactorily

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completed. In such event, the Project Engineer will notify the contractor in writing of this acceptance as of the date of final inspection.

NIGHTTIME CONSTRUCTION OPERATIONS (02/06)(Rev'd 06/07): Section 105, Control of Work, of the 2000 Standard Specifications is amended to add the following.

105.20 NIGHTTIME CONSTRUCTION OPERATIONS.

(a) Description: This work consists of furnishing, installing, operating, maintaining, moving, and removing portable light towers and equipment-mounted fixtures for nighttime construction operations. Nighttime construction operations are defined as work performed after sunset and before sunrise.

(b) Equipment Requirements: Materials and equipment shall be in good operating condition and in compliance with applicable OSHA, NEC, and NEMA codes.

The contractor shall furnish, to the engineer, two light meters capable of measuring the level of illuminance. These light meters will be used by the engineer to check the adequacy of illumination throughout the nighttime construction operations. The light meters will become the property of the contractor after final acceptance.

Suitable brackets and hardware shall be provided to mount lighting fixtures on equipment and machinery. Mountings shall be designed so that light fixtures can be positioned as necessary to reduce glare and provide the required illumination. Mounting brackets and fixtures shall not interfere with the equipment operator or any overhead structures and shall be securely connected to the fixtures to insure minimum vibration.

Equipment-mounted systems shall be attached to construction equipment to provide Level II and Level III illuminance. Equipment mounted lighting shall be designed and positioned to be operated independently of general illumination.

Portable systems may consist of ground-mounted, trailer-mounted, or equipment mounted light towers. Portable light towers shall be sturdy and free-standing without the aid of guy wires or bracing. Towers shall be capable of being moved as necessary to keep pace with the construction operation. Extreme caution shall be used when moving portable light towers in the vicinity of overhead utilities. Portable lighting systems shall be positioned to minimize the risk of being impacted by traffic on the roadway or by construction equipment.

Conventional vehicle headlights shall not be permitted as the sole means of illumination while working. All motorized vehicles shall be equipped with conventional vehicle headlights to permit safe movement in non-illuminated areas. Use of strobe lights on vehicles and equipment is prohibited. Use of flashing lights shall be kept to a minimum to prevent motorist distraction. Flashing lights shall not be used behind barrier protection systems

Switches shall be provided to adequately control the various lights. All wiring shall be weatherproof and installed according to local, state, federal, and OSHA requirements. Ground fault circuit interrupters shall be provided for electrical outlets used for electrical tools and extension cords. The contractor shall provide sufficient fuel, spare lamps, generators and qualified personnel to ensure that all required lights operate continuously during nighttime construction operations. In the event of any failure of the lighting system, the construction operation shall be discontinued until the required level of illumination is restored. In residential areas, generator systems shall be selected to

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comply with local noise ordinances. A supply of emergency flares shall be maintained by the contractor for use in the event of emergency or unanticipated situations.

(c) Illumination Requirements: All operations that are performed during nighttime hours shall be properly illuminated to allow for the safe performance and inspection of the work.

Work area is defined as a minimum of 50 feet (15 m) ahead and behind the employee, where work is to be performed. A minimum of 5 foot-candles (54 lux) shall be maintained throughout the work area during nighttime construction operations, and during the setup and removal of lane or roadway closures.

Lighting shall be adequate to meet the required level of illuminance and uniformity over the work area as follows:

(1) Level I (5 foot-candles, 54 lux): This level of illuminance shall be provided for all work areas of general construction operations, such as excavation and embankment; cleaning and sweeping; landscaping; planting and seeding. Stockpiles shall also be illuminated to Level I to enhance safety and improve work efficiency.

(2) Level II (10 foot-candles, 108 lux): This level of illuminance is required for areas on or around construction equipment such as that used for drainage installations, striping, base course construction, milling, asphalt paving operations, and concrete placement and removal. This level is necessary for safe operation of equipment and for obtaining an acceptable level of accuracy.

(3) Level III (20 foot-candles, 215 lux): This level of illuminance is required for tasks requiring a higher level of visual performance or for tasks with a higher level of difficulty. Such tasks include, pavement or structural crack filling, joint repair, joint cleaning, joint sealing, pavement patching and repairs, saw-cutting, installation of signal equipment or other electrical/mechanical equipment, structural erection and other tasks involving fine details or intricate parts and equipment.

(d) Glare Control: All lighting provided under this item shall be designed, installed, and operated to avoid glare interference with roadway traffic or discomfort for residences adjoining the roadway. The contractor shall locate, aim, and adjust the lights to provide the required level of illuminance and uniformity in the work area without the creation of objectionable glare. The engineer shall determine when glare exceeds acceptable levels, either for traffic or adjoining residences. The contractor shall provide shields, visors, or louvers on luminaries as necessary to reduce objectionable levels of glare.

At a minimum, the following requirements shall be met to avoid objectionable glare to oncoming traffic:

(1) Tower-mounted luminaries shall generally be aimed either parallel or perpendicular to the roadway.

(2) All luminaries shall be aimed such that the center of the beam axis is no greater than 60 degrees from the vertical.

(3) Luminous intensity of any luminary shall not exceed 20,000 candelas at an angle of 72 degrees from the vertical.

(e) Operational Requirements: Thirty days prior to the start of night time operations, the contractor shall submit a lighting plan to the engineer for approval. The contractor shall select appropriate lighting systems and design a lighting plan to achieve the required illuminance levels.

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The lighting plan shall include location of lights necessary for every aspect of work; description of light equipment to be used; description of power source; attachment and mounting details for lights to be attached to equipment; technical details pertaining to the lighting fixtures; details on hoods, louvers, shields, or other glare control methods; and lighting calculations confirming that the illumination requirements will be met by the layout plan.

Lighting inspection will include (1) light meter measurements to determine illumination levels, (2) subjective observation of the lighting setup to evaluate glare potential for drivers and workers, and (3) a physical check of the lighting equipment to ensure that it complies with the specification requirements included in the contractor's lighting plan.

Prior to the first night of operation, the engineer will check the adequacy of the installed lighting using a light meter. A summary of these measurements will be noted in the inspection records to provide a basis for comparing subsequent measurements. If the required illuminance levels are not met, the contractor shall make the necessary adjustments before any work proceeds.

Operational checks shall be made when construction phasing changes and lighting plan changes are required to accommodate different phases of construction. Periodic checks will be made throughout the duration of nighttime operations. If the required illuminance levels are not met, the contractor shall make the necessary adjustments to the lighting plan before work continues.

During construction operations, in the event of any failure of the lighting system, the operations shall be discontinued until the required level of illumination is restored.

CONTRACTOR QUALITY CONTROL: Subsection 106.05 of the 2000 Standard Specifications is amended as follows:

The second paragraph is deleted and the following substituted.

Quality Control requirements shall be as specified in the appropriate specification section and as specified in the latest edition of the Department's "Quality Control/Quality Assurance Manual". In case of a discrepancy, the project specification shall govern over the manual.

The contractor shall perform sufficient testing to assure that his processes are providing work in accordance with the plans and specifications. The minimum frequency of quality control testing shall be equal to or greater than the minimum frequencies shown for acceptance in the DOTD Materials Sampling Manual. The results of the contractor's tests shall be furnished to the engineer on a routine basis, usually daily, and upon completion of an item of work, a summary of the quality control tests shall be provided to the Project Engineer.

RAILWAY-HIGHWAY PROVISIONS (04/01): Subsection 107.08 of the 2000 Standard Specifications is amended as follows.

Heading (n) is amended to include the following. The required Railroad Protective Liability Insurance shall be purchased on behalf of New Orleans Public Belt Railroad, Attn.: Chief Engineer, 4822 Tchoupitoulas Street, New Orleans, LA 70115.

The ratio of the estimated cost of operations within the Railway's property to the total estimated project cost is seventy-five (75%) percent. No direct payment will be made for providing the required insurance coverages.

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LEGAL RELATIONS AND RESPONSIBILITY TO PUBLIC: Section 107 of the Standard Specifications and Supplemental Specifications thereto is amended as follows.

Subsection 107.07, Public Convenience and Safety, is amended as follows.

The third paragraph is deleted and the following substituted.

When the contractor works at night, adequate artificial lighting shall be provided in accordance with Subsection 105.20. Signs, flaggers or other traffic controls shall also be provided to protect workers, the work and the traveling public. When such work affects traffic safety, the contractor shall submit to the Project Engineer for approval a plan of lighting, signing, flagmen or other traffic controls. If the approved plan proves inadequate after work begins, the contractor shall make such changes as directed. If the Project Engineer finds that the night work is so hazardous as to preclude the beginning or require the discontinuing of such work, the contractor shall immediately cease all such operations.

If artificial lighting negatively impacts any railroad operations, including the ability of railroad traffic to safely cross the bridge due to glare or effects from artificial lighting, the contractor shall submit to the Project Engineer and the Chief Engineer of the New Orleans Public Belt Railroad (through the Project Engineer) for approval a plan of lighting to remedy such conditions. If the Project Engineer or the Chief Engineer of the New Orleans Public Belt Railroad finds that the night work is so hazardous as to preclude the beginning or require the discontinuing of such work, the contractor shall immediately cease all such operations.

The procurement of police officers for public safety during construction shall be in accordance with the Department's Policy for Use of Police Officers in Construction/Maintenance Work Zones. The Project Engineer shall determine the need for police officers to assist in controlling traffic in a particular work zone. The number of officers needed, the tasks they will perform, and their location within the work zone will vary as a function of the zone type. Police officers shall be placed at strategic locations at times during construction as determined by the Project Engineer.

The three types of law enforcement services are Police Presence, Police Enforcement and Police Traffic Control. Police Presence is defined as the use of police officers at the beginning of the active work zone area utilizing their blue lights to gain attention of drivers. Police Enforcement is utilized when enforcement is required to enhance the safe operation of the work zone. Police Traffic Control is to be used in detour / diversion situations.

The Project Engineer will extend an invitation to the appropriate Louisiana State Police (LSP) Troop Commander and the Causeway Police to attend the pre-construction conference.

Prior to commencing the work on the project, the contractor shall contact the LSP Troop Commander to obtain law enforcement services of police officers during construction. If the LSP Troop is unable to provide law enforcement services for the project work zone, the LSP Troop Commander or the contractor will extend the invitation to the appropriate local law enforcement authorities.

Police officers will report directly to the contractor. However, the contractor will not have the authority to direct the placement of the police officer or the patrol vehicle in situations that are contrary to established procedures and/or could endanger the police

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officer. The Project Engineer will make the final determination on all issues regarding police officer responsibility in work zones.

Prior to the beginning of the shift, the contractor shall provide a daily work zone briefing to the police officer. For major changes in traffic patterns, advanced notification shall be provided to the police agency working the detail. This information should also be provided to the motoring public through the DOTD district and / or the LSP Troop.

The contractor shall pay for law enforcement services provided by the police officers based on the hourly wage and vehicle rate fee scheduled below. The Department will reimburse the contractor monthly for the incurred cost. The contractor shall furnish time record documentation with the request for reimbursement. The provisions of Subsection 109.04 shall not apply to this reimbursement.

The agreed upon fee schedule for police officers in work zone is as follows:

$25 per vehicle per day – vehicle use fee

$40 per hour per officer (one officer per vehicle) (minimum 2 hours).

Subsection 107.09, Navigable Waters and Wetlands, is amended to include the following.

In accordance with the provisions of this Subsection, the Department has obtained the required U.S. Coast Guard permit.

The Department has obtained a Coastal Use Permit or other approval from the Louisiana Department of Natural Resources, Coastal Management Division, for all work within the Louisiana Coastal Zone.

Contractor shall obtain all permits and approvals required for his proposed work and site construction facilities from the U.S. Coast Guard, U.S. Army Corps of Engineers, and other agencies as required that have regulatory authority in the project area.

Bidders shall comply with the permit requirements.

Subsection 107.17, Damage Claims, is hereby deleted and the following substituted.

The contractor shall indemnify the Department and its program management consultant (LTM), their officers and their employees and the New Orleans Public Belt Railroad, their officers and employees, from all suits, actions, or claims brought because of injuries or damage sustained by any person or property due to operations of the contractor; due to negligence in safeguarding the work; or use of unacceptable materials in constructing the work; or any negligent act, omission or misconduct of the contractor; or claims or amounts recovered from infringements of patent, trademark or copyright; or from claims or amounts arising or recovered under the Workmen's Compensation Act or other law, ordinance, order or decree; any money due the contractor as considered necessary by the Department for such purpose, may be retained for use of the State; or, in case no money is due, the surety bond may be held until such suits, actions, claims for injuries or damages have been settled and suitable evidence to that effect furnished to the Department; except that money due the contractor will not be withheld when the contractor produces satisfactory evidence that the adequate Workmen's Compensation, Public Liability, and Property Damage Insurance are in effect.

PAINT DAMAGE CLAIMS: The contractor shall be solely responsible for damage caused to vehicles, vessels, persons, property or the environment, due to his paint operations.

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In particular, the contractor shall take all necessary precautions to prevent damage to any adjacent building or structure and to moving and parked vehicles and vessels.

The contractor shall immediately replace, repair, or compensate for at his own expense, any damage due to his operations

The contractor shall provide and maintain a local representative (with a local telephone number and mailing address) available from 9:00 am to 5:00 pm, and additionally at any other time the contractor is working, to receive claims from claimants. The DOTD or NOPBRR will not act as a claim service for the contractor.

The contractor shall post signs during working hours before and after the work zone indicating the name of the contractor and a claim telephone number clearly shown to inform the public of the painting activities and the action to be taken in case of damage to their person or property. Sign size, layout and location shall be submitted to the Project Engineer for approval prior to fabrication.

Valid damage claims, as determined by the Project Engineer, from bridge patrons and similar claimants shall be satisfied within 15 days from the date of claim. This does not preclude repairs of damages at a later date with written concurrence of the claimant. Damages shall be repaired by the contractor to the satisfaction of the owner of the damaged property and the LADOTD, or their representative.

When a claim is filed, a claim form must be completed. A sample claim form shall be submitted to the Project Engineer for approval prior to the start of site work. Copies of completed forms shall be transmitted weekly to the Project Engineer. The claim forms shall include the following: Name, address, phone number, license plate and other identifying numbers, a description of the damage, a description of how the damage will be repaired or how the claim will be otherwise settled, a signature line for the claimant agreeing to the above descriptions to be signed prior to the repairs, another signature line for the claimant indicating that the repairs were done to their satisfaction.

Failure of the contractor to properly settle valid damage claims within 15 days from date of claim which arise from the contractor's operations may require that all site work and payment to the contractor be halted until the claims are resolved.

CASH MANAGEMENT PLAN - "PHASE FUNDED" CONSTRUCTION (07/04)

This project has been selected by the Department to be implemented under the cash management plan, "phase funding," authorized by LSA-R.S. 48:251 and LAC 70:101 et seq., for certain long-term construction contracts. This construction project will be segmented by fiscal year, and only those funds necessary to carry out planned construction activities in each fiscal year will be appropriated by the Legislature and budgeted by the Department.

The continuation of this contract is contingent upon the continuation of an appropriation of funds by the Legislature to fulfill the requirements of the contract. If the Legislature fails to appropriate sufficient monies to provide for the continuation of this contract or if such appropriation is reduced by the veto of the governor or by any means provided in the Capital Outlay Act, Title 39 of the Louisiana Revised Statutes of 1950, or any other applicable laws to prevent the total appropriations for the year from exceeding revenues for that year or for any other lawful purpose and the effect of such reduction is to provide insufficient monies for the continuation of the contract, the contract shall terminate on the date of the beginning of the first fiscal year for which funds are not appropriated. When a contract, or portion thereof, is terminated for the reasons

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enumerated herein, the Louisiana Standard Specifications for Roads and Bridges, Subsection 108.11, Termination of Contract, shall govern.

In order to insure adequate funds are budgeted each year for this phase-funded project, the contractor shall comply with the special provision, "Critical Path Method (CPM) For Construction Progress Scheduling", contained elsewhere herein.

Nothing herein shall relieve the contractor from any other requirement or obligation as set forth in the standard specifications, special provisions, supplemental provisions or any other contract requirement.

CRITICAL PATH METHOD (CPM) FOR CONSTRUCTION PROGRESS SCHEDULING (06/07): Critical Path Methods (CPM) as described and with terms as defined in the Associated General Contractors of America (AGC) publication, *Construction Planning and Scheduling*, latest edition, shall be used in construction scheduling, establishing the critical items of work, and measuring progress of the work. In case of discrepancy between these specifications and *Construction Planning and Scheduling*, these specifications shall govern.

Section 108, Prosecution and Progress of the 2006 Standard Specifications and the Supplemental Specifications thereto is amended as follows.

Subsection 108.03, Construction Progress Schedule: This subsection is deleted and the following substituted.

The contractor shall submit to the project engineer for approval, CPM Construction Schedules, Summary of Activities tabulations, and Scheduled Earnings tabulations, all as described hereinafter, and altogether defined as "Construction Progress Schedule" or "Construction Schedule". The Construction Progress Schedule shall be based on the planned and specified finished work, the maintenance of traffic restrictions, and other design requirements given in the plans and specifications. Each sheet or page of each submittal shall be identified with the contractor's company name, state project number, project name, date prepared, revision dates, and sheet or page number. If the submittals are not prepared by the contractor's own staff, the company name of the preparer shall be shown on each sheet or page.

The critical activities as shown on the approved Construction Schedule will be considered in establishing the controlling item of work. If the Construction Schedule has not been approved, the engineer will establish the controlling work item and charge the contract time accordingly. Scheduled Earnings will be the basis for measurement of contractor's progress.

Approved Construction Progress Schedules and approved associated data shall become part of the contract documents. Un-approved Construction Progress Schedules and associated data shall not be considered relevant or applicable for any purposes during or after completion of the project and shall not be binding on the Department. The sequence of work as represented on the Construction Progress Schedule and subsequent updates shall be interpreted as being the intention of the contractor at the time that the schedule was made.

(a) Construction Schedule: The Construction Schedule shall be a Critical Path Method (CPM) graphic diagram, computer prepared, utilizing the Precedence Diagramming Method (PDM). For the calendar day contract, the Gregorian calendar shall be used.

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The schedule shall show and describe the various activities of work required to complete the contract in sufficient detail so that all activities are readily identifiable and progress on the activities can be readily measured. Sufficient detail in bridge work means each element of work (piles, footings, columns, caps, rebar, cure time, etc.) of individual bents; each element of work in individual spans (girders, strip seal joints, Class AA, rebar, cure time, etc.); individual approach slabs; railings; rebar for all of the above as separate activities; and, miscellaneous other bridge work. Sufficient detail in road work means individual runs of pipe in drainage structures; individual box culverts; individual detour roads; the embankment, excavation, base and paving layers within definable geometric limits (e.g., from station to station, within a single ramp, etc.). Physical locations of activities within definable geometric limits (e.g., from station to station, within a single ramp, individual bents, individual spans, etc.) shall be included in the activity description or shown in activity codes relative to each activity. It shall include submittals and approvals of critical samples, shop drawings, procedures, order lists (pilings for example), or other things that could have a significant schedule impact.

Relatively minor items of work, similar or non-similar, may be grouped together into one activity (or more). Activities to be performed by subcontractors shall be included and identified. The schedule shall show the sequence in which the activities are to be accomplished and their dependency relationships. The estimated contract earnings and pay item quantities associated with each activity shall be included, and the sum of the estimated earnings shall equal the current contract amount.

The duration of activities shall be in whole calendar days and no activity shall have duration of less than one calendar day or more than 30 calendar days. The ending event of the schedule shall be a finish milestone identified as "Contract Completion Date". Its sole predecessor shall be "Reserved Float". The sole predecessor of "Reserved Float" shall be "Final Inspection" which shall be a finish milestone and shall have as predecessors all of the activities that must be completed prior to the Department's final inspection of the work. The duration of "Reserved Float" is the difference between "Final Inspection" and "Contract Completion Date". "Reserved Float" is defined as that part of the shared float reserved exclusively for the contractor's use. The contract date for stipulated damages will be adjusted by change order to the beginning date of the activity "Reserved Float".

The Construction Schedule shall be computer plotted on sheets not larger than 22 inches x 36 inches and shall show a continuous flow of information from left to right with no arrows from right to left and shall be drawn to a time scale of calendar days. The critical path shall be clearly identified. Resource constraints shall be identified, as shall scheduled starts or completions imposed on the schedule by the contractor.

The contractor shall submit color-coded graphics in the required multiple copies. The choice of the color coding must remain in effect for the life of the contract.

The contractor shall provide the Department with the means to electronically translate the Construction Schedule data into a configuration that can be read and processed by the Department or its consultants' hardware and Primavera software. If the contractor elects to use SureTrak Project Manager software, the following defaults must be placed: (1) resources shall be non-driving; (2) default activity type shall be "Task"; (3) activity type shall not be "Independent"; (4) duration display style shall be "Day (d)"; (5) float style shall be "Days"; and, (6) dates time format shall be "Don't show time". The revenue feature in SureTrak Project Manager does not translate to Primavera Project

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Planner (P3), so in SureTrak Project Manager the earnings must be entered as cost data. In both the SureTrak Project Manager and in the Primavera Project Planner (P3) "Back up" menu selection, the contractor will ensure that the option "Remove access list during backup" is checked. In addition, the project must be saved in SureTrak as a "Concentric P3" Type project.

(b) Summary of Activities: The Summary of Activities shall be a tabulation of all activities shown on the Construction Schedule, and shall accurately reflect the data used in preparation of the Construction Schedule. The summary shall be computer generated and sequenced by activity number. Each activity shall include as a minimum the following, in calendar days:

1. Activity numbers.
2. Activity description.
3. Estimated duration of activity.
4. Early start.
5. Late start.
6. Constrained start, if constrained.
7. Early finish.
8. Late finish.
9. Constrained finish, if constrained.
10. Status (whether critical).
11. Free float.
12. Total float.
13. Monetary value of the activity.
14. Remaining duration and calendar days used.

(c) Scheduled Earnings: The Scheduled Earnings shall be a product of the software creating the Construction Schedule and shall be a tabulation of accumulated scheduled contract earnings, based on late starts, measured in accumulated dollars for all activities, for each monthly partial estimate. The tabulation shall be prepared from the Construction Schedule and shall be computer generated. The Schedule of Earnings will not include advanced payments for stockpiled materials.

(d) Cash Management Document: When designated as a Cash Management Project, prior to the issuance of the Notice to Proceed, the contractor shall provide to the Department and obtain approval from the Department of the Scheduled Earnings report as described above, except that it shall be based on early starts. The Department will use this report for its cash management purposes. Failure of the contractor to provide and obtain approval of the Scheduled Earnings Report will result in withholding of any funds due the contractor.

(e) Submittal: Prior to or at the preconstruction conference the contractor shall submit to the project engineer for approval, in triplicate, a Construction Schedule giving a proposed schedule of operations that provides for completion of the work, a Summary of Activities tabulation, a Scheduled Earnings tabulation, and a Forty-Five Day Look-Ahead task list. The contractor shall also submit the Construction Schedule data electronically capable of being processed with the hardware and software being used by the Department or its consultants.

Within 7 calendar days after receipt of the submittal, the project engineer and contractor shall meet and review the proposed schedules and tabulations. Any revisions resulting from the review shall be submitted, in triplicate, for approval within 7 calendar

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days after the meeting. This procedure will be repeated as necessary. The approved final schedule shall be called the "Baseline Schedule".

Failure to have obtained approval of a Baseline Schedule and tabulations within 20 calendar days after the Notice to Proceed will result in withholding twenty-five percent of the amount of partial estimates until such schedules and tabulations are submitted and approved. Failure to have obtained approval of a Baseline Schedule and tabulations within the third estimate period may result in the Department's determination that the contractor is in default under the provisions of Subsection 108.09.

(f) Construction Schedule Updates: The contractor shall update and submit each month, within 7 calendar days after the partial estimate is submitted, the Construction Schedule critical path diagram, Summary of Activities tabulation, Scheduled Earnings tabulation, a Forty-Five Day Look-Ahead task list, and a current Turnaround Document as follows:

(1) The updated Construction Schedule critical path diagram will be in the same form as that submitted in (e) Submittal. It will be updated for progress through the estimate closing date, recalculated and plotted. The contractor will revise, adjust, and recalculate the schedule so that the difference in the work completion date calculated by the Retained Logic Method shall not be more than one-half an estimate period different from the work completion date calculated by the Progress Override Method. The Construction Schedule critical path diagram will show both the look ahead critical path for the duration of the project and the look back critical path as reported in the prior months.

(2) The updated Summary of Activities and Scheduled Earnings tabulation will be in the same form as that submitted in (e) Submittal. It will be updated for progress through the estimate closing date, recalculated and printed.

(3) The Forty-Five Day Look-Ahead task list will show all incomplete activities which the logic has determined either should be or may be active during the next forty-five days. It will be plotted in a graphic form similar to that of the Construction Schedule critical path diagram.

(4) The Turnaround Document will be a listing of the log record of a new activity added monthly to the schedule for the purpose of keeping a current presentation of the following information:

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a. The original contract completion date presented as actual calendar date.
b. The number of days added to the contract by approved change order (if any, if none, so state).
c. The present computed completion date presented as an actual calendar date and as a workday number, if applicable.
d. A list of activities deleted and added (if any, if none, so state), including their descriptions.
e. A list of logic changes and the reasons for the changes (if any, if none, so state).
f. A list of budget changes and the reasons for the changes (if any, if none, so state).
g. A narrative description of any other changes to the Construction Schedule critical path diagram.

Failure to submit the monthly updates of the Construction Progress Schedules within 7 calendar days after the partial estimate was submitted will result in withholding of twenty-five percent of the amount of partial estimate payments until such schedules are submitted and approved. Failure to have obtained approval of three consecutive monthly updates of the Construction Progress Schedule may result in the Department's determination that the contractor is in default under the provisions of Subsection108.09.

(g) CPM Reviews: The project engineer will designate the time and location for review of construction progress. The contractor's representative designated under Subsection 105.05 will be required to attend the construction progress review or a contractor's representative directed by the project engineer shall attend. The current approved Construction Schedule, Summary of Activities and Scheduled Earnings tabulations shall be reviewed, and required or desired changes discussed and documented.

As a minimum the following shall be discussed: contractor's compliance with approved schedules and tabulations, delays, proposed and approved contract quantity increases and decreases, proposed and approved extra work, actual starts, durations and finishes, and actual contract earnings.

If requested by the project engineer, within 7 calendar days following the review meeting the contractor shall submit to the project engineer for approval, in triplicate, a revised Construction Schedule, Summary of Activities tabulation, and Scheduled Earnings tabulation, and Forty-Five Day Look-Ahead, all in accordance with paragraph (e) Submittal, and all brought up to date to reflect agreements made at the review meeting. Failure to submit the revision of the Construction Progress Schedules within 7 calendar days after the request will result in withholding of twenty-five percent of the amount of partial estimate payments until such schedules are submitted and approved. Failure to have obtained approval of three consecutive monthly updates of the Construction Progress Schedule may result in the Department's determination that the contractor is in default under the provisions of Subsection108.09.

(h) The CPM Construction Schedule will be provided at no direct pay.

Subsection 108.04, Prosecution of Work: Heading (b), Disqualification, is deleted and the following is substituted.

(b) Disqualification. The contractor's progress will be determined monthly at the time of each partial estimate, and will be based on the total amount of money earned by

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the contractor, excluding advanced stockpiled material, as shown by the partial estimate compared to scheduled earnings as shown by the approved Scheduled Earnings tabulation, as of the end of the partial estimate period. If the contractor's progress is more than 10 percent behind scheduled earnings, the contractor may be notified that disqualification will occur if progress becomes delinquent by more than the percentages specified hereinafter, and additional notifications will be made, as the engineer deems necessary.

Prior to the elapsing of 55 percent of the contract time, the contractor will be disqualified if progress is more than 20 percent behind scheduled earnings. After 75 percent of the contract time has elapsed, the contractor will be disqualified if progress is more than 10 percent behind scheduled earnings. Disqualification will be applied between 55 and 75 percent contract time elapsed on a pro-rata basis; for example, when 65 percent of the contract time has elapsed, the contractor will be disqualified if progress is more than 15 percent behind scheduled earnings.

The Department's placement of the contractor in default under any provision of this subsection will be cause for disqualification. During the period of disqualification, the contractor will not be permitted to bid on contracts nor be approved as a subcontractor on contracts. Any bid submitted by the contractor during the period of disqualification will not be considered and will be returned. The period of disqualification will continue until the completed work on the contract is within the foregoing percentages or until all work on the contract has been satisfactorily completed.

Subsection 108.07, Determination and Extension of Contract Time: This subsection is amended as follows.

The third and fourth paragraphs are deleted and the following substituted.

The contract time for the work as awarded is based on the original quantities as defined in Subsection 102.05 and includes time to procure material, equipment and an adequate labor force to complete the work. If satisfactory fulfillment of the contract requires performance of work in greater quantities than those specified, or requires performance of extra work in accordance with Subsection 104.02 and the contractor requests additional contract time, the contractor shall submit a proposed CPM schedule based on the latest approved CPM schedule showing the increased time and revised completion date for approval by the Department. When the contract is altered in accordance with Subsection 104.02 and the engineer determines that a reduction in contract time is warranted due to decreased effort, the contractor shall submit a proposed CPM schedule based on the latest approved CPM schedule showing the reduced time and revised completion date for approval by the Department. A CPM schedule will be required for the engineer to process a change order that either increases or decreases the contract time.

If the contractor finds it impossible, for reasons beyond the contractor's control, to complete the work within the contract time as specified or as extended in accordance with the provisions of this subsection, the contractor shall, at the time the delay occurs make a written request to the engineer for an extension of time setting forth therein the reasons which justify granting the request. Such written request shall conform to the requirements of EDSM III.1.1.28. If the request does not so conform, the contractor hereby agrees to and shall be deemed to have expressly waived any claim for such additional time. The contractor's plea that insufficient time was specified is not a valid reason for extension of time. If the engineer finds that the work was delayed because of

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conditions beyond the control and without the fault of the contractor, the engineer may extend the contract time in such amount as conditions justify. The contractor's written request to the engineer for an extension of contract time shall include a proposed CPM schedule based on the latest approved CPM schedule update showing the increased time and revised completion date for approval by the Department. This CPM schedule document will be required for the engineer to process a change order that changes the contract time.

PROGRESS PHOTOGRAPHS: The contractor shall furnish the following color photographs of the work during this project, at no direct pay.

Twenty ground photographs (ten on the east bank side of the river and ten on the west bank side of the river) shall be taken from points designated by the Project Engineer at each of the following stages.

(a) At five (5) different times during the shop fabrication.
(b) Once each month after the start of field construction.
(c) When the project is 100% complete.

Twenty aerial photographs shall be taken upon completion and before final acceptance of this project, with input from the Project Engineer. These should include photographs of the main bridge from Pier A to Pier IV, two looking upstream, two looking downstream, and one from the river, as well as the east bank and west bank interchanges and elevated structures. Prints of each negative shall be approximately 8" x 10" size, glossy finish, mounted on linen, with a 1/2" binding strip along one of the long edges. Overall size of prints, including binding strip and margins, shall not exceed 8-1/2" x 11". A 2-1/2" x 2-1/2" title block shall be provided on each print, preferably in the lower right corner, containing the following information:

STATE OF LOUISIANA
DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT

STATE PROJECT NUMBER	**STATE ROUTE NUMBER**
NAME OF PROJECT	**PHOTO NUMBER**
CONTRACTOR	**DATE**
DESCRIPTION OF PHOTO	

The contractor shall furnish seven (7) sets of photographs to the Project Engineer, one (1) set to the Consulting Engineers, and one (1) set to the New Orleans Public Belt Railroad at the following addresses:

Modjeski and Masters, Inc.
1055 St. Charles Avenue, Suite 400
New Orleans, LA 70130

New Orleans Public Belt Railroad
Attn. Chief Engineer
4822 Tchoupitoulas Street
New Orleans, LA 70115

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The following table contains a summary of the distribution of the progress photos:

Progress Photo	Photo Set Distribution		
	Project Engineer	Modjeski and Masters, Inc.	New Orleans Public Belt Railroad
Ground Photos @ Various Stages	7 Sets	1 Set	1 Set
Aerial Photos @ Completion	7 Sets	1 Set	1 Set
All Photo Negatives	--	--	1 Set

All progress photographs, including photograph negatives, produced in accordance with this item shall be considered to be work made for hire for the New Orleans Public Belt Railroad under all appropriate copyright laws and shall become the property of the New Orleans Public Belt Railroad (Manager Engineering and Maintenance, 4822 Tchoupitoulas Street, New Orleans, LA 70115).

PROSECUTION AND PROGRESS: Section 108 of the 2000 Standard Specification is hereby amended as follows:

Subsection 108.06, Labor, Methods, and Equipment is hereby amended to include the following.

The contractor shall make all necessary arrangements for the supply of all electricity, compressed air, water and other utilities for the project independent of the LADOTD and the NOPBRR.

DETERMINATION AND EXTENSION OF CONTRACT TIME (1/04): Subsection 108.07 Determination and Extension of Contract Time is amended to include the following.

The contractor shall document for each month of scheduled construction, the occurrence of adverse weather conditions having an impact on controlling items of work. An adverse weather day is one on which rainfall or wet soil conditions will prevent construction operations from proceeding for at least 5 continuous hours of the day or 65 percent of the normal work day, whichever is greater, with the normal working force engaged in performing the controlling item of work. If the contractor submits a written request for additional contract time due to adverse weather conditions, the contractor's request will be considered only for adverse weather days in excess of the allowable number of days per month stated below. An equitable adjustment in contract time will be made at the conclusion of the project by comparing the total number of excess adverse weather days requested by the contractor to the number of adverse weather days that were

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included in the construction schedule but were not used. Contract time will not be reduced due to the adjustments for adverse weather. An adjustment in the contract time due to adverse weather will not be cause for an adjustment in the contract amount.

The following are anticipated adverse weather days that the contractor shall include in each month of his calendar day construction schedule.

January	11 days	May	5 days	September	4 days
February	10 days	June	6 days	October	3 days
March	8 days	July	6 days	November	5 days
April	7 days	August	5 days	December	8 days

COMPENSATION FOR ALTERATIONS OF THE CONTRACT (07/06): Subsection 109.04 of the 2000 Standard Specifications and the supplemental specifications thereto is amended as follows. Delete this subsection and substitute the following.

109.04 COMPENSATION FOR ALTERATIONS OF THE CONTRACT.

Payment for work performed in accordance with Subsections 104.02 and 105.19 will first be made at the contract's established unit prices. If unit prices are not applicable, the second basis of payment will be negotiated prices agreed to by change order prior to the start of the work. If an acceptable negotiated price cannot be established prior to the work being performed, the Department may require the contractor to perform the work on a "force account" basis.

(1) Unit Prices – When payments are made at the contract's established unit prices, and the work requires a material change in construction method or sequence, adjustment to the unit prices for or against the contractor shall be made in accordance with Subsections 104.02 and 109.03.

(2) Negotiated Prices – The Department's objective is to compensate the contractor using the same pricing formulas established in determining the original bid contract prices. Therefore, reasonable rates for labor burden, company owned equipment internal cost recovery rates, jobsite overhead items and rates, home office overhead and profit mark-upon direct costs, and other subjective pricing components established by the contractor at the time the original contract bid prices were determined will also be used in determining the negotiated prices for the change order work. The change order authorizing the work shall include a detail cost breakdown showing direct labor, materials, equipment, and subcontractor costs, as well as each of the subjective pricing components listed above.

(3) Force Account -When "force account" is the method of payment, the contractor shall be paid the direct cost of the work as determined and documented in Headings (a) through (g) below. Jobsite and home office overhead indirect expenses, and profit for all parties shall be considered fully compensated by a 15 percent mark-up on allowable direct cost items described in the Headings (a) through (d) below, and the mark-up on direct cost for the subcontractor and contractor described in Heading (e) below. The Department may consider additional reimbursement to the contractor for indirect fixed jobsite overhead costs for delays that are not the contractor's fault or responsibility, but are the Department's fault or responsibility or determined by judicial proceeding to be the Department's sole responsibility or are the fault and responsibility of

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a local government when the change order results in extension of the project's critical work path and the 15 percent mark-up on direct costs is deemed by the Department to be insufficient.

(a) Direct Labor: For labor and working foremen in direct charge of operations, the contractor shall receive the wage rates agreed on in writing before beginning work for each hour that said labor and foremen are engaged in such work. Jobsite and home office supervisory personnel shall not be included as direct labor.

The contractor shall receive the actual costs paid to, or in behalf of, workers for subsistence and travel allowances, health and welfare benefits, pension fund benefits or other benefits when such amounts are required by collective bargaining agreement or other employment contract applicable to the classes of labor employed on the work, but limited to a maximum daily rate for subsistence and travel allowances. This maximum shall be agreed upon prior to the contractor incurring such charges.

(b) Direct Materials: For materials accepted by the engineer and used, the contractor shall receive the actual cost of such materials delivered to the work, including transportation charges and sales taxes if applicable.

(c) Equipment: For authorized machinery or special equipment the contractor shall receive the rental rates agreed on in writing before such work is begun. For equipment rented from independent outside sources, the contractor will be reimbursed the reasonable actual cost as shown on paid rental invoices. For company owned equipment, the contractor will be reimbursed his internal cost recovery equipment charge rate consistent with his original bid cost estimates. The Department's Engineering Directives and Standards Manual, EDSM III.1.1.27, entitled Equipment Rental Rates, provides additional guidance concerning allowable equipment rental rates and their application. If the contractor chooses to use a rental rate guide book instead of his internal cost recovery rates to establish rental rates for company owned equipment, adjustments to the allowable type of equipment and hours per day must be made as described in the EDSM. In addition, no 15 percent mark up on equipment direct cost for jobsite and home office overhead expenses and profit will be allowed if the contractor chooses to use rental rate guide book prices instead of his internal cost recovery rates.

(d) Bond, Insurance and Tax: For property damage, liability and workmen's compensation insurance premiums, unemployment insurance contributions, social security taxes, and bond costs on force account work, the contractor shall receive the actual cost thereof. The contractor shall furnish satisfactory evidence of the rates paid for such bond, insurance and tax.

(e) Subcontractor Costs: For change order work performed by an approved subcontractor, the subcontractor shall receive the subcontractor's actual and reasonable allowable direct cost of such work as described in Headings (a) through (d) above plus a 15 percent mark-up for the subcontractor's indirect jobsite and home office overhead expenses and profit. In addition, the contractor will be paid a 10 percent mark-up on the subcontractor's total direct and indirect costs, and profit for general supervision and sequencing of the change order work.

(f) Non-allowable Costs: No additional contractor cost reimbursement will be made for general superintendence, small tools or craft specific tool allowances, or other direct or indirect costs not specifically included in Headings (a) through (e) above.

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(g) Statements: No payment will be made for force account work until the contractor has furnished the engineer with duplicate itemized statements of the cost of such work detailed as follows:

(1) Name, classification, date, daily hours, total hours, rate and extension for each laborer and foreman.

(2) Designations, dates, daily hours, total hours, rental rate and extension for each unit of machinery and equipment.

(3) Quantities of materials, prices and extensions.

(4) Transportation of materials.

(5) Cost of property damage, liability and workmen's compensation insurance premiums, unemployment insurance contributions, social security taxes, and bond costs.

The contractor's representative and the engineer shall compare records of the cost of work done as ordered on a force account basis. Such comparison shall be made daily. Statements shall be accompanied by invoices for materials used and transportation charges. If materials used on force account work are not purchased for such work, but are taken from the contractor's stock, in lieu of invoices, the contractor shall furnish an itemized list of such materials showing that the quantity claimed was actually used, and that the price and transportation costs claimed represent the actual cost to the contractor. Invoices shall be accompanied by the contractor's notarized statement that payment in full has been made for the materials.

PAYMENT ADJUSTMENT (03/07): Section 109, Measurement and Payment of the 2000 Standard Specifications and the supplemental specifications thereto, is amended to add the following.

This project is designated for payment adjustment for asphalt cements and fuels in accordance with Subsection 109.09 as follows.

109.09 PAYMENT ADJUSTMENT (ASPHALT CEMENTS AND FUELS).

(a) General: Payment for contract items indicated herein will be adjusted to compensate for cost differentials of Performance Graded (PG) asphalt cements, gasoline, and diesel fuel when such costs increase or decrease more than 5 percent from the Department's established base prices for these items. The base price indices for asphalt cements and fuels will be the monthly price indices in effect at the time bids are opened for the project. The base price indices for asphalt cements will be as stated in paragraph (b) below. The base price index for fuels will be as stated in paragraph (c) below.

Payment adjustments will be made each monthly estimate period when a price index for this period varies more than 5 percent from its respective base price index. The monthly price indices to be used with each monthly estimate will be the price indices for the month in which the estimate period begins.

If the project is placed in default, payment adjustments will be based on the monthly price indices used for the last monthly estimate period prior to the project being placed in default, unless a monthly price index decreases in which case the lower monthly price index will be used.

If it is determined after completion of work on any eligible item that the total quantity paid to date must be adjusted to reflect more accurate quantity determinations,

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the Department will prorate the additional quantity to be added or subtracted over all previous estimate periods in which the item of work was performed in order to determine additional payment adjustments. If payment adjustments were made during any of these partial estimate periods, this added or subtracted quantity that has been prorated will likewise have payment adjustments calculated and included.

(b) Performance Graded (PG) Asphalt Cements: The base price index will be the monthly price index in effect at the time of bid opening as shown elsewhere herein. The monthly price indices will be the average, excluding the extreme outliers, of the unit prices for PG 64-22, the average, excluding the extreme outliers, of the unit prices for PG 70-22m, and the average, excluding the extreme outliers, of the unit prices for PG 76-22m. The monthly prices for each of these asphalt materials will be F.O.B. refinery or terminal as determined from the quoted prices effective on the first calendar day of each month from suppliers of these materials. Suppliers considered are those who have requested to participate in the liquid asphalt index determination and have supplied materials on DOTD projects within the past twelve months. These suppliers and materials shall be listed on the Department's Qualified Products List (QPL 41) and must be marketed in Louisiana.

Payment adjustments will be made in accordance with the following formulas:

If Monthly Price Index exceeds Base Price Index,

$$P_a = (A - 1.05B) \times C \times D \times (1.00 + T)$$

If Base Price Index exceeds Monthly Price Index,

$$P_a = (0.95B - A) \times C \times D \times (1.00 + T)$$

Where:

P_a	=	Price adjustment (increase or decrease) for asphalt cement.
A	=	Monthly Price Index for respective PG 64-22, PG 70-22m, or PG 76-22m in dollars per ton/megagram.
B	=	Base Price Index for respective PG 64-22, PG 70-22m, or PG 76-22m in dollars per ton/megagram.
C	=	Tons/megagrams of asphaltic concrete.
D	=	Percent of respective asphalt cement, per job mix formula, in decimals.
T	=	Louisiana sales tax percentage, in decimals. (Note: Local tax is not considered)

The engineer will furnish the weights (mass) of asphaltic concrete placed during the monthly estimate period with the respective asphalt cement content, excluding the asphalt content in reclaimed asphaltic pavement (RAP) as per job mix formula. If the asphalt cement content changes during the estimate period, the respective weight (mass) of asphaltic concrete produced at each cement content will be reported.

Item 510-02, Pavement Widening, and all contract pay items under Sections 502 and 508, will be eligible for payment adjustments of asphalt materials. No payment adjustment will be made for other asphalt materials, including emulsions and cutbacks.

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The base price indices for asphalt cements and fuels will be posted on the DOTD internet website before the 10th calendar day of each month at the following URL: www.dotd.louisiana.gov/lettings/lac_price_index/priceindices.asp.

(c) Fuels: The base price index for this project will be the monthly price index in effect when bids are opened for the project. The monthly price index will be the minimum price quotations for unleaded gasoline and No. 2 diesel fuel listed for the New Orleans area in *Platt's Oilgram and Price Report* effective on the first calendar day of each month.

Payment adjustment will be made in accordance with the following formulas:

If Monthly Price Index exceeds Base Price Index,

$$P_a = (A - 1.05B) \times Q \times F$$

If Base Price Index exceeds Monthly Price Index,

$$P_a = (0.95B - A) \times Q \times F)$$

Where:

P_a	=	Price adjustment.
A	=	Monthly Price Index in dollars per gallon/liter.
B	=	Base Price Index in dollars per gallon/liter.
Q	=	Pay Item Quantity (Pay Units).
F	=	Fuel Usage Factor Gal (L)/Pay Unit.

The following is a listing of contract pay items that are eligible for payment adjustment and the fuel usage factors that will be used in making such adjustment. Contract items that expand the items listed herein by use of letter designations are also eligible for fuel price adjustments; for example:

Item 601-01-G, Portland Cement Concrete Pavement 8 inches (200 mm) thick.

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STATE PROJECT NOS. 005-10-0037, 006-01-0021, 006-02-0064, 006-25-0001, 006-30-0041, 063-03-0051, 063-04-0035
SPECIAL PROVISIONS

ELIGIBLE CONTRACT PAY ITEMS & FUEL USAGE FACTORS FOR FUEL PAYMENT ADJUSTMENT

ITEM NO.	PAY ITEM	UNITS	MIN. ORIGINAL CONTRACT QUANTITY FOR PAY ADJUSTMENT	FUEL USAGE FACTORS	
				Diesel[2]	Gasoline
203-01[1]	General Excavation	gal/cu yd	10,000 cu yd	0.29	0.15
203-02	Drainage Excavation	gal/cu yd	10,000 cu yd	0.29	0.15
203-03[1]	Embankment	gal/cu yd	10,000 cu yd	0.29	0.15
203-04	Nonplastic Embankment	gal/cu yd	10,000 cu yd	0.29	0.15
203-07	Borrow (Vehicular Measurement)	gal/cu yd	10,000 cu yd	0.29	0.15
301-01	Class I Base Course	gal/cu yd	3,000 cu yd	0.88	0.57
301-02	Class I Base Course (" Thick)	gal/sq yd	50,000 sq yd	0.04	0.03
302-01	Class II Base Course	gal/cu yd	3,000 cu yd	0.88	0.57
302-02	Class II Base Course (" Thick)	gal/sq yd	50,000 sq yd	0.04	0.03
303-01	In-Place Cement Stabilized Base Course	gal/sq yd	50,000 sq yd	0.04	0.03
304-02	Lime Treatment (Type B)	gal/sq yd	50,000 sq yd	0.04	0.03
304-03	Lime Treatment (Type C)	gal/sq yd	50,000 sq yd	0.04	0.03
304-04	Lime Treatment (Type D)	gal/sq yd	50,000 sq yd	0.04	0.03
305-01	Subgrade Layer (" Thick)	gal/sq yd	50,000 sq yd	0.04	0.03
308-01	In-Place Cement Treated Base Course	gal/sq yd	50,000 sq yd	0.04	0.03
401-01	Aggregate Surface Course (Net Section)	gal/cu yd	3,000 cu yd	0.88	0.57
401-02	Aggregate Surface Course (Adjusted Vehicular Measurement)	gal/cu yd	3,000 cu yd	0.88	0.57
502-01	Superpave Asphaltic Concrete	gal/ton	1000 ton	2.40[3]	0.2
502-02	Superpave Asphaltic Concrete	gal/cu yd	500 cu yd	4.80[4]	0.4
502-03	Superpave Asphaltic Concrete (" Thick)	gal/sq yd	10,000 sq yd	0.13[5,6]	0.01[6]
508-01	Asphaltic Concrete (SMA)	gal/ton	1000 ton	2.40[3]	0.2
510-02	Pavement Widening	gal/sq yd	3,000 sq yd	0.86	0.24
601-01	Portland Cement Concrete Pavement (" Thick)	gal/sq yd	15,000 sq yd	0.11	0.15

1 If project has both 203-01 & 203-03, only the item with larger quantity is eligible.
2 For fuel adjustment purposes, the term "diesel" shall represent No. 2 or No. 4 fuel oils or any of the liquified petroleum gases, such as propane or butane.
3 If natural gas or coal is used instead of diesel for aggregate drying and heating the fuel usage factor shall be 1.67 gal/ton.
4 If natural gas or coal is used instead of diesel for aggregate drying and heating the fuel usage factor shall be 13.34 gal/cu yd.
5 If natural gas or coal is used instead of diesel for aggregate drying and heating the fuel usage factor shall be 0.09 gal/sq yd.
6 Per inch of thickness.

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STATE PROJECT NOS. 005-10-0037, 006-01-0021, 006-02-0064, 006-25-0001, 006-30-0041, 063-03-0051, 063-04-0035
SPECIAL PROVISIONS

ELIGIBLE CONTRACT PAY ITEMS & FUEL USAGE FACTORS FOR FUEL PAYMENT ADJUSTMENT (METRIC)

ITEM NO.	PAY ITEM	UNITS	MIN. ORIGINAL CONTRACT QUANTITY FOR PAY ADJUSTMENT	FUEL USAGE FACTORS	
				Diesel[2]	Gasoline
203-01[1]	General Excavation	l/m^3	7,600 m^3	1.44	0.74
203-02	Drainage Excavation	l/m^3	7,600 m^3	1.44	0.74
203-03[1]	Embankment	l/m^3	7,600 m^3	1.44	0.74
203-04	Nonplastic Embankment	l/m^3	7,600 m^3	1.44	0.74
203-07	Borrow (Vehicular Measurement)	l/m^3	7,600 m^3	1.44	0.74
301-01	Class I Base Course	l/m^3	2,300 m^3	4.36	2.82
301-02	Class I Base Course (mm Thick)	l/m^2	41,800 m^2	0.18	0.14
302-01	Class II Base Course	l/m^3	2,300 m^3	4.36	2.82
302-02	Class II Base Course (mm Thick)	l/m^2	41,800 m^2	0.18	0.14
303-01	In-Place Cement Stabilized Base Course	l/m^2	41,800 m^2	0.18	0.14
304-02	Lime Treatment (Type B)	l/m^2	41,800 m^2	0.18	0.14
304-03	Lime Treatment (Type C)	l/m^2	41,800 m^2	0.18	0.14
304-04	Lime Treatment (Type D)	l/m^2	41,800 m^2	0.18	0.14
305-01	Subgrade Layer (mm Thick)	l/m^2	41,800 m^2	0.18	0.14
308-01	In-Place Cement Stabilized Base Course	l/m^2	41,800 m^2	0.18	0.14
401-01	Aggregate Surface Course (Net Section)	l/m^3	2,300 m^3	4.36	2.82
401-02	Aggregate Surface Course (Adjusted Vehicular Measurement)	l/m^3	2,300 m^3	4.36	2.82
502-01	Superpave Asphaltic Concrete	l/Mg	900 Mg	10.01[3]	0.83
502-02	Superpave Asphaltic Concrete	l/m^3	400 m^3	23.77[4]	1.98
502-03	Superpave Asphaltic Concrete (mm Thick)	l/m^2	8,400 m^2	0.59[5,6]	0.45[6]
508-01	Asphaltic Concrete (SMA)	l/Mg	900 Mg	10.01[3]	0.83
510-02	Pavement Widening	l/m^2	2,500 m^2	3.89	1.09
601-01	Portland Cement Concrete Pavement (mm Thick)	l/m^2	12,500 m^2	0.5	0.68

1 If project has both 203-01 & 203-03, only the item with larger quantity is eligible.
2 For fuel adjustment purposes, the term "diesel" shall represent No. 2 or No. 4 fuel oils or any of the liquified petroleum gases, such as propane or butane.
3 If natural gas or coal is used instead of diesel for aggregate drying and heating the fuel usage factor shall be 6.97 l/mg.
4 If natural gas or coal is used instead of diesel for aggregate drying and heating the fuel usage factor shall be 16.53 l/m^3.
5 If natural gas or coal is used instead of diesel for aggregate drying and heating the fuel usage factor shall be 0.41 l/m^2.
6 Per mm of thickness.

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REMOVING OR RELOCATING STRUCTURES AND OBSTRUCTION: Section 202 of the 2000 Standard Specifications and Supplemental Specifications thereto is amended to add the following heading.

(i) Removing Existing Bridge Metalwork (Demolition) and Salvaging: This Work consists of the removal of existing bridge metalwork as shown on the contract plans and provides for the mandatory scrapping and recycling of the removed metalwork by a scrap yard approved by the project engineer. The scrap yard shall be advised in writing that the existing coatings on the bridge metalwork are known to contain high levels of lead and chromium and may contain other possibly hazardous substances.

The contractor is therefore warned and advised that the existing coatings on the bridge are known to contain high levels of lead and chromium and may contain other possibly hazardous substances. It shall be the contractor's responsibility to identify and comply with all applicable Federal, State, and Local laws, rules, regulations and ordinances with respect to disturbance of these materials containing potentially hazardous substances. See "Cleaning, Painting and Waste Disposal/Recycling of Existing Bridge Metalwork Faying Surfaces" for additional information and requirements regarding (1) worker safety and (2) environmental protection.

Rivet or Bolt Removal: All rivet or bolt removal from the existing bridge shall be accomplished by mechanical means. Torch cutting of rivets will not be allowed. Rivet removal from lead coated structures is an OSHA trigger task with a presumed lead exposure level and all provisions of CFR 1926.62 shall apply. Red lead paint was also applied to the faying surfaces of all connections when originally constructed; therefore, lead based paint is present at all metalwork connections between plies and under rivet heads on all portions of the bridge. To minimize worker lead exposure as required by OSHA regulation it shall be required that prior to any rivet removal, the coating on and at least 1 inch around each end of the rivet shall be removed. This paint removal and resulting waste disposal shall be subject to the same requirements as specified for "Cleaning, Painting and Waste Disposal/Recycling of Existing Bridge Metalwork Faying Surfaces" except that the removal technique may be changed provided the same level of containment and waste recycling are accomplished.

Torch Cutting of Metalwork: Torch cutting on lead coated structures is an OSHA trigger task with a presumed lead exposure level and all provisions of CFR 1926.62 shall apply. At a minimum, employees performing such operations in the open air shall be protected by filter-type respirators in accordance with the requirements of subpart E of 29 CFR 1926. Other employees exposed to the same atmosphere as the welders or burners shall be protected in the same manner as the welder or burner. To minimize worker lead exposure levels by engineering control, as required by OSHA regulation, it shall be required at a minimum that prior to any torch or flame cutting of singly ply metalwork, an area 6 inches on each and all sides of the cut line shall have all the paint removed. This paint removal and waste disposal shall be subject to the same requirements as specified for "Cleaning, Painting and Waste Disposal/Recycling of Existing Bridge Metalwork Faying Surfaces" except that the removal technique may be changed provided the same level of containment and waste recycling are accomplished.

Torch or flame cutting across multiple plies of metalwork is prohibited. Disassembly or mechanical cutting is required.

Mechanical Cutting of Metalwork: Mechanical cutting of existing coated metalwork shall be subject to the same lead emission levels limits as established by

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Environmental Air Monitoring as specified in "Cleaning, Painting and Waste Disposal/Recycling of Existing Bridge Metalwork Faying Surfaces" and all provisions of CFR 1926.62 shall apply. Should specified lead emission levels be exceeded appropriate containment measures shall be employed to reduce emissions to the established levels.

Cleaning and Painting: All existing bridge metalwork that is to remain from which existing paint has been removed and/or which have uncoated cut surfaces or exposed faying surfaces due to member or component removal shall be abrasive blast cleaned and painted with the full three coat ALKYD paint system, System B as described in Section 811 of the Special Provisions.

SUPERPAVE ASPHALTIC CONCRETE MIXTURES (01/05): Section 502 of the 2000 Standard Specifications and the supplemental specifications thereto is amended as follows.

Subsection 502.01, Description.

The fourth paragraph is amended to include the following. A mixture of any design level, including Level A, may be used on the shoulders at the contractor's option.

Subsection 502.12, Quality Control and Acceptance.

The third and fourth paragraphs of Heading (b) are deleted and the following substituted. Pavement density and surface tolerance requirements will not be applied for short irregular sections, such as drives, aprons and turnouts; however, hot mix shall be placed to provide a neat, uniform appearance and shall be compacted by satisfactory methods. Any mixtures used for shoulders, curbs, driveways, turnouts, crossovers, joint repair, leveling, guardrail widening, islands, bike paths, patching, widening, and miscellaneous handwork will be paid separately in 1000 ton sublots, or portions thereof, in accordance with Section 502.12(c) and Table 502-8.

The first paragraph of Heading (f)(2) is deleted and the following substituted.

Acceptance testing for pavement density will be conducted by the Department. Three pavement samples for each mix use shall be obtained from each sublot within 24 hours after placement. When this falls on a day the contractor is not working, sampling shall be done within 3 calendar days. Sampling shall be performed using the random number tables shown in DOTD S605. If there are different mix uses within the same sublot, i.e. shoulder and roadway, then an additional core may be taken to ensure that there is at least one core per mix use. The density requirement for each lot will be as shown in Table 502-3 determined in accordance with DOTD TR 304. Payment will be made in accordance with Table 502-6 using the total number of cores for the lot in accordance with Subsection 502.12(g). Payment for small quantity lots will be made in accordance with Table 502-8.

Subsection 502.13, Measurement.

The first sentence of the second paragraph of Heading (a) is deleted and the following substituted. Estimated quantities of asphaltic concrete shown on the plans are based on 110 lb/sq yd/inch (2.35 kg/sq m/mm) thickness.

ASPHALTIC CONCRETE EQUIPMENT AND PROCESSES (11/04): Section 503 of the 2000 standard specifications is amended as follows.

Subsection 503.02 Plant Equipment.

Heading (c) Anti-Strip Additive Equipment is amended to include the following. The anti-strip delivery system shall ensure that the proper amount of material is delivered

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continuously. This system may be a paddle-type no-flow indicator, which triggers a light or alarm in the control room and an alarm in the plant lab when the anti-strip material is not flowing. Other similar systems may be allowed with approval by the District Laboratory Engineer. In either system, if the anti-strip flow is not restored within 15 minutes, production shall be discontinued until the system is repaired.

CULVERTS AND STORM DRAINS (12/06): Section 701, Culverts and Storm Drains, of the 2000 Standard Specifications, and the supplemental specifications thereto, is deleted and the following substituted.

SECTION 701
CULVERTS AND STORM DRAINS

701.01 DESCRIPTION. This work consists of furnishing, installing, and cleaning pipe, pipe arch, storm drains and sewers, also referred to as culverts or conduit, in accordance with these specifications and in conformity with lines and grades shown on the plans or established.

701.02 MATERIALS. Materials shall comply with the following sections and subsections:

Usable Soil	203.06(a)
Selected Soil	203.06(b)
Plastic Soil Blanket	203.10
Mortar	702.02
Flowable Fill	710
Portland Cement Concrete	901
Recycled Asphaltic Pavement (RAP)	1003.01
Stone	1003.03(d)
Recycled Portland Cement Concrete	1003.03(c)
Granular Material	1003.07
Bedding Material	1003.08
Concrete Sewer Pipe	1006.02
Reinforced Concrete Pipe	1006.03
Reinforced Concrete Pipe Arch	1006.04
Gasket Materials	1006.06
Plastic Pipe	1006.07
Split Plastic Coupling Bands	1006.07(d)(4)
Plastic Yard Drain Pipe	1006.09
Bituminous Coated Corrugated Steel Pipe and Pipe Arch	1007.02
Structural Plate for Pipe, Pipe Arch and Arch	1007.04
Corrugated Aluminum Pipe and Pipe Arch	1007.05
Coupling Bands	1007.09
Reinforcing Steel	1009
Geotextile Fabric	1019

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(a) Side Drain Pipe or Side Drain Pipe Arch: When the item for Side Drain Pipe or Side Drain Pipe Arch is included in the contract, the contractor has the option of furnishing reinforced concrete pipe or reinforced concrete pipe arch, corrugated metal pipe or corrugated metal pipe arch, or plastic pipe, as allowed by EDSM II.2.1.1 or unless otherwise specified.

(b) Cross Drain Pipe or Cross Drain Pipe Arch: When the item for Cross Drain Pipe or Cross Drain Pipe Arch is included in the contract, the contractor has the option of furnishing reinforced concrete pipe or reinforced concrete pipe arch, corrugated metal pipe or corrugated metal pipe arch, or plastic pipe, as allowed by EDSM II.2.1.1 or unless otherwise specified.

(c) Storm Drain Pipe or Storm Drain Pipe Arch: When the item for Storm Drain Pipe or Storm Drain Pipe Arch is included in the contract, the contractor has the option of furnishing reinforced concrete pipe or reinforced concrete pipe arch, or plastic pipe, as allowed by EDSM II.2.1.1 or unless otherwise specified.

(d) Yard Drain Pipe: When the item for Yard Drain Pipe is included in the contract, the contractor has the option of furnishing concrete sewer pipe, plastic yard drain pipe or plastic pipe in accordance with Section 1006 unless otherwise specified.

(e) Material Type Abbreviations:

(1) Reinforced Concrete Pipe:

RCP	Reinforced Concrete Pipe
RCPA	Reinforced Concrete Pipe Arch

(2) Corrugated Metal Pipe:

CAP	Corrugated Aluminum Pipe
CAPA	Corrugated Aluminum Pipe Arch
CMP	Corrugated Metal Pipe
CMPA	Corrugated Metal Pipe Arch
CSP	Corrugated Steel Pipe
CSPA	Corrugated Steel Pipe Arch
BCCSP	Bituminous Coated Corrugated Steel Pipe
BCCSPA	Bituminous Coated Corrugated Steel Pipe Arch

(3) Plastic Pipe:

PP	Plastic Pipe
PVCP	Polyvinyl Chloride Pipe
RPVCP	Ribbed Polyvinyl Chloride Pipe
CPEPDW	Corrugated Polyethylene Pipe Double Wall

(f) Joint Type Abbreviations:

T1	Type 1 Joint
T2	Type 2 Joint
T3	Type 3 Joint

(g) Quality Assurance for Pipe: Manufacturing plants will be periodically inspected for compliance with specified manufacturing methods, and material samples will be randomly obtained for laboratory testing for verification of manufacturing lots. Materials approved at the manufacturing plant will be subject to visual acceptance inspections at the jobsite or point of delivery.

701.03 EXCAVATION. For all pipe, when the sides of the trench are stable as evidenced by the sides of the trench being able to maintain a vertical cut face, the

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minimum trench width at the bottom of the excavation will be 18 inches (460mm) on either side of the outside diameter of the pipe. If the sides of the trench are unstable, the width of the trench at the bottom of the excavation, for plastic or metal pipe, shall be a minimum width of at least 18 inches (460mm) or one pipe diameter on each side of the outside diameter of the pipe, which ever is greater. Surplus material or excavated material that does not conform to the requirements of Subsection 203.06(a) shall be satisfactorily disposed of in accordance with Subsection 202.02. Moisture controls including backfill materials selection and dewatering using sumps, wells, well points or other approved processes may be necessary to control excess moisture during excavation, installation of bedding, over-excavated trench backfilling, pipe placement and pipe backfill.

(a) Over-excavation: When unsuitable soils as defined in Subsection 203.04 or a stable, non-yielding foundation cannot be obtained at the established pipe grade, or at the grade established for placement of the bedding, unstable or unsuitable soils below this grade shall be removed and replaced with granular material meeting the requirements of Subsection 1003.07, bedding materials meeting the requirements of Subsection 1003.08 or Type A backfill. All granular, backfill materials placed below the established pipe or bedding grade shall be placed in lifts not exceeding 8 inches (200 mm) thick and sufficiently compacted by hand or a dynamic mechanical hand compaction device over the surface of each lift to form a stable, non-yielding foundation at the surface of the established bedding or pipe grade.

When rock is encountered, it shall be removed below grade and replaced with material complying with Subsection 1003.07, bedding materials meeting the requirements of Subsection 1003.08 or Type A backfill. The compacted earth cushion shall have a thickness under the pipe of at least 1/2 inch per foot (40 mm/m) of fill height over the top of the pipe with a minimum thickness of 8 inches (200 mm). All granular, backfill materials placed below the established pipe or bedding grade shall be placed in lifts not exceeding 8 inches (200 mm) thick and sufficiently compacted by hand or a dynamic mechanical hand operated compaction device over the surface of each lift to form a stable, non-yielding foundation at the surface of the established bedding or pipe grade.

Materials used to backfill in an over-excavated portion of a trench do not require encasement in a Geotextile Fabric.

Density of approved materials placed in over-excavated trenches will not be measured or determined.

701.04 FORMING PIPE BED. Bedding material, when specified, shall be constructed in accordance with Section 726. Materials allowed for bedding shall be as specified in Section 1003.08 or may be Type A backfill materials. When bedding materials are specified, additional excavation shall be performed below established pipe grade and the bedding material placed in lifts not exceeding 8 inches (200 mm) thick and lightly compacted by hand or a dynamic hand compaction device over the surface of each lift.

When the bottom of the pipe is not laid in a trench but is constructed above natural soils, a uniform bed shall be constructed as specified for the bottom of a trench.

Density of approved bedding materials will not be measured or determined.

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701.05 LAYING PIPE. 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 laps 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.

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.

701.06 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 comply with Subsection 1006.05, and shall be sealed with gasket material installed in accordance with the manufacturer's recommendations.

(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.

(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.

(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 flush and even.

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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.

Joints shall be approved and shall be sealed with gasket material. 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 901, and as directed.

(f) Geotextile Fabric, Pipe Joints: For concrete, metal and plastic pipes, Types 2 and 3 joints shall be wrapped with geotextile fabric for a minimum of 12 inches (300 mm) on each side of joint for pipe 36 inches (900 mm) or less in diameter and a minimum of 18 inches (450 mm) on each side of the joint for pipe greater than 36 inches (900 mm) in diameter. Ends of the 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.

701.07 RELAYING PIPE. If specified or directed, existing pipes shall be removed and suitable sections relaid as specified for new pipes.

701.08 BACKFILLING.

(a) General: Prior to backfilling, pipes found to be damaged or out of alignment or grade shall be removed and reinstalled, or replaced.

Type A backfill material shall be stone, recycled portland cement concrete, flowable fill, or RAP.

Type B backfill materials are selected soils. Where Type B backfill materials are called for, Type A backfill materials may be substituted.

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.

When Type A backfill material is used, geotextile fabric surrounding this backfill shall be placed in accordance with Subsection 726.03 between the aggregate backfill material and all other natural or placed soils in the trench or embankment. Care shall be taken to prevent damage to geotextile fabric during placement of backfill material. For concrete pipe, the fabric shall enclose not only the initial backfill but shall be wrapped over the top of the pipe with at least 12 inches (300 mm) of overlap.

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When a trench box or trench sheeting is used in unstable soils and/or for worker safety, and when moved during backfilling operations, filling and additional compaction of the disturbed zone of backfill must take place immediately and in a manner acceptable to the engineer.

Initial backfill is a structural backfill encasing the pipe from the bottom of the pipe to the springline for concrete pipe and to a point one foot (0.3 m) above the top of the pipe for both metal and plastic pipe. Final backfill is not a structural backfill and shall extend from the top of the initial backfill to the top of the natural ground or subgrade in cut areas or to the top of existing ground in fill areas. Any fill required above the final backfill is considered and treated as embankment.

(b) Backfill Applications:

(1) Under Concrete Pavements: Type B backfill may be used as initial and final backfill for all pipes, culverts or drains under concrete pavements. Placement and compaction shall be as specified in Heading (d) below.

(2) Cross Drains Under Flexible Pavements: All reaches, exclusive of those portions of the pipe which are under shoulders, of cross drains and all other culverts, pipes or drains that cross the centerlines of the new roadway or centerlines of existing roadways, such as intersections and are under flexible pavements shall receive an initial backfill of Type A material. Type B backfill materials may be used as final backfill for all pipes. Placement and compaction shall be as specified in Heading (c) and (d) below. Where the subgrade is above existing ground, embankment material as specified for the remainder of the project shall be used from the top of the final backfill to the top of the established embankment grade.

(3) Other Drains Under Flexible Pavements: All reaches of all culverts, pipes or drains under flexible pavements that do not cross the centerlines of new roadway or centerlines of existing roadways, and exclusive of those portions of the pipe which are totally under shoulders, shall receive an initial and final backfill of Type B material. Placement and compaction shall be as specified in Heading (d) below. Where the subgrade is above existing ground, embankment material as specified for the remainder of the project shall be used from the top of the final backfill to the top of the established embankment grade.

(4) Other Areas: All culverts, pipes or drains in nonpaved areas or paved areas that serve as driveways or shoulders shall receive an initial and final backfill of Type B material. Placement and compaction shall be as specified in Heading (d) below.

(5) Pipes Subject to Construction Traffic; The embankment or pipe backfill 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 direct pay.

(c) Placement and Compaction; Type A Backfill: For all pipes, culverts and conduits under paved and nonpaved areas, where Type A backfill material is used, the Type A backfill shall be thoroughly hand compacted under the pipe haunches and then dynamically compacted in layers not exceeding 8 inches (200 mm) compacted thickness. Compaction under the haunches of the pipe shall initially be by hand tamping or other

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acceptable means, until a level is reached that the dynamic tamping can commence. Each lift shall be compacted by applying at least eight passes of a hand operated, dynamic mechanical compaction device over the surface of each lift. With approval of the engineer, layer thickness may be increased to 12 inches (300 mm) with verification of satisfactory installation and performance. If flowable fill is used it shall be furnished, placed and consolidated in accordance with Section 710. The contractor shall control placement operations during initial backfill operations so as not to damage protective coatings on metal pipes. The contractor shall repair damaged coatings at no additional pay.

(d) Placement and Compaction; Type B Backfill: For all pipes, culverts and conduits, where Type B backfill is allowed, the Type B material shall be placed in layers not exceeding 8 inches (200 mm) compacted thickness. Compaction shall be with suitable mechanical equipment. With approval of the engineer, layer thickness may be increased to 12 inches (300 mm) with verification of satisfactory installation and performance.

(e) Placement and Compaction; Trenchless or Partial Trench Condition: All pipes, culverts, drains and conduits placed with any portion of the pipe above existing ground must also comply with Subsections (a),(b) (c) and (d) above for the portion of the pipe within a trench and that portion of the pipe not constructed in a trench. The width of initial and final backfill of that portion above existing ground and not within a trench will be constructed to such a width that the requirements for placement, compaction and density are met.

(f) Density Requirements: The in place density of Type A backfill materials and bedding materials, will not be measured or determined. Type A backfill, exclusive of RAP and flowable fill, shall be placed at or near optimum moisture content determined in accordance with DOTD TR 415 or 418. RAP materials shall be placed and compacted in a slightly moist condition.

The maximum dry density of initial or final Type B backfill under all paved areas which are to be under traffic will be determined in accordance with DOTD TR 415 or TR 418 and in-place density determined in accordance with DOTD TR 401. Initial and final Type B backfill under all paved areas, under traffic, shall be placed at or near optimum moisture content determined in accordance with DOTD TR 415 or TR 418. Each layer shall be compacted by approved methods prior to the placement of a subsequent layer. The engineer will approve the compaction method based upon validation that such method, including moisture control, will achieve at least 95 percent of maximum dry density as determined in accordance with DOTD TR 401. With approval of the engineer, density testing may be waived on subsequent layers with backfill installation in accordance with approved compaction methods and continued satisfactory performance.

Initial and final backfill in unpaved areas or paved areas such as shoulders or driveways, shall be placed evenly and compacted along the length of the culvert, pipe or drain from the top of the initial backfill to the top of the subgrade. Layered backfill shall be compacted at least to the density of the adjoining existing soils or the compaction required of the laterally adjoining layers of soil immediately outside the trench for embankment elevations. Initial and final backfill shall be placed and compacted at or near optimum moisture content determined in accordance with DOTD TR 415 or TR 418.

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701.09 INSPECTION OF PIPES. 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.

(a) 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 (900 mm) 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 by the engineer prior to use. Use of an unapproved mandrel or a mandrel altered or modified after approval will invalidate the test. If the mandrel fails to pass, the pipe is overdeflected.

Unless otherwise permitted, overdeflected pipe shall be uncovered and, if not damaged, reinstalled. Damaged pipe shall not be reinstalled, 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 overdeflection, shall be removed and replaced with new pipe.

The mandrel shall be a rigid, nonadjustable, odd-numbered legged (minimum 9 legs) mandrel having a length not less than its nominal diameter or 24 inches (600 mm), whichever is less. The minimum diameter at any point shall be 5.0 percent less than the base inside diameter of the pipe being tested. The mandrel shall be fabricated of steel, aluminum or other approved material fitted with pulling rings at each end. The nominal pipe size and outside diameter of the mandrel shall be stamped or engraved on some segment other than a runner. A suitable carrying case shall be furnished.

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.

(b) Metal Pipe: If the inside diameter of metal pipe or rise dimension 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.

701.10 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 Subsection 202.02 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.

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Removed soil, debris and other materials shall be disposed of in accordance with Subsection 202.02 or as otherwise approved in writing.

701.11 STUBBING AND PLUGGING PIPES. When it is required that pipes be plugged, such plugs shall be constructed of Class R concrete complying with Section 901. Thickness of plug and method of construction shall be as directed.

When new pipes are to be stubbed into new or existing pipes or other structures, the connection shall be made with approved mortar complying with Subsection 702.02.

701.12 MEASUREMENT. Pipe, both new and relaid, will be measured in linear feet (lin m) as follows unless stated otherwise.

(a) Pipe not confined by fixed structures will be measured by the number of joints at the nominal length of each joint.

(b) Pipe confined by fixed structures will be measured along the pipe between the termini of pipe in structure walls.

(c) Pipe confined by a fixed structure on one end and unconfined at the other end will be measured along the pipe from the terminus of pipe in the structure wall to the unconfined end of pipe.

(d) Fabricating of pipe tees, elbows and other fittings will be measured per each fitting. The length of pipe in such fittings will be included in the pay length measurement of pipes of which they form a part.

(e) Excavation required for installation of pipes will not be measured for payment, except as otherwise specified in Subsection 203.14.

(f) Furnishing and placing backfill material below existing ground level for pipes will not be measured for payment. Backfill material needed to complete backfill above natural ground and around pipes that extend above natural ground will be measured and payment will be made under applicable earthwork items. When specified, flowable fill will be measured and paid for in accordance with Section 710.

(g) Plugging and stubbing of pipes will not be measured for payment.

(h) Cleaning existing pipes will be measured by the length of pipe cleaned and accepted.

(i) Concrete collars will be measured per each.

701.13 PAYMENT.

(a) Payment for pipe will be made at the contract unit price per linear foot (lin m) of the types and sizes specified.

When plastic pipe is specified on the plans or elected to be used by the contractor, payment will be made at the contract unit price per linear foot (lin m) of the types and sizes specified in accordance with the payment schedule of Table 701-1.

Table 701-1
Payment Schedule for Plastic Pipe

Percent Payment	Stage of Completeness
75	After placement and backfill has been completed

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25	After the pipe has met vertical deflection requirements in accordance with Subsection 701.09(a)

(b) Payment for fabricating pipe tees, elbows and other fittings will be made at the contract unit price per each fitting.

(c) When unstable conditions are encountered, the additional excavation will not be measured for payment; however, the additional materials furnished and placed for the pipe foundation will be measured and paid for as follows:

(1) Granular Materials: Payment will be made under the embankment item. The net section volume of the materials will be multiplied by 3 to determine the pay volume. When the contract does not include a pay item for embankment, payment will be made in accordance with Subsection 104.02.

(2) Bedding Material: Measurement and payment will be made in accordance with Section 726. When the contract does not include a pay item for bedding material, payment will be made in accordance with Subsection 104.02.

(d) Payment for cleaning existing pipes will be made at the contract unit price per linear foot (lin m).

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(e) Payment for concrete collars will be made at the contract unit price per each.

Payment will be made under:

Item No.	Pay Item	Pay Unit
701-01	Cross Drain Pipe (Size & Type)	Linear Foot (Lin m)
701-02	Cross Drain Pipe Arch (Size & Type)	Linear Foot (Lin m)
701-03	Storm Drain Pipe (Size & Type)	Linear Foot (Lin m)
701-04	Storm Drain Pipe Arch (Size & Type)	Linear Foot (Lin m)
701-05	Side Drain Pipe (Size)	Linear Foot (Lin m)
701-06	Side Drain Pipe Arch (Size)	Linear Foot (Lin m)
701-07	Yard Drain Pipe (Size)	Linear Foot (Lin m)
701-08	Relaying Pipe	Linear Foot (Lin m)
701-09	Fabricating Pipe Fittings	Each
701-10	Reinforced Concrete Pipe (Extension)	Linear Foot (Lin m)
701-11	Reinforced Concrete Pipe Arch (Extension)	Linear Foot (Lin m)
701-12	Corrugated Metal Pipe (Extension)	Linear Foot (Lin m)
701-13	Corrugated Metal Pipe Arch (Extension)	Linear Foot (Lin m)
701-14	Cleaning Existing Pipes	Linear Foot (Lin m)
701-15	Concrete Collar	Each
701-16	Plastic Pipe (Extension)	Linear Foot (Lin m)

TEMPORARY SIGNS, BARRICADES, BARRIERS AND PAVEMENT MARKINGS (01/06): Section 713 of the 2000 Standard Specifications and the Supplemental Specifications is amended as follows:

Subsection 713.02, Materials is amended as follows. Heading (b)(1) is deleted and the following substituted.

(1) Temporary Signs and Barricades: On the mainline of freeways and expressways, the initial sequence of advanced warning construction signs shall be fabricated using ASTM D 4956 Type X fluorescent orange reflective sheeting. Reflective sheeting for all other temporary signs and barricades shall comply with the requirements of ASTM D 4956, Type III.

Subsection 713.04, Temporary Signs and Barricades, is amended to include the following:

(d) Project Signs: The contractor shall furnish, install, maintain, and upon completion of the project remove "project signs" in accordance with the following requirements.

Project signs shall conform to the requirements of Section 713 and the project sign detail contained elsewhere herein. Shop drawings will be furnished to the successful bidder by contacting the Department's Traffic Services Sign Shop at (225) 935-0121 or 935-0142.

Project signs shall be required at the beginning and end of the project and shall follow sign G-20-1, "Road Work Next 'X' Miles", or as directed by the engineer.

Payment for project signs shall be included in the contract unit price for Item 713-01 Temporary Signs and Barricades.

Subsection 713.07 Measurement is renumbered to 713.08.

Subsection 713.07 is added as follows:

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713.07 Portable Work Zone Traffic Control Devices. All Category I, II, and III portable work zone traffic control devices, as described below, shall be crashworthy as determined by evaluations through the National Cooperative Highway Research Program (NCHRP) 350 for Test Level 3 (TL-3).

(1) 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 Report 350 TL-3 criteria. Drum and light combinations with Type A or C warning lights and fastener hardware consisting of vandal resistant 1/2 inch (13 mm) diameter cadmium plated steel bolts and nuts used with 1 1/2 inch (38 mm) diameter by 3/4 inch (19 mm) 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 on self-certification by the supplier. The supplier shall certify that the product is crashworthy in accordance with the evaluation criteria of NCHRP 350. This certification may be a one-page affidavit signed by the supplier, with supporting documentation kept on file to be furnished if requested.

(2) 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 TL-3. The contractor shall provide the engineer a listing of all the Category II devices to be used on the project prior to installation including a reference to the FHWA Work Zone letter number for each device. The contractor shall also certify that each device has been crash tested and meets the NCHRP 350 requirements.

(3) Category III devices include massive devices such as concrete barriers, water filled barriers and portable attenuators. Individual crash testing is required for Category III devices. FHWA letters of approval shall serve as verification that these devices comply with the crash testing requirements of NCHRP Report 350 TL-3. The contractor shall provide the engineer a listing of all the Category III devices to be used on the project prior to installation including a reference to the FHWA Work Zone letter number for each device. The contractor shall also certify that each device has been crash tested and meets the NCHRP 350 requirements.

Subsection 713.08 Payment is renumbered to 713.09, and amended as follows.

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Table 713-2 Payment Schedule is deleted and the following substituted.

Table 713-2
Payment Schedule
Temporary Signs, Barricades and Related Devices

Percent of Total Contract Amount Earned	Allowable Percent of Lump Sum Price for Temporary Signs and Barricades
Initial Erection	20
25	40
50	60
75	80
100	100

The third sentence of the second paragraph is deleted and the following substituted. The concrete in temporary precast barriers furnished by the contractor will be identified by lots and shall be subject to pay adjustments in accordance with Table 901-3 and Note 1 therein.

A pay item is added as follows.

Pay Item
713-10 Temporary Portable Barrier (Type), Each

TEMPORARY PRECAST CONCRETE BARRIERS (04/01): Subsection 713.05 of the standard specifications is amended to include the following.

The temporary precast concrete barrier units to be furnished by the contractor shall be removed and transported by the contractor to the DOTD Luling Maintenance Unit, 315 3rd Street, Luling, LA 70070 and unloaded as directed.

FIELD LABORATORIES: Subsection 722.01, Description, of the 2000 Standard Specification is hereby deleted and the following substituted.

The work consists of furnishing laboratory buildings at the project sites or plant sites as specified. These laboratories are to be provided exclusively for the use of Department and contractor personnel involved in the Department's Quality Assurance Program and one additional field laboratory at the project site for the exclusive use by the Coating Inspector and Environmental Monitor. All other project site offices and buildings for the use by the contractor and sub-contractors shall be furnished as needed at no direct payment.

Subsection 722.02, General Requirements, is hereby amended to include the following.

Quality Assurance Program Laboratories shall be completely installed before construction begins and shall remain in full service until the project is complete.

Field Office: The contractor shall furnish one building constructed of wood, metal, masonry, or other approved material for the purpose of housing the personnel, records, reports and equipment necessary for administering the construction contracts. Interior surface of walls shall be paneling or approved wall board and the flooring shall be tile or other approved flooring material. Exterior walls and ceiling space shall be

adequately insulated. The building must be handicapped accessible. It shall be completely installed before construction begins and shall remain in full service until all roadway and bridge improvements are completed.

The building shall have a minimum floor area of 2400 square feet. As a minimum it will contain the following:

- Four 12 foot by 12 foot offices
- A 12 foot by 22 foot conference room
- A 12 foot by 12 foot kitchen with sink and running water
- Two restrooms with commode and lavatory
- A 10 foot by 10 foot storage area (with lock and key)

The contractor shall provide a secure facility including, but not limited to hasp locks, surrounding fences, security lights, and security bars on all windows and doors. The contractor shall also provide a parking area for personnel.

The building will be provided with adequate lights, power outlets, and heating and cooling equipment. The contractor will be responsible for providing telephone service and electrical.

The Field Office will be provided with a Framed Relay T-1 Circuit from the LTM office in Baton Rouge to the Field Office. The Field Office must be wired with Category 5E wiring and each office and cubicle must be network capable. Cubicles will be set up by LTM as needed.

Equipped Project Site Laboratory: The contractor shall be required to furnish, install and maintain two (2) laboratory buildings and equipment, at the project site, one on each side of the river, for the exclusive use of the Department and their designated representatives and inspectors.

Field laboratories shall be weather tight and constructed of wood, metal, masonry or other approved material for the purpose of housing the personnel, testing equipment, records and reports as necessary for the Quality Assurance Program.

Each laboratory shall have a minimum floor space of 160 square feet, or other approved size that provides sufficient space with a minimum ceiling height of 7 feet. The laboratory shall have at least one outside door and have sufficient windows. The laboratory buildings shall have electric lighting and power outlets as directed. Fume hoods with electric exhaust fans of such size and location to ensure continuous removal of hazardous fumes and air borne particles during testing operations shall be provided. The building and contents shall be secured by suitable lock and catches. The engineer shall be afforded access to the laboratory at all times and shall be provided with a set of keys as necessary.

The contractor shall provide a secure facility including, but not limited to hasp locks, surrounding fences, security lights, and security bars on all windows and doors. The contractor shall also provide a parking area for personnel.

The contractor shall be required to furnish, install and maintain the following equipment in satisfactory condition, as needed, throughout the life of the project:

1.) An automatic soil compaction hammer capable of compacting both standard and modified proctors, with arrangement for both 12" and 18" drops and also accommodates 4" and 6" molds with adjustable hammer weight from 5.5 to 10 pounds. The specifications for the hammer shall be in accordance with TR 415, Field Moisture-Density Relationships, and TR 418, Moisture-Density Relationships, and shall have a striking face which is a

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3.1416 sq. in. (2026.83 mm sq.) sector face as specified for each mold diameter. The equipment shall include two (2) molds of each size (1/30 cu. ft. and 1/33.33 cu. ft. or 1/10 cu. ft.)

2.) A compaction block or pedestal composed of Portland cement concrete shall be supplied for use with the automatic compaction hammer. The block shall weigh a minimum of 200 pounds. The hammer shall be secured to the block.

3.) An electronic scale capable of measuring in both English and metric units and shall have a capacity of 13.6 kgs or more with a sensitivity of 5 grams.

4.) An electronic scale capable of measuring in metric units and shall have a capacity of 2 kilograms or more with a sensitivity of 0.1 grams.

5.) Two (2) electric or gas hot plates. An open flame hot plate shall be equipped with suitable shield to disperse heat evenly and to prevent direct contact of the flame with the drying pan. The hot plates shall be of sufficient size to accommodate the drying pans.

The automatic soil compaction hammer and scales noted above shall be calibrated by an independent laboratory on an annual basis and shall be verified by Department personnel on each project.

6.) An approved nuclear device (Troxler Model 3440) with a transport case, locks and keys. Also, included shall be an operators manual, referenced standard block, scraper plate/drill rod guide and a ¾" auger.

The nuclear device shall be wipe test every 6 months and calibrated every 2 years by an independent laboratory and shall be verified by Department personnel on each project.

Laboratory buildings shall be constructed, furnished, maintained and located as approved. The contractor shall provide suitable desks, chairs and file cabinets for personnel using these facilities. Sturdy work benches shall be constructed along at least one wall, or as directed, to provide sufficient work area for the types of tests being conducted. Laboratory buildings shall be heated and approved sanitary facilities provided.

The contractor will be responsible for providing telephone service, electrical power and high speed internet service with a desired minimum connection speed of 768 KB upstream and 1.5 MB downstream.

Coating Inspector and Environmental Monitor Laboratory: The Coating Inspector and Environmental Monitor laboratory shall have minimum exterior dimensions of 30 feet x 8 feet or equivalent area. The building shall be equipped with two suitable desks with at least two locking drawers each, four chairs, 2-four drawer legal size filing cabinets with lock, one drafting table, electric chilled drinking fountain, electric lights, toilet, sink with running potable water, automatic electric heaters, two air conditioner units of at least 8,000 BTUs each, all to the satisfaction of the Project Engineer. The contractor shall provide all necessary services including janitorial service, electric power, and connection of telephone service in the LTM Inspection's name, all to the satisfaction of the Project Engineer. The telephone service shall consist of two independent lines with one jack for each line in each room of the building. The telephone bill will be paid by the contractor. All services shall be obtained independent of the LADOTD and the NOPBRR. The Coating Inspector and Environmental Monitor shall be afforded access to the building at all times and shall be provided with a set of keys.

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The contractor shall provide a secure facility including, but not limited to hasp locks, surrounding fences, security lights, and security bars on all windows and doors. The contractor shall also provide a parking area for personnel.

The contractor shall provide internet service for the entire duration of the project. There shall be a minimum of two different connection access points available within the laboratory. The internet service shall not begin until the field laboratory has been delivered and installed onsite and shall not terminate earlier than the laboratory's removal from the site, or unless directed by the Project Engineer. The desired minimum connection speed is 768 KB upstream and 1.5MB downstream per connection access point. If this desired level of service cannot be accommodated, then the fastest level of service available shall be provided.

Subsection 722.03, Project Site Laboratory, is hereby amended to include the following.

The contractor may utilize approved existing LADOTD or NOPBRR property as a staging area for the field laboratories, his own project site offices, and a staging area for material and equipment. All equipment and material associated with the lead removal and containment operation shall be confined to the immediate work area.

The contractor shall maintain the staging area in a neat and safe condition including mowing of the grass and litter pick-up. Litter shall be picked-up and stored in designated containers as it occurs. Upon completion of the project, the contractor shall remove all temporary structures associated with the project and shall return the area to its original condition to the satisfaction of the Project Engineer, the LADOTD and the NOPBRR.

CONSTRUCTION LAYOUT: Subsection 740.02, Construction Requirements, of the Standard Specifications and Supplemental Specifications is hereby amended to include the following.

The Project Engineer may make either spot or complete checks on all construction alignment and grades to determine the correctness of the survey work; however, these checks will not relieve the contractor of responsibility for constructing the work in the positions and to the elevations shown on the plans or approved revisions thereto.

SHOP DRAWINGS AND WORKING DRAWINGS: Subsection 801.03 of the 2000 Standard Specifications is amended to include the following.

Heading (a) is amended to include the following.

The consulting engineers referred to in the plans and specifications are:

Modjeski and Masters, Inc.
1055 St. Charles Avenue, Suite 400
New Orleans, LA 70130
(504) 524-4344
(504) 561-1229 (Fax)

All required shop drawings, working drawings and other submittals shall be furnished to the Consulting Engineers in accordance with Subsection 801.03(a), and a copy of each transmittal letter shall be sent to the Project Engineer.

For all submittals, the number of submittal copies shall be:

Initial Review	5 (6 for electrical items)
Distribution	11 (12 for electrical items)

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The New Orleans Public Belt Railroad shall be copied on all shop drawings and shop drawing transmittal letters as part of the shop drawing review process.

Heading (a)(2) is amended to include the following.

In addition, the contractor shall provide one (1) set of final approved shop drawings, all other final approved drawings, and examined drawings to the New Orleans Public Belt Railroad through the Project Engineer upon completion of the project. The final approved drawings shall be on 0.004 inch thick translucent polyester film with matte finish on both sides.

All required shop drawings, working drawings and other submittals shall be furnished to the consulting engineers in accordance with Subsection 801.03(a), and a copy of each transmittal letter shall be sent to the engineer.

DRIVEN PILES: Section 804 of the 2000 Standard Specifications is hereby amended as follows:

The "Geotechnical Design Engineer" shall be substituted for "DOTD Chief Construction Engineer", "the Department" and "Pavement and Geotechnical Engineer". The Geotechnical Design Engineer shall be:

Eustis Engineering
3011 28th Street
Metairie, LA 70002-6019
(504) 834-0157

Subsection 804.06, Pile Driving Equipment, is amended as follows.

The fifth sentence of heading (b)(1), Hammer Cushion is deleted and the following substituted.

The hammer cushion shall be inspected in the presence of the engineer when beginning pile driving at each structure and after every 100 hours of use during pile driving operations.

Subsection 804.07, Preparation for Installation of Driven Piles, is amended as follows.

The first paragraph of heading (a)(4), Cone Penetrometer Test (CPT) Probings, is deleted and the following substituted.

The Cone Penetrometer Test (CPT) probings will be taken at all test pile and indicator pile locations, and the CPT locations shown in the plans for production piling. The probings will be taken by the Geotechnical Design Engineers for the Project.

The third paragraph is deleted and the following substituted.

The contractor shall make arrangements with the Geotechnical Design Engineers for the project to have the CPT probings taken at least 30 calendar days prior to driving test piles or indicator piles. When necessary, the contractor shall provide equipment necessary to assist in moving the Geotechnical Design Engineer's test truck around the site. The site for the probings shall be leveled as directed.

Subsection 804.08, Construction Requirements, is amended as follows.

The last sentence of heading (g), Pile Driving Stresses and the following substituted.

Pile driving criteria may be provided by the Geotechnical Design Engineer to maintain pile driving stresses within the maximum allowable driving stresses.

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STATE PROJECT NOS. 005-10-0037, 006-01-0021, 006-02-0064, 006-25-0001, 006-30-0041, 063-03-0051, 063-04-0035
SPECIAL PROVISIONS

Subsection 804.08, Construction Requirements, is amended to include the following. Pile driving records shall be made and as a minimum include:

1. The date
2. The pile type
3. Overall length
4. Pile size (side dimension or H section)
5. Embedment below finished grade
6. Depth and diameter of prepunch or predrill
7. Hammer type
8. Stroke height
9. Number of blows per foot of penetration

Subsection 804.10, Determination of Pile Bearing Capacity, is amended as follows.

The second sentence is deleted and the following substituted.

The pile bearing capacity determination shall be made by use of the Dynamic Formula or the Wave Equation or the Test Pile Loading Results, as specified in the plans.

Subsection 804.11, Field Testing Piles, is amended as follows.

The following is added to the end of paragraph of heading (b), Test Piles.

All test piles and/or indicator piles shall be inspected by DOTD Fabrication Inspectors prior to delivery to the project.

The entire paragraph of heading (g)(5), Load Cell, is deleted and the following substituted.

When specified in the plans, the contractor shall furnish the load cell. The load cell and bearing plates shall be of sufficient size and capacity to measure the maximum load applied. The contractor shall have the load cell calibrated by an approved testing laboratory if it has not been calibrated within six months preceding the load test.

The last sentence of heading (g)(10)a, Dynamic Monitoring Scheduling, is deleted and the following substituted.

The Project Engineer will notify the Geotechnical Design Engineer to confirm that the pile and all associated pile driving equipment are on site, have been inspected and assembled, and are ready for driving operations at least 24 hours prior to dynamic monitoring. The contractor shall allow for a possible 7 day delay when rescheduling is required due to contractor delay.

The Geotechnical Design Engineers shall also interpret the soil boring results obtained by the contractor as a part of the construction contract.

The following paragraphs are added to heading (g)(10).

Monitoring Schedule for Dynamic Analysis: The pile to be monitored with the Geotechnical Design Engineer's Pile Driving Analyzer (PDA) shall be driven initially to one foot above the plan tip elevation, or as directed by the Project Engineer. Pile restrikes shall be performed in accordance with the time intervals specified in Subsection 804.11(e) unless shown otherwise in the plans. Permanent piles may have restrikes monitored with the PDA as determined by the Project Engineer and Geotechnical Engineer.

Dynamic Analysis: The contractor shall provide information relative to the pile driving system such that the Geotechnical Design Engineer can perform wave equation analyses for each occurrence of dynamic monitoring, if required. Additional production piles may be monitored if deemed necessary by the Project Engineer.

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STRUCTURAL CONCRETE (12/05): Section 805 of the 2000 Standard Specifications and the Supplemental Specifications thereto is amended as follows.

Table 805-2 is deleted and the following substituted.

Table 805-2
Concrete Placement Rates for Bridge Decks

Pour Size Cubic Yards (Cu m)	Minimum Placement Rate Cubic Yards (Cu m) Per Hour
0-50 (0-40)	20 (15)
51-75 (41-60)	25 (20)
76-125 (61-100)	30 (25)
Over 125 (Over 100)	40 (30)

STRUCTURAL METALS: Section 807 of the 2000 Standard Specifications and the supplemental specifications thereto is amended as follows.

Subsection 807.08 Straightening Material and Curving Rolled Beams and Welded Girders is amended as follows. The third sentence of the paragraph in Heading (a) is deleted and the following is substituted.

Heat straightening of ASTM A 709, Grade 100 (A 709M, Grade 690), and A 709, Grade 100W (A 709M, Grade 690W) steel shall be done only under rigidly controlled procedures, each application subject to approval of the Project Engineer.

Subsection 807.21 Connections Using High Strength Bolts is amended as follows. The paragraph of Heading (e)(2) is deleted and the following substituted.

When plans specify the steel as unpainted ASTM A 709, Grade 50W (A 709M, Grade 345W), A 709, Grade HPS 50W (A 709M, Grade HPS 345W), A 709, Grade HPS 70W (A 709M, Grade HPS 485W), or A 709, Grade 100W (A 709M, grade 690W) contact surfaces within joints shall be thoroughly cleaned by Commercial Blast Cleaning in accordance with Subsection 811.06(c) or other approved methods that will remove all dirt, oil, grease, rust scale, loose mill scale, weld slag or other foreign matter, and shall remain unpainted.

Subsection 807.30 Bent Plates is amended as follows. The fourth and fifth paragraphs are deleted and the following substituted.

Allowance for springback of ASTM A 709, Grade 100 (A 709M, Grade 690), and A 709, Grade 100W (A 709M, Grade 690W) steel should be about three times that for structural carbon steel. For brake press forming, the lower die span should be at least 16 times the plate thickness. Multiple hits are advisable.

If shorter radii are essential, plates shall be bent hot at a temperature not greater than 1150°F (620°C), except for ASTM A 709, Grade 100 (A 709M, Grade 690), and A 709, Grade 100W (A 709M, Grade 690W) steel. If ASTM A 709, Grade 100 (A 709M, Grade 690), and A 709, Grade 100W (A 709M, Grade 690W) steel plates to be bent are heated to a temperature greater than 1125°F (610°C), they must be requenched and tempered in accordance with the producing mill's practice. Hot-bent plates shall conform to the requirements herein for cold-bent plates.

Subsection 807.47 Straightening Bent Material and Cambering is amended as follows.

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The first paragraph of Heading (a) is deleted and the following substituted.

Straightening of plates, angles, other shapes and built-up members, when permitted, shall be done by methods that will not produce fracture or other damage. Distorted members shall be straightened by mechanical means or, if approved, by supervised application of a limited amount of localized heat, except that heat straightening of ASTM A 709, Grade 100 (A 709M, Grade 690), and A 709, Grade 100W (A 709M, Grade 690W) steel shall be done only under rigidly controlled procedures, each application subject to approval of the Project Engineer. In no case shall the maximum temperature of ASTM A 709, Grade 100 (A 709M, grade 690), and A 709, Grade 100W (A 709M, Grade 690W) steel exceed 1125°F (610°C), nor shall the temperature exceed 950°F (510°C) at weld metal or within 6 inches (150 mm) of weld metal. Heat shall not be applied directly on weld material. In all other steels, the temperature of the heated area shall not exceed 1150°F (620°C) (a dull red) as controlled by temperature indicating crayons, liquids or bi-metal thermometers.

The paragraph of Heading (b) is deleted and the following substituted.

Correction of errors in camber in welded beams and girders of ASTM A 709, Grade 100 (A 709M, Grade 690), and A 709, Grade 100W (A 709M, Grade 690W) steel shall be done only under rigidly controlled procedures, each application subject to approval.

Subsection 807.52 Weathering Steel is amended as follows. The first paragraph is deleted and the following substituted.

When ASTM A 709, Grade 50W (A 709M, Grade 345W), A 709, Grade HPS 50W (A 709M, Grade HPS 345W), A 709, Grade HPS 70W (A 709M, Grade HPS 485W), or A 709, Grade 100W (A 709M, Grade 690W) weathering steel is specified to be left unpainted, the following modifications in the requirements of this subsection shall apply.

Subsection 807.53 Measurement is amended as follows. The eighth paragraph of Heading (a) is deleted and the following substituted.

ASTM A 709, Grade 36 (A 709M, Grade 250), A 709, Grade 50 (A, 709M, Grade 345), A 709, Grade 50W (A 709M, Grade 345W), A 709, Grade HPS 50W (A 709M, Grade HPS 345W), A 709, Grade HPS 70W (A 709M, Grade HPS 485W), A 709, Grade 100 (A 709M, Grade 690), or A 709, Grade 100W (A 709M, Grade 690W) steel shall include all steel classified as such in the plans or specifications.

PAINTING AND PROTECTIVE COATINGS: Section 811 of the Standard Specifications and Supplemental Specification is amended to include "Paint Analysis for Lead, Cadmium and Chromium" included elsewhere herein.

Subsection 811.01, Description, is hereby amended to delete the second paragraph and substitute the following.

Unless otherwise specified, an approved Three-Coat Alkyd Paint System meeting the requirements of System B shall be used for coating metal surfaces requiring painting.

Subsection 811.04, Painting Metal, is hereby amended to delete heading (c) and substitute the following.

(c) Corrosion Inhibiting Alkyd Paint System: Corrosion Inhibiting Alkyd Paint System shall be a non-polluting pigmented alkyd paint to be used in a three-coat paint system on properly prepared structural steel surfaces to be permanently exposed. The primer and intermediate coats shall be tinted for color contrast.

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The minimum dry film thickness of the coatings shall be as follows:

Prime Coat	3.0 mils (50μm)
Intermediate (Prime) Coat	2.0 mils (50μm)
Aluminum Topcoat	2.0 mils (50μm) – AASHTO M69, Type I

Subsection 811.08, Application, is hereby amended to include the following.

Heading **(a)** is amended to read as follows. Three-Coat Waterborne Paint System or Three-Coat Alkyd Paint System.

Subsection 811.08 **(a) (2),** Field Spot Painting, is deleted and the following substituted.

After final bolting of the widening member connections to the existing bridge metalwork is completed, all exposed inorganic zinc coated surfaces, the installed bolts, the existing painted surfaces of the original roadway brackets, and any damaged or other unprimed surfaces to be field primed or painted shall be blast cleaned in accordance with Subsection 811.06**(b)** Near-White Blast Cleaning Method and painted with the approved primers and topcoat to a minimum total dry film thickness of 5 mils for the two prime coats and 2.0 mils for the topcoat. Each of the prime coats shall be allowed to cure 24 hours prior to applying the succeeding coats. The cleaning, paint removal and waste disposal shall be subject to the same requirements as specified for Item S-101, CLEANING, PAINTING AND WASTE DISPOSAL/RECYCLING OF EXISTING BRIDGE METALWORK FAYING SURFACES AT WIDENING MEMBER CONNECTIONS except that the removal technique may be changed provided the same level of cleaning, containment and waste recycling are accomplished.

Subsection 811.08 **(a) (3)**, Topcoat, is amended to include the following.

It is mandatory that prior to field application of the topcoat all primed metalwork surfaces shall be pressure washed at a minimum pressure of 3000 psi. All visible deposits of oil, grease, soil, or drawing or cutting compounds and other soluble contaminants shall be removed by solvent cleaning in accordance with SSPC- SP1 Solvent Cleaning prior to pressure washing.

Subsection 811.09, Shop Painting, is hereby amended to include the following.

Heading **(a)**, Surfaces to be Painted, is amended as follows.

A three inch wide zone shall be left unpainted between the edge of the field contact surface at connection joints which is painted with inorganic zinc coating and the shop applied primer coats.

SECTION 1008 – PAINTS

CORROSION INHIBITING ALKYD PAINT SYSTEM: Subsection 1008.06 of the 2000 Standard Specifications and Supplemental Specifications is hereby deleted and the following substituted.

The Corrosion Inhibiting Alkyd Paint System shall be a three-coat paint system applied to properly prepared structural steel surfaces that are permanently exposed to weather. The paint shall be compatible with basic lead silico chromate paint. System B shall be used. The corrosion inhibiting pigment in System B shall be calcium borosilicate. The primer and the intermediate coats shall be tinted for color contrast. An aluminum topcoat in accordance with AASHTO M69, Type I shall be applied.

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SPECIFIC REQUIREMENTS: Test methods shall be the latest in effect. The manufacturer assumes all responsibility in formulating products which meet these specifications.

System B shall comply with the following requirements.

PRIME COAT

Property	ASTM Test Method	Requirement Min.	Max
Pigment, % by wt	D2371	53	--
Vehicle, % by wt	D2371	--	47
Wt/gal, lb @ 77° F	D1475	11.4	--
Water, %		--	0.25
Coarse Particle and Skims (Total Residue Retained on No. 325 Sieve Based on Paint), %	D185	--	1.0
Fineness of Grind (North Std)	D1210	5	
Viscosity (Stormer-Krebs Units) @ 77° F	D562	75	85
Dry through, hours	D1640	18	--
Nonvolatile Vehicle, % by wt	D2369	57	--
	D2372		
Pigment			
Calcium Boro-Silicate	D4288	80.0%	--
Synthetic Iron Oxide	D84, Class I	16.0%	18.0%
Organo Montmorillonite		1.0%	2.0%
Vehicle			
Alkyd Resin, Solution	TT-R-266, Type I Class A	43.0%	50.0%
Linseed Oil		20.0%	27.0%
Mineral Spirits	TT-T-291E, Type II*	--	28.0%
Driers		1.0%	2.0%

*Small quantities of alcohols or alcohol/water mixtures may replace some mineral spirits where such materials are used as polar additives for the suspending aid.

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INTERMEDIATE COAT

Property	ASTM Test Method	Requirement Min.	Max
Pigment, % by wt	D2371	44	--
Vehicle, % by wt	D2371	--	56
Wt/gal, lb @ 77° F	D1475	10.2	--
Water, %		--	0.25
Coarse Particle and Skims (Total Residue Retained on No. 325 Sieve Based on Paint), %	D185	--	1.0
Fineness of Grind (North Std)	D1210	5	
Viscosity (Stormer-Krebs Units) @ 77° F	D562	75	85
Dry through, hours	D1640	--	10
Nonvolatile Vehicle, % by wt	D2369 and D2372	45	--
Pigment			
Calcium Boro-Silicate	D4288	80.0%	--
Synthetic Iron Oxide	D84, Class I	17.5%	18.5%
Organo Montmorillonite		1.5%	2.5%
Lampblack		--	2.0%
Vehicle			
Alkyd Resin, Solution	TT-R-266, Type I Class A	65.0%	--
Mineral Spirits*	TT-T-291E, Type II*	--	34.0%
Driers		1.0%	1.5%

*Small quantities of alcohols or alcohol/water mixtures may replace some mineral spirits where such materials are used as polar additives for the suspending aid.

DRILLED SHAFT FOUNDATIONS: Section 814 of the 2000 Standard Specifications and the Supplemental Specifications thereto is amended as follows:

Subsection 814.02, Materials, is amended as follows.

Concrete used shall be Class S, but that the maximum aggregate size shall be limited to 0.75 inches. The concrete slump at time of placement shall be between 7 and 9 inches and shall be a minimum of 4 inches slump for the full duration of concrete placement.

Subsection 814.04, Experience Requirements, is amended as follows: The first paragraph is deleted and the following substitute.

The contractor shall have a minimum of three years experience in constructing drilled shaft foundations of similar size as required by the project within the past five years and shall submit descriptions of that experience. The descriptions of the drilled shaft projects shall contain names and telephone numbers of owners' representatives who can verify the contractor's participation on those projects.

Subsection 814.04 is amended to include the following.

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A minimum of three years of experience in post or tip grouting in addition to the experience required for the construction of drilled shaft foundations.

Subsection 814.05, Drilled Shaft Installation Plan, is amended to add the following items:

12. Details of base grouting, as specified in the Special Provisions.
13. Details of drilled shaft testing, as specified in the Special provisions.

No changes shall be made to the drilled shaft installation plan without approval from the engineer. Drilled shaft installation plan shall be submitted prior to the start of test drilled shafts.

Subsection 814.08, Excavation Methods, is amended as follows:

The wet method of construction shall be used for all drilled shafts (test and production) and a permanent casing shall be used. Use of a temporary casing is not permitted.

The last two sentences of the second paragraph are deleted.

The third paragraph is deleted and the following substituted:

The contractor shall set a suitable temporary surface casing. The minimum surface casing length shall be the length required to prevent caving of the surface soils and to aid in maintaining shaft position and alignment. Predrilling with slurry and/or overreaming to the outside diameter of the casing may be required to install the surface casing at some sites.

The last paragraph is deleted.

Subsection 814.08(a), Dry Construction Method, is amended as follows:

The last paragraph is deleted and the following substituted:

The dry construction method shall be used only when shaft excavations, as demonstrated in a trial shaft or test drilled shaft, have 12 inches (300 mm) or less of seepage water accumulated over a one hour period without pumping, the sides and bottom remain stable without detrimental caving, sloughing, or swelling for a four hour period, and the loose material and water can be satisfactorily removed prior to inspection and prior to placing concrete.

Subsection 814.09, Excavation Procedures and Conditions, is amended to include the following.

Field records shall be taken during the construction of the drilled shafts. As a minimum, the field record shall include:

1. Shaft location.
2. Shaft diameter.
3. Base embedment.
4. Detailed record of the actual concrete volume placed per unit depth and compared to the theoretical shaft volume.
5. Shaft reinforcing steel.
6. Any unusual occurrences during installation.

Copies of these records shall be turned over to the Project Engineer and the Geotechnical Design Engineers.

Subsection 814.09(a), Soil Sampling, is amended as follows:

The last sentence in the last paragraph is deleted.

Subsection 814.09(f), Adjacent Drilled Shaft Construction, is amended to change the value of 4 shaft diameters to 3 shaft diameters.

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Subsection 814.09(g,) Excavation Procedures and Conditions, is amended to delete the paragraph and substitute the following:

(g) Lost Tools: Drilling tools that are lost in the excavation shall be promptly removed by the contractor. All costs due to lost tool removal shall be borne by the contractor including but not limited to costs associated with the repair of hole degradation due to removal operations or time limits being exceeded during the period the excavation remains open.

Subsection 814.10, Permanent Casing, is amended as follows.

The first paragraph is deleted and the following substituted.

Permanent casing type, size, and length, shall be as specified in the plans. Casings shall be steel, smooth, clean and watertight and shall be free of accumulations of hardened concrete both inside and outside. It shall be of ample strength to withstand both handling and driving stresses during installation.

Subsection 814.11, Temporary Casing, is amended as follows.

Removable casings are not permitted on this project.

Subsection 814.12, Slurry, is amended as follows.

The first paragraph is deleted and the following substituted.

When slurry is employed in the drilling process as in the wet construction method, mineral slurry or polymer slurry may be used in accordance with these specifications. The contractor shall provide a list of construction projects, within the past three years, where the proposed slurry has been used to construct drilled shafts in comparable site conditions as those anticipated for the required drilled shafts. The project list shall contain names and telephone numbers of owner's representatives who can verify the field performance of the proposed slurry.

Subsection 814.12(a)(1)a. is amended to delete the first paragraph.

Subsection 814.12(a)(2), Polymer Slurry Requirements, is deleted and the following substituted:

The approved polymer slurry shall have sufficient viscosity to stabilize the shaft excavation and sufficient positive pressure head to inhibit the influx of ground water into the excavated hole. The material used to make the slurry shall not be detrimental to concrete or surrounding ground strata. Control testing using suitable apparatus shall be carried out on the polymer slurry mixture by the contractor to determine the density, sand content, viscosity, and pH. Tests shall be performed when the slurry temperature is above 40°F (5°C).

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Acceptable values for these physical properties are shown in Table 814-1.

Table 814-1
Polymer Slurry Specifications

Property (Units)	At Time of Slurry Introduction	In Hole at Time of Concreting	Test Method
Density	63-64 pcf (1010 – 1026 kg/m³) (fresh water)	63-64 pcf (1010-1016 kg/m³) (fresh water)	Mud Balance (API 13B-Sec 1)
Viscosity (minimum)	45 seconds	N/A	Marsh Funnel (API 13B-Sec 2)
pH	8 – 10	8 – 10	pH Paper pH Meter (API 13B-Sec 6)
Max. Sand Content (% by Volume)	1	1	Sand Screen Set (API 13B-Sec 4)

The limits shown in Table 814-1 may be adjusted when field conditions warrant as demonstrated by a trial shaft, test drilled shaft, or other methods approved by the engineer.

Subsection 814.12(a)(3), Polymer Slurry Mixing, is deleted and the following substituted:

The polymer slurry shall be mixed thoroughly with clean fresh water in a separate mixing tank with a higher shear agitating mixer. Water hardness shall be tested prior to mixing to insure it meets the manufacturer's recommendations. The contractor shall take all steps necessary to prevent the slurry from losing the required viscosity.

Subsection 814.12(b)(1), Mineral Slurry Requirements, is amended to delete the first sentence and substitute the following:

Mineral slurry shall consist of processed attapulgite, sepiolite, or bentonite clays containing pure sodium bentonite.

Subsection 814.12(b)(1), Mineral Slurry Requirements, is amended as follows.

The second paragraph is deleted and the following substituted.

Control testing using suitable apparatus shall be carried out on the mineral slurry mixture by the contractor to determine density, sand content, viscosity, and pH. Tests shall be performed when the slurry temperature is above 40°F (5°C). Acceptable values for these physical properties are shown in Table 814-2.

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Subsection 814.12(b)(1), Mineral Slurry Requirements, is amended to delete Table 814-2 and substitute the following:

Table 814-2
Mineral Slurry Specifications

Property (Units)	At Time of Slurry Introduction	In Hole at Time of Concreting	Test Method
Density	64.3 – 69.1 pcf (1030 – 1107 kg/m³) (fresh water)	64.3 – 75.0 pcf (1030-1202 kg/m³) (fresh water)	Mud Balance (API 13B-Sec 1)
Viscosity	28 - 45 seconds	N/A	Marsh Funnel (API 13B-Sec 2)
pH	8 – 11	8 – 11	pH Paper pH Meter (API 13B-Sec 6)
Max. Sand Content (% by Volume)	4	4	Sand Screen Set (API 13B-Sec 4)

Subsection 814.12(b)(1), Mineral Slurry Requirements, is amended as follows.

The third paragraph is deleted and the following substituted.

The limits in Table 814-2 may be adjusted when field conditions warrant as demonstrated by a trial shaft, test drilled shaft, or other methods approved by the engineer.

Subsection 814.12(c), Slurry Testing Frequency, is amended as follows.

The first paragraph is deleted and the following substituted.

Density, viscosity, sand content, and pH testing shall be performed initially until a consistent working pattern has been established, taking into account the mixing process, and blending of freshly mixed slurry and previously used slurry. Density, viscosity, sand content, and pH value testing shall be performed a minimum of four times during the first eight hours the slurry is in use.

Subsection 814.12(i), Blended Mineral-Polymer Slurry, is amended to add the following:

(i) Blended Mineral-Polymer Slurry: If the contractor elects to use blended mineral-polymer slurry, a detailed report shall be submitted specific to the project, prepared by a qualified slurry consultant. The report shall describe slurry materials, mix proportions, mixing methods and quality control methods. Details of the slurry quality control testing criteria shall also be furnished. A manufacturer's representative shall be present during construction of the trial shaft to provide guidance on the proper proportions, mixing and quality control of the blended mineral-polymer slurry.

Subsection 814.13(c), Drilled Shaft Cleanliness Requirements, is amended as follows.

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The second paragraph is deleted and the following substituted.

Drilled shaft bottom cleanliness will be determined by visual inspection for dry shafts or other methods deemed appropriate by the engineer for wet drilled shafts. The device proposed to check for bottom cleanliness shall be approved by the engineer prior to use. The bottom of the drilled shaft excavation shall be cleaned, regardless of the method of load distribution, with a cleanout bucket or other appropriate tool. When a cleanout bucket is used, it shall be equipped with a one-way flap gate that prevents spoil in the bucket from re-entering the drilled shaft excavation. End bearing drilled shafts, drilled by the wet construction method, shall require a final bottom cleaning with an air-lift or submersible pump prior to concrete placement. Care shall be taken not to decrease the borehole stability while utilizing the air-lift or submersible pump.

Subsection 814.13(d), Excavation Inspection and Requirements, Time of Excavation, is amended to include the following.

The requirement that the shaft shall be drilled a minimum of 6 inches deeper if the specified time of excavation for the bottom 5 feet is exceeded.

Subsection 814.14(a), Reinforcing Steel Construction and Placement, Cage Construction and Placement, is amended to include the following.

The requirement that CSL tubes and testing shall be required for all drilled shafts (test and production).

Subsection 814.14(d), Spacers, is amended as follows.

The first sentence is deleted and the following substituted.

Concrete wheels, with a minimum width of 1 inch (25 mm), or other non-corrosive rolling spacing devices, approved by the engineer, shall be placed at the top and bottom of the steel reinforcement cage and at sufficient intervals along the shaft to insure concentric spacing for the entire length of the steel reinforcement cage.

Subsection 814.15(b)(1), Tremie, is amended as follows.

The first paragraph is deleted and the following substituted.

Tremies shall consist of a tube of sufficient length, weight, and diameter to discharge concrete at the shaft base elevation. Inside and outside surfaces of the tremie shall be clean and smooth to permit both flow of concrete and unimpeded withdrawal during concreting. The wall thickness of the tremie shall be adequate to prevent crimping or sharp bends that restrict concrete placement. The tremie's inside diameter shall be at least 6 times the maximum aggregate size used in the concrete mix but shall not be less than 10 inches (250 mm). Tremies shall be clearly marked at one foot increments. Tremies used for concrete placement in dry excavations shall consist of: a tube of solid construction; a tube constructed of sections which can be added and removed; or a tube of other approved design. Aluminum tremies will not be allowed. Tremies used for concrete placement in wet excavations shall be constructed as follows:

Subsection 814.15(b), Tremie and Pumped Concrete Placement Methods, is amended as follows.

Sections (2) & (3) are deleted.

Subsection 814.16(d), Concrete Placement Time Limitations, is deleted and the following substituted.

Concrete shall be placed as soon as possible after the reinforcing steel placement and shall be continuous from the bottom to the top elevation of the shaft. Concrete placement shall continue after the shaft excavation is full, until good quality concrete is evident at the top of the drilled shaft. Unless approved otherwise by the engineer, the

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elapsed time from the beginning to completion of concrete placement in the drilled shaft shall not exceed two hours for drilled shafts 5 feet (1.5 m) diameter or less. The minimum concrete placement rate for drilled shafts larger than 5 feet (1.5 m) diameter shall be 30 cubic yards (23 cu m) per hour.

The engineer may allow an extension of the concrete placement time if the contractor adequately demonstrates by trial mix and slump loss tests that the slump of the concrete will be no less than 4 inches (100 mm) during the entire time of concrete placement during the longer placement time.

These tests shall be conducted by a DOTD certified concrete technician in the presence of the engineer. The slump loss tests shall be performed at intervals not to exceed 30 minutes and shall be made from a trial mix proportioned from the approved concrete mix design. The temperature of the trial mix shall be kept at a level representative of construction site conditions. A slump loss versus time curve shall be furnished to the engineer prior to concreting production shafts.

Subsection 814.19, Nondestructive Testing of Drilled Shafts, is amended as follows.

The second paragraph is deleted and the following substituted.

The CSL test shall be used on all production shafts, trial shafts, and test drilled shafts when any of the following conditions occur:

Subsection 814.19(a), NDT Consultant, is deleted and the following substituted.

The NDT consultant shall be an experienced independent test organization approved by the engineer prior to testing. All CSL testing and analyses shall be performed under the supervision of a registered professional engineer in the State of Louisiana. The NDT consultant shall have a minimum of three years experience in field testing and analyses of CSL test results.

Subsection 814.19(b), Testing Schedule, is deleted and the following substituted.

The CSL testing for all drilled shafts shall not be conducted until 24 hours after the placement of all concrete in a shaft. After placement of concrete, all CSL tests for production drilled shafts must be completed within 48 hours for PVC access tubes and 20 calendar days for steel access tubes. CSL tests for trial shafts and test drilled shafts must be completed within 48 hours after placement of concrete. During the development of the CSL testing schedule, the contractor shall consider the CSL testing time constraints and the drilled shaft production schedule.

Subsection 814.19(c), Access Tubes, is amended as follows.

The last paragraph is deleted and the following substituted.

The pipes shall each be fitted with a watertight shoe on the bottom and a removable cap on the top. The pipes shall be securely attached to the interior of the reinforcement cage. The engineer may allow the tubes to be installed on the outside of the cage if the access tubes have a minimum concrete cover of 3 inches (75 mm) and bumpers are installed on the outside of the cage to prevent tubes from being crushed. The tubes shall be installed in each shaft in a regular, symmetric pattern such that each tube is equally spaced from the others around the perimeter of the cage. The tubes shall be as near to parallel and vertical as possible. The tubes shall be fastened to the reinforcement cage at 5 feet (1.5 m) intervals or as directed by the engineer. The tubes shall extend from 6 inches (150 mm) above the shaft bottom to at least 3 feet (1 m) above the shaft top. If the shaft top is subsurface, the tubes shall extend at least 3 feet (1 m) above the ground and/or water surface. Care shall be taken during reinforcement

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installation operations in the drilled shaft hole so as not to damage the tubes. Within 2 hours after concrete placement, the access tubes shall be filled with clean water and the tube tops capped or sealed to keep out debris. Care shall be exercised in the removal of caps or plugs from the pipes after concrete placement so as not to apply excess torque, hammering, or other stresses which could break the bond between the access tubes and the concrete.

Subsection 814.19(g), Nondestructive Testing of Drilled Shafts, Evaluation of CSL Testing, is revised as follows.

A sentence is added after the first sentence.

The contractor shall allow three working days for the evaluation to be conducted after receipt of the testing report and logs.

Subsection 814.21, Test Holes, is deleted in its entirety and the following substituted:

When shown in the plans or when ordered by the engineer in writing, trial shafts will be required. The construction of trial shafts will be used to determine if the methods and equipment used by the contractor are sufficient to produce a shaft excavation meeting the requirements of the plans and specifications. Trial shafts shall be constructed and approved prior to constructing production shafts. Trial shafts will be evaluated based on field observation and will not be finalized prior to receiving CSL results. The contractor will be evaluated during trial shaft excavations on his ability to:

1. Control dimensions and alignment of excavations within tolerances.
2. Seal the casing into impervious materials.
3. Control the size of the excavation under caving conditions by the use of slurry or by other means.
4. Properly clean the completed shaft excavation
5. Construct excavations in open water areas.
6. Determine the elevation of ground water.
7. Satisfactorily place concrete meeting the specifications within the prescribed time frame.
8. Properly pick up and position the reinforcing cage.
9. Satisfactorily execute any other necessary construction operations.

The contractor shall revise his methods and equipment as necessary at any time during the construction of the trial shaft when he is unable to satisfactorily carry out any of the necessary operations described above.

(a) Location, Size, and Depth: The trial shaft shall be drilled at the location shown in the plans, or as directed by the engineer. If the diameter of the trial shaft is not shown in the plans, the trial shaft diameter shall be the diameter of the largest production drilled shafts required by the plans. If the depth of the trial shaft is not shown in the plans, the trail shaft depth shall be the depth of the deepest production drilled shaft, or as directed by the engineer.

(b) Construction Requirements: The trial shaft shall be constructed with a reinforcing cage containing the same reinforcing steel configuration as shown in the plans for the production shafts. The trial shaft shall be filled with concrete in the same manner that production reinforced drilled shafts will be constructed, unless directed otherwise by the engineer. The concreted trial shaft shall be left in place except that the top of the shaft shall be removed to a depth of 2 feet (600 mm) below the final ground line. This also shall apply to shafts constructed in water.

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(c) Trial Shaft Evaluation: When the contractor fails to demonstrate, to the engineer, the adequacy of his methods or equipment, additional trial shafts shall be provided at no cost to the Department. No test drilled shafts or production shafts shall be constructed until the trial shaft has been evaluated. This evaluation will include review of excavation methods, field construction procedures, and all CSL test results.

Subsection 814.22(b), Test Holes, is deleted in its entirety and the following substituted:

Trial shafts will be measured by the linear foot (lin m) installed.

Subsection 814.23(a), Drilled Shafts, is amended to delete last two sentences of the second paragraph and substitute the following:

Acceptance and payment for each lot will be made in accordance with Table 901-5 and Note 1. Authorized overruns shall be paid as follows:

Subsection 814.23(a)1, Drilled Shafts, is amended as follows.

The second sentence is deleted and the following substituted.

When reinforcing splices are required due to increases in shaft length up to and including 16 feet (5 m) the additional deformed reinforcing steel required for splices will be paid for at the contract unit price.

Subsection 814.23(b), Test Holes, is deleted in its entirety and the following substituted:

Payment for trial shafts will be made at the contract unit price per linear foot (lin m) and shall include the cost of CSL Testing. Payment for trial shafts required by the engineer but not specified by the plans, except when required for acceptance of polymer slurries, will be made in accordance with Subsection 109.04.

PORTLAND CEMENT CONCRETE (06/20/06): Section 901 of the 2000 Standard Specifications and the supplemental specifications thereto is amended as follows.

Subsection 901.06 is amended as follows.

Heading (b) is deleted and the following substituted.

(b) Quality Control Tests: The contractor shall be responsible for determining gradation and moisture content of fine and coarse aggregates used in the concrete mixture and for testing the mixture at the job site for slump, unit weight (mass), temperature, and air content (when used). The contractor shall conduct operations to produce a mix complying with the reviewed and accepted mix design, except that variations will be permitted within specified control limits for individual samples. The contractor shall be responsible for monitoring the components (cement, mineral and chemical admixtures, aggregates) in their mix to protect against any changes due to component variations. As component shipments arrive, the contractor shall verify slump, air content and set time by testing at ambient temperatures. The contractor shall make adjustments to the mix design to rectify any changes which would adversely affect constructability, concrete placement or the specifications. The contractor shall submit test results to the Department for review each day of paving. Testing to validate component consistency will be documented on the control logs. Conformance or variation in mix parameters (workability, set times, air content, etc.) shall be noted on the control logs. The contractor shall provide a copy of the proposed testing plan to the engineer for record. Acceptance of the plan does not relieve the contractor's responsibility for consistency. Test results for gradation, slump, unit weight (mass), and air content shall be plotted on

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control charts for individual samples. These control charts shall be submitted to the engineer.

Times at which to obtain control test samples shall be set by the contractor using random number tables in accordance with DOTD S 605 or by random selection. Gradation control limits of aggregates shall be as shown in Subsection 1003.02. When required, additional test samples shall be taken as directed for slump, concrete temperature, and air content.

The minimum number of quality control tests to be performed by the contractor for structural and pavement concrete shall be in accordance with the Materials Sampling Manual.

For minor structure concrete only, the contractor will not be required to have a Certified Concrete Technician or Authorized Concrete Field Tester, but shall implement a quality control testing program to ensure that the concrete meets the requirements of these specifications.

When producing concrete for Type B and D pavements, gradations shall be determined daily on each stockpile of aggregate to be used. All gradation calculations shall be based on percent of dry weight (mass). Upon determination of the gradation of each stockpile, the percent of the total aggregates retained shall be determined mathematically based on the proportions of the combined aggregate blend, and checked for conformance with Table 1003-1A.

Subsection 901.08 is amended as follows.

The second paragraph of Heading (a) is deleted and the following substituted.

For concrete placements having a least dimension of 48 inches (1200 mm) or greater, or if designated on the plans or the project specifications as being mass concrete, the allowable cement type shall be Type II portland cement, Type IP portland-pozzolan cement, or Type IS portland blast furnace slag cement. The cement or combination of cement and fly ash or ground granulated blast furnace slag, shall be certified to generate a heat of hydration of not more than 70 calories/gram (290 kJ/kg) at 7 days.

Table 901-02, Master Proportion Table for Portland Cement Concrete, is deleted and the following substituted.

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Table 901-2
Master Proportion Table for Portland Cement Concrete

	Average Compressive Strength, psi (MPa) at 28 days	Grade of Coarse Aggregate	Min. Cement, lb/yd³ (kg/m³) of Concrete [9]	Maximum Water/Cement ratio, lb/lb(kg/kg) [1,9]	Total Air Content (Percent by volume) [4]	Slump Range [10], inches (mm)		
						Non-Vibrated	Vibrated	Slip Form Paving [2]
Structural Class [11]								
AA(M)	4400 (30.4)	A, P	560 (332)	0.44	5±1	2-5 (50-125)	2-4 (50-100)	N.A.
AA	4200 (29.0)	A, P	560 (332)	0.44	5±1	2-5 (50-125)	2-4 (50-100)	N.A.
A(M)	4400 (30.4)	A, P	510 (302)	0.53	5±2	2-5 (50-125)	2-4 (50-100)	N.A.
A	3800 (26.2)	A, F [8], P	510 (302)	0.53	5±2	2-5 (50-125)	2-4 (50-100)	1-2.5 (25-65)
D	3300 (22.8)	A, B, D, P	420 (249)	0.58	5±2	2-5 (50-125)	1-3 (25-75)	N.A.
F	3400 (23.5) [5]	A,P	460 (273)	0.44	5±1	2-5 (50-125)	2-4 (50-100)	N.A.
P(X)	7500 (51.7) [5]	A, F [8], P	700 (415)	0.40	5±2	N.A.	2-10 (50-250)	N.A.
P(M)	6000 (41.4) [5]	A, F [8], P	600 (356)	0.44	5±2	N.A.	2-6 (50-150) [7]	N.A.
P	5000 (34.5) [5]	A, F [8], P	560 (332)	0.44	5±2	N.A.	2-6 (50-150) [7]	N.A.
S	3800 (26.2)	A,P	650 (385)	0.53	5±2	6-8 (150-200)	N.A.	N.A.
Minor Structure Class [11]								
M	3000 (20.7)	A, B, P	470 (279)	0.56	5±2	2-5 (50-125)	2-4 (50-100)	1-2.5 (25-65)
R	1800 (12.4)	A, B, D, P	370 (219)	0.70	5±2	2-5 (50-125)	2-4 (50-100)	N.A.
Y	3000 (20.7)	Y	560 (332)	- [3]	6-9	N.A.	1-3 (25-75)	N.A.
Pavement Type [11]								
B	4000 (27.6) [6]	N/A [13]	475 (282)	0.53	5±2	N.A.	2-4 (50-100)	1-2.5 (25-65)
D	4000 (27.6) [6]	N/A [13]	450 (267)	0.53	5±2	N.A.	2-4 (50-100)	1-2.5 (25-65)
E	4000 (27.6) [6]	A, F [12], P	600 (356)	0.40	5±2	N.A.	2-4 (50-100)	1-2.5 (25-65)

N.A. – Not Applicable

[1] Except for Class AA, AA(M), or F concrete, the maximum volume of water; gal. (L), shall be reduced 5 percent when a water-reducing admixture is used, and 10 percent when an air-entraining admixture, or air-entraining and water-reducing admixtures, is used. When the coarse aggregate portion of the mix is 100 percent crushed aggregate, the water may be increased by 5 percent provided the maximum water listed in Table 901-2 is not exceeded.

[2] Also slump range for other concrete placed by extrusion methods.

[3] Refer to Subsection 901.08(c).

[4] Total air content ranges when air-entrainment is allowed or specified. Air content shall be designed at midrange.

[5] Values shown represent the minimum compressive strengths allowed.

[6] Average compressive strengths for Pavement Type concrete shall be 3600 psi (24.8 MPa) when air-entrainment is used.

[7] No more than a 2 inch (50 mm) slump differential for any design pour.

[8] Grade F coarse aggregate shall be used only when specified or permitted. The minimum cement content shall be increased when this aggregate is used.

[9] For mixes including partial replacement of cement with fly ash or ground granulated blast furnace slag, the minimum cement and maximum water contents shown apply to the total cement and fly ash or ground granulated blast furnace slag content of the mix. Additional cement may be required to achieve minimum compressive strength.

[10] When a slump range is specified in other sections, that range shall govern.

[11] See Subsection 901.08(a) for allowable types of cement.

[12] For use in partial depth patching.

[13] Aggregate grading shall comply with the requirements of Subsection 1003.02(c).

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STATE PROJECT NOS. 005-10-0037, 006-01-0021, 006-02-0064, 006-25-0001, 006-30-0041, 063-03-0051, 063-04-0035
SPECIAL PROVISIONS

PAINTS: Section 1008 of the 2000 Standard Specification and Supplement Specifications thereto is amended as follows:

Subsection 1008.06, Corrosion Inhibiting Alkyd Paint System, is hereby added.

The Corrosion Inhibiting Alkyd Paint System shall be a three-coat paint system applied to properly prepared structural steel surfaces that are permanently exposed to weather. The paint shall be compatible with basic lead silico chromate paint. System B shall be used. The corrosion inhibiting pigment in System B shall be calcium borosilicate. The primer and the intermediate coats shall be tinted for color contrast. An aluminum topcoat in accordance with AASHTO M69, Type I shall be applied.

SPECIFIC REQUIREMENTS: Test methods shall be the latest in effect. The manufacturer assumes all responsibility in formulating products which meet these specifications.

System B shall comply with the following requirements.

PRIME COAT

Property	ASTM Test Method	Requirement Min.	Requirement Max
Pigment, % by wt	D2371	53	--
Vehicle, % by wt	D2371	--	47
Wt/gal, lb @ 77° F	D1475	11.4	--
Water, %		--	0.25
Coarse Particle and Skims (Total Residue Retained on No. 325 Sieve Based on Paint), %	D185	--	1.0
Fineness of Grind (North Std)	D1210	5	
Viscosity (Stormer-Krebs Units) @ 77° F	D562	75	85
Dry through, hours	D1640	18	--
Nonvolatile Vehicle, % by wt	D2369	57	--
	D2372		
Pigment			
Calcium Boro-Silicate	D4288	80.0%	--
Synthetic Iron Oxide	D84, Class I	16.0%	18.0%
Organo Montmorillonite		1.0%	2.0%
Vehicle			
Alkyd Resin, Solution	TT-R-266, Type I Class A	43.0%	50.0%
Linseed Oil		20.0%	27.0%
Mineral Spirits	TT-T-291E, Type II*	--	28.0%
Driers		1.0%	2.0%

*Small quantities of alcohols or alcohol/water mixtures may replace some mineral spirits where such materials are used as polar additives for the suspending aid.

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INTERMEDIATE COAT

Property	ASTM Test Method	Requirement Min.	Max
Pigment, % by wt	D2371	44	--
Vehicle, % by wt	D2371	--	56
Wt/gal, lb @ 77° F	D1475	10.2	--
Water, %		--	0.25
Coarse Particle and Skims (Total Residue Retained on No. 325 Sieve Based on Paint), %	D185	--	1.0
Fineness of Grind (North Std)	D1210	5	
Viscosity (Stormer-Krebs Units) @ 77° F	D562	75	85
Dry through, hours	D1640	--	10
Nonvolatile Vehicle, % by wt	D2369 and D2372	45	--
Pigment			
Calcium Boro-Silicate	D4288	80.0%	--
Synthetic Iron Oxide	D84, Class I	17.5%	18.5%
Organo Montmorillonite		1.5%	2.5%
Lampblack		--	2.0%
Vehicle			
Alkyd Resin, Solution	TT-R-266, Type I Class A	65.0%	--
Mineral Spirits*	TT-T-291E, Type II*	--	34.0%
Driers		1.0%	1.5%

*Small quantities of alcohols or alcohol/water mixtures may replace some mineral spirits where such materials are used as polar additives for the suspending aid.

TRAFFIC SIGNALS (06/07): Section 1020, Traffic Signals of the Standard Specifications and the supplemental specifications thereto, is amended as follows.

Subsection 1020.01, Traffic Signal Heads.

Heading (a), General Requirements is deleted and the following is substituted.

(a) General Requirements: Traffic signal sections, beacon sections and pedestrian signal sections shall be of the adjustable type. Materials and construction of each section shall be the same.

Signals shall be constructed for either 8 or 12-inch (200 mm or 300 mm) lens in accordance with the plans. Signal sections shall have three to five sections per face and beacon sections have only one section per face. Signal sections and associated brackets shall be finished inside and out with two coats of high grade dark olive green enamel, color number 14056 according to Federal Standard No. 595b with each coat independently baked. Visors shall be coated green on the outside and black on the inside. Edges shall be deburred and smooth with no sharp edges.

Subsection 1020.04, Poles for Traffic Signal Systems.

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Heading (a), Pedestal Support Signal Poles is amended as follows.

The sixth paragraph is deleted and the following is substituted.

Pedestals shall be finished with at least one coat of rustproofing primer, applied to a clean surface and one coat of dark olive green enamel, color number 14056 according to Federal Standard No. 595b.

ITEM S-001, SPECIAL CATCH BASIN (S-1): This item consists of constructing, furnishing and installing a special catch basin S-1 at the locations shown in the project plans and in accordance with the project plan details and Section 702 of the 2000 Standard Specifications for Roads and Bridges as amended by the Supplemental Specifications.

Payment will be made at the contract unit price for a special catch basin S-1, which shall include all material, tools, equipment, labor, incidentals, and the performance of all work necessary to complete the item.

Payment will be made under:

Item S-001, Special Catch Basin S-1, per each.

ITEM S-002, JEFFERSON PARISH CATCH BASIN (TYPE 4): This item consists of constructing, furnishing and installing a Jefferson Parish catch basin (Type 4) at the locations shown in the project plans and in accordance with the Jefferson Parish Standard Details and Section 702 of the 2000 Standard Specifications for Roads and Bridges as amended by the Supplemental Specifications.

Payment will be made at the contract unit price for Jefferson Parish catchbasin (Type 4), which shall include all material, tools, equipment, labor, incidentals, and the performance of all work necessary to complete the item.

Payment will be made under:

Item S-002, Jefferson Parish Catch Basin (Type 4), per each.

ITEM S-003, TEMPORARY DRIVEWAY (SEWAGE TREATMENT PLANT): This item consists of constructing, furnishing and maintaining a temporary driveway (Sewage Treatment Plant) at the locations shown in the project plans and in accordance with the Project Plan Suggested Sequence of Construction drawings and Section 725 of the 2000 Standard Specifications for Roads and Bridges as amended by the Supplemental Specifications.

Payment will be made at the contract lump sum price for a temporary driveway (Sewage Treatment Plant), which shall include all material, tools, equipment, labor, incidentals, and the performance of all work necessary to complete the item.

Payment will be made under:

Item S-003, Temporary Driveway (Sewage Treatment Plant), per lump sum.

ITEM S-004, CONCRETE DRAINAGE CHUTE AND INLET [WBB 1110+71]: This item consists of constructing, furnishing and installing a concrete drainage chute and inlet at the locations shown in the project plans and in accordance with the project plan details and Section 702 of the 2000 Standard Specifications for Roads and Bridges as amended by the Supplemental Specifications.

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Payment will be made at the contract lump sum price for a concrete drainage chute and inlet [WBB 1110+71], which shall include all material, tools, equipment, labor, incidentals, and the performance of all work necessary to complete the item.

Payment will be made under:

Item S-004, Concrete Drainage Chute and Inlet [WBB 1110+71], per lump sum.

ITEM S-005, SPECIAL GUARD RAIL ANCHOR SECTION [6'-3"]: This item consists of constructing, furnishing and installing a special guard rail anchor section [6'-3"] at the locations shown in the project plans and in accordance with the DOTD Standard Plan GR-200 and Section 704 of the 2000 Standard Specifications for Roads and Bridges as amended by the Supplemental Specifications.

Payment will be made at the contract unit price for special guard rail anchor section [6'-3"], which shall include all material, tools, equipment, labor, incidentals, and the performance of all work necessary to complete the item.

Payment will be made under:

Item S-005, Special Guard Rail Anchor Section [6'-3"], per each

ITEM S-006, CONCRETE ROADWAY BARRIER TRANSITION (54" TO 32"): This item consists of constructing, furnishing and installing a concrete roadway barrier transition 54" to 32" at the locations shown in the project plans and in accordance with the project plan details and Section 733 of the 2000 Standard Specifications for Roads and Bridges as amended by the Supplemental Specifications.

Payment will be made at the contract unit price for concrete roadway barrier transition 54" to 32", which shall include all material, tools, equipment, labor, incidentals, and the performance of all work necessary to complete the item.

Payment will be made under:

Item S-006, Concrete Roadway Barrier Transition 54" to 32", per each.

ITEM S-007 AND ITEM S-014, CONCRETE ROADWAY BARRIER TRANSITIONS: These items consist of constructing, furnishing and installing a concrete roadway barrier transition 32" to curb at the locations shown in the project plans and in accordance with the project plan details and Section 733 of the 2000 Standard Specifications for Roads and Bridges as amended by the Supplemental Specifications.

Payment will be made at the contract unit price for concrete roadway barrier transition 32" to curb, which shall include all material, tools, equipment, labor, incidentals, and the performance of all work necessary to complete the items

Payment will be made under:

Item S-007, Concrete Roadway Barrier Transition (32" To Barrier or Mountable Curb)(20' to 10' Transition), per each.

Item S-014, Concrete Roadway Barrier Transition (32" To Barrier Curb)(40' Transition), per each.

ITEM S-008, CONCRETE ROADWAY BARRIER END TRANSITION TO GUARD RAIL: This item consists of constructing, furnishing and installing a concrete roadway barrier end transition to guard rail at the locations shown in the project plans and in accordance with the DOTD Standard Plan GR-201 and Section 733 of the 2000

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Standard Specifications for Roads and Bridges as amended by the Supplemental Specifications.

Payment will be made at the contract unit price for concrete roadway barrier end transition to guard rail, which shall include all material, tools, equipment, labor, incidentals, and the performance of all work necessary to complete the item.

Payment will be made under:

Item S-008, Concrete Roadway Barrier End Transition to Guard Rail, per each.

ITEM NOS., S-009 THRU S-012, IMPACT ATTENUATORS: These items consist of furnishing and constructing a kinetic impact attenuator, generally referred to as a compression crash cushion, in accordance with plan details, manufacturer's recommended procedures and other requirements specified in this special provision. Kinetic impact attenuators shall be connected to a rigid backup wall to resist the impact loads. The backup wall shall be constructed in accordance with the plan details and may require some modification to achieve compatibility with the specific attenuator supplied by the contractor.

All attenuators must have been successfully crash tested and conform to the requirements of the NCHRP 350. Attenuators that do not meet the crash testing requirements of the NCHRP 350 will not be allowed on any Federal or State funded projects.

The attenuators shall provide the necessary protection for the entire designated area on the plan. The attenuators shall satisfy the design criteria described in the following table:

Item No.	Location	Design Speed (mph)	Width of Hazard (in.)	Narrow Type Required?
S-009	EBB 1091+60	50	15	No
S-010	L18W 650+28	40	15	Yes
S-011	L18E 852+01	40	53(±)	No
S-012	WBB 962+94	45	24	Yes

The contractor shall submit information on the type, size and the manufacturer of the attenuator he intends to utilize for each location including proposed backup wall modification to the Bridge Design Section for review and approval. A copy of this information will be retained in the District Maintenance Office. The contractor shall not modify the configuration of the gore area for the sake of accommodating the installation of a narrower attenuator, unless it is substantiated that no other type of attenuator is available in the market for a wide gore application.

All units shall be assembled with corrosion resistant fasteners. Bolts, nuts and washers shall be American National Standard. Miscellaneous metal work shall be fabricated from either M1020 merchant quality or ASTM A 36 steel and after fabrication, shall be galvanized in accordance with Subsection 811.12. All welding shall be performed by a certified welder in accordance with Section 815.

Hazard marker panels will be furnished by the Department and the contractor shall attach the hazard markers by approved methods.

The contractor shall furnish the engineer a certified statement that the impact attenuators and the material used conform to the plans and specifications.

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Payment will be made at the contract unit price for an impact attenuator (kinetic), which shall include all material, tools, equipment, labor, incidentals, and the performance of all work necessary to complete the item.

Payment will be made under:

Item S-009, Impact Attenuator (Kinetic) [EBB 1091+60], per each.
Item S-010, Impact Attenuator (Kinetic) [L18W 650+28], per each.
Item S-011, Impact Attenuator (Kinetic) [L18E 852+01], per each.
Item S-012, Impact Attenuator (Kinetic) [WBB 964+25], per each.

ITEM S-013, JUNCTION BOX [BCW 253+40]: This item consists of constructing, furnishing and installing a junction box [BCW 253+40] at the locations shown in the project plans and in accordance with the project plan details and Section 702 of the 2000 Standard Specifications for Roads and Bridges as amended by the Supplemental Specifications.

Payment will be made at the contract lump sum price for a junction box [BCW 253+40], which shall include all material, tools, equipment, labor, incidentals, and the performance of all work necessary to complete the item.

Payment will be made under:

Item S-013, Junction Box [BCW 253+40], per lump sum.

ITEM S-015 AND ITEM S-016, VIDEO DETECTION DEVICE AND CONNECTION AND VIDEO DETECTION SYSTEM: These items consist of furnishing all necessary equipment, labor and material to install video detector device and connection and video detection system as described in these specifications.

General: This specification sets the minimum requirements for a wide-area vehicle detection system that processes video images for vehicle presence, count, speed and other typical traffic parameters. The detection of vehicles passing through the field of view of an image sensor shall be available to a large variety of end user applications as simple contact closure outputs, data for traffic controller and other traffic data. This reflects the current real time detector or alarm states (on/off) or as summary traffic statistics that are reported locally or remotely. The contact closure outputs shall be provided to a traffic signal controller and comply to the NEMA (National Electrical Manufacturers Association) Type C or D detector rack or a Type 170 input file rack standards.

The system architecture shall fully support networking of system components through a variety of industry standard and commercially available infrastructures that are used in the traffic industry. The serial data communications shall support direct connect, modem and multi-drop interconnects. Simple twisted pair wiring shall be supported to minimize overall system cost, improve reliability, utilizing existing infrastructure and ease of system installation and maintenance.

Both video communications and serial data communications shall optionally be interconnected over long distances through repeat and daisy chain configurations. A single serial data communications multi-drop link on twisted pair shall extend up to 2 miles (3.2 Km) and include up to 24 units on a drop before the signal(s) must be repeated.

On the software application side of the network, the system shall be integrated through a client-server relationship. A communications server application shall provide

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the data communications interface between as few as one to as many as hundreds of machine vision processor (MVP) sensors and a number of client applications. The client applications shall either be hosted on the same PC as the communications server or may be distributed over a local area network of PC's using the industry standard TCP/IP network protocol. Multiple client applications shall execute simultaneously on the same host or multiple hosts, depending on the network configuration.

The video detection system shall easily interface to an ethernet switch in the traffic control cabinet.

System Hardware: The machine vision system hardware shall consist of 4 components: 1) a color, 16x zoom lens, Machine Vision Processor (MVP) sensor; 2) a communication interface panel; 3) and optional cabinet interface module; and 4) an optional personal computer (PC). The PC shall host the communication server and client applications to setup, program and monitor and detection performance.

The MVP sensor shall communicate with the cabinet interface module, communications interface panel and the various PC applications using the industry-standards TCP/IP network protocol. Additionally, one or more PCs shall communicate directly or remotely to a MVP sensor network where each MVP sensor has a unique Internet Protocol (IP) address. The MVP sensor network shall support communications over a mix of media, including PSTN, CDPD dedicated twisted-pair, fiber and wireless.

The cabinet interface module shall communicate directly with up to 8 MVP sensors and shall comply with the form factor and electrical characteristics of a NEMA type C or D detector rack or a 170 input file detector rack card. For a contact closure interface to a traffic controller or other device, this interface shall accept 8 contact closure inputs (usually red and green control signals) and provide 16 contact closure output to a traffic signal controller. For a SDLC interface to a NEMA TS2 traffic controller, this interface shall display 32 phase colors and emulate up to 4 bus interface units (BIU).

The communication interface panel in the cabinet shall provide electrical termination of external cables for video, data and power to the MVP sensor. The communication interface panel shall provide transient protection to electrically protect equipment in the panel. The communications interface panel shall be available in two models: a 4-sensor model or a single-sensor model.

System Software: The MVP sensor's embedded firmware shall automatically perform a variety of diagnostic, installation, fault tolerant and vehicle detection operations. Vehicle detection shall be reliable, consistent and perform under all weather, lighting and traffic congestion conditions.

A software suite of client applications shall reside on the host client/server PC. The software suite shall support Microsoft Windows 98, later operating systems and ME, XP, NT, 2000. Client applications shall include:

Network Browser: Learn a network of connected modular cabinet interface units and MVPs then show the topology in a logical hierarchical relationship.

Detector Editor: Create and modify detector configurations to be executed on the MVP sensor.

Operation Log: Extract the MVP run-time operation log of special events that have occurred.

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Software Installer: Reconfigure one or more MVP sensors with a newer release of embedded system software.

Video Player: Play streaming color video from any or all sensors connected to network. Video player shall also have the ability to go in to a video wall option which will divide the PC screen in as many sensors that are opened giving the user optimal viewing. The video player shall also be able to record and play back any or all sensors being viewed. Detection performance shall be able to viewed from the video player. In addition, speeds and classification of vehicles shall be able to be viewed from the video player.

Video Controller: Control the zoom, pan & tilt (optional) of the sensor it is controlling. Multiple sensors shall be able to be viewed or controlled at the same time. If multiple sensors are being viewed simultaneously, the video controller application shall allow the user to enlarge the screen in to a video wall option, which will split up the whole screen with the number of sensors being viewed.

An optional software developer's kit shall facilitate creation of custom client applications.

MVP Image Sensor: The MVP image sensor shall be integrated imaging color CCD array with wavelet CODEC technology hardware compression; optics, high-speed, image processing hardware and a general purpose CPU bundled into a sealed enclosure. The CCD array shall be directly controlled by the general purpose CPU, thus providing high video quality for detection that has virtually no noise to degrade detection performance. It shall be possible for the user to zoom the lens, as required for operation. It shall provide JPEG video compression software and a video compression co-processor so as not to interfere with detection performance while streaming video. The MVP shall provide direct real-time iris and shutter speed control. The MVP image sensor shall be equipped with an integrated 16x minimum zoom lens that can be changed using either configuration computer software or a hand-held controller. Each camera shall use an Ethernet addressing protocol so that each unit may be addressed via IP schema. Additionally, the camera shall have a failsafe mode in which detector calls are constantly placed to controller in the event of a malfunction.

The MVP sensor shall output full motion color video through the means of a differential video port in NTSC format. The differential video is transmitted over a single twisted pair.

Real-time detector performance shall be observed by viewing the video output from the sensor with overlaid flashing detector to indicate the current detection state (on/off).

The MVP shall also have the option of being attached to a pan/tilt driver that allows the user to pan, tilt and zoom the camera from within the same software package for video detection. The driver shall be able to come back to the original detection position within 0.2° after panning and tilting.

Power: The MVP sensor shall operate on 24 VAC, 50/60 Hz at a maximum of 20 watts. The camera and processor electronics shall consume a maximum of 10 watts and the remaining 15 watts shall support an enclosure heater.

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Video Outputs: The MVP shall provide video output from the communications interface panel for real-time NTSC or PAL display on a monitor or PC over standard coax cable.

The software shall also display streaming video as part of the user software based on JPEG video compression or optimal hardware-based wavelet video compression. The streaming video shall be recordable as a data file on the PC for later playback and editing. Streaming video from multiple MVPs shall be simultaneously displayable as a group or video wall. Streaming video shall be possible at communication speeds from 9.6k Baud to 230k Baud.

Detection Types: The MVP shall be able to be programmed with a variety of detector types that perform specific functions. The general functions performed by the detectors shall:

1) Include presence/passage detection of moving and stopped vehicles.
2) Enable detection based on the direction of travel or based on when a moving vehicle stops.
3) Measuring vehicle speed and length and provide 5 classes of vehicles based on length.
4) Determine counts, either lane by lane or cumulative.
5) Speed alarm detectors:
   - Output alarm on each fast vehicle, ignoring vehicles of length of less than the user defines.
   - Output alarm based on the average number of vehicles the user enters and the upper and lower speed thresholds that the user defines.
   - Output alarm based on the average speed over a user defined time frame.
   - Output alarm based on a user defined percent increase or decrease over a speed limit.

Detection Zone Programming: Placement of detection zones shall be by means of a supervisor computer (PC) operating in the Windows 98, 2000 or Windows NT graphical environments, a keyboard and a mouse. The VGA monitor shall be able to show the detection zones superimposed on images of traffic scenes.

The detection zones shall be created by using a mouse to draw detection zones on the supervisor computer's VGA monitor. Using a mouse and the keyboard it shall be possible to place, size and orient detection zones to provide optimal road coverage for vehicle detection. It shall be possible to download detector configurations from the supervisor computer to the MVP, to retrieve the detector configuration that is currently running in the MVP and to back up detector configurations by saving them to the supervisor computer's removable or fixed disks.

The supervisor computer's mouse and keyboard shall be used to edit previously defined detector configurations to permit adjustment of the detection zone size and placement, to add detectors for additional traffic applications, or to reprogram the sensor

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for different traffic applications or changes in installation site geometry or traffic rerouting.

Optimal Detection: The video detection system shall optimally detect vehicle passage and presence when the MVP sensor is mounted 30 feet (10M) or higher above the roadway, when the image sensor is adjacent to the desired coverage area and when the distance to the farthest detection zone locations are not greater than ten (10) times the mounting height of the MVP. The recommended deployment geometry for optimal detector also requires that there be an unobstructed view of each traveled lane where detection is required. Although optimal detection may be obtained when the MVP is mounted directly above the traveled lanes, the MVP shall not be required to be directly over the roadway. The MVP shall be able to view either approaching or receding traffic or both in the same field of view. The preferred image sensor orientation shall be to view approaching traffic since there are more high contrast features on vehicles as viewed from the front rather than the rear. The MVP sensor placed at a mounting height that minimizes vehicle image occlusion shall be able to monitor a maximum of 6 to 8 traffic lanes simultaneously.

Data Collection: The MVP sensor shall optionally store cumulative traffic statistics, internally in non-volatile memory, for later retrieval and analysis. The following data types are available to be stored in time increments from a cycle to one-hour increments:

1) Average Flow Rate
2) Total Volume Count
3) Arithmetic Mean Speed
4) Vehicle Class Count
5) Average Time Headway
6) Average Time Occupancy
7) Level of Service
8) Space Mean Speed
9) Space Density
10) Density

The above data types shall also be available to view viewed real-time.

Modular Cabinet Interface Unit (Mini Hub II): The modular cabinet interface unit shall provide the hardware and software means for up to 8 MVP sensors to communicate real-time detector states and alarms to a local traffic signal controller. It shall comply with the electrical and protocol specifications of NEMA TS-1. The card shall have 1500 V RMS isolation rack logic ground and street wiring.

The modular cabinet interface unit shall be a simple interface card that plugs directly into an enclosure matching a NEMA type C or D detector rack. The modular cabinet interface unit with enclosure shall be a shelf-mounted unit. The modular cabinet interface unit shall provide 8 phase inputs and 16 detector outputs. In a TS-2 environment, the mini-hub shall connect to the traffic controller via a SDLC cable provided by the video detection manufacturer. The SDLC cable shall transmit all the inputs and outputs from the MVP.

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Communications Interface Panel: The communications interface panel shall support one to 4 MVPs. The communications interface panel consists of a predefined wire termination block for MVP power, data and video connections, a power transformer for the MVP, electrical surge protectors to isolate the modular cabinet interface unit and MVP and an interface connector to cable directly to the modular cabinet interface unit.

The connection from the MVP(s) to the communications interface panel shall be via 5 ½ twisted pair with an overall shield and not coaxial cable. Manufacturer shall either supply their recommended twisted pair cable for one continuous run from MVP to communications interface panel. Splicing of the cable will not be allowed.

The interface panel shall provide power for 4 MVPs through 4 step-down transformers, taking local line voltage and producing 28 VAC, 50/60 Hz, at about 30 watts. A ½ amp slow-blow fuse shall individually protect the step-down transformers.

System Installation: The supplier of the video detection system shall supervise the installation and testing of the video detection system and computer equipment. A factory certified representative from the computer equipment. A factory certified representative from the supplier shall be on-site during installation. A 40-hour session of training shall be provided to personnel of the contracting agency in the operation, setup and maintenance of the video detection system. Instruction and materials shall be provided for a maximum of 10 persons and shall be conducted at a location selected by the contracting agency.

Warranty, Service and Support

Its supplier for a minimum of 2 years shall warrant the video detection system. Ongoing software support by the supplier shall include software updates of the MVP sensor, mini Hub II and supervisor computer applications. These updates shall be provided free of charge during the warranty period. The supplier shall maintain a program for technical support and software updates following expertise of the warranty period. This program shall be available to the contracting agency in the form of a separate agreement for continuing support.

The camera shall be ideal for freeway, intersection, bridge, tunnel, railroad, traffic monitoring and incident prevention applications, as well as link the traffic management center with each IP-addressable camera in the field. Also to be available with a Communications Server Software Developer's Kit (SDK), a programmer can easily create new client applications for display, incident alarms and traffic parameter databases.

Remote connections shall be able to utilize phone lines, leased CATV, or CDPD to bring compressed video and data back to the office.

Detection zones shall include count, presence and incident detection. Real-time polling or stored traffic data to include: volume, occupancy, speed, density, headway and 5 vehicle classifications either by phase or in time intervals from 1 second to 60 minutes. Extensive Boolean logic capabilities shall provide flexibility in detector layouts and helping validate an event or incident alarm.

To help troubleshoot the system, a status indicator shall appear in the video picture and an operations log provides a history of events.

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Measurement and Payment: Item S-015, Video Detector Device and Connection, per each shall include all required materials, tools, equipment, labor, and incidentals required to install each video detection device as described above (a color, 16x zoom lens, Machine Vision Processor (MVP) sensor), including the cable connection to the controller cabinet, per each as indicated on the plans.

Item S-016, Video Detection System (Intersection) per each shall include all required materials, tools, equipment, labor and incidentals required to install the video detection equipment at each intersection for proper operation of the system. This item includes, but is not limited to, the communication interface panel and Modular Cabinet Interface Unit (Mini Hub II). The software, testing and training shall also be included in this pay item.

Payment will be made under:
Item S-015, Video Detection Device And Connection, per each.
Item S-016, Video Detection System, per each.

ITEM S-017, PEDESTRIAN PUSHBUTTONS: Pedestrian push buttons shall consist of a fifty-one (51) mm (two (2) inch) direct type push button and single momentary contact switch. The housing shall be primed cast metal and shall be coated the same color as the traffic signal heads. The housing shall include conduit fittings for ½" conduit on the back and bottom. Operating voltage for pedestrian push buttons shall no exceed 24 volts DC.

The housing shall be waterproof with a hermetically sealed actuator and switch assembly. It shall be impossible to receive an electrical shock under any weather conditions. Where a pedestrian push button is attached to the pole, the housing shall be shaped to fit the curvature of the pole or post to which it is attached to provide a rigid installation.

The pedestrian push button housing, with the exception of push buttons, gaskets, terminal blocks, wiring, sockets, and hardware, shall be finished inside and out with two coats of high grade green enamel (Outdoor Advertising Association #144 Green). Each coat shall be independently baked to resist peeling and chipping.

The pedestrian push button signs included under pay item 729-01, shall be 9"x12" MUTCD Type R10-4a(L) or/and R10-4a(R) as required, and in accordance with Section 729 of the DOTD Standard Specifications for Roads and Bridges. Pedestrian push button signs shall be attached to the side of the pole so that the sign arrow points to the appropriate crosswalk.

Pedestrian push buttons shall be provided complete with suitable mounting hardware to mount to wood or steel signal poles in accordance with Subsection 736.15 of the LADOTD Standard Specifications for Roads and Bridges, LADOTD Traffic Installation Standard Details and the MUTCD current adopted edition.

Pedestrian pushbutton and push button sign work will be paid for at the contract unit price per each, complete and accepted. Measurement will include furnishing and installing pedestrian pushbutton, mounting hardware, supplementary hardware and all equipment, tools, labor and incidentals necessary to complete the work.

Payment will be made under:
Item S-017, Pedestrian Pushbuttons, per each.

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ITEM S-018, LED PEDESTRIAN SIGNAL HEAD: This section includes the furnishing and installing of fiber optic cable, equipment and materials related to the fiber-optic components of the closed loop communication system.

General: The pedestrian signal shall consist of a housing, hinged door, LED module message lens, blank-out Z-crate sun visor, and required hardware. The design shall provide optimal energy performance.

The pedestrian signal shall be capable of displaying both brightly and uniformly while subjected to powerful ambient light conditions. Under the same light conditions, the message(s) shall blank-out when the signal is not energized.

Position of Signal Indications: The pedestrian signal indications shall be configured in a single housing using one (1) 2-Symbol/2-Color message LED module. The position of each indication shall be as shown in plans. International Symbol indications, the upraised "HAND" and the "WALKING PERSON", shall be used. The indications "DON'T WALK" and "WALK" shall not be acceptable.

Housing: The housing shall be constructed from one (1) piece of die cast, corrosion resistant, aluminum alloy complete with integrally cast top, bottom, sides, and back. The fully constructed housing shall be free from any defects. Four (4) integrally cast hinged lug pairs and two (2) flanges shall be provided. Two (2) lug pairs located on the top and two (2) on the bottom, equally spaced, to allow the door to swing open. All mounting locations within the housing shall be symmetrical. The housing shall provide a dust-proof and weatherproof enclosure when properly mounted.

Housings shall be provided with two (2) 2" ports. One (1) port shall be located on the top and one (1) on the bottom. Each port shall have a 72-feet boss integrally cast to eliminate rotation or misalignment of the signal. All teeth shall be clean and sharp to provide full engagement and positive locking with standard signal mounting equipment and hardware. Reinforcing ribs shall be provided to project load-bearing stress.

Door/Visor Frame: The door shall be die cast construction of one (1) piece, corrosion resistant, aluminum alloy. The door shall mount to the housing by use of clevis pins, eyebolt/wing nut assemblies, and flanges. Each eyebolt shall be held securely to the housing and include one (1) wing nut. The clevis pins, together with the eyebolt and wing nut assemblies, shall be designed to allow the door to latch and unlatch without the use of tools. The door shall include an additional frame, molded as a part of the door, to protect and hold a visor.

Visor: A visor shall be provided with each signal and attach to the doorframe by use of metal screws. The visor shall be constructed of black Lexan material, or approval equal, having a crate-type design to provide protection against vandalism and ultraviolet radiation.

When installed properly, the visor shall be parallel to the message-bearing surface. When the indication on the message-bearing surface is illuminated, the illuminated message shall be viewed *entirely*, without shadows, by the pedestrian when the pedestrian is within a minimum ten degrees (10°) left or right of a line perpendicular to the message-bearing surface.

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Messages: Message configuration shall be the solid "HAND" symbol internally illuminated with a Portland orange color source on the left half of the MBS (message bearing surface) and a solid "WALKING PERSON" symbol internally illuminated with an incandescent white color source on the right half of the MBS.

The "HAND" and "WALKING PERSON" symbols shall each be a minimum 11" (279 mm) in height and 7" (178 mm) in width. Message configuration, color and size shall be as defined by the I.T.E. Equipment Standard "*Pedestrian Traffic Signal Control Indications*" adopted March 19, 2004. Internal illumination shall be provided by LED.

Pedestrian LED traffic signal modules shall be designed for the message bearing surface of a 16" × 18". Pedestrian traffic signal housing built to the PTCSI Standard. The message-bearing surface of the module shall be supplied with a **fully populated** "HAND" and "MAN" symbol, side by side, with the individual LED's being visible, that comply with PTCSI standard for these symbols for a message-bearing surface of the size specified. This message-bearing surface shall be designed so that it can be removed from the sealed unit for replacement without further damage to the module.

Optical Assembly: LED pedestrian signal modules shall not require special tools for installation.

LED pedestrian signal modules shall fit into the existing traffic housings built to the VTCSH Standard without any modification to the housing.

Installation of a replacement LED module into the existing pedestrian housing shall only require the removal of the existing optical unit components, i.e., lens, lamp, gaskets, and reflector.

Each pedestrian module shall have a sticker attached stating compliance to the ITE Standard for color.

LED Signal Lens: The lens of the LED pedestrian signal modules shall be field replaceable.

The lens of the LED pedestrian signal modules shall be polycarbonate UV stabilized and a minimum of 3/16 " thick.

The exterior of the lens of the LED pedestrian signal module shall be smooth and frosted to prevent sun phantom.

LED Pedestrian Signal Module Construction: LED Pedestrian Signal Module Construction

The LED pedestrian signal module shall be a single, self-contained device, not requiring on-site assembly for installation into signal housing.

All Portland Orange LEDs shall be "AlInGaP" technology or equal, and rated for 100,000 hours or more at 25°C and 20 mA. "ALGaAS " technology is not acceptable.

All internal LED and electronic components shall be adequately supported to withstand mechanical shock and vibration from high winds and other sources.

The signal module shall be made of UL94VO flame-retardant materials. The lens is excluded from this requirement.

Each individual LED traffic module shall be identified for warranty purposes with the manufacturer's trade name, serial number and operating characteristics, i.e., rated voltage, power consumption, and volt-ampere.

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Environmental Requirements: The LED pedestrian signal modules shall be rated for use in the ambient operating temperature range of -40°C to +60°C (-40°F to +140°F).

The LED pedestrian signal modules shall be protected against dust and moisture intrusion per requirements of NEMA Standard 250-1991, sections 4.7.2.1 and 4.7.3.2, for type 4 enclosures to protect all internal LED, electronic, and electrical components.

Luminous Intensity

Each module shall provide an average luminous of at least 3750 candela per square meter of lighting surface for the "HAND", and 5300 candela per square meter for the "WALKING PERSON" symbol throughout the warranty period over the operating temperature range.

The luminous intensity of the LED pedestrian signal module shall not vary more than ± 10 % for voltage range of 80 VAC to 135 VAC.

Chromaticity: The measured chromaticity coordinates of the LED signal modules shall conform to the chromaticity requirements of Section 5.3 and Figure C of the PTCSI standard.

Electrical: The secured, color coded, 914 mm (36 in) long, 600V, 20 AWG minimum, jacketed wires, conforming to the National Electrical Code, rated for service at +105°C, ½ inch stripped and tinned are to be provided for electrical connection.

The LED pedestrian signal module shall operate from a 60 ±3 Hz AC line over a voltage range of 80 VAC to 135 VAC. Rated voltage for all measurements shall be 120 ±3 volts rms.

The LED circuitry shall prevent perceptible flicker over the voltage range specified above.

The LED pedestrian signal module circuitry shall include voltage surge protection against high-repetition noise transients and low-repetition noise transients as stated in Section 2.1.6, NEMA Standard TS-2, 1992.

Catastrophic failure of one LED light source shall not result in the loss of more than the light from that one LED.

The LED pedestrian module shall be operationally compatible with the currently used controller assemblies. The LED pedestrian module shall be operationally compatible with conflict monitors.

The LED pedestrian module including its circuitry must meet Federal Communications Commission (FCC) Title 47, Subpart B, Section 15 regulations concerning the emission of noise.

The LED pedestrian module shall provide a power factor of .90 or greater over the operating voltage range and temperature range specified above for modules with 6 watts or more.

Total harmonic distortion (current and voltage) induced into an AC power line by an LED pedestrian module shall not exceed 20% over the operating voltage range and temperature range specified above.

For abnormal conditions when nominal voltage is applied to the unit across the two phase wires (rather than nominal voltage being applied to the phase wire and the neutral wire), the pedestrian signal unit shall default to the upraised hand symbol.

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Quality Assurance: LED pedestrian modules shall be manufactured in accordance with a Vendor quality assurance (QA) program including both design and production quality assurance. All QA process and test results documentation described below shall be kept on file for a minimum of seven years.

Manfacturer Qualification: Manufacturer of the product supplied must have experience with furnishing LED lighting for the installation of at least 5,000 LED traffic signals on any one project in the United States.

Warranty: The unit shall be repaired or replaced by the contractor if it exhibits a failure due to workmanship or material defect within the first 60 months from the date of installation.

16.2 The unit shall be repaired or replaced if the intensity level falls below the requirements specified in LUMINOUS INTENSITY part a, within 36 months from the day of installation.

Finish: All signal sections, with the exception of LED, gaskets, terminal blocks, wiring, sockets, visors, and hardware, shall be finished inside and out with two coats of high grade green enamel (Outdoor Advertising Association #144 Green). Each coat shall be independently baked to resist peeling and chipping.

Hardware: All signal hardware shall be of stainless steel construction.

Measurement and Payment: LED pedestrian signal head will be paid for at the contract unit price per each, complete and accepted. Measurement will include furnishing and installing LED pedestrian signal module and housing, mounting hardware, supplementary hardware and all equipment, tools, labor and incidentals necessary to complete the work.

Payment will be made at the contract unit price under:

Item S-018, LED Pedestrian Signal Head, per each.

ITEM S-019, COMMUNICATION TOWER: The tower shall be 75' and includes the foundation. It shall be high strength steel meeting the requirements of ASTM A-595 grade A or ASTM A-572 and complying with the Louisiana Department of Transportation and Development Standard Specifications. The tower shall be designed to comply with the current edition of the AASTO publications, Standard Specifications for Structural Supports for Highway Signs, Luminaire, and Traffic Signals. The tower and fittings shall be hot dipped galvanized in accordance with the requirements of ASTM A-123. The tower may be assembled by telescoping pole segments on the job site. The base plate shall be made of steel plates having essentially the same chemical composition as the tower and shall be designed to withstand the full bending moment of the shaft. The base shall be secured the bottom section by a continuous electric arc weld. The pole height shall be 75'. The tower shall be suitable for minimum working wind load of 100 MPH.

The pole shaft shall have a base diameter of approximately 18" tapered to approximately 10" diameter at the pole top. The pole shaft may have a round or polygonal cross section. A cap shall cover the pole shaft on top and be welded in place. Lifting holes shall be installed in each section at the overlapping connection(s) for

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compressing the parts together to the manufacturer's recommendations. The mounting bolt circle shall be 20" and holes in the base plate shall be 2-1/4' diameter.

The contractor shall construct an antenna tower foundation, and shall submit details of the foundation design to the Department for approval. Payment for the foundation is included under this item.

Four anchor bolts for the tower shall be provided with the tower and be 1-3/4"x 84" (not including any bent portion), 108KSI yield ASTM A-687-B7 or ASTM A-193-B7. The top 7" of the bolt shall be threaded and the top 12" shall be hot dipped galvanized in accordance with the requirement of ASTM A-123. Leveling and cap nuts shall be provided and have 2-5/8" across the flats and the maximum dome height shall be 1-3/4" with an inside clearance of ½" between the threads and the top of the dome. Two washers shall be provided with each bolt. An additional bolt shall be supplied with each order for testing by DOTD for conformance with specifications.

Payment will be made under:

Item S-019, Communication Tower, per each.

ITEM S-020, ANTENNA: The antenna shall be 9.5 DB Gain, Omnidirect for communication with the District 02 Headquarters. It shall be a directional Yagi capable of 9.5 Db minimum gain at a pre-selected frequency assigned by the Department with maximum VSWR 1.5 to 1. Wind rating minimum (no ice) 100 MPH. Maximum exposed area 2.0 square feet. All phasing harness, mounting brackets, braces and hardware that is required to mount the antenna to the supporting structure shall be included. Construction and hardware to be of non-ferrous metal except mounting brackets which may be of galvanized steel or approved equal. The cable shall be Heliax LDF4-50A, foam filled DB2068, or approved equal. The cable and N type connector shall be included and connected directly from the antenna and to the radio modem.

Payment will be made under:

Item S-020, Antenna, per each.

ITEM S-021, RADIO COMMUNICATION SYSTEM: This item consists of providing the radio system communication as specified in the "Traffic Signal Control System, Traffic Control Standard Number 18A" except as modified below.

The Department will perform the frequency coordinate and apply for licensing to use the frequency. A 75' antenna tower will be provided at the location shown in the plans and paid for under separate items. The tower and its foundation will be constructed in accordance with the specification contained elsewhere herein.

Both labor and material and all incidentals required for an operational radio system not included in the items specified for the antenna and tower shall be provided by the contractor under this item. This includes all necessary hardware to complete the installation of the radio system as designated on the plans and in accordance with good engineering practices. This also includes all testing of the system and coordination with the DOTD District 02 office to ensure the radio communication system provides the required communication with their office.

Telephone terminal boards will be supplied by the Department.

Payment will be made under:

Item S-021, Radio Communication System, per each.

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ITEM NOS.: S-022, FIBER OPTIC DROP CABLE (12 FIBER, SINGLE MODE); S-023, FIBER OPTIC TRUNK CABLE (48 FIBER, SINGLE MODE); S-024, FIBER OPTIC SPLICE CLOSURE (TYPE M); S-025, PRETERMINATED PATCH PANEL (12F, SC DUPLEX SM); S-026, FUSION SPLICE; S-027, PATCH CORD (SINGLE MODE 2F, SC-LC 1 METER); S-028, ETHERNET SWITCH; AND S-029, TESTING: This section includes the furnishing, installing and testing of fiber optic cable, equipment and materials related to the fiber-optic components of the closed loop communication system.

Item S-022, Fiber Optic Drop Cable (12 Fiber Single Mode):

This cable design shall be used to provide a communication path between field devices and the main trunk cable of the system. This cable design is more flexible with a much smaller bend radius than stranded loose-tube cable and shall be used in conjunction with preterminated patch panels. The technical requirements of this cable shall be the same as the trunk cable with the following exceptions.

Cable Construction: Optical fibers shall be placed in a single filled loose buffer tube with a nominal diameter of 3.0 mm. In the case of a hybrid design, the single-mode fibers shall be the first fiber colors in the tube. For this project, a 12-fiber single-mode cable shall be used.

Water swellable dielectric strength members shall be applied evenly around the outside of the buffer tube for tensile strength. The dielectric strength members shall be non-nutritive to fungus and electrically nonconductive. They shall also be free from dirt and foreign matter. Water blocking shall be provided by the strength members, which shall be impregnated with a water swellable compound. The cable shall not have stiff longitudinal rods or any other component that will cause the cable to have a preferential bend.

Cables shall be sheathed with flame-retardant polyvinyl chloride (PVC). The nominal jacket thickness shall be 1.4 mm. The jacketing material shall be applied directly over the tensile strength members. The PVC shall contain carbon black to provide ultraviolet light protection and shall not promote the growth of fungus. The cable shall meet the requirements of the National Electrical Code® (NEC®) Section 770, for Non-Plenum Applications - Applicable Flame Tests: ANSI/UL 1666. The cable shall be listed OFNR. The cable shall contain no metallic elements.

Drop Cable Fiber and Cable Parameters	
Parameter	Value
Multimode attenuation	3.5/1.0 @ 850/1300nm
Single-mode attenuation	0.4/0.3 db/km @ 1310/1550 nm
Coated fiber diameter	245 ± 5 μm
Minimum bend radius (loaded)	4.1 in. (10.5 mm)
Minimum bend radius (unloaded)	2.8 in. (7.0 mm)
Tensile rating short term (Installation)	300 lbf (1320 N)
Tensile rating installed (long term)	73 lbf (330 N)
Nominal outer diameter	0.28 in. (7.0 mm)

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Item S-023, Fiber Optic Trunk Cable (48 Fiber, Single-Mode):

This stranded loose tube cable design shall be used as the main cable type between controller cabinets, cameras, signs or other devices. The cable configuration shall be dictated by the particular communication path, data rate, and distance of the optical path. Three possible designs are all single-mode fiber, all multimode fiber, or a hybrid design containing multimode and single-mode fiber. In the case of a stranded loose tube hybrid design, single-mode and multimode fibers shall not occupy the same buffer tube. Single-mode tubes shall be placed in the first available tubes in the cable (i.e., blue, orange, etc.) based on cable design, multimode tubes shall follow. For this project, 48 fiber single-mode cable shall be installed as shown on the plans.

General Considerations: The cable shall be an accepted product of the United States Department of Agriculture Rural Utilities Service (RUS) 7 CFR 1755.900 and meet the requirements of ANSI/ICEA Standard for Fiber Optic Outside Plant Communications Cable, ANSI/ICEA S-87-640-1999. In addition, the cable shall meet all requirements stated in this specification.

The cable(s) shall be all-dielectric stranded loose tube design. For fiber counts < 24 fibers, a 3 place configuration with 2 buffer tubes and a central member under a common round jacket, providing it meets all requirements contained herein, shall be acceptable.

The cable(s) shall be new and of current design and manufacture.

The cabled fiber and cable provided shall come from the same manufacturer to ensure comprehensive technical and warranty support.

Fiber Specifications: All fibers in the cable must be usable and meet required specifications.

Each optical fiber shall be sufficiently free of surface imperfections and inclusions to meet the optical, mechanical, and environmental requirements of this specification.

Each optical fiber shall consist of a doped silica core surrounded by a concentric glass cladding. The fiber shall be a matched clad design.

Each optical fiber shall be proof tested by the fiber manufacturer at a minimum of 100 kpsi (0.7 GN/m^2).

The fiber shall be coated with a dual layer acrylate protective coating. The coating shall be in physical contact with the cladding surface.

The attenuation specification shall be a maximum value for each fiber at 23 ± 5 °C.

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The single-mode fiber utilized in the optical fiber cable shall meet EIA/TIA-492CAAA, "Detail Specification for Class IVa Dispersion-Unshifted Single-Mode Optical Fibers," and ITU recommendation G.652, "Characteristics of Single-Mode Optical Fiber Cable."

Parameter	Single-Mode Fiber
Typical Core Diameter	8.3 μm (characterized value)
Cladding Diameter	125.0 ± 0.7 μm
Core-to-Cladding Concentricity	≤ 0.5 μm
Cladding Non-Circularity	$\leq 1.0\ \% \quad \left(1 - \frac{\text{Minimum Cladding Diameter}}{\text{Maximum Cladding Diameter}}\right) \times 100$
Coating Diameter	245 ± 5 μm
Attenuation (maximum)	0.35/0.25 dB/km @ 1310/ 1550nm
Attenuation Uniformity	No point discontinuity ≥ 0.10 dB at either 1310 nm or 1550 nm
Attenuation at the Water Peak	At 1383 ± 3 nm shall not exceed 2.1 dB/km
Cutoff Wavelength (cabled) (λ_{ccf})	< 1260 nm
Mode Field Diameter	9.40 ± 0.4 μm at 1310 nm 10.40 ± 0.8 μm at 1550 nm
Macrobend Attenuation	1 turn of fiber around a 32 ± 2 mm diameter mandrel ≤ 0.50 dB at 1550 nm. 100 turns of fiber around a 75 ± 2 mm diameter mandrel ≤ 0.05 dB at 1310 nm and ≤ 0.10 dB at 1550 nm.
Zero Dispersion Wavelength (λ_O):	1302 nm ≤ λ_O ≤ 1322 nm
Zero Dispersion Slope (S_O)	≤ 0.092 ps/(nm²•km)
Maximum dispersion	≤ 3.55 ps/(nm•km) 1285 nm - 1330 nm ≤ 18 ps/(nm•km) at 1550 nm
Fiber Curl	≥ 4.0 m radius of curvature
Fiber Polarization Mode Dispersion (PMD)	$\leq 0.5\ \text{ps}/\sqrt{\text{km}}$

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The multimode fiber utilized in the optical fiber cable shall meet EIA/TIA-492AAAA-A-1997, "Detail Specification for 62.5-µm Core Diameter/125-µm Cladding Diameter Class Ia Graded-Index Multimode Optical Fibers."

Parameter	Multimode Fiber
Typical Core Diameter	62.5 ± 3.0 µm
Cladding Diameter	125.0 ± 2.0 µm
Core-to-Cladding Concentricity	≤ 3.0 µm
Cladding Non-Circularity	$< 2.0\ \% \quad \left(1 - \frac{\text{Minimum Cladding Diameter}}{\text{Maximum Cladding Diameter}}\right) \times 100$
Core non-circularity	$\leq 5\ \% \quad \left(1 - \frac{\text{Minimum Core Diameter}}{\text{Maximum Core Diameter}}\right) \times 100$
Coating Diameter	245 ± 5 µm
Attenuation (maximum)	3.50/1.0 dB/km @ 850/1300 nm
Attenuation Uniformity	No point discontinuity ≥ 0.20 dB at either 850 nm or 1300 nm
Attenuation at the Water Peak	The attenuation coefficient at 1380 nm shall not exceed the attenuation coefficient at 1300 nm by more than 1.0 dB/km.
Macrobend Attenuation	100 turns of fiber around a 75 ± 2 mm diameter mandrel ≤ 0.5 dB at 850 nm or 1300 nm.
IEEE 802.3 Performance	Shall support laser-based Gigabit Ethernet (GbE) 1000BASE-SX operating window (850 nm) at 500 meters, 1000BASE-LX operating window (1300 nm) at 1000 meters without the use of mode conditioning (a.k.a., offset) patch cords.
Minimum Cabled RML Bandwidth	385 MHz•km at 850 nm
Minimum LED Bandwidth	200/500 MHz•km at 850/1300 nm
Numerical Aperture	0.275 ± 0.015

Specifications for Outdoor Cable Construction: Optical fibers shall be placed inside a loose buffer tube. The nominal outer diameter of the buffer tube shall be 3.0 mm, regardless of the fiber count. Each buffer tube shall contain up to 12 fibers. The fibers shall not adhere to the inside of the buffer tube.

Each fiber shall be distinguishable by means of color-coding in accordance with TIA/EIA-598-A, "Optical Fiber Cable Color Coding." The fibers shall be colored with ultraviolet (UV) curable inks.

Buffer tubes containing fibers shall be color-coded with distinct and recognizable colors in accordance with TIA/EIA-598-A, "Optical Fiber Cable Color Coding."

Buffer tube colored stripes shall be inlaid in the tube by means of co-extrusion when required. The nominal stripe width shall be 1 mm.

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For cables containing more than 12 buffer tubes, standard colors are used for tubes 1 through 12 and stripes are used to denote tubes 13 through 24. The color sequence applies to tubes containing fibers only, and shall begin with the first tube. If fillers are required, they shall be placed in the inner layer of the cable. The tube color sequence shall start from the inside layer and progress outward.

In buffer tubes containing multiple fibers, the colors shall be stable across the specified storage and operating temperature range and not subject to fading or smearing onto each other or into the gel filling material. Colors shall not cause fibers to stick together.

The buffer tubes shall be resistant to external forces and shall meet the buffer tube cold bend and shrink-back requirements of 7 CFR 1755.900.

Fillers may be included in the cable core to lend symmetry to the cable cross-section where needed. Fillers shall be placed so that they do not interrupt the consecutive positioning of the buffer tubes. In dual layer cables, any fillers shall be placed in the inner layer. Fillers shall be nominally 3.0 mm in outer diameter.

The central member shall consist of a dielectric, glass reinforced plastic (GRP) rod. The purpose of the central member is to provide tensile strength and prevent buckling. The central member shall be over-coated with a thermoplastic when required to achieve dimensional sizing to accommodate buffer tubes/fillers.

Each buffer tube shall be filled with a non-hygroscopic, non-nutritive to fungus, electrically non-conductive, homogenous gel. The gel shall be free from dirt and foreign matter. The gel shall be readily removable with conventional nontoxic solvents.

Buffer tubes shall be stranded around the dielectric central member using the reverse oscillation, or "S-Z", stranding process. Water swellable yarn(s) shall be applied longitudinally along the central member during stranding.

Two polyester yarn binders shall be applied contra-helically with sufficient tension to secure each buffer tube layer to the dielectric central member without crushing the buffer tubes.. The binders shall be non-hygroscopic, non-wicking, and dielectric with low shrinkage.

For single layer cables, a water swellable tape shall be applied longitudinally around the outside of the stranded tubes/fillers. The water swellable tape shall be non-nutritive to fungus, electrically non-conductive, and homogenous. It shall also be free from dirt and foreign matter.

For dual layer cables, a second (outer) layer of buffer tubes shall be stranded over the original core to form a two-layer core. A water swellable tape shall be applied longitudinally over both the inner and outer layer. The water swellable tape shall be non-nutritive to fungus, electrically non-conductive, and homogenous. It shall also be free from dirt and foreign matter.

The cables shall contain at least one ripcord under the sheath for easy sheath removal.

Tensile strength shall be provided by the central member, and additional dielectric yarns as required. The dielectric yarns shall be helically stranded evenly around the cable core. The central member and/or other strength members shall not cause the cable to have a preferential bend.

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Non-armored cables shall be sheathed with medium density polyethylene (MDPE). The minimum nominal jacket thickness shall be 1.4 mm. Jacketing material shall be applied directly over the tensile strength members (as required) and water swellable tape. The polyethylene shall contain carbon black to provide ultraviolet light protection and shall not promote the growth of fungus.

The jacket or sheath shall be free of holes, splits, and blisters. The cable jacket shall contain no metal elements and shall be of a consistent thickness.

Cable jackets shall be marked with the manufacturer's name, month and year of manufacture, sequential meter or foot markings, a telecommunication handset symbol as required by Section 350G of the National Electrical Safety Code® (NESC®), fiber count, and fiber type. In addition to these standard markings, the cable shall also be marked with "LA DOTD Traffic Signal Cable" in the same print and manner as the standard print. The actual length of the cable shall be within -0/+1% of the length markings. The print color shall be white. The height of the marking shall be approximately 2.5 mm. The location of switch back points shall be marked on the outer jacket to facilitate mid-span access. Re-marking during the manufacturing process shall not be allowed.

The maximum pulling tension shall be 608 lbf (2700 N) during installation (short term) and 200 lbf (890 N) long term installed.

The shipping, storage, and operating temperature range of the cable shall be -40°C to +70°C. The installation temperature range of the cable shall be -30°C to +70°C.

General Cable Performance Specifications: When tested in accordance with FOTP-3, "Procedure to Measure Temperature Cycling Effects on Optical Fibers, Optical Cable, and Other Passive Fiber Optic Components," the change in attenuation at extreme operational temperatures (-40°C and +70°C) shall not exceed 0.15 dB/km at 1550 nm for single-mode fiber and 0.3 dB/km at 1300 nm for multimode fiber.

When tested in accordance with FOTP-82, "Fluid Penetration Test for Fluid-Blocked Fiber Optic Cable," a one-meter length of unaged cable shall withstand a one-meter static head or equivalent continuous pressure of water for one hour without leakage through the open cable end.

When tested in accordance with FOTP-81, "Compound Flow (Drip) Test for Filled Fiber Optic Cable," the cable shall exhibit no flow (drip or leak) of filling and/or flooding material at 70°C.

When tested in accordance with FOTP-41, "Compressive Loading Resistance of Fiber Optic Cables," the cable shall withstand a minimum compressive load of 125 lbf/in (220 N/cm) applied uniformly over the length of the sample. The125 lbf/in (220 N/cm) load shall be applied at a rate of 0.1 in. (2.5 mm) per minute. The load shall be maintained for a period of 1 minute. The load shall then be decreased to 63 lbf/in (110 N/cm). Alternatively, it is acceptable to remove the 125 lbf/in (220 N/cm) load entirely and apply the 63 lbf/in (110 N/cm) load within five minutes at a rate of 0.1 in. (2.5 mm) per minute. The 63 lbf/in (110 N/cm) load shall be maintained for a period of 10 minutes. Attenuation measurements shall be performed before release of the 63 lbf/in (110 N/cm) load. The change in attenuation shall not exceed 0.15 dB at 1550 nm for single-mode fibers and 0.3 dB at 1300 nm for multimode fiber.

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When tested in accordance with FOTP-104, "Fiber Optic Cable Cyclic Flexing Test," the cable shall withstand 25 mechanical flexing cycles around a sheave diameter not greater than 20 times the cable diameter. The change in attenuation shall not exceed 0.15 dB at 1550 nm for single-mode fiber and 0.3 dB at 1300 nm for multimode fiber.

When tested in accordance with FOTP-25, "Repeated Impact Testing of Fiber Optic Cables and Cable Assemblies," except that the number of cycles shall be two at three locations along a one meter cable length and the impact energy shall be at least 4.4 Nm (in accordance with ICEA S-87-640)", the change in attenuation shall not exceed 0.15 dB at 1550 nm for single-mode fiber and 0.3 dB at 1300 nm for multimode fiber.

When tested in accordance with FOTP-33, "Fiber Optic Cable Tensile Loading and Bending Test," using a maximum mandrel and sheave diameter of 560 mm, the cable shall withstand a rated tensile load of 601 lbf (2670 N) and residual load of 30% of the rated installation load. The axial fiber strain shall be ≤ 60% of the fiber proof level after completion of 60 minute conditioning and while the cable is under the rated installation load. The axial fiber strain shall be ≤ 20% of the fiber proof level after completion of 10 minute conditioning and while the cable is under the residual load. The change in attenuation at residual load and after load removal shall not exceed 0.15 dB at 1550 nm for single mode fiber and 0.3 dB at 1300 nm for multimode fiber.

When tested in accordance with FOTP-85, "Fiber Optic Cable Twist Test," a length of cable no greater than 2 meters shall withstand 10 cycles of mechanical twisting. The change in attenuation shall not exceed 0.15 dB at 1550 nm for single-mode fiber and 0.3 dB at 1300 nm for multimode fiber.

When tested in accordance with FOTP-37, "Low or High Temperature Bend Test for Fiber Optic Cable," the cable shall withstand four full turns around a mandrel of ≤ 20 times the cable diameter after conditioning for four hours at test temperatures of -30°C and +60°C. Neither the inner nor the outer surfaces of the jacket shall exhibit visible cracks, splits, tears, or other openings. The change in attenuation shall not exceed 0.3 dB at 1550 nm for single mode fiber and 0.5 dB at 1300 nm for multimode fiber.

Quality Assurance Provision: All cabled optical fibers > 1000 meters in length shall be 100% attenuation tested. The attenuation of each fiber shall be provided with each cable reel.

The cable manufacturer shall be ISO 9001 registered.

Packaging: The completed cable shall be packaged for shipment on non-returnable wooden reels or steel reels. The cable shall be protected from damage with a flexible cover wrapped around the cable between reel flanges.

Top and bottom ends of the cable shall be available for testing. Both ends of the cable shall be sealed to prevent the ingress of moisture. Each reel shall have a weather

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resistant reel tag attached identifying the reel and cable. The reel tag shall include the following information:

Cable Number	Gross Weight
Shipped Cable Length in Feet	Job Order Number
Manufacturer Product Number	Customer Order Number
Date Cable was Tested	Manufacturer Order Number
Cable Length Markings	Item Number
a: Top (inside end of cable)	
b: Bottom (outside end of cable)	

The reel (one flange) marking shall include:
"Manufacturer"
Country of origin (e.g., USA)
An arrow indicating proper direction of roll when handling
Fork lift-handling illustration
"DO NOT SHIP REEL ON SIDE" or
"DO NOT LAY REEL ON ITS SIDE"

Each cable shall be accompanied by a cable data sheet. The cable data sheet shall include the following information:

Manufacturer Cable Number	Manufacturer Product Number
Manufacturer Factory Order Number	Customer Name
Customer Purchase Order Number	Ordered Length
Maximum Billable Length	Actual Shipped Length
Measured Attenuation of Each Fiber (for lengths > 1000 m)	Bandwidth Specification (where applicable)

Miscellaneous: The cable manufacturer shall provide installation procedures and technical support concerning the items contained in this specification.

The manufacturer shall provide a 24-hour per day technical assistance hotline.

Cable and fiber manufacturer shall be vertically integrated to ensure long-term reliability of the cabled fiber and to ensure comprehensive technical support and warranty support.

Item S-024, Fiber Optic Splice Closure (Type M):

Splice closures shall be used for through, branch or drop splice locations, under-grade or aerial. Three sizes of splice closures are possible. Type S splice closure shall have capacity of up to 48 single fiber splices in four 12-fiber splice trays. Type M splice closure shall have a capacity of up to 144 single fiber splices in four 36-fiber splice trays. Type L splice closure shall have a capacity of up to 288 single fiber splices in eight 36

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fiber splice trays. All closure sizes shall accommodate a minimum of six cable entries in one end.

The closure shall be comprised of two end plates and two glass-filled high-density thermoplastic shells. The thermoplastic shells shall have a permanently installed neoprene gasket and shall not require any additional material for re-entry. The closing hardware shall be captive to the top shell. The torquing sequence shall be molded into the shells. The top shell shall have a factory installed air valve port.

One end plate shall have six pre-molded cable ports in a three-section configuration; the opposite end plate shall be solid. The three section end plate shall have four entry ports that will accommodate up to a 7/8" (22 mm) cable and two entry ports that will accommodate up to a 3/4" (32 mm) cable. Weather resistant urethane grommets shall be available for both the 3/4 and 7/8 inch ports to allow the installation of smaller diameter drop cables and shall have a minimum of 3 cable entries. These grommets shall be used for any drop cable entry (cable diameter 0.27" to 0.31"). The end cap shall provide individual central member tie off points and achieve a watertight seal without the use of sealing washers. End plates shall have accommodations for external grounding of shielded cables.

All exposed metal on the closure shall be machined stainless steel. The Type S closure shall have a nominal diameter of 6" and a nominal length of 17". The Type M closure shall have a nominal diameter of 6" and a nominal length of 22". The Type L closure shall have a nominal diameter of 8.5" and a nominal length of 22". The end plates for the Type S, M and L closures shall be interchangeable. The closure shall require no special tools; drill kits, torches or power supplies for assembly, reentry or additional cable entries. The closure shall be suitable for installation in aerial, handhold or buried applications. An aerial bracket shall be employed for aerial installations. The closure shall be tested in accordance with GR-771-core, meet all requirements therein, and shall have test data demonstrating compliance. The closure shall not require encapsulation. The closure shall be provided with plugs for unused ports. The closure shall be provisioned with a storage compartment kit for loose tube mid-span splicing applications. (Preformed Line Products Pup (8006622 & Coyote Closures 8006560/8006561 or approved equal.)

Fiber optic splice tray 36 fiber: The splice tray shall be used in conjunction with splice enclosure, shall be from the same manufacturer, and shall be fully compatible with the splice enclosure supplied. The splice tray shall be of molded thermoplastic construction with a clear plastic hinged cover. The splice tray shall have removable tabs around the perimeter of the fiber compartment for fiber routing. Each splice tray shall include tie wraps, felt strips, and labeling device. The 12 fiber splice tray shall have the capacity for 12 individual heat shrink protected fusion splices; nominal dimensions of 6-7/8" L x 5-1/2" W x 7/16" H and be used in conjunction with type S closure. The 36 fiber splice tray shall have the capacity for 36 individual heat shrink protected fusion splices in three elastomer 12-count splice blocks; splice tray nominal dimensions of 11" L x 5-1/2" W x 7/16" H and be used in conjunction with type S closure. For the 36-fiber tray, regardless of the number of splices made in the splice tray, elastomer blocks shall be installed for up to 36 fibers. (Preformed Line Products 80806033 and 80805110 or approved equal).

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Aerial Bracket-for aerial mount splice closures, an aerial bracket designed specifically for the closure used shall be supplied to secure the closure to the strand. (Preformed Line Products 8003325 or approved equal).

Splice trays, aerial brackets, heat shrink protection sleeves and ancillary materials necessary to complete construction per the plans shall be considered incidental to the splice closure.

Item S-025, Preterminated Patch Panel (12f, SC Duplex Single-Mode):

The preterminated patch panel in conjunction with a drop cable serves as the attachment point from the controller cabinet to the trunk cable.

The preterminated patch panel shall be comprised of a factory terminated housing and a length of drop cable. The patch panel shall be an epoxy filled ABS Plastic housing with nominal dimensions of 10.4" long, 1.5" wide and overall depth of 1.4" from coupler tip to the base of the unit. The patch panel shall have six duplex SC SM couplers with ceramic inserts vertically arrayed along the length of the housing. The couplers shall be configured in a stair-stepped arrangement to facilitate easy access to each coupler pair. Each coupler port shall have a label affixed to designate the port number. The connectors on the inside of the housing shall be factory terminated to a PC finish (> -40 dB) with a maximum insertion loss of 0.40 dB. The inside of the housing shall be filled with an epoxy to permanently secure the connectors and the cable on the inside of the housing. The housing shall incorporate a 2.5-inch strain relief boot around the exiting drop cable to provide bend radius protection. The housing shall have integrated mounting notches for field mounting.

Each preterminated patch panel shall be provided with factory test results for back reflection and insertion loss. This test report shall reference the serial number of the patch panel. The test report shall be provided to the Project Engineer after installation. (Fiber Connections Gator Patch GP2J012FN-Bxx, where xx represents the length of the drop cable in meters, or approved equal).

The preterminated patch panel shall be shipped coiled or on a spool, in either case the free end of the cable shall be on the top end of the coil or spool.

Item S-026, Fusion Splice:

Unless noted, all optical fiber splices shall be fusion splices. Splices shall be made with a fusion splicing machine capable of active fiber alignment via Local injection/detection or PAS. Maximum splice loss allowable shall be 0.10 dB.

Splices shall be protected using an industry standard 60 mm heat shrink protection sleeve incorporating a stainless steel rod.

Protection sleeves shall be shrunk using a heat-shrink oven; no open flame, heat gun or other device shall be used.

Item S-027, Patch Cord, Single Mode (f, SC-LC 1 Meter):

Any patch cord used for system configuration shall be compatible with fiber types and connectors specified herein. Multimode patch cords shall be orange in color; single-mode patch cords shall be yellow in color. All cordage shall incorporate a 900 um buffered fiber, aramid yarn strength members, and an outer jacket. Patch cords may be

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simplex (1 fiber) or duplex (2 fiber), depending on the application. Simplex patch cords shall be constructed of 3.0 mm OD cordage, Duplex patch cords shall be constructed of "zip cord" cordage with a nominal diameter of 2.0 mm x 4.0 mm. All patch cords shall feature factory terminated, heat cure ceramic ferrule connectors. Strength members of the cordage shall be crimped to the connector body. Insertion loss for each connector @ 1300 nm shall be <0.40 dB for multimode connectors. Insertion loss for each connector @ 1310 nm shall be <0.40 dB for single-mode connectors. Return loss for single-mode connectors shall be > -40 dB. Patch cords shall have part number, manufacturer, and Lot number affixed onto the jacket of the assembly. Test measurements shall be documented and shall be included with the packaging of each assembly. SC/LC duplex patch cords shall have contrasting boot colors at each end of the assembly to designate transmit and receive functions. For duplex patch cords, a user-installed clip to fix polarity for LC and SC connectors shall be provided. The cable assembly manufacturer shall be ISO 9001 Certified.

Item S-028, Ethernet Switch:

General Requirements:

The Ethernet network shall be comprised of an environmentally hardened Ethernet switching hub (i.e. Ethernet switch), herein referred to as a 'switch', compliant with IEEE 802.3 (10 Mbps) and IEEE 802.3u (100 Mbps).

The switch shall be industrial-grade switching product that provides wire-speed Fast Ethernet and Gigabit Ethernet connectivity for deployment in harsh environments. It shall be comprised of industrial-grade components, a compact form factor, convection cooling, and relay output signaling to extend intelligent services such as enhanced security, high availability, and advanced quality of service (QoS) to areas that cannot be served by traditional commercial-grade Ethernet switches.

The switch shall be embedded with software that allows administrators to easily configure features, monitor performance, and troubleshoot multiple switches using a standard Web browser. If needed, the switch shall support Simple Network Management Protocol (SNMP)-based network management platforms.

The software functionality shall support traditional data, video, and voice services, with enhanced intelligent services features for additional security, advanced QoS, and high availability. Intelligent services are critical in supporting the reliability and determinism of proprietary Layer 2 solutions typical of industrial Ethernet deployments, while providing the advantages (standardization, open connectivity, bandwidth, integration, etc.) of an advanced Ethernet switching architecture. These intelligent services shall include Layers 2-4 traffic prioritization, rate limiting, and security filtering, helping to ensure the high uptime, low latency, deterministic performance, and data integrity critical for industrial automation control networks.

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Functional Hardware Requirements:

Feature	Specifications
Operating Temperature	-40° to 60° C / -40° to 140° F
Relative Humidity	5%-95% non-condensing
Cooling	Passive (no fans)
Shock/Vibration	50 g 500 Hz Trapezoidal/MIL-STD-810
Dimensions (inches) hxdxw	3.75x5x8
Cabling	Front and Downward
Alarm Relays	2 normally closed
LED	Relay, Power (for each source), Port Status (similar to 2950)
Mounting Options	Din Rail (ports front or downwards) Rack Mounting Adapters
Power Transformer	Separate SKU Din Rail (110/220 AC)
Power	24 V DC (Optional Redundant Power)
Power Surge Protection	30%
Warranty	5 – year Limited Lifetime

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Software and Performance Requirements:

High Availability	IGMP Snooping Support 4,000 VLANS Broadcast Storm Control Rapid Spanning Tree Support
Quality of Service	4 service queues Weighted Round Robin Queuing Strict Priority Scheduling
Security	Security Access Control Lists (Layers 2-4) SNMP v3 Support
Peformance Specifications	13.6 Gbps switching fabric Forwarding Rate up to 4.8Mpps Configurable up to 8,000 MAC addresses
Standards Supported	IEEE 802.1x Security Support IEEE 802.1w Rapid Spanning Tree Protocol (RSTP) IEEE 802.1s Multiple Spanning Tree Protocol (MSTP) IEEE 802.3x full duplex on 10BASE-T, 100BASE-TX, and 1000BASE-T ports IEEE 802.1D Spanning-Tree Protocol IEEE 802.1p CoS prioritization IEEE 802.1Q VLAN IEEE 802.3 10BASE-T specification IEEE 802.3u 100BASE-TX specification IEEE 802.3ab 1000BASE-T specification IEEE 802.3ad Link Aggregation Control Protocol (LACP) IEEE 802.3ah Ethernet in the First Mile (EFM) RMON I and II standards SNMPv1, SNMPv2c, and SNMPv3

Mounting Requirements: The switch shall provide options for DIN Rail mounting or panel mounting via brackets or other mounting options as approved by the Project Engineer.

Warranty: The Switch shall be warranted for defects in material and workmanship for five (5) years after shipment.

Construction:

General OSP Cable Installation: The Contractor shall submit to the Project Engineer for approval a detailed construction and installation procedure (SOP) covering all aspects of the construction and installation process for each specific cable type to be used on this project. The Contractor shall secure from the cable manufacturer the construction and installation procedures to be used on the project. The SOP shall be submitted for review by the Project Engineer. The Contractor shall maintain traffic control that as detailed in the special provision entitled "Maintenance of Traffic".

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Cable Installation Procedures and Standards and Safety Precautions: The Contractor shall follow all appropriate OSHA and industry standards related to safety when working in manholes or underground vaults and when handling optical fibers.

Cable Handling: The Contractor shall install all fiber optic cable according to the manufacturer's recommended procedures and these specifications.

Pulling Tension: The Contractor shall not exceed the maximum recommended pulling tension during installation as specified by the cable manufacturer. Prior to installation of any fiber-optic, the contractor shall provide documentation as to how tension will be monitored during cable installation. Cable placed without provisions for tension control shall be considered unfit for use and shall be replaced at the contractor's expense.

Allowable Bend Radius: The Contractor shall not violate the minimum recommended bend radius during installation as specified by the cable manufacturer. Unless the manufacturer's recommendations are more stringent, use the following guidelines for minimum bend radius:

20 X Cable Diameter Short Term - During Installation
10 X Cable Diameter Long Term – Installed

Cable Installation Guidelines: Before the installation begins; the Contractor shall carefully inspect the cable reels for imperfections such as nails that might cause damage to the cable as it is unreeled. The Contractor shall take all necessary precautions to protect reeled cable from vandals or other sources of possible damage while unattended. Any damage to the cable sections may require replacement of the entire section. Whenever unreeled cable is placed on the pavement or surface above a manhole, the Contractor shall provide means of preventing vehicular or pedestrian traffic through the area in accordance with the special detail entitled "Maintenance of Traffic". The Contractor shall use the "figure-eight" method to prevent kinking or twisting when the cable is unreeled or back-fed. The Contractor shall not coil fiber optic cable in a continuous direction except for lengths of 100 feet or less. The preferred size for the "figure-eight" is 15 feet in length, with each loop 5 feet to 8 feet in diameter. When "figure-eighting" cable, the Contractor shall exercise care to relieve pressure on the cable at the crossover points of the eight; this may be done by placing cardboard shims at the crossover or by forming a second "figure-eight". The Contractor shall keep the cable continuous throughout the pull. Cable breaks will only be allowed at designated splice or end points.

Cable End Sealing: After cable placement, all cable ends shall be sealed with an appropriate sized cable cap to prevent water ingress.

Cable Installation Underground/Bridge: The Contractor shall follow established industry norms for underground fiber optic cable construction and cable manufacturers recommended procedures. Traditional pulling or cable jetting methods may be employed for placement. Cable pulling lubricants, placing equipment or ancillary materials are considered incidental to the cable installation.

Cable Installation Aerial: Cable shall be lashed to existing or new 1/4 EHS messenger. Cable shall be single lashed. The Contractor shall follow established industry norms for aerial fiber optic cable construction and cable manufacturers recommended procedures. New strand installation, lashing wire, additional guying,

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existing cable repositioning, and any other make ready work or ancillary materials are considered incidental to the cable installation.

Cable Storage: At designated intervals throughout the cable plant, the Contractor shall pull and store excess cable slack for future terminations or splicing. Unless otherwise noted on the plans, the following are the requirements for cable storage:

For Pull Boxes, the Contractor shall apply the following storage requirements for the indicated situations:

Trunk cable at mid-span splice locations (coiled uncut slack) - 100 feet
Trunk cable at slack storage locations (coiled uncut slack) - 50 feet
Trunk cable end point - 50 feet
Drop cable (from controller cabinet) end point – 50 feet

For Controller Cabinet locations, the Contractor shall apply the following storage requirement:

Controller Cabinet End point –10 feet (from patch panel to conduit entry)

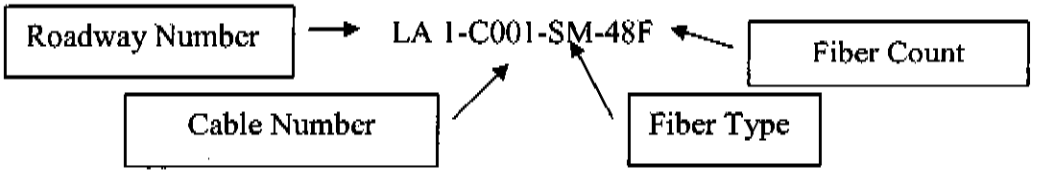
The Contractor shall properly store all cable to minimize susceptibility to damage. The Contractor shall maintain proper bend radius, both short and long term, during cable storage. Pull Boxes: store the excess or slack cable in the pull box or communication box in accordance with the Plans details. Controller Cabinet: coil slack in a hand coil not to exceed the minimum bend radius of the fiber and secure with cable ties.

For Aerial Splice point locations:

Trunk cable midpoint (coiled uncut slack) – 80 feet
Trunk cable end point - 40 feet
Drop cable (from controller cabinet) end point - 40 feet

For Aerial Slack storage locations-100 feet (2 brackets 50' apart): The slack requirements above may be modified by the written approval of the Project Engineer, in particular in locations where splicing operations require additional slack.

Cable Marking: The cable label shall be a minimum of 2" wide wrap around style with a clear film over-wrap. It shall be specifically designed for outside plant environments. The Contractor shall use only permanent marking pens, as recommended or provided by the manufacturer. For all cable applications, the Contractor shall legibly print the Roadway number, cable ID number, Fiber Type, and fiber count as shown in the Plans with a permanent-marking pen as recommended by the label manufacturer and seal with a laminate covering. The following is an <u>example</u> of the cable labeling scheme:



The Contractor shall clean the installed cable of all dirt and grease before applying any label. The Contractor shall follow the label manufacturer's recommended procedure for applying cable labels. The Contractor shall label all cables in every pull box and splice closure. The Contractor shall place cable labels in the following locations:

Within 18" of every cable at its entry to a pull box

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Within 18" of every cable at its exit from a pull box (in the case of coiled slack)
Within 18" of every cable entry into a splice closure (aerial or undergrade)
(For drop cables, label as "Drop to *Intersection name/number*")

Splice Closure Installation: The Contractor shall follow the manufacture's recommended procedures for closure installation.

Unless detailed in the plans, all non-endpoint splices shall be made using mid-span access techniques. Only fibers to be spliced shall be cut, all remaining fibers occupying the same buffer tube shall be stored uncut in the splice tray. Un-cut buffer tubes shall be stored in the closure in an orderly manner and shall be accessible for future splicing operations. If a prescribed buffer tube length for mid-span splicing is not recommended by the manufacture, two times the recommended strip length for through splices shall be stored in the closure. For mid-span splice locations, the trunk cable shall enter the two outside lower ports on the closure; the drop cable shall enter the middle port through one of the three available grommet entry ports.

All buffer tubes shall be labeled within 2" of the splice tray using a permanent marker or wrap around write-on labels. Labels shall designate route of the fiber (for example, "trunk north", "drop cable", etc.). In addition, all splices in splice trays shall be labeled using the scheme supplied by the manufacturer of the splice tray. The labeling on the tray shall designate left side fiber/tube/cable and right side Fiber/tube/cable. After splicing operations are complete, a flexible sealant (RTV) shall be applied to the heat shrinks. A clear plastic film shall be used to cover the sealant and heat shrinks to keep the sealant from making contact with fibers or the splice tray cover. A calibrated torque wrench shall be used for final assembly of the splice closure. Flash test shall be per the manufacturers recommended method.

Pigtails shall be labeled at the splice tray exit point in numerical order (example: 1, 2…12).

Preterminated Patch Panel/Patch Cord/Ethernet Switch Installation:

Prior to installation, the contractor shall get approval from the Project Engineer as to the placement of these components in the traffic control cabinet.

Item S-029, Testing:

Pre-Installation OTDR Testing. The contractor shall test all fibers in each reel of cable prior to installation. This testing shall be for both continuity and attenuation. The tests shall be conducted at 1550 nm for single mode fibers. The testing shall be performed by a qualified technician using an Optical Time Domain Reflectometer (OTDR) via a "pigtail" splice. The pigtail (pulse suppressor) shall be a minimum of 100 meters to allow the entire length of fiber under test to be visible on the trace. The resultant OTDR trace(s) shall reflect overall length, attenuation expressed in dB/km, and shall indicate no point discontinuity >0.10 dB. All test results shall be within ± 0.02 dB/km of factory supplied attenuation measurements for single mode fibers. Testing shall be conducted in one consistent direction only. Resulting traces shall be supplied to the Project Engineer in electronic format (1.44 mb 3.5" disk) prior to installation of the cable. The contractor may opt, at his discretion, to accept factory

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results and install cable at his own risk. In either case, On-the-reel test results and/or factory supplied attenuation values shall be provided to the Project Engineer prior to cable installation.

Post Installation Testing: After all splicing operations have been completed, all connectorized links (patch panel to patch panel) in the system shall be testing using a calibrated laser light source and power meter. The test shall be performed at 1310 nm and 1550 nm in one direction only. Results shall be organized and presented in a logical manner in an 8.5" x 11" binder to the Project Engineer. Each tested link shall indicate the date tested, direction of the test (near end/far end), reference levels, make and model of test equipment used, and loss per link in dB. An estimated loss calculation shall be supplied based on fiber distance for each link. Loss for each link shall not exceed the cumulative specified losses of the components in the link. (Example, @ 1310 nm, a 1 km link with 2 splices and a connector pair on each end shall not exceed 1.35 dB (0.35 dB + 0.10 dB + 0.10 dB + 0.4 dB + 0.4 dB)). Consideration of connector variability shall be noted when evaluating the test results.

After all splicing operations have been completed, the cable plant shall be tested for continuity and attenuation using an OTDR at 1310 nm and 1550 nm. All trunk fibers shall be tested. All trunk fibers shall be tested using a pulse suppressor of at least 100 meters in length.

At all intersection locations, all spliced fibers shall be tested. The resultant OTDR traces shall demonstrate compliance with connector/splice loss specifications as well as the absence of any point discontinuity >0.10 dB. An event table or individual splice loss measurements shall be displayed on the OTDR Traces. Attenuation per kilometer shall also be displayed.

For un-spliced or "stranded" fibers, the test shall be performed from one consistent direction only. The resultant OTDR traces shall demonstrate compliance with splice loss specifications as well as the absence of any point discontinuity >0.10 dB. An event table or individual splice loss measurements shall be displayed on the OTDR Trace. Attenuation per kilometer shall also be displayed.

Attenuation measurements shall be within ± 0.02 dB/km of factory values of the cable(s) prior to installation. Cursor and marker locations shall be placed in linear fiber, not in any dead zone created by the pigtail splice. Any point discontinuity of > 0.10 dB shall be evaluated for cause. Any point discontinuity > 0.10 dB resulting from installation or manufacturing shall require the replacement of the entire cable segment affected at no expense to the Department for either labor or materials.

The Contractor shall provide disk based traces and accompanying software, or provide hard copy traces. In either case, the minimum information required on the traces shall be:

Date of Test	Near End/Far End
Operator/Technician performing test	Pulse width
Wavelength tested	Distance/dB Scale
Sheath length of Cable	Attenuation in dB/km

An event table indicating splice loss and or any point discontinuities

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Single direction OTDR measurements of splice loss that show a splice loss greater than 0.10 dB shall be measured bi-directionally and averaged for true splice loss. If the bi-directional average is greater than 0.10 dB, the splice shall be remade. If the bi-directional average is less than 0.10 dB, the splice will be acceptable. No additional payment will be made for this measurement.

Contractor Warranty and Maintenance: Any and all warranties and guarantees shall comply with section 104.05 of the 2000 edition of the Louisiana Standard Specifications For Roads and Bridges.

As Built Documentation: Provide to the Project Engineer four copies of as built documentation of all work provided in accordance with this specification prior to Final Acceptance of the Project. As a minimum, include in the as built documents the following:

Manuals: Operator's manual detailing operating instructions for each different type of equipment installed.

Maintenance procedures manual detailing manufacturers preventative and corrective maintenance procedures for each different type or model of equipment installed.

System connectivity Diagrams detailing fiber-optic and electrical system interconnection cables. For the fiber-optic system, footage marks at each splice closure for all cables shall be included in the diagrams. Location and amount of coiled or aerial slack shall also be shown on the diagram. Any deviation from the fiber-optic splice plan shall be detailed on the diagrams. Drawings shall be in 11" x 17" (A3) format. The Project Engineer may, at his discretion, provide the base route drawings in electronic format for annotation. Four sets of diagrams shall be provided in hard copy or electronic copy to the Engineer.

As Built Drawings that detail the final installation route of all cable shall include depth of conduit and exact pull box locations. These drawings may be combined with items shown above.

All project documentation shall be organized in a logical, orderly manner. The Contractor shall provide documentation in bound form in 3 ring binders. The Contractor shall deliver as built documentation no later than 30 days after the completion of the installation.

Submittals: Prior to any work, the Contractor shall obtain approval from the Project Engineer for the products and procedures to be used or furnished on the project. Submittal data shall be organized in an orderly manner; data shall be separated by material type. The Contractor shall provide four copies of the submittal package to the Project Engineer. The following table details the submittal requirements for the equipment for a particular pay item.

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The table is a guideline and does not relieve the contractor from submitting additional information to form a complete submittal package.

Material	Specification Reference	Catalog Cuts	Mfg. Specs	Factory Test	Install. Docs.	Test Schedule	Test Plan	Test Reports	Submittal Due Date (Cal. Days after NTP)
FO Cable	2.1-2.2	X	X	X	X	X	X	X	30 Days
Splice Closure	2.3	X	X	X	X				30 Days
Preterminated Patch Panel	2.4	X	X	X				X	30 Days
Fusion Splice	2.5	X	X					X	30 Days
FO Patch Cords	2.6	X	X	X					30 Days
Ethernet Switch	2.7	X	X						30 Days
Cable Labels	2.8	X	X		X				30 Days

Measurement and Payment:

Fiber Optic cable, including drop cable, shall be measured for payment by the amount actually installed, complete, functional, and accepted. Unless otherwise specified in the Plans, all costs for materials, testing, labeling and storage shall be included in the overall cost of the cable installed.

Splice Closures shall be measured for payment by the actual number of units installed, tested and accepted.

Fiber optic splices shall be measured for payment by the actual number of splices made, tested and accepted.

Preterminated patch panels shall be measured for payment on the actual number of preterminated patch panels installed and tested. Because the length of each assembly varies depending on the location of the splice point, payment for the drop cable will be made in the line item, Fiber Optic Drop Cable, 12 Fiber, Single Mode, per linear foot. However, the patch panel and drop cable are to be installed as a unit.

Patch cords shall be measured for payment by the actual number of units installed, tested and accepted.

Fiber optic snowshoes shall be measured for payment by the actual number of units installed and accepted.

Ethernet switches shall be measured for payment by the actual number of units installed, tested and accepted.

All testing required under section 2.9 shall be measured as a lump sum for full delivery of testing and acceptance requirements. Measurement of testing includes subsistence necessary to conduct the testing. Payment of the lump sum will be made after all test results are accepted by the Project Engineer.

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Payment:

Fiber optic cable, closures, fusion splices, Preterminated patch panels, patch cords, aerial slack storage brackets, Ethernet switches and testing are paid for at the Contract Unit Price for the various items. Payment is full compensation for furnishing and installing the items complete and in place according to this Specification.

Payment shall be made at the contract unit price under:

Item S-022, Fiber Optic Drop Cable (12 Fiber, Single Mode), per linear foot.
Item S-023, Fiber Optic Trunk Cable, (48 Fiber, Single Mode), per linear foot.
Item S-024, Fiber Optic Splice Closure, (Type M), per each.
Item S-025, Preterminated Patch Panel, (12F, SC Duplex SM), per each.
Item S-026, Fusion Splice, per each.
Item S-027, Patch Cord, Single Mode (2F, SC-LC 1 Meter), per each.
Item S-028, Ethernet Switch, per each.
Item S-029, Testing, per lump sum.

TEM S-030 and S-031, PULL BOXES (TYPE GG, 24" x 36" x 36") AND (TYPE HH, 30" x 48" x 36"):

General: The purpose of this specification is to define the minimum material and physical requirements used to manufacture pre-cast traffic signal wiring pull boxes.

Material Specifications:

The material shall provide high strength with the following minimum properties:

Compressive Strength.....11,000 psi
Tensile Strength ..... 1,200 psi
Flexural Strength..... 2,400 psi
Temperature Range.....-40 to +140 °F

Resistance of the material to chemicals shall conform to the defined testing method of ASTM D-543, Section 7. Additional requirements are sunlight resistance and non-flammable, tested in accordance with ASTM G-53 and ASTM D-635, respectively. Material in the finished product shall retain 75% of the values tested on the control specimen. The material supplied shall not have cracks, checks, blisters, or surface pits. Weathering changes shall not affect the sunlight resistance characteristics nor produce an unsightly appearance such as spots or conspicuous color. The color of the finished material shall be of typical concrete/composite gray.

Both the box and cover shall be designed for a static vertical load of 15,000 pounds. A 25,500 pound vertical test load shall be applied to each over a 10" square area without any part breaking. The box load shall be designed for a lateral load of 800 psf. A 1,200 psf test load shall be applied without any part breaking.

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Dimensional requirements of the boxes shall be in accordance with the following table:

Type	Size (L x W x D) (in.)
G	24 x 36 x 18
GG	24 x 36 x 36
H	30 x 48 x 18
HH	30 x 48 x 36

Type GG & HH may be a single depth pull box of 36" or may be comprised of two stacked 18" (Type G or H) boxes to achieve the required depth.

A foot area shall be provided around the entire perimeter of the box. The interior of the box shall be hollow. A non-skid surface shall be provided on the top of the cover to prevent a slippery surface when wet or dry. The cover shall be embossed with the legend "Traffic Signal" and shall be constructed of the same material as the body of the box. Steel or iron material is not acceptable. Stainless steel or brass bolts, washers, and/or inserts shall be provided to secure the cover in place. See plan details for additional information.

Pull boxes shall be installed as indicated on the plan details.

Pull boxes shall have 2 pieces of steel pierced channel (Unistrut No. P1000-H3 or equal) installed on one wall of the longer side of the pull box. See project plans for spacing details.

Type H & HH pull boxes shall have a two-piece top.

Submittal Data: Submittal data indicating compliance with these standards shall be accompanied by test documents signed by a registered professional engineer. Detailed technical information, including drawings, etc., on the material being offered shall be supplied to the Project Engineer prior to installation.

Measurement and Payment: Pull box installations shall be measured for payment by the number of pull boxes with concrete pads actually installed, complete, functional, and accepted. Unless otherwise specified in the plans, all costs for installing conduit into, grouting/sealing materials, fill material, restoring asphalt or concrete, shall be included in the overall cost of the pull box. Installing 2" PVC to the existing stub out at traffic controller locations shall be included in the overall cost of installing the pull box and shall be considered incidental to the installation of pull boxes in such locations.

Payment shall be made at the unit contract price under:

Item S-030, Pull Box, (Type GG, 24" x 36" x 36"), per each.
Item S-031, Pull Box, (Type HH, 30" x 48" x 36"), per each.

ITEM S-032 AND ITEM S-033, ADJUST SIGNAL HEAD (3 SECTION, 12" LED LENS, RYG) AND ADJUST SIGNAL HEAD (3 SECTION, 12" LED LENS, R LT. Y LT. G): These items consist of moving existing signal head to new position shown in plans.

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The adjustment of the existing signal head shall be paid for at the contract unit price per each completed and accepted. Measurement shall include moving existing signal head to new position shown on plans and connection of conductors. This item shall include all incidental mounting hardware, supplementary hardware equipment, tools, labor and incidentals necessary to complete the work.

Payment will be made at the contract unit price under:

Item S-032, Adjust Signal Head (3 Section, 12" LED Lens, RYG), per each.
Item S-033, Adjust Signal Head (3 Section, 12" LED Lens, R LT. Y LT. G), per each.

ITEM S-034, HANDRAIL: This item consists of constructing, furnishing and installing handrail at the locations shown in the Project Plans and in accordance with Project Plan details

Payment will be made at the contract linear foot price for handrail, which shall include all material, tools, equipment, labor, incidentals, and the performance of all work necessary to complete the item.

Payment will be made under:

Item S-034, Handrail, per linear foot.

ITEM S-035, EASTBANK RAILROAD SPUR AND STUB TRACKWORK: This item consists of providing all material and labor needed to construct railroad trackwork as shown in the contract drawings and described herein.

All materials, workmanship and installation shall conform to the requirements of the American Railway Engineering and Maintenance-of-Way Association (AREMA), Chapters 1 through 5, 22, 28, and The Portfolio of Trackwork Plans, except as otherwise specified herein.

The work to be performed by the Contractor under this section consists of the following:

1. Removal of existing trackwork; rails and ties.
2. Removal of existing ballast and rail bed.
3. Furnishing and installing railroad tracks for the east bank railroad spur and stub track. Installation includes surfacing and alignment of track after ballast is placed.
4. Furnishing and installing ties and hardware as required for the east bank railroad spur and stub track.
5. Furnishing and installing railroad turnout.
6. Furnishing one set of switch ties for the required turnout.
7. Furnishing four pairs of compromise joints.
8. Geotextile fabric
9. Coordinating the trackwork with the New Orleans Public Belt Railroad to maintain uninterrupted rail traffic.

All track construction designated to be done by the Contractor shall be performed under the direction of personnel experienced with railroad construction.

All track shall be staged so as to minimize interference with rail traffic.

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SPECIAL PROVISIONS

Materials: Materials required to perform the work, include the following:

Rails. Running rails shall be 115RE rail (Relay #1) drilled 3 ½"x6"x6". Guard rails shall be second hand rail, straight and in good condition. Guard rails shall be 90RA rail (Relay).

Joint Bars: 1 pair of relay 115# (36"- 6 hole) joint bars for every 39 ft. section of rail (relay)

1 pair of relay 90# (24" – 4 hole) joint bars for every 39 section of rail (relay).

Turnout: The turnout shall be a new #9 Left hand insulated turnout with a new 115# SMSG frog, 16'-6" switch points and new stock and closure rails conforming to AREMA Plan 910-41.

Compromise Joints. Relay 90# - 115# compromise joints shall be forged steel joints as manufactured by the Cleveland Frog and Crossing Company or approved equal. Joints shall be furnished in pairs designated as Left Hand or Right Hand Joints.

Track Bolts. Track bolts for 115# Track shall be new Standard Oval Neck Track Bolts, 1"x 5 ½", with new Spring Lock Washers and Nuts. Track bolts for 90# track shall be new Oval Neck Track Bolts, 1"x 5 ¼", with new Spring Lock Washers and Nuts.

Tie Plates. Tie plates shall be double shoulder tie plates for 5 ½" base rail (relay). Tie plates for inner guard rail on structure shall conform to AREMA No. 10 tie plates.

Rail Anchors. Rail anchors shall be new 115# Improved Fair drive-on rail anchors.

Track Spikes. High-carbon steel track spikes shall be 5/8-inch square by 6-inches under the head with a reinforced throat. Rail and tie plate spikes shall be new.

Ties. Pre-drilled, dapped, treated timber ties shall be provided to the dimensions specified herein. Ties for all track shall be oak. Size of ties on ballast shall be 7" x 9" x 8'-6".

Ties shall be sawn on four sides. Hardwood ties shall have Gang Nail or Strip Iron Anti-splitting devices installed in each end before treatment. Ties shall be incised, air seasoned, kiln or vapor dried prior to treatment. Steaming or heating in preservative is prohibited. Ties shall be seasoned and treated separately from other mixed species. All ties shall be treated using the "Empty Cell Process". During impregnation, the pressure shall be at least 175 p.s.i. and shall be maintained for a sufficient time to assure adequate penetration and retention of preservative. Ties shall be treated with a solution of 60 percent creosote and 40 percent petroleum conforming to AREMA. All ties shall be treated to refusal Ties shall be sized, drilled for spikes and dapped prior to preservation treatment at the treatment plant. Ties shall be banded in lots of 16 ties per bundle with spacers between bundles to allow forklift unloading. Ties shall be inspected at point of loading, before, during and after creosoting by an authorized Railroad inspector. Each tie must be stamped on both ends by the inspector. Certificate of Inspection shall accompany invoice. The cost of inspection shall be borne by the Contractor.

Switch ties for No. 9 turnout for the spur track (for 115RE rail) shall be furnished in accordance with the "Portfolio of Trackwork Plans" of the AREA Manual. The additional restrictions regarding selection, handling, drying, sawing and treating of ties stated above shall also apply to switch ties. Switch ties shall be banded in lots of 8 with spacers placed between bundles to allow forklift unloading.

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Geotextile Fabric: Shall be of woven or polypropylene continuous filaments polyester or polypropylene fabric. Fabric shall be spun-bound, needle-punched or otherwise mechanically interlocked and shall meet the following minimum requirements:

Physical Properties	Test Methods	Requirements
Weight		4.0 oz. per sq. yd. minimum
Grab Tensile Strength	ASTM D-4632	200 lbs per inch minimum in either direction
Bursting Strength	ASTM D-3786	400 psi
Puncture Resistance	ASTM D-4833	85 lbs. minimum
Trapezoidal Tear	ASTM D-4533	90 lbs. minimum

The geotextile fabric shall be delivered in rolls to facilitate installation. During shipment and storage, the woven fabric shall be wrapped in a heavy-duty covering to protect it from direct sunlight, ultraviolet rays, temperatures greater than 140 degrees F. (60 degrees C.) mud, dirt, dust, debris, and abrasion.

Switch Stand. Switch stand for use in the turnout shall be heavy duty automatic safety switch stand, Racor Style 22E, Trailable, as manufactured by ABC Rail Products, or equal. Switch stand shall be furnished with a padlock pedestal and rigid connecting rod 3'- 1 ½" long to match AREMA standard head rod.

Switch Point Protector. Furnish fabricated manganese switch point guard, Model FM as manufactured by Western-Cullen Hayes, Inc., or approved equal. Switch Point Protector for 115# rail shall be Model FM-3-20-115#RE.

Construction Methods: All track construction not covered specifically herein shall be in accordance with AREMA specifications and recommended practices.

All removed rail, rail cutoffs and fasteners shall be delivered to the Railroad by the Contractor as directed by the Project Engineer. Existing ties shall become property of the Contractor.

The Contractor shall provide access for the Railroad to perform their designated work on spans and approaches to the bridge. Material for track construction shall be placed near the limits of the work by the Contractor.

Contractor shall coordinate work with the Railroad and Signal Subcontractor to adjust track as required for correct signal operation.

Geotextile Fabric. Geotextile fabric shall be placed under the sub-ballast as shown in the typical railroad section. Placement of the fabric shall be in accordance with the manufacturer's instruction. Geotextiles which have a difference between the textures of the two sides shall be unrolled with the bearded or fuzzy side down and smooth side up.

Ties. In unloading material, ties shall be handled with tongs to avoid splitting or bruising. The use of picks or shovels in the handling and placing of ties will be not be permitted. All timber and lumber when delivered at the site of the work shall be neatly stored in piles on blocking above the ground surface.

Ties shall be carefully placed on the steelwork and laid normal to the centerline of the track with the wide heartwood face down. Ties shall be moved only with tongs to minimize any damage incident to handling. Moving and placing ties with

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picks, spike mauls, sledges, or shovels will not be permitted. The top surface of ties shall provide full bearing for the rail or tie plate. Adzing shall be restricted to that necessary to provide a sound and true bearing. All holes bored in the field or cuts made in the field shall be treated with three coats of creosote oil. Holes shall be treated with hole treaters applying preservative under pressure.

Tie Plates. Tie plates shall be so placed that the rails will have full bearing on the plate, and the plate will have full bearing on the tie. Tie plates shall be set at right angles to the rail with the outside shoulder against the base of rail, and centered on the tie. Tracks shall be fully tie-plated.

Rail. The base of rail and the surface of the tie and tie plate shall be cleaned prior to laying. Rail shall be laid without bumping or striking to the standard gage. Rail shall be spiked promptly after laying. Spikes shall be started and driven vertically and square with the rail with approximately 1/8-inch space between the head of the spike and the base of the rail. Two rail-holding spikes shall be used on each tie plate for ties on tangents with the spikes staggered to avoid splitting ties. On curves, three spikes shall be used per tie plate with the third spike placed on the outside of the curve. In no case shall spikes be overdriven or straightened while being driven. If spikes are withdrawn, the holes shall be swabbed with creosote and plugged with tie plugs of proper size to fit the hole.

Standard gage of track is 4 feet 8 2 inches measured at right angles between rail heads in a plane 5/8-inch below top of rail. The track shall be laid to the standard gage on tangents. For curves over 8 degrees, the standard gage shall be widened 1/8-inch for each increment of 2 degrees to a maximum of 4 feet 8-3/4 inches and shall be gated every third tie. When laying rail, the line rail which is the outside rail on curves shall first be spiked to the tie. The gage rail shall then be spiked to the proper gage. Rail shall be cut only with rail saws.

Rail Anchors. Each tie shall be anchored 200 ft. of track ahead and behind the switch and every second tie thereafter.

Guard Rails. Each guard rail shall be spiked with two spikes to each tie.

Removal of Existing Track. Tracks to be removed shall be dismantled by pulling individual spikes and removing track bolts with a wrench. In the event of frozen bolts, acetylene torches may be used to remove the frozen nut, however, care shall be exercised to ensure that rail or joint bar is not damaged. Rail shall be handled with rail clamps or electromagnets, and major items or materials such as switch stands, frogs, etc. shall be individually lifted and unloaded from the conveying vehicle in a manner which will minimize any possible damage. The Contractor shall deliver all rails and hardware to the Railroad. After all track metal has been removed, the cross ties and any other timber items may then be removed as the Contractor may elect; however, all wood shall be removed from the track area.

Existing track and rail structure shall be removed to the limits shown on the plans. Rail bed material above the adjacent existing ground shall be removed to an elevation consistent with the adjacent ground on either side of the existing track. Where the rail bed is not higher than the adjacent ground and the removal of the existing track leaves depressions or holes, these depressions and holes shall be filled with embankment material. The embankment material shall be an A2-6 reddish tan sandy clay in accordance with AASHTO Specification M145. The fill material shall be compacted, and graded to match the existing ground and terrain. Compaction shall be in accordance

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with ASTM Specification D698T (Proctor Test) and shall be made using roller, mechanical tampers, or vibratory equipment. The cost of the removal of the track, rail bed material, and the filling and compaction of depressions and holes shall be included in this item.

The Contractor shall notify the NOPBRR two (2) weeks in advance of the demolition of existing railroad tracks in order that the NOPBRR can mark those ties that they want to remain the property of the NOPBRR. The existing turnout, and all rails, joint bars, tie plates, rail anchors, and ties (marked by NOPBRR) to be removed by the project shall be carefully removed from track by the Contractor and remain the property of the NOPBRR. These items shall be neatly stockpiled on the premises and remain the property of the NOPBRR. The Contractor shall notify the NOPBRR when the removal and stockpiling of salvageable track materials has been completed. Existing ties that are to be removed by the project and that are not marked by NOPBRR for salvage shall be promptly removed from the premises and disposed of by the Contractor within the current DEQ/EPA guidelines for disposal of used creosote treated timbers.

Removal of Soil for New Track: Existing soil and in-situ material shall be removed to the limits and shape as shown in the typical railroad track section shown in the plans. Cost to remove the existing material shall be included in this item.

Adjustments. Before final acceptance of the work, all spikes loosened during ballasting shall be redriven to proper position, all tracks shall be realigned and brought to correct grade, and the ballast shall be dressed to the section shown on the plans.

Measurement: There will be no measurement for the required work.

Payment: Construction of the East Bank Railroad Spur and Stub Trackwork will be paid for at the contract price per lump sum, which shall include all material, tools, equipment, labor, and incidentals, and the performance of all work necessary to satisfactorily complete the item.

Payment will be made under:

Item S-035, EastBank Spur and Stub Trackwork, per lump sum.

ITEM S-036, RAILROAD SUB-BALLAST: This item consists of providing all material and labor needed to place railroad sub-ballast as shown in the contract drawings and described herein.

All materials, workmanship and installation shall conform to the requirements of the American Railway Engineering and Maintenance-of-Way Association (AREMA), Chapters 1 through 5, 22, 28, and The Portfolio of Trackwork Plans, except as otherwise specified herein.

The work to be performed by the Contractor under this section consists of the following:

1. Furnishing and installing all required sub-ballast section for constructing the spur and stub track shown on the plans.
2. Coordinating the trackwork with the New Orleans Public Belt Railroad to maintain uninterrupted rail traffic.

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STATE PROJECT NOS. 005-10-0037, 006-01-0021, 006-02-0064, 006-25-0001, 006-30-0041, 063-03-0051, 063-04-0035
SPECIAL PROVISIONS

All track construction designated to be done by the Contractor shall be performed under the direction of personnel experienced with railroad construction.

All track shall be staged so as to minimize interference with rail traffic.

Materials: Materials required to perform the work shall be compacted granular sub-ballast shall conform to ASTM D1241 and have the following gradation limits:

Size of Sieve Opening	Percent Passing By Weight
2"	100%
1"	90 - 100%
3/8"	50 - 84%
#10	26 - 50%
#40	12 - 30%
#200	0 - 10%

Construction Methods: All construction not covered specifically herein shall be in accordance with AREMA specifications and recommended practices.

Construction of sub-ballast sections shall be performed in accordance with AREMA, except as specified herein. Place, spread and compact the sub-ballast in 6-inch layers of compacted thickness in order to raise track to the construction grade. Place and spread sub-ballast so as to avoid segregation of the material and pockets of large or fine materials. Remix any segregated material until a uniform mixture is obtained. Maintain the material at a moisture content sufficient to permit proper compaction and preclude raveling or loss of material throughout the placing and compaction operation.

Immediately after spreading each layer, the sub-ballast shall be compacted, for the full depth of each layer to a minimum of 100% of the maximum dry density as determined by AASHTO Designation T-99, Method D. The moisture content of the sub-ballast shall not be more than two percentage points above or below the optimum moisture content of the material as determined by AASHTO Designation T-99, Method D.

Measurement: The furnishing of sub-ballast shall be measured for payment by the cubic yard in approved vehicles at the site of work. Allowance will not be made for wastage or shrinkage during transportation from car or other point of loading. Approved vehicles for this purpose may be any type acceptable to the Project Engineer. The body shall be any shape such that the actual contents may be readily and accurately determined and will remain constant. Unless all approved vehicles for the work are of uniform capacity, each vehicle must bear a plainly legible identification mark indicating its approved capacity. The Project Engineer may reject all loads hauled in non-approved vehicles. Upon delivery of each load of material to the job site, and prior to Contractor measurement of the load, the Contractor shall Alevel-off@ each load within the approved vehicle so that an accurate measurement of the load can be made. After leveling off the load, the Contractor shall measure each load at the site of work. The Project Engineer shall witness the Contractor's measurement of each load of material and verify its computed yardage.

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Payment: Payment for sub-ballast will be paid for at the contract price per cubic yard, which shall include all material, tools, equipment, labor, and incidentals, and the performance of all work necessary to satisfactorily complete the item.

Payment will be made under:

Item S-036, Railroad Sub-Ballast, per cubic yard.

ITEM S-037, RAILROAD GRANITE BALLAST: This item consists of providing all material and labor needed to place railroad granite ballast as shown in the contract drawings and described herein.

All materials, workmanship and installation shall conform to the requirements of the American Railway Engineering and Maintenance-of-Way Association (AREMA), Chapters 1 through 5, 22, 28, and The Portfolio of Trackwork Plans, except as otherwise specified herein.

The work to be performed by the Contractor under this section consists of the following:

1. Furnishing and installing all required crushed granite rock ballast at top of the sub- ballast section for constructing the spur and stub track shown on the plans.
2. Coordinating the trackwork with the New Orleans Public Belt Railroad to maintain uninterrupted rail traffic.

All track construction designated to be done by the Contractor shall be performed under the direction of personnel experienced with railroad construction.

All track shall be staged so as to minimize interference with rail traffic.

Materials: Materials required to perform the work shall be crushed rock granite ballast shall conform to AREMA Size No. 57 and have the following gradation limits:

Size of Sieve Opening	Percent Passing By Weight
1 ½"	100%
1"	95 - 100%
1/2"	25 – 60%
No. 4	0 – 10%
No. 8	0 – 5%

Construction Methods: All construction not covered specifically herein shall be in accordance with AREMA specifications and recommended practices.

Construction of ballast sections shall be performed in accordance with AREMA except as specified herein. Ballast stockpiled for future use shall be stored in a dry area that can be covered to prevent contamination by fine particles and/or deleterious substances. Stockpiled ballast shall be stored in a manner that will facilitate handling operations. Measures shall be taken to prevent contact of ballast with natural ground. No direct payment will be made for storage facilities.

The ballast material shall be transported and delivered to the site in rubber-tired dump trucks in a manner that will prevent segregation or loss of material. Ballast shall be unloaded in the center and/or sides of the track and distributed by a spreader, ballast

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distributor or regulator. After the ballast has been properly distributed, preliminary alignment and surfacing of the track can begin. The track, after being aligned, shall be brought to grade and surface with a minimum of three intermediate lifts and one final lift. No lift shall exceed 4 inches in compacted thickness and the Contractor shall make his own estimate as to how many of these lifts are needed to reach final grade. Regardless of how many lifts are made, the final lift shall not exceed 2 inches in compacted thickness and shall primarily be a smoothing lift. For each lift, the track shall be raised and ballast distributed under the full length of each tie. The ballast shall be tamped after each lift with mechanical tampers. The final lift shall be followed by lining and tamping. When raising track, both rails shall be raised nearly uniformly.

Prior to the first lift, the track shall be brought to approximate alignment. The final lift shall result in true alignment, profile and cross-level as shown on the plans. The final lift shall be accomplished by the use of grade stakes, spot boards, track levels and/or automatic tamping equipment capable of controlled lifting, lining and cross-leveling of the track.

Tamping shall begin at the ends of a tie and be progressed to a point 15 inches inside either base of rail. Both ends of the ties shall be tamped simultaneously, and tamping inside and outside of the rail shall be done at the same time. When using mechanical type tampers, the depth of the tamping tools shall be set to the depth below bottom of tie to ensure proper tamping. Squeeze pressure of tamping tools on tampers so equipped must be set to suit the type of ballast being tamped to ensure that ballast is properly tamped. Power tamping tools shall be either hand-held or machine-mounted. Two tamping tools shall always be used opposite each other at the same time. Tampers shall be started from a nearly vertical position directly against the sides of the tie being tamped and worked downward past the bottom of the tie, after which the tamping tool shall be forced downward to tamp the ballast under the tie. The ballast shall be retamped as necessary during track construction. After the track has been brought to the required elevation and grade, the track shall provide a true and finished surface alignment, without humps, sags, hollows, or irregularities.

After the track has been finally surfaced and lined, the ballast shall be dressed to conform to the section shown on the contract drawings. The ballast section shall be given a final shape by means of a ballast regulator equipped with a rotary track broom or other equally satisfactory means. The tie cribs and ballast shoulders shall be properly compacted by using ballast compactors. All excess ballast shall be removed and deficiencies of ballast shall be corrected.

Measurement: The furnishing of ballast shall be measured for payment by the cubic yard in approved vehicles at the site of work. Allowance will not be made for wastage or shrinkage during transportation from car or other point of loading. Approved vehicles for this purpose may be any type acceptable to the Project Engineer. The body shall be any shape such that the actual contents may be readily and accurately determined and will remain constant. Unless all approved vehicles for the work are of uniform capacity, each vehicle must bear a plainly legible identification mark indicating its approved capacity. The Project Engineer may reject all loads hauled in non-approved vehicles. Upon delivery of each load of material to the job site, and prior to Contractor measurement of

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the load, the Contractor shall Alevel-off@ each load within the approved vehicle so that an accurate measurement of the load can be made. After leveling off the load, the Contractor shall measure each load at the site of work. The Project Engineer shall witness the Contractor=s measurement of each load of material and verify its computed yardage.

Payment: Payment for ballast will be paid for at the contract price per cubic yard, which shall include all material, tools, equipment, labor, and incidentals, and the performance of all work necessary to satisfactorily complete the item.

Payment will be made under:

Item S-037, Railroad Granite Ballast, per cubic yard.

ITEM S-038, SELF-SUPPORTING CONCRETE BARRIER (JEFFERSON HIGHWAY/CLEARVIEW PARKWAY INTERSECTION): This item consists of constructing, furnishing and installing a self-supporting concrete roadway barrier at the locations shown in the Project Plans and in accordance with the Standard Plan GR-201 and Section 733 of the 2000 Standard Specifications for Roads and Bridges as amended by the Supplemental Specifications.

Payment will be made at the contract lump sum price for self-supporting concrete barrier, which shall include all material, tools, equipment, labor, incidentals, and the performance of all work necessary to complete the item.

Payment will be made under:

Item S-038, Self-Supporting Concrete Barrier (Jefferson Highway/Clearview Parkway), per lump sum.

ITEM S-039, SAW CUTTING (PORTLAND CEMENT CONCRETE PAVEMENT): This item consists of providing all material and labor needed to saw cut concrete pavement (including concrete with asphalt overlay) at the locations shown on the contract plans in accordance with Section 601 of the 2000 Standard Specifications for Roads and Bridges as amended by the Supplemental Specifications. Average asphalt overlay depths are shown in the Summary Table of Removal of Portland Cement Concrete Pavement in the contract plans.

Saw cutting (Portland Cement Concrete Pavement) will be paid for at the contract unit price per linear foot, which shall include all material, tools, equipment, labor, and incidentals, and the performance of all work necessary to complete the item.

Payment will be made under:

Item S-039, Saw Cutting (Portland Cement Concrete Pavement), per linear foot.

ITEM S-040, SAW CUTTING (ASPHALTIC CONCRETE PAVEMENT): This item consists of providing all material and labor needed to saw cut asphaltic concrete pavement at the locations shown on the contract plans in accordance with Section 601 of the 2000 Standard Specifications for Roads and Bridges as amended by the Supplemental Specifications.

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Saw cutting (Asphaltic Concrete Pavement) will be paid for at the contract unit price per linear foot, which shall include all material, tools, equipment, labor, and incidentals, and the performance of all work necessary to complete the item.

Payment will be made under:

Item S-040, Saw Cutting (Asphaltic Concrete Pavement), per linear foot.

ITEM S-041, CONCRETE CURB (DOWELED): This item consists of constructing, furnishing and installing concrete roadway curb doweled into the existing roadway at the locations shown in the project plans and in accordance with the project plan details and Section 707 of the 2000 Standard Specifications for Roads and Bridges as amended by the Supplemental Specifications.

Payment will be made at the contract linear foot price for concrete curb (doweled), which shall include all material, tools, equipment, labor, incidentals, and the performance of all work necessary to complete the item.

Payment will be made under:

Item S-041, Concrete Curb (Doweled), per linear foot.

ITEM S-042, CONCRETE BARRIER (DOWELED): This item consists of constructing, furnishing and installing concrete roadway barrier doweled into the existing roadway at the locations shown in the Project Plans and in accordance with the project plan details and Section 733 of the 2000 Standard Specifications for Roads and Bridges as amended by the Supplemental Specifications.

Payment will be made at the contract lump sum price for concrete barrier (doweled), which shall include all material, tools, equipment, labor, incidentals, and the performance of all work necessary to complete the item.

Payment will be made under:

Item S-042, Concrete Barrier (Doweled), per lump sum.

ITEM S-043, HIGHWAY CROSSING SIGNALS: These specifications will govern the work to be performed by the contractor for the procurement of materials and installation of Highway Crossing Signals located at Jefferson Hwy (existing crossing).

Definition of Terms:

A. AREMA – The American Railway Engineering and Maintenance-of-Way Association.

B. FRA – Federal Railroad Administration.

Scope of Work:

- Remove existing signals "R" & "1R". "2L" & "3L" as denoted on the plans.
- Relocate existing completed signal cantilever "1L" as denoted on the plans.
- Supply and install new signal bridge "R" as denoted on the plans.
- Supply and install new UG cable to signal "R" & "1L" as denoted on the

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plans and track wires for AC/C circuit 1TB, 1TN.

- Supply and install AC/DC track circuit in existing signal house.
- Re-use LED signal lights from removed cantilevers that are in good condition.
- Removed signal to be taken to designated area by NOPB and turned over to NOPB.
- Perform operational test and place in service advance warning signal RR crossing.

In Service Acceptance, Verification, and Corrections: The contractor will furnish plans marked "As In Service" after project has been placed in service. One set to remain at the signal location, the other to be returned to the railroad.

The contractor will notify the railroad and the Project Engineer in writing of major deviations that may have occurred from original estimate, material listing, and major changes during field installation, from marked "As In Service" drawings.

The contractor will be required to provide a written statement to the railway and Project Engineer verifying that all phases of the project have been completed following the applicable AREMA standard and/or Federal Railroad Administration rules and/or Federal Highway Regulatory rules governing highway crossing signals.

Material Requirements:

General: All material shall be in accordance with AREMA recommended practices and/or conform to the FRA standards governing the operation installation and maintenance of highway crossing signals.

Crossing Lights: Shall be LED 12 inch aluminum, all hardware to be stainless steel. All lights shall be Safetran, RSI, GSI or approved equal. Crossing light junction boxes shall be Safetran, RSI, GSI or approved equal.

Cantilevers, Bridge Signal: Shall be aluminum walkout type complete with ladder and platform. Upright ladder shall be furnished to provide a safe means to access the platform. Lincoln Industries, Safetran, RSI or approval equal. Lengths and light configurations shall be in accordance with NOPB standard configurations.

A 36 inch #6 AWG bare copper ground wire will be welded to base of mast for grounding connection.

The contractor shall submit bridge signal design and calculations for approval.

Relays: Relays shall be Safetran, Alstom type S plug in, or approved equivalent with registration plates. Non-vital application shall be Potter Brumfield, Dayton or approved equal.

Cable: Signal and control cable shall be Okonite. All cable at the site shall be new including tie ins to remote facilities.

Terminals: Connections shall utilize standard AAR terminal posts. Test links shall be provided on all external cable connections. Terminals for external cable entry shall utilize ERICO 4-way terminal posts or approved equal.

Grounding: All lightning protection equipment and grounding schemes shall conform to signal standards.

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SPECIAL PROVISIONS

Wiring: House wiring shall be Okonite Okozel or approved equal type Z #14 for control circuitry and Z #10 or #6 where specified on the plans.

AC DC Track Circuits: Ring 10 AC DC. Parts include track driver, track resistor and track diode. Harmon, GETS, RSI or approved equal.

Hardware and Fasteners: Hardware and Fasteners furnished with all ground material shall be stainless steel.

Installation: Contractor shall furnish all services, construction material and equipment necessary to install the Grade Crossing Warning Signal. All work shall be completed in a workman like manner and conform to AREMA standard recommended practices and to FRA regulations governing the installation, maintenance and testing of grade crossing and train control systems.

General Requirements: Contractor shall be required to wear hard hats, safety shoes, safety glasses and earplugs (when necessary) at all times while contractor is working on the property.

Contractor shall be responsible for coordinating relocation of utilities that interfere with operation of the system.

Cable Installation: Cable installation depth shall be 36" below grade for all control cable with exception of cable that is under or within 5 foot of roadbed, which shall be at a minimum depth of 54".

Cable crossing under any structures such as roads or roadbed shall be encased in 4-inch schedule 80, HDPE or approved equal PVC.

Roadway structures shall be crossed by directional bore method. Open cuts on roadways are not permitted. During a road closure or roadbed construction project installation of PVC pipe will be permitted by direct burial methods.

Inspection: All work shall be subject to the approval of the NOPB or the Project Engineer to ensure the work is being performed in a workman like manner. Any discrepancies in workmanship will be corrected to the satisfaction of the Project Engineer and the railroad at no additional cost to the Department.

Equipment: Contractor shall furnish necessary equipment needed to perform all work in a safe and efficient manner.

Cutover and Test: The contractor will coordinate the cutover and test of the highway crossing signals. This shall include final test or any temporary cutovers that may be necessary due to road construction or equipment installation.

Site Dress up: Contractor shall dress up all construction areas around facilities with crushed rock that shall provide personnel with safe access to the facility or equipment. Step-ups to any equipment or housing shall not exceed 12 inches from top of ground. Slope and fill shall provide for adequate drainage and safe access to and around the facility. If access roads are servicing the site these roads shall be graded to original condition prior to the construction project.

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Miscellaneous Installation Items: All hardware shall be coated with a light coating of No-OXID grease.

Equipment that is not aluminum shall be primed and painted with two coats of Rustoleum Aluminum paint.

All technical manuals provided with the crossing equipment shall be left in crossing control bungalow.

Disposal and Clean-Up: Contractor shall be responsible for removal of all debris generated due to the construction of the project. A waste dumpster shall be coordinated and delivered to the site and left on site for the duration of the project.

Measurement: There will be no measurement for the required work.

Payment: Highway Crossing Signals will be paid for at the contract price per lump sum, which shall include all material, tools, equipment, labor, and incidentals, and the performance of all work necessary to satisfactorily complete the item.

Payment will be made under:

Item S-043, Highway Crossing Signals, per lump sum.

ITEM S-044, REMOVAL OF STRUCTURES AND OBSTRUCTIONS: This item consists of providing all material and labor needed to remove and dispose of items described herein. These items consist of, but are not limited to:

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Westbank

No.	Parcel Nos.	Type of Structure	Location	Left/ Right	Description of Structure/Obstruction.
1-W	RR-1-2	Billboard	274+22	Left	Billboard (CBS Oudoor)
2-W	2-4	Obstruction	265+00	Left	Building Materials, yard storage are for Jefferson Parish
3-W	RR-4-3	Obstruction	252+00	Left	Materials/storage yard for Jefferson Parish Sheriff's Office
4-W	IN-5-2-C-1	Billboard	241+50	Right	Billboard (CBS Outdoor)
5-W	RR-6-1	Billboard	232+50	Left	Billboard (Marco)
6-W	7-3	Commercial	231+00	Left	Single story commercial metal building on slab (Rock N Roll Auto)
7-W	RR-7-4	Commercial	229+50	Right	Single story commercial mobile home office for Auto Sales, 5 light standards.
8-W	7-7	Billboard	226+50	Right	Billboard on mono pole (CBS Outdoor)
9-W	7-10/7-10-C-1	Commercial	225+80	Left	Single story concrete block warehouse building (Advantage Capitol)
10-W	7-10	Billboard	223+50	Left	Billboard on mono pole (CBS Outdoor)
11-W	14-2	Commercial	54+50	Right	Single story wood frame building on slab (damaged by Hurricane Katrina). Former Horse farm
12-W	14-2	Commercial	54+50	Right	Single story wood frame building on slab (damaged by Hurricane Katrina). Former Horse farm

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Eastbank

No.	Parcel Nos.	Type of Structure	Location	Left/ Right	Description of Structure/Obstruction
1-E	RR-19-7	Billboard	136+00	Right	Billboard (Interstate)
2-E	RR-19-10	Billboard	136+00	Left	Billboard (Marco)
3-E	20-3	Commercial	134+00	Left	Single storyframe and block metal commercial Garage.
4-E	20-4	Commercial	133+00	Left	Single story commercial building
5-E	20-4	Commercial	132+00	Left	Single story concrete block and metal commercial building
6-E	20-4	Commercial	131+00	Left	Single story concrete block and metal commercial building
7-E	RR-21-1	Billboard	130+85	Left	Billboard (CBS Outdoor)
8-E	RR-19-7	Billboard	130+00	Right	Billboard (Interstate)
9-E	21-2	Commercial	129+90	Left	Two story metal commercial building with metal shed.
10-E	RR-19-7	Commercial	126+50	Right	NOPB Building, Functional replacement.
11-E	RR-19-7	Commercial	126+00	Right	Single story brick building owned by NOPB, functional replacement.
12-E	RR-19-7	Signs	125+00	Right	Two brick monument signs and flag pole, NOPB functional replacement..
13-E	RR-19-7	Commercial	125+00	Right	Single story brick commercial building. NOPB Administration building(historic), fuctional replacement.
14-E	21-3	Commercial	125+00	Left	Two story concrete block and metal building.

Any slab or footing supporting the above structures shall be removed and disposed of. All existing piles supporting the above structures shall be cut a minimum of 10 feet below ground. Any existing piles in the area where required piles are to be driven shall be removed and disposed of.

Any utilities providing service to the above structures shall be removed and disposed of.

Parts of Nos. 10-E, 11-E, 12-E and 13-E are of historical significance and will be removed by others. The Contractor shall not remove and dispose of the remaining structures from Nos. 10-E, 11-E, 12-E and 13-E before October 31, 2008 or as directed by the Project Engineer.

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Removal of Structures and Obstructions will be paid for at the contract price per lump sum, which shall include all material, tools, equipment, labor, and incidentals, and the performance of all work necessary to complete the item.

Payment will be made under:

Item S-044, Removal of Structures and Obstructions, per lump sum.

ITEM S-045, REMOVAL OF MAIN BRIDGE EXISTING ROADWAY DECK AND FLOOR SYSTEM: This item consists of providing all material and labor needed to remove and dispose of items required on the contract plans. These items consist of, but are not limited to:

- Removal of concrete roadway deck
- Removal of steel floor system subfloorbeams
- Removal of steel floor system stringers
- Removal of steel railing
- Removal of steel floor system expansion joints

Removal under this item shall be subject to the limitations and prohibitions contained in the Special Provision for Section 202, "Removing or Relocating Structures and Obstructions" elsewhere herein.

Removal of Main Bridge Existing Roadway Deck and Floor System from Pier A to Pier IV will be paid for at the contract price per lump sum, which shall include all material, tools, equipment, labor, and incidentals, and the performance of all work necessary to complete the item.

Payment will be made under:

Item S-045, Removal of Main Bridge Existing Roadway Deck and Floor System, per lump sum.

ITEM S-046, REMOVAL OF EASTBANK EXISTING HIGHWAY SUPERSTRUCTURE: This item consists of providing all material and labor needed to remove and dispose of items required on the contract plans. These items consist of, but are not limited to:

- Removal of concrete roadway deck
- Removal of steel floor system stringers
- Removal of steel cantilever highway brackets
- Removal of steel railing
- Removal of pile supported concrete substructure
- Removal of concrete abutments
- Removal of existing bridge sign located at abutment

Removal under this item shall be subject to the limitations and prohibitions contained in the Special Provision for Section 202, "Removing or Relocating Structures and Obstructions" elsewhere herein.

Removal of Eastbank Existing Highway Superstructure from Pier IV to ground will be paid for at the contract price per lump sum, which shall include all material, tools, equipment, labor, and incidentals, and the performance of all work necessary to complete the item.

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Payment will be made under:

Item S-046, Removal of Eastbank Existing Highway Superstructure, per lump sum.

ITEM S-047, REMOVAL OF WESTBANK EXISTING HIGHWAY SUPERSTRUCTURE: This item consists of providing all material and labor needed to remove and dispose of items required on the contract plans. These items consist of, but are not limited to:

- Removal of concrete roadway deck
- Removal of steel floor system stringers
- Removal of steel cantilever highway brackets
- Removal of steel railing
- Removal of pile supported concrete substructure
- Removal of concrete abutments
- Removal of existing bridge sign located at abutment

Removal under this item shall be subject to the limitations and prohibitions contained in the Special Provision for Section 202, "Removing or Relocating Structures and Obstructions" elsewhere herein.

Removal of Westbank Existing Highway Superstructure from Pier A to ground will be paid for at the contract price per lump sum, which shall include all material, tools, equipment, labor, and incidentals, and the performance of all work necessary to complete the item.

Payment will be made under:

Item S-047, Removal of Westbank Existing Highway Superstructure, per lump sum.

ITEM S-048, This item consists of providing all material and labor needed to remove and dispose of items required on the contract plans. These items consist of, but are not limited to:

- Removal of concrete roadway deck
- Removal of precast, prestressed concrete girders
- Removal of curtain walls and approach slabs
- Removal of light standards
- Removal of concrete bents, footings, and cutoff of piles.

Removal under this item shall be subject to the limitations and prohibitions contained in the Special Provision for Section 202, "Removing or Relocating Structures and Obstructions" elsewhere herein.

Removal of Jefferson Highway Overpass will be paid for at the contract price per lump sum, which shall include all material, tools, equipment, labor, and incidentals, and the performance of all work necessary to complete the item.

Payment will be made under:

Item S-048, Removal of Jefferson Highway Overpass, per lump sum.

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ITEM S-049, REMOVAL OF EXISTING RAILROAD TOWER FOUNDATION: This item consists of providing all material and labor needed to remove and dispose of items required on the contract plans. These items consist of, but are not limited to:

- Removal of concrete foundation pedestrian and concrete pile cap
- Removal of timber piling.

The cavities left after the removal shall be filled with acceptable fill material. Fill material shall be of acceptable quality, free from large or frozen lumps, wood, or other foreign material, and contain less than 5 percent organic content. Backfill material shall be placed in horizontal lifts not exceeding 12 inches in loose thickness and compacted to a compaction consistent with the density of the surrounding soils and to the satisfaction of the project engineer.

Removal of existing railroad tower foundation will be paid for at the contract price per lump sum, which shall include all material, tools, equipment, labor, and incidentals, and the performance of all work necessary to complete the item.

Payment will be made under:

Item S-049, Removal of Existing Railroad Tower Foundation, per lump sum.

ITEM S-101 CLEANING, PAINTING AND WASTE DISPOSAL/ RECYCLING OF EXISTING BRIDGE METALWORK FAYING SURFACES: This item consists of cleaning and painting of all existing bridge metalwork faying surfaces at stringer connections to the floorbeams of the existing Huey P. Long Bridge and any other miscellaneous metalwork connections as shown on the contract plans. Cleaning of the surface includes the removal of the existing lead and chromium containing coatings, corrosion, mill scale and any other contaminants and the establishment of the proper anchor profile on all metal surfaces, containing and collecting of the blast debris, temporary site storage of collected debris, sampling, testing, transporting and recycling of potentially hazardous materials and all other collected debris. Painting of the cleaned surfaces shall be with a DOTD approved inorganic zinc primer. All work shall be in accordance with the Project Plans, Standard Specifications and these Special Provisions.

General Requirements: The contractor is warned and advised that the existing coating system on the structure contains lead and chromium. Paint samples were taken from various locations on different elements on the main bridge metalwork. The samples were analyzed for lead, chromium and cadmium. Lead and chromium were found at varying concentrations. Lead is known to be present under rivet heads and on all faying surfaces. A report on the results of this paint sampling and testing is appended to the project specifications.

As actual conditions across the bridge may vary, the bidder is encouraged to take any additional samples for his own testing he feels may be required for the development of his bid. The contractor is further warned and advised that portions of the bridge metalwork have not been blast cleaned in the past and metalwork underlying the existing coating contains mill scale and has no anchor profile.

The contractor shall use recyclable steel abrasives for the blasting and cleaning operations which are to be conducted under containment. Collected blasting waste and dust collector waste shall be taken to a beneficial reuse facility such as a lead smelter as approved by the DOTD. Previously used and/or recycled abrasives from other projects shall not be used.

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Safety Standards: All personnel hired for work on this project, including those hired during the course of the work, shall be competent in their respective trades.

All personnel hired for work at the project site shall be examined in accordance with 29 CFR 1926.62(j) (3) (ii) (A)-(F) prior to employment for this project.

It shall be the contractor's responsibility to comply with all applicable federal, state, and local laws, rules, regulations and ordinances pertaining to (a) Worker Safety and (b) Environmental Protection including, but not limited to, the following which are presented as illustrative examples:

(a) Worker Safety

- 29 CFR 1910, "Occupational Safety and Health Standards", et seq.
- 29 CFR 1926, "Safety and Health Regulations for Construction", et seq.
- 29 CFR 1926.62, "Lead", et seq.
- 40 CFR 117, "Determination of Reportable Quantities for Hazardous substances"
- NIOSH Method 7082 "Lead"
- OSHA Instruction CPL 2-02.58, "1926.62, Lead Exposure in Construction; Interim Final Rule – Inspection and Compliance Procedures"

The contractor shall submit to the Project Engineer a written site specific compliance plan for review at least two (2) weeks prior to the pre-construction meeting. The compliance plan shall describe how the following standards will be met:

- Exposure monitoring [29 CFR 1926.62 (d)]
- Methods of compliance [29 CFR 1926.62 (e)]
- Respiratory Protection [29 CFR 1926.62 (f) and 1910.134 (b), (d), (e), (f)]
- Protective work clothing and equipment [29 CFR 1926.62 (g)]
- Housekeeping [29 CFR 1926.62 (h)]
- Hygiene Facilities and Practices [29 CFR 1926.62 (I)]
- Medical Surveillance [29 CFR 1926.62 (j)]
- Medical Removal Protection [29 CFR 1926.62 (k)]
- Employee information and training [29 CFR 1926.62 (l) and 1926.59 and 1926.21]
- Signs [29 CFR 1926.62 (m)]
- Record keeping [29 CFR 1926.62 (n)]
- Applicable sections of 1926.62 Appendices A-D

(b) Environmental Protection

- 40 CFR 50, "National Primary and Secondary Ambient Air Quality Standards"
- 40 CFR 60, "Standards for Performance for New Stationary Sources," Appendix A, "Test Methods"
- 40 CFR 261, "Identification and Listing of Hazardous Waste"
- 40 CFR 262, "Standards Applicable to Generators of Hazardous Waste"
- 40 CFR 263, "Standards Applicable to Transportation of Hazardous Waste"
- 40 CFR 264, "Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities"
- 40 CFR 268, "Land Disposal Restrictions"

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- EPA SW-846, "Test Methods for Evaluating Solid Waste-Physical/Chemical Methods", U.S. Environmental Protection Agency
- La. R.S. 30:2001, et seq., "Louisiana Environmental Quality Act" and enabling regulations found in Louisiana's "Environmental Regulatory Code: (most recent edition), particularly:
    - LAC 33:IX.101 et seq., "Water Quality Regulations"
    - LAC 33:V.101 et seq., "Hazardous Waste and Hazardous Materials"
    - LAC 33:III.101 et seq., "Air Quality Regulations"
    - La. R.S. 49:214.21 et seq., "State and Local Coastal Resources Management Act of 1978: and enabling regulations found in the "Louisiana Administrative Code"
    - LAC 43:I.701, et seq., "Coastal Management"

The contractor shall be familiar with and have available at the jobsite, the following referenced industry guidelines:

- SSPC Guide 6 (CON), "Guide for Containing Debris Generated During Paint Removal Operations", as published by the Steel Structures Painting Council: The Society of Protective Coatings (SSPC)
- SSPC Guide 7 (DIS), "Guide for Disposal of Lead-Contaminated Surface Preparation Debris", as published by the Steel Structures Painting Council: The Society of Protective Coatings (SSPC)

The contractor shall submit the name, address and credentials of an EPA recognized AIHA or A2LA accredited lead testing laboratory he intends to use for the testing of wastes generated by the cleaning operation; and the name, address and credentials of a duly licensed waste transporter and waste recycling facility(s) he intends to use to the Project Engineer for review prior to commencement of work.

Chain of Custody forms shall be required for all test specimens or samples taken from the project and transported to testing laboratories. Copies of Chain of Custody forms or Hazardous Waste Manifests shall be submitted to the Project Engineer for review as generated. Final documentation and applicable results shall be submitted to the Project Engineer as completed.

The contractor shall make their on-site changing, washdown, laundering, and discarded clothing disposal facilities and all safety training and personal protection equipment available to the Project Engineer, his representatives, and the Department at no additional cost. The contractor shall provide immediate access to all work areas to the Project Engineer, his representatives, and the Department during the project.

The contractor shall provide exposure assessments, exposure monitoring, equipment, hygiene facilities, medical surveillance training, and all other provisions as required by the Occupational Safety and Health Administration (OSHA) Interim Final Rule on Lead Exposure in Construction to his own employees, to Department employees, and to the Project Engineer and his employees who are acting as inspectors or project managers on projects where removal of lead based paint is occurring. For the purpose of this Special Provision, all references in the Interim Final Rule to "the Employer," with regard to providing exposure assessments, exposure monitoring, equipment, hygiene facilities, medical surveillance training, and all other provisions shall mean "the contractor" and all references to employee(s) shall mean the contractor's employees, the Department's employees and the Project Engineer and his employees. The

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Department and the Project Engineer shall be responsible for requiring their employee(s) to wear equipment and use facilities provided by the contractor in accordance with the Interim Final Rule.

The contractor shall provide the employee(s) protective clothing and equipment, change areas, showers, eating facilities, and hand washing facilities as required by the Interim Final Rule. Until the contractor performs an employee exposure assessment and determines actual employee exposure, the contractor shall provide to the employee(s) interim respiratory protection, which shall include the respirator, respirator training and fit testing, and a respirator program. The interim respirator protection provided to the employee(s) shall be based on anticipated exposure levels greater than the Permissible Exposure Limit (PEL) ($50\mu g/m^3$), but less than 10 times the PEL ($500\mu g/m^3$). At a minimum, the contractor shall provide the employee(s) with a half mask air purifying respirator with high efficiency particulate (HEPA) filters, which provides a respiratory protection factor of 10. If, through employee exposure assessment, the contractor determines that the employee exposure level is greater than $500\mu g/m^3$, the appropriate respirator shall be provided.

At a minimum, the contractor shall conduct an employee exposure assessment on one (1) employee designated by the Project Engineer. The initial exposure assessment and any additional exposure assessments shall be conducted, and the results reported, in accordance with the Interim Final Rule.

The results of the employee exposure assessment(s) shall be fully documented. The results of the employee exposure assessment(s) shall be determined and reported in time frames consistent with the Interim Final Rule. Employee exposure assessment results shall be forwarded directly to the Project Engineer.

The contractor shall provide lead training to all employees working on the structural metalwork on the project. The contractor shall provide the following information at the preconstruction meeting.

1. Name and qualifications of the trainer.
2. Location and time of the training.
3. An outline of the training to be provided.

Each trained employee shall be provided with a certificate of training by the contractor.

The training shall be conducted within the parishes of Orleans or Jefferson. The training shall occur between the hours of 7:00 a.m. and 5:00 p.m. on Tuesday, Wednesday, or Thursday.

It shall be the contractor's responsibility to obtain all permits required and to furnish the Project Engineer with copies of all permits.

Paint System:

(a) General: The contractor shall apply an LADOTD approved inorganic zinc primer. The coating manufacturer shall provide certified independent test results that the coating, when applied as recommended, will produce a slip coefficient of 0.33 when tested in accordance with the procedures specified in the AISI publication Specification for Structural Joints Using ASTM A325 or A490 Bolts. The paint shall be applied in accordance with the manufacturers written recommendations and at the recommended dry film thickness. Coating materials shall not be used until the Project Engineer has inspected the materials and each batch of paint has been tested by the DOTD Materials and Testing Section.

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(b) Information To Be Provided: For each coating system, the contractor shall provide the manufacturer's application instructions and include the data listed below:

1. Name of Paint Manufacturer
2. Surface preparation recommendations
3. Prime coating pot life at the anticipated application temperatures
4. Specific mixing instructions
5. Percent volume solids (thinned and non-thinned)
6. Minimum and maximum dry film thickness per coat and total system
7. Minimum and maximum wet film thickness per coat
8. Minimum and maximum curing time between coats, including atmospheric conditions for each
9. Thinner recommended and maximum thinning ratios to be used with each paint.
10. Clean-up thinner, soaps, degreasers, etc.
11. Ventilation requirements
12. Allowable atmospheric conditions during which the paint shall be applied including ambient temperature, relative humidity, surface temperature and dew point temperature
13. Allowable application methods
14. Shelf life
15. Product Technical Data Sheets
16. Material Safety Data Sheets (MSDS)

(c) Product Delivery and Handling: Materials shall be delivered to the job site in their original, undamaged, unopened containers. Each container shall bear the name and address of manufacturer, manufacturer's brand name, trade name or trademark, color batch number, date of manufacture, shelf life and special directions. If the material is dated in code, the key to interpret the code shall be provided to the Project Engineer. All rejected materials shall be removed from the job site immediately.

Paints shall be stored in enclosed, ventilated structures at 40°F (4°C) to 100°F (38°C) and shall be protected from weather. Storage facilities shall be power ventilated to ensure that inside temperatures do not exceed the maximum storage temperature. Flammable materials shall be stored in accordance with state and local codes. Damaged materials and materials exceeding the shelf life shall be removed from the site.

All containers of paint shall remain unopened until required for use. Those containers which have been previously opened shall be used first. The label information shall be legible and shall be checked at the time of use. Paint which has livered, gelled, or otherwise deteriorated during storage shall not be used. The oldest paint of each kind shall be used first. In every case, paint is to be used before its shelf life has expired. In order to use paints which are more than one year old, the manufacturer must certify in writing that the paint is still suitable for use.

(d) Other Materials: All other materials not specifically described but required for a complete and proper installation of painting shall be selected by the contractor subject to the approval of the Project Engineer.

(e) Spare Supplies: From every batch of material, the contractor shall provide one quart container of each color and type of coating. These spare paint supplies shall be submitted to the Project Engineer.

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Surface Preparation: All existing bridge metal surfaces that are to be connection areas for bridge widening members, as indicated in the plans, shall be blast cleaned in accordance with the Near White Blast Cleaning Method (SSPC SP10/NACE No.2).

The visual standard form SSPC-VIS 1, SSPC-SP10 that corresponds to the initial rust condition will be used to judge acceptable steel cleanliness.

Recyclable steel abrasives shall be used on the project and the abrasives shall meet the requirements of SSPC-AB3. All recycled metallic abrasive shall meet the cleanliness requirements of SSPC-AB2. Previously used and/or recycled abrasives from other projects shall not be used.

Prior to all surface preparation and painting operations, the contractor shall protect all surfaces not scheduled to be painted. Deposits of dirt, debris, and oil or grease are known to exist and shall be removed prior to blast cleaning with clean cloths using clean petroleum solvents that do not deposit a thin film.

Surface profiles shall be 1.5 to 3.0 mils (380 to 760 μm). Prior to the application of the prime coat, the contractor shall verify the surface profile with X-Coarse Press-O-Film tape in accordance with Method C of ASTM D 4417 "Standard Test Methods for Field Measurement of Surface Profile of Blast Cleaned Steel."

To facilitate inspection, the contractor shall, on the first day of abrasive blasting operation, blast two metal panels to an SSPC-SP10/NACE No.2 near while blast cleaned condition and with a surface profile between 1.5 to 3.0 mils. ASTM A-36 Steel Plates shall measure a minimum of 8-1/2 inches (216 mm) by 11 inches (280 mm) by 1/4 inch (6 mm) thick. Panels meeting the requirements of the specifications shall be dated and initialed by the contractor and the Project Engineer. One of the panels shall be coated with a clear, non-yellowing finish; the other used to calibrate the dry film thickness gages used on the project. The panels shall be wrapped in corrosion-inhibitive paper and kept in a clean, dry area. They shall be used as the comparison standard throughout the project.

All fins, tears, slivers, and burred or sharp edges that are present on any steel member, or that appear during the blasting operation, shall be removed by grinding and the area re-blasted. Pack rust at connections and at other areas on the structure shall be removed to the satisfaction of the Project Engineer by using needle guns, power tools, hammers, chisels, or other methods which will not cause damage to the steel.

Scaling hammers may be used to remove heavy scale but heavier type chipping hammers which would excessively scar the metal shall not be used. Cleaning and painting shall be scheduled so that dust and spray from the cleaning process will not fall on wet, newly painted surfaces. Blasting and painting operations inside the containment shall proceed in a linear fashion from one end of the containment to the other. Blasting and painting operations shall proceed in the same direction as the air flow inside the containment.

All abrasive, dust and paint residue shall be removed from steel surfaces with a commercial grade HEPA filtered vacuum cleaner equipped with a brush-type cleaning tool, or by double blowing. If the double blowing method is used, the exposed top surfaces of all structural steel, including flanges, longitudinal stiffeners, splice plates, hangers, etc., shall be vacuumed after the double blowing operations are completed. The steel shall be kept dust free and primed within 8 hours after blast cleaning. Blast cleaned surfaces shall be painted the same day or re-blasted. Occurrence of rust after cleaning shall be cause for re-cleaning by blasting or other cleaning methods as directed. Within the contained area, all blow-down operations must be

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completed prior to painting. Once painting has commenced, only vacuuming will be allowed. If any dust, as evidenced by simply wiping the surface with a finger, accumulates on a primed surface, all surfaces shall be vacuumed prior to subsequent coating.

Any scaffolding, staging or support steel above the area to be coated shall be vacuumed and cleaned to prevent abrasive or dust from dropping onto the freshly cleaned surface or later contaminating the freshly painted surface. Freshly painted surfaces that are contaminated shall be re-blasted and re-painted. All surfaces to be coated shall be completely free of grit, dirt or any contaminant prior to coating regardless of original contaminant.

The contractor's Quality Control Inspector shall confirm compliance with all applicable specifications prior to Quality Assurance Testing. The Project Engineer or his representative may defer testing and/or acceptance of the work area until such time that all visible flaws and defects are corrected, and compliance is again verified by contractor's QC Inspector. Once the contractor's Quality Control Inspector has verified compliance with all applicable specifications and conducted all required testing, the Project Engineer or his representative will inspect surfaces to be painted prior to coating and will inspect the painting operation. This inspection does not relieve the contractor of responsibility for proper preparation of the surface or application of the coating. Any scaffolding and or staging shall remain in place in any particular work area until the Project Engineer or designated representative has accepted the completed work.

Electrical Equipment, Material and Incidentals: Extreme care shall be exercised when working in the vicinity of electrical cables and fixtures. Prior to blasting and/or painting operations in close proximity to the electrical cables, the contractor may request that the cables be de-energized for the blasting or painting operation. The disconnection time shall be between the hours of 6:00 a.m. and 2:00 p.m. Disconnections shall be coordinated with NOPBRR, through the Project Engineer, who will perform the disconnection and will require a minimum three (3) working days advance notice.

The contractor shall submit a schedule for approval on times of power disconnect. After de-energized but prior to blasting or painting, the cables shall be suitably covered and protected from damage. The coverage and protection measures shall be submitted to and approved by the Project Engineer. All costs associated with de-energizing and protection of electrical cables shall be included in this item.

A lock-out, tag-out protocol shall be employed at the various electrical disconnect switches.

Plastic coated conduit and fittings, open wiring, cables and cords that exist on and around the bridge shall not be sandblasted nor painted and shall be cleaned of over spray. Any wiring and cables or conduit damaged by painting operations shall be replaced in its entirety at the contractor's expense.

Application:

(a) General: Coatings application shall be in accordance with the manufacturer's recommendations, SSPC-PA 1 Paint Application Specification No. 1 and these specifications, whichever is more stringent. Coatings shall be applied only to surfaces prepared in accordance with these specifications. Paint systems may be applied by conventional or airless spray equipment in accordance with the manufacturer's recommendations and these specifications.

The finished surface shall be free from dry spray, over spray, runs, sags, drips, excessive paint build-up, ridges, waves, laps, streaks, and variations in color, texture and finish (glossy or

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dull). The coverage shall be complete and shall be so applied as to produce an even film of uniform thickness, completely coating corners and crevices, and bonded to the underlying surface. The edges of any existing un-removed coating at tie-in areas shall be feathered, leaving surfaces, prior to new paint application, tapered and free of loose or damaged coating. Care shall be exercised to avoid over spraying or spattering paint on surfaces not to be coated. Damage to surfaces not to be coated shall be repaired by the contractor at the contractor's expense. When fresh paint is damaged by the elements, the containment, or equipment, it shall be replaced by the contractor at no direct pay.

(b) Weather Limitations: The contractor's coating inspector shall perform necessary tests immediately before blasting and painting and at least every two hours during the painting operation to determine the dew point, temperature, and relative humidity. Readings shall be taken at the same area where the members are being coated. The contractor's Quality Control Inspector shall record all readings on applicable forms and submit daily to the Project Engineer or his representative.

(1) Temperature: Paint shall be applied in accordance with the manufacturer's recommendations and these specifications, whichever is the more stringent. Paint shall not be applied to steel which has a temperature that will cause blistering or porosity, or otherwise will be detrimental to the life of the paint.

Paint, when applied, shall be approximately the same temperature as that of the surface on which it is applied. Paint shall not be applied unless the surface temperature of the metal is at least 45°F (7°C) and rising, and shall not exceed a steel surface temperature of 100°F (38°C). Steel surface temperature requirements shall be maintained during and after painting in accordance with heading (3) Humidity.

(2) Moisture: Paint shall not be applied during rain, snow, fog, or misty conditions, or when the steel surface temperature is less than 5°F or 3°C above the dew point. Paint shall not be applied to wet or damp surfaces.

(3) Humidity: Where manufacturers have not made a different written recommendation, paints shall not be applied when the relative humidity exceeds 85 percent. Fans, heaters, ventilators or other equipment shall be used inside enclosed areas where conditions are not within the stated limits.

(c) Ventilation: The contractor shall provide the proper mechanical ventilation, if required for proper curing.

(d) Paint Properties, Mixing and Thinning: Paints shall be thoroughly stirred, strained and kept at a uniform consistency during application. Coatings shall be mixed in accordance with the manufacturer's instructions, including listed weather tolerances. Where necessary to accommodate the conditions of the surface, temperature, weather and method of application, the paint may be thinned immediately prior to use by the addition of not more than the amount of thinner recommended by the manufacturer. Unless otherwise specified, paint shall not be reduced more than necessary to obtain the proper application characteristics. Thinner shall be only as recommended by the coating manufacturer.

(e) Methods of Paint Application: Paint shall not be applied to a surface until it has been prepared as specified. Paint shall be applied before any surface rusting occurs, or any dust or oil has accumulated. In the event that eight (8) hours have passed since the surface to be coated has been approved for coating application, the area shall be re-inspected to assure compliance with the surface preparation specified. After a coat is dry, missed or damaged spots shall be repaired before succeeding coats are applied.

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The manufacturer's recommended minimum and maximum recoat periods shall be strictly observed. Where conditions require recoat after the recommended maximum recoat period, the contractor shall employ the manufacturer's written recommended remedial procedures. Any coating removed during this process shall be replaced prior to applying additional coats. The contractor shall protect adjacent surfaces already properly coated.

The contractor's equipment shall be designed for application of the materials specified. Compressors shall have suitable traps and filters to remove water and oil from the air. Prior to using compressed air, the contractor's Coating Inspector shall verify daily the cleanliness using a blotter test in accordance with ASTM D 4285 "Standard Test Method for Indicating Oil or Water in Compressed Air." The contractor's Coating Inspector shall record all test results on applicable forms and submit daily to the Project Engineer or his representative. Spray equipment shall be equipped with mechanical agitators, working pressure gages, pressure regulators, and spray nozzles of the proper sizes.

Members shall be covered as necessary to prevent accumulation of dry spray on blasted or painted surfaces. All dry spray shall be removed by sanding. If necessary, areas of deficient primer thickness shall be thoroughly cleaned to remove all dirt, grease, or other contaminates and recoated to the specified thickness. If the paint manufacturer, Project Engineer, or his designated representative requires that the surface be blasted instead of sanded, the contractor shall comply. Where protection is provided for coated surfaces, such protection shall be preserved in place until the paint film has properly dried. Items which have been coated shall not be handled, worked on, or otherwise disturbed until the paint coat is completely dry and hard. All damage to coated surfaces shall be repaired by the contractor upon removal of protection.

(f) Film Thickness: Coatings shall be applied between the minimum and maximum thicknesses recommended by the manufacturer.

After each coat has been allowed to dry, the dry film thickness shall be measured by the contractor's Coating Inspector and verified by the Project Engineer with a calibrated dry film thickness gage, both in accordance with SSPC-PA-2.

(g) Damaged Areas: Should any mudcracking or other defects develop in the applied coating, the affected area shall be removed by blast cleaning and repainted. All scaffolding to be used shall be equipped with rubber rollers or other protection to prevent damage of painted surfaces. All damaged areas shall be repaired prior to removing the containment except for areas in contact with containment supports.

(h) Protection of the Public and Work: The contractor shall protect all parts of the new and existing work against physical damage and disfigurement by splatters, splashes and smirches of paint materials. All existing or newly painted surfaces that are marred or damaged due to any and all construction activities shall be repaired with materials and to a condition equal to that of the coating system specified. The contractor shall take all precautions necessary to protect the surface from contamination prior to or during the application process. The contractor shall be responsible for all damage caused by the painting project to persons or property.

Quality Control: The contractor shall provide safe access to the job site for all workers and for the Project Engineer or his representative at all times while the work is in progress and throughout the life of this contract.

The contractor shall comply with the safety and application procedures recommended for each paint system by the coating manufacturer.

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Quality Control shall be the responsibility of the contractor. It will be the responsibility of the contractor to provide sufficient coating inspection personnel and documentation to assure full compliance with these specifications to the satisfaction of the Project Engineer. At a minimum there shall be one full time employee (either an employee of the contractor or the contractor's coating inspector) at the site when the blasting operations start until completion of the painting of this project.

The contractor shall provide to the Project Engineer a certificate showing National Association of Corrosion Engineers (NACE) Certification (Successfully completed Level 1, Level 2, Level 3, and Peer Review) of the Quality Control Inspector.

The contractor's Coating Inspector shall confirm that all areas meet minimum thickness requirements prior to the Quality Assurance Testing performed by the Project Engineer.

The contractor's Quality Control Inspector shall perform the following tests and record the following information to be submitted to the Project Engineer in accordance with the referenced procedures and frequency:

- Relative Humidity and Dew Point Readings inside containment.....SEC 101.07(B). Before and every 2 hours during painting and blasting activities.
- Temperature Readings of air, material and steel surfaces.....SEC 101.07(B). Before and every 2 hours during painting and blasting activities.
- Ambient Readings in the mixing area during mixing activities.
- Profile Height Measurements.....ASTM D4417. Daily before coating.
- Visual Inspection of blasted surfaces. Daily before coating.
- Blotter Test Results.....ASTM D4285. Daily prior to blasting.
- Wet Film and Dry Film Thickness Measurements.....SSPC PA2. Daily.
- Wind Speed and Direction.....Daily every 2 hours.

Readings shall be taken at the same area where the members are being coated.

The painting contractor shall be totally responsible for quality control regardless of the fact that the Department, the Project Engineer or their representatives are present. Copies of all Quality Control testing documents shall be furnished to the Project Engineer on a daily basis.

All inspection for Quality Assurance shall be done by the Project Engineer or his representative.

Shop Drawings:

(a) General: At least 60 days prior to the commencement of work, the contractor shall submit to the Project Engineer a Containment Design Plan for examination within the following guidelines:

(1) All drawings shall be original tracings conforming to Section 801.03 of the 2000 Standard Specifications.

(2) The containment system shall be shown in plan and elevation views. Details shall include the containment enclosure, all materials, seals, supports, anchorage, scaffolding, air ventilation and filtration systems, anticipated loads on the structure, vertical and horizontal clearances, and the method of attachment to the structure.

(3) Indicate the maximum permissible debris and wind loads permitted on the containment system and describe its installation and removal parameters and procedures.

(4) The containment system with all anticipated loading shall be reviewed and stamped by a professional civil engineer registered in the State of Louisiana. The analysis shall ensure

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that the containment system and the contractor's equipment shall not surpass allowable construction loads (as defined in the Project Plans) for the bridge members nor compromise the structural integrity of the bridge. The containment system shall not foul highway or railroad clearances. Calculations shall be submitted to the Project Engineer for review.

(5) Permanent attachments or fasteners to the bridge will not be allowed. Welded connections and any other weldments to bridge members are prohibited. No additional holes shall be drilled.

(6) All components of the containment system shall be clearly identified on the drawings.

(7) No loads shall be attached to the bridge railing without prior written consent of the Project Engineer.

(8) The contractor shall submit drawings for examination in accordance with Subsection 801.03(a) of the 2000 Standard Specifications and Special Provisions.

(b) Examination: Examination of these working or shop drawings by the Project Engineer does not relieve the contractor of his responsibility for obtaining the degree of containment and collection stated herein. Said examination is for general review only and confirmation that the loads placed on any member are within allowable stresses, to evaluate the general loads on the structure, and to establish the containment removal parameters. It specifically is not an approval for the structural integrity of the scaffolding system. The structural integrity of the scaffolding is solely the responsibility of the contractor and the manufacturer of the scaffolding materials. The contractor shall be fully responsible for safety measures and the scaffolding work. The contractor shall properly maintain his containment system during work and shall not deviate from the working or shop drawings without prior submittal, and examination of the changes by the Project Engineer.

Containment:

(a) General: The frequency and proximity of workers, the public, and environmentally sensitive receptors to the project site requires a high level of emission control.

The intent of this section is to specify a method to totally contain all spent materials, dust or mists and any other debris generated during the cleaning or subsequent vacuuming of the structure in preparation for field coating. The method specified is for total containment of the cleaning work area within a negative pressure enclosure.

The design of the enclosure and the air flow and dust filtering equipment required is the responsibility of the contractor.

Attachments made to any bridge member for securing the containment or equipment shall not damage the member and must be reviewed by the Project Engineer. No additional holes shall be drilled.

In the event that the National Weather Services issues a tropical storm or hurricane warning for the project area, those components of the containment system that would cause an overstress condition on any bridge member or the span as a whole, or that may become detached, shall be removed immediately from the structure. The items to be removed and the parameters for removal shall be identified on the containment design calculations and drawings. The contractor shall also submit for approval a detailed plan for removal of the necessary items. The plan shall demonstrate the contractor's ability to implement the plan including a description of the time frame, manpower requirements and equipment required to implement the plan. The removal and reinstallation of the containment system due to the high winds or approaching storms shall be at no direct pay and should be included in the bid price for this item. In the event

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it is necessary to suspend operations and remove containment and scaffolding, the contractor shall retain a local contact to handle unsafe conditions that may be caused by the storm and stored on-site equipment. The local contact information shall be provided to the Project Engineer prior to the evacuation.

(b) Class and Type of Containment: The following containment methodology is from the SSPC - Guide 6 (95). The contractor shall design and utilize a SSPC Class 1 A containment system. When vacuum shrouded blast cleaning is employed, ground covers or free-hanging tarpaulins may provide controls equivalent to Class 1A containments.

The containment enclosures shall have air moving equipment attached capable of creating a negative pressure condition within. This pressure shall be sufficient to prevent any spent material or dust from leaving the enclosure during the cleaning. It shall also be capable of creating sufficient air flow through the enclosure to provide adequate visibility and a safe working environment for the blasting operators. The contractor shall design the containment and ventilation system to provide a minimum of 60 feet per minute downdraft and 100 feet per minute cross-draft airflow within the containment. These are minimum design requirements and increased ventilation airflow or other engineering measures may be needed to provide a safe working environment. Auxiliary lighting shall be used within the enclosure where necessary to illuminate the active work surface to a minimum of 550 lux. This is required for clear viewing of all cleaning, painting and inspection operations as directed by the Project Engineer. All air exhausted from the containment enclosure shall be filtered by means of a filtering system or dust collectors. All filters or dust collectors shall be cleaned before delivery to the project site and shall be cleaned before removing from the project site. The contractor is responsible for the design and effectiveness of this filtering equipment.

No dust discharge shall be allowed from the exhausted air from the filters, dust collectors, vacuum truck, or other support equipment used for pickup of spent materials. The contractor shall conduct all blasting operations and grit recycling operations under containment and negative pressure conditions. Recycling operations are also subject to the same emission requirements that are required for the blast cleaning containment system. The combination of removal technique and containment system shall have the desired effect of preventing the release of airborne lead containing dust and debris to below the levels required by all local, state and federal regulations and to control the workers' environment within containment as required by OSHA regulations 29 CFR 1926.62. The containment shall control environmental emissions according to the following assessment criteria. Failure to meet this criteria will result in the suspension of cleaning operations and require significant modification or redesign of the containment system, work practice or removal technique prior to resuming cleaning operations.

(c) Methods for Assessing Quantity of Emissions: The contractor is advised that the Department may engage an independent third party to conduct environmental monitoring for TSP Lead Levels and Visual Assessment of Emissions. This monitoring may be continuous, however, the Project Engineer will have the option of suspending or conducting only random or periodic monitoring if compliance with the acceptance criteria set by this specification is demonstrated.

The contractor is advised that he should not assume he is in compliance with any or all environmental laws or regulations based on satisfactory results of the monitoring conducted by the Department or its representatives. This monitoring is being conducted only to aid in determining non-compliance with the contract specification containment requirements and to trigger the need for containment or work practice modification.

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The contractor shall be responsible for conducting any and all monitoring and assessments he deems necessary to assure compliance with all applicable environmental or worker safety laws and regulations at his own expense.

(1) Visible Emission Assessment: The contractor shall prohibit all cumulative visible emissions greater in duration than 5 percent of the work day. A work day shall be defined for purposes of visual emission assessment as an eight-hour day. This amounts to a cumulative emission duration limit of 24 minutes per workday. Any emissions occurring in any one hour of any work day that cumulatively exceeds 3 minutes shall be cause for immediate suspension of work and modification or adjustment of the containment system to eliminate the source of emissions prior to resuming cleaning operations.

The visual assessment of emissions will be used to indicate the need for immediate changes in containment or work practice. This visual assessment will be used as a supplement to EPA Ambient Air Monitoring for TSP – Lead. In the event of conflict between the visual assessment and the instrument monitoring, the data generated from the instrument monitoring will prevail. The visual assessment procedure shall be based on 40 CFR 50, Appendix A, Method 22. Visual assessment will be conducted by an independent third party environmental testing firm under separate contract with the Department and New Orleans Public Belt Railroad.

(2) Instrument Monitoring for TSP Lead: The contractor shall conduct his paint removal and cleaning operations such that emissions of lead shall not be in excess of 1.5 $\mu g/m^3$ over a 24-hour period. Monitoring for this level shall be accomplished using high volume TSP (total suspended particulate) air samplers in accordance with 40 CFR 50.

Emissions in excess of 1.5 $\mu g/m^3$ in any 24-hour period shall be cause for shut down of the project until corrections are made to the containment or work procedures are modified to comply with this level of emissions.

Seven (7) days of baseline monitoring prior to project start-up will be undertaken to determine pre-existing conditions.

Visible Accumulation and Project Housekeeping: Any discharge, spilling, leaking, pumping, pouring, emitting, or dumping of any abrasive blast media (spent or unspent), paint chips, dirt, debris, lead contaminated materials, fuel, oil, paints, or solvents that are generated as a result of any of the contractor activities that result in any visible accumulation within the project limits, temporary waste storage site, or contractor's equipment and materials storage yard shall be cleaned up immediately. Failure to immediately clean up any visible accumulations in a timely manner with adequate equipment and personnel will result in immediate suspension of all work on the project by the Project Engineer. The source of the emission, spill, etc. shall be determined and corrective measures shall be taken to prevent any recurrence. All visible accumulations shall be cleaned up by vacuuming or other appropriate methods, and the emitted or spilled materials shall be contained and stored as required by regulations referenced in these Specifications.

Waste Handling, Disposal and Recycling: Disposal specifications described below are referenced to the SSPC-Guide 7 (DIS). Debris generated by the contractor's cleaning operation, including abrasive blast residue, spent blast mediums, rust, mill scale, paint particles and dust shall be removed from the contaminant area at least once per day.

These wastes shall be collected in leak-proof containers which shall be clearly marked of the hazards of its contents, tare weight of the container, and origin and date of the material collection with weather resistant labels. Transfer of this material from the work area to the

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containers and the storage site for the containers shall be such that no pollution of the environment will occur and workers are fully protected. The containers shall be transported to a temporary storage site in accordance with 40 CFR Part 263: "LAC 33:V." The contractor shall be responsible for obtaining the temporary storage site at no additional charge to the Department. This site shall be secure, providing protection from migration of the waste into the environment and from vandalism and public access. Warning signs shall be prominently displayed around the perimeter of the site. The wastes may remain at the temporary storage site no longer than ninety (90) calendar days.

Recyclable steel abrasives shall be used as the surface preparation method. All blasting waste and dust collector waste shall be handled as a hazardous waste. These wastes shall be taken to a beneficial reuse facility such as a lead smelter. The reclaiming facility shall have a Resource Conservation and Recovery Act (RCRA) Part B permit. The facility shall provide the Department with certification that the lead was reclaimed and that the waste has been recycled and no longer exists. All other waste streams shall be stored in separate containers. These waste streams shall be sampled and tested to determine their classification and shall be properly disposed of based on that classification. Steel additives to the blasting waste and the dust collector waste will not be allowed.

All waste shall be presumed to be hazardous until it is clearly demonstrated by appropriate sampling and testing to be non-hazardous. All hazardous or non–hazardous wastes shall be handled and stored as a hazardous waste.

Sampling of the wastes generated shall be in accordance with 40 CFR Part 261: "LAC 33:V." The sampling and testing laboratory designated by the contractor and approved by the Project Engineer shall prepare a sampling plan in accordance with the Environmental Protection Agency's Manual SW 846.

The Project Engineer or his representative shall be present during the sampling of waste. The Project Engineer shall document that the samples are representative of wastes contained at the temporary storage site. The samples shall be analyzed in accordance with the best procedures and quality assurance requirements of 40 CFR Part 268: "LAC 33:V".

Wastes found to be hazardous are subject to the provisions of the RCRA. Transportation of hazardous wastes for treatment and disposal shall be completely manifested in accordance with 40 CFR Part 262: "LAC 33:V". A manifest will be required for transport of both hazardous and non-hazardous waste. The manifest shall be returned to the Project Engineer.

Payment: Any damage to the structure or surrounding area resulting from the contractor performing any of the above prescribed work shall be repaired, as directed by the Project Engineer, by the contractor at no additional cost to the Department.

Payment will be made at the contract lump sum price for cleaning, painting of existing bridge metalwork faying surfaces at each stringer connection to floorbeams and any other miscellaneous metalwork connections of the Huey P Long Bridge and recycling or disposal of all generated waste which will constitute full compensation for all equipment, labor, tools, sampling, testing, materials, temporary site storage, transportation, treatment, and disposal of waste materials, incidentals and the performance of all work necessary to complete this item.

Payment will be made under:

Item S-101, Cleaning, Painting and Waste Disposal/Recycling of Existing Bridge Metalwork Faying Surfaces, per lump sum.

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ITEM S-102, DECK DRAINAGE SYSTEM: This item consists of furnishing and installing the complete deck drainage system for the structure in accordance with project plan details and the following.

Pipe hangers, scuppers and drain grates shall be steel conforming to ASTM A36, galvanized after fabrication in accordance with ASTM A123.

Bolts, nuts and washers connecting drain grates and scuppers shall be stainless steel. All other bolts, nuts, washers and screws shall conform to ASTM A325.

Piping and fittings shall be standard fiberglass pipe conforming to ASTM D2310 classification RTRP-12ET, or steel conforming to ASTM A36 galvanized after fabrication in accordance with ASTM A123, unless otherwise noted on the project plans.

Exposed metalwork not galvanized shall be painted in accordance with the Project Paint Specifications. Damaged galvanizing shall be repaired in accordance with Subsection 811.12.

Drainage support metalwork fabricated and provided under the previous Superstructure Contract, shall be erected under this contract as shown in the project plans. However, cost of erection of this metalwork is not paid under this item, but is instead included under item S-123, Structural Metalwork (Erect).

Before ordering or fabricating any materials for this item, the contractor shall prepare drawings as necessary to show the proposed piping layout, including fittings, and shall submit the required number of copies in accordance with Subsection 801.03.

Payment will be made at the contract lump sum price for deck drainage system, which shall include all material, tools, equipment, labor, incidentals and the performance of all work necessary to complete the item.

Payment will be made under:

Item S-102, Deck Drainage System, per lump sum.

ITEM S-103, MODIFIED STANDARD TEMPORARY PRECAST BARRIER (15' UNIT): This item consists of furnishing, installing, and relocating temporary precast concrete barrier units in accordance with the project plan details, Section 805 of the 2000 Standard Specifications and Supplemental Specifications, and the following requirements.

Connecting pins (one per unit) and plastic reflectors (two per unit) shall be furnished by the contractor and shall be included in the bid price for this item. Reflectors shall have 7.0 square inches (minimum) reflective area, and be installed a maximum of 15 feet apart (each side) in accordance with the manufacturer's recommendations.

The barriers shall have 1-1/8 inch diameter vertical precast holes spaced a maximum of 24 inches apart to allow for tie down of each precast section to the existing or new roadway deck.

The barriers shall have 1 inch diameter precast holes for connection of a continuous guardrail to barriers after they have been placed.

The contractor shall furnish as part of this item all hardware, tools and labor required to attach the temporary barricades to the roadway deck including but not limited to anchor bolts, nuts, angle iron, and drilling holes through existing roadway deck.

The contractor shall furnish and install a continuous guardrail to the temporary barricades after anchoring the barricades to the roadway deck. This guardrail shall conform to the applicable portions of Section 704 of the 2000 Standard Specifications. All material, tools, labor, incidentals and the work necessary to complete the guardrail work are included in this item.

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Damaged pins, reflectors, or other hardware shall be replaced as directed by the Project Engineer.

The contractor shall be responsible for the transportation and storage of unused barrier sections at all times at no additional cost.

After completion of the work, barrier units shall become the property of the Department and shall be removed and transported to a site designated by the Project Engineer within twenty miles of the work site and unloaded as directed. All costs of providing, installing, relocating, loading, transporting and unloading the barrier units shall be included in the price bid on this item.

Barrier units damaged due to the contractor's operations shall be satisfactorily repaired or replaced at no direct pay. Temporary Emergency Barrier Transitions, as per the Project Plans, shall be under this item at no direct pay.

Temporary precast barrier will be measured per 15' unit.

Payment will be made at the contract unit price for modified standard temporary precast barrier, which shall include all material, tools, equipment, labor, incidentals, and the performance of all work necessary to complete the item.

Payment will be made under:

Item S-103, Modified Standard Temporary Precast Barrier (15' Unit), per each.

ITEM S-104, VARIABLE MESSAGE SIGN UNIT: This work consists of furnishing, operating and maintaining portable changeable message signs to be used at locations designated on the project plans or as directed by the Project Engineer. When it is determined by the Project Engineer that the signs are no longer necessary for traffic channelization, the signs shall become the property of the Department.

The changeable message signs shall be new when delivered to the job site and shall be solar powered.

The portable changeable message signs shall be approved by the Project Engineer.

A message sign shall consist of three separate lines. Each line shall consist of eight characters. Each character shall be nominally 18 inches in height. The width shall be adequate to meet the below legibility requirements. Each character shall be a 5 x 7 LED module or hybrid LED disk. Characters shall be separated at a distance such that the legibility requirements are maintained.

All internally illuminated portions of the sign shall be amber in color. All other illuminated surfaces meant for message display shall be fluorescent yellow. All other surfaces on the front panel shall be flat black in color.

The sign shall be clearly visible under all conditions and all lanes of travel from a distance of 1000 feet perpendicular to the sign center. The contractor shall maintain this legibility for the duration of this contract. Determination of legibility distance shall rest solely with the Project Engineer.

All programming functions shall be controlled by an on-board computer. All programming shall be accomplished through a keyboard and screen. The computer shall store a minimum of 200 preprogrammed messages and 25 six frame sequence messages. The computer shall maintain a list of all available messages. The program shall provide for moving arrow displays.

A password shall be provided to control entry into the computer program. All current passwords shall be provided to the Project Engineer. The contractor shall have qualified

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personnel available at all times to program or change the sign message immediately, at the request of the Project Engineer.

A cellular telephone shall allow complete remote control of the portable changeable message sign. The cellular telephone shall allow the operator complete remote control of the on-board computer as described in the following paragraphs:

Remote control:

1) Computer Base Station Operation

The operator can monitor and remotely control single or multiple message centers as if the operator were present at each unit. The minimum base station requirements are:

a) PC compatible computer
b) 12 inch monochrome monitor
c) Modem
d) One (1) hard disk drive
e) Communications software
f) Cellular telephone

The solar powered signs shall be powered by a bank of batteries. The batteries shall be recharged automatically by a group of solar panels located at the highest point on the unit. When the battery bank is fully charged, the sign shall operate for a period of 30 days without sun. The solar panel generator array shall recharge the battery bank at a rate of 2.5 hours of sun to one 24 hour period of usage.

The solar powered signs shall have the capability to operate from 120 VAC commercial electrical service. The sign shall include a 120 VAC battery charger. If for any reason the solar panels are unable to charge the battery bank, the contractor shall either supply 120 VAC commercial electrical service or replace the batteries at time intervals such that there is no interruption of service to the sign.

The trailers shall comply with all applicable Federal and State laws and regulations. A trailer shall be structurally adequate to serve both as a carrier and as an operating platform for all components of the complete unit. The trailer can be moved anywhere desired as long as there is cellular phone coverage. The base structure shall be structural rectangular steel tubing. All tubing ends shall be closed.

Axle and suspension systems shall be rated at 5000 pounds minimum. Wheels and tires shall be a minimum of 15 inches, 4 ply and shall be rated for towing at on-highway speeds of 65 MPH.

Four (4), 2000 pounds capacity jacks with crank type swivel shall be installed on each unit.

Each hitch shall have a 6000 pound GVWR capacity with a 2 inch ball with heavy duty safety chains in accordance with SAE JH684f.

The portable changeable message sign shall be used in conjunction with other traffic signs and devices in accordance with the Project Plans, Specifications and as directed by the Project Engineer.

The signs shall be stored in an approved secure storage area when not in use. The contractor shall be required to perform all maintenance operations recommended by the manufacturer and keep adequate records of such operations.

The signs shall be kept clean and in good repair at all times. This includes keeping the unit clean.

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Prior to completion of the project and when the signs are deemed of no further use in handling of traffic, each sign shall be cleaned, checked and repaired as necessary to place the sign in good operational condition prior to transfer of title to the Department.

After inspection by Departmental personnel and the signs are found to be in good operational condition with all working parts functioning, the signs, along with a copy of the signs' operating manual, maintenance records and title transfer shall be delivered to District Headquarters.

Measurement of the changeable message sign unit will be per each.

Payment will be made at the contract unit price for the accepted portable changeable message signs measured as noted above, which will be full compensation for furnishing, operating and maintaining the unit for the exclusive use during the life of the contract and, when the signs are no longer needed on the project, the reconditioning of the signs and the transfer of the title of the signs and delivery thereof to the District 02 Headquarters, and includes all equipment, tools, labor and incidentals necessary for this item of work.

Payment will be made under:

Item S-104, Variable Message Sign Unit, per each.

ITEM S-105, BARRIER MOUNTED SIGN POST: This item consists of fabricating and installing sign mounting brackets/posts attached to the barrier fascia at the locations shown on the project plans. The work shall conform to applicable project plan details and 2000 Standard Specifications as amended by the Supplemental Specifications, all as directed by the Project Engineer.

Sign mounting brackets/posts shall be constructed of ASTM A36 steel and hot dipped galvanized in accordance with ASTM A123.

Payment will be made at the contract unit price for barrier mounted sign posts, which shall include all material, tools, equipment, labor, incidentals and the performance of all work necessary to complete the item.

Payment will be made under:

Item S-105, Barrier Mounted Sign Post, per each.

ITEM S-106, PRECAST-PRESTRESSED HIGH PERFORMANCE CONCRETE (HPC) GIRDERS (TYPE BT-78): This item consists of manufacturing, transporting, storage and placement of High Performance Concrete Precast-Prestressed Girders (Type BT-78) in accordance with plan details, the 2000 Standard Specifications as amended elsewhere herein, and the following.

Materials:

a. Concrete: Concrete to be furnished for High Performance Concrete Precast-Prestressed Girders (Type BT-78) shall be Class P(HPC).

b. Cement: Cement shall comply with Section 1001 and Subsection 901.08(a) and the following. For Class P(HPC) concrete, the contractor will be permitted the use of silica fume to a maximum of 10 percent by weight of the total combination of cement, fly ash and silica fume. The contractor will also be permitted the use of fly ash with Type I, I(B), I(C), II or III portland cement up to a maximum of 35 percent by weight for the total combination of cement, fly ash and silica fume.

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The contractor will be permitted partial substitution on a pound (kilogram) for pound (kilogram) basis of grade 100 or grade 120 ground granulated blast-furnace slag for portland cement in concrete mixes only when using Type I, I(B) or II portland cement. When substituted at the ready-mix plant, the contractor may use the substitution rate of grade 100 or grade 120 ground granulated blast-furnace slag conforming to Subsection 1018.28 up to 45 percent by weight (mass) of cement for minor structures (including concrete pipe), structures, and pavement. If the producer wants to increase the substitution rate of grade 100 or grade 120 ground granulated blast-furnace slag above 45 percent up to a maximum of 50 percent, the cement and slag must be blended at the cement plant or terminal. The blended cement containing over 45 percent of grade 100 or grade 120 ground granulated blast-furnace slag must be in compliance with Subsection 1001.04 for portland blast-furnace slag cement.

c. Fine Aggregate: Fine aggregate shall comply with Subsection 1003.02(a) except that other gradations of concrete sand will be permitted if demonstrated in trial mixes to produce the required concrete properties and are accepted as part of the proposed mix design.

d. Coarse Aggregate: Coarse aggregate shall comply with Subsection 1003.02(b) except that other gradations of uncrushed and crushed concrete coarse aggregate will be permitted if demonstrated in trial mixes to produce the required concrete properties and are accepted as part of the proposed mix design.

Portland Cement Concrete: Portland cement concrete shall comply with Section 901 and the following. Concrete Class P(HPC) shall conform to the following requirements:

Average compressive strength at 56 days ≥ 10,000 psi (69.0 MPa)

Slump ≤ 10 inches (250 mm)

Concrete mix design and slump shall be selected by the contractor to ensure that concrete does not segregate.

Permeability (total charge passed) shall be ≤ 2,000 coulombs at 56 days.

a. Mix Design: Mix design shall be in accordance with Subsection 901.06(a) and the following. For Class P(HPC) concrete, the contractor shall make two demonstration trial batches, of at least 3 cu. yd. (2.29 cu. m) each, on separate days at the prestressed concrete girder plant to show that the girder concrete sections can be cast with the proposed mix design. Materials used in concrete batches shall be identical to those that will be used in production. These demonstration batches shall be made in sufficient time before the production girders are cast to demonstrate that design compressive strength and permeability can be achieved. Cylinders shall be made and match-cured with the girder section for Class P(HPC) concrete. The cylinders shall be cured and tested in the same manner as acceptance cylinders in a production mode. The design trial batch shall meet the minimum design compressive strength before mix design approval will be given. Test results for slump, air content, wet unit weight, permeability and compressive strengths at concrete ages of 1, 3, 7, 28, and 56 days shall be submitted. The verified time-temperature history of the concrete during the initial curing period shall be submitted for Class P(HPC) concrete. If requested, the contractor shall furnish materials to the Department for further verification of trial mixes.

b. Curing: Curing of High Performance Concrete precast-prestressed bridge girders (Type BT-78) shall be in accordance with Subsection 805.14(e) and the following. To establish adequacy of curing methods and to determine whether concrete has attained the required compressive strength, a minimum of eight test cylinders shall be made from the last batch of concrete and match-cured under the same conditions and technique as the corresponding

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members that they represent. Three cylinders shall be tested by the contractor no later than 56 calendar days after casting to determine if the required strength has been achieved. The remaining five cylinders may be tested at any time as required by the contractor. However, no more than three cylinders shall be tested in one day. If all five cylinders have been tested and the concrete has not obtained required strength, the members involved shall be held at the plant until the 56-day cylinders are tested. If the average 56-day concrete cylinder strength has not achieved the required strength, all members involved will be subject to rejection. Payment will be made in accordance with the Department's manual entitled "Application of Quality Assurance Specifications for Precast-Prestressed Concrete Plants." Curing methods other than heat curing shall be in accordance with Subsection 805.10. Hot weather concrete limitations as stipulated in Subsection 901.11(b) shall not be applicable for heat curing; however, precautions such as cooling of forms will be required.

Heat curing shall be done under a suitable enclosure to contain the heat in order to minimize moisture and heat losses. The contractor shall ensure that the enclosure is closed around the ends of the girders closest to the anchorage abutments at each end of the prestressing bed. Initial application of heat shall begin only after concrete has reached its initial set as determined by ASTM C403. When used, steam shall be at 100 percent relative humidity. Application of heat shall not be directly on concrete. During application of heat, concrete temperature shall be increased at a rate not to exceed 40°F (5°C) per hour until the desired concrete temperature is achieved. The concrete temperature shall not exceed 160°F (70°C). Heat curing may continue until concrete reaches release strength. At the contractor's option, the application of heat may be reduced or discontinued to ensure that the concrete temperature does not exceed 160°F (70°C). If structural defects occur, the defective members will be rejected. The contractor shall detension the strands before the internal concrete temperature has decreased to 20°F (7°C) less than its maximum temperature. The contractor shall be permitted to add heat to maintain the internal concrete temperature within 20°F (7°C) of the maximum temperature. Two recording thermometers showing time-temperature relationship in the concrete shall be furnished for each 200 ft. (60 m) of bed. For girders, one thermocouple shall be located at the center of gravity of the top flange and one within 1 inch (25 mm) of the center of gravity of the bottom flange.

c. Permeability: Permeability (Total Charge Passed) for Class P(HPC) concrete, determined in accordance with AASHTO T277, shall be ≤ 2,000 coulombs at 56 days. The permeability samples shall have a diameter of 4 inches (100 mm) and a minimum length of 8 inches (200 mm). The test specimens shall be prepared by the contractor, and furnished to the Louisiana Transportation Research Center (LTRC) for testing. Class P(HPC) concrete test specimens shall be cured using the same procedures as the girders and piles until tested 56 days after casting. The average value of three specimens shall be reported. If used, silica fume shall be added as early as possible in the concrete batching and as directed by a technical representative of the admixture supplier to ensure uniform distribution. High range water-reducers may be used to control slump, water/cementitious material ratio and proper distribution of fly ash, slag or silica fume. Admixtures shall be plant added. Air entraining and set controlling admixtures may be used. All admixtures shall be compatible. Compatibility shall be demonstrated with trial batches. Admixtures containing chlorides shall not be used.

d. Substitutions: No substitutions will be allowed for Structural Class P(HPC) concrete.

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Transportation and Storage: Transportation and storage of High Performance Concrete Precast-Prestressed Bridge Girders (Type BT-78) shall be in accordance with Subsection 805.14(f) and the following. Precast-prestressed girder members (Type BT-78) using Class P(HPC) concrete shall be held at the plant for at least 28 days after casting and until the concrete has attained the specified compressive strength. Specified compressive strength shall be attained no later than 56 days after casting.

Acceptance and Payment Schedule: Acceptance and payment schedules shall be in accordance with Subsection 901.12 and the following. Class P(HPC) concrete will not be accepted and shall be removed if the specified compressive strength of 10,000 psi (69 MPa) and permeability of less than or equal to 2000 coulombs is not achieved by 56 days.

DOTD TESTING PROCEDURE MANUAL TR 226M/226-95: For this project, TR 226M/226-95 is amended to require the use of 4 inches (100 mm) by 8 inches (200 mm) match-cure molds. Match-cure molds shall be the Sure-cure Cylinder Moulds System from Products Engineering, or approved equal.

DOTD TESTING PROCEDURE MANUAL TR 230M/230-95: For this project, TR 230M/230-95 is amended as follows. For testing Class P (HPC) concrete, the testing machine shall have been calibrated within 6 months prior to the time of testing. Neoprene caps with a durometer hardness of at least 70 shall be used for testing Class P (HPC) concrete.

Measurement: This item shall be measured per linear foot in accordance with Subsection 805.17(c).

Payment: Payment for Precast-Prestressed High Performance Concrete (HPC) Girders, Type BT-78 will be made at the contract unit price per linear foot, in accordance with Subsection 805.18(b).

Payment will be made under:

Item S-106, Precast-Prestressed High Performance Concrete (HPC) Girders (Type BT-78), per linear foot.

ITEM S-107, TRUSS MONITORING: This item consists of all work and equipment necessary to continue to monitor and maintain the pier and truss monitoring system shown in the project plans and to survey the piers. This work shall also include all work necessary to monitor the output from the truss monitoring system throughout the duration of the project, including post processing, data collection, data analysis, and reporting of data as described in the Truss Monitoring sheets of the project plans. All work pertaining to truss monitoring as described in these Special Provisions and on the truss monitoring sheets in the project plans will be paid under this item. The purpose of the truss monitoring system is to monitor the existing truss and piers during construction in order to ensure that the construction sequence and activities do not adversely affect the existing structure. The requirements of the truss monitoring system are detailed in the project plans.

The pier surveying shall include the following:

The Contractor shall survey the main river Piers A, I, II, III, and IV for vertical elevation, horizontal position, and vertical alignment on a monthly basis and survey river elevation at site on date surveyed. The first survey shall be performed before any work is performed. The last

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survey shall be performed immediately prior to the completion of construction. The location of the survey points are provided by the New Orleans Public Belt Railroad as follows:

Survey Locations: Existing Brass Pins – There are two (2) existing brass survey pins, one located on the riverside (downstation) of Pier A and one located on the deck truss side (downstation) of Pier IV. The vertical constant from existing brass pin to top of existing pier bridge seat is as follows:

Pier A: 115.388'
Pier IV: 48.001'

Existing "X" Marks – There are "X" marks located on the remaining piers with vertical constant from "X" mark to top of existing pier bridge seat as follows:

Pier I: "X" mark under hatch = 13.092'
Pier II: "X" mark at east downstation arm at panel 1-10, outside walkway = 13.086'
Pier III: "X" mark on rivet on downstation outside handrail = 14.729'

The contractor shall provide a chisel mark on each pier for lateral and longitudinal control, independent of existing survey marks.

At no point during the project shall these or equivalent survey locations be lost.

A copy of each survey performed shall be forwarded to the New Orleans Public Belt Railroad through the Project Engineer. A copy of each survey shall also be given to the Project Engineer.

The contractor shall survey additional locations for elevation on a monthly basis in conjunction with his pier survey. These additional survey locations have been permanently marked by the Substructure Contractor. The Project Engineer will turn over the locations of these survey points at each pier and the Substructure Contractor's means of establishing the initial elevation readings of these survey points to the Contractor for his use. These survey points are in the following general locations and are shown in the truss monitoring section of the project plans:

Survey Locations:

Top of top tie channels: both exterior channels, upstream end, downstream end, and c/l bridge of each channel (6 locations per pier).

Top of new concrete encasement: one on the upstream side and one on the downstream side of the pier (2 locations per pier).

Top of exterior column base plate: one on upstream side and one on downstream side of each column (2 locations each base plate, 4 locations per pier).

Top of interior column base plate above jacking frame: one on the upstream side and one on the downstream side of the column (2 locations per pier, 4 for pier IV).

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Elevations shall be recorded to a precision of five thousands of a foot (0.005'). Upon completion of each monthly survey, the contractor shall submit all survey information for these additional survey locations to the Consulting Engineers (through the Project Engineer).

Navigation Clearance Gage: At the completion of the deck widening, the contractor shall verify the current position of the navigation clearance gages located on the river piers. The contractor shall check the clearance reported by the gage against the actual clearance for the navigational channel as shown in the USCG permit. The results of this survey may require the repositioning of this gage. Repositioning the navigation clearance gage is not part of the scope of work for this item; only the verification of its position at the end of the work.

Payment: Payment will be made for pier and truss monitoring, pier surveying, and position of navigation clearance gage at the end of the work which shall include all material, tools, equipment, labor, incidentals and the performance of all work necessary to complete the item according to the following payment schedule:

Equal monthly payments for the length of the construction contract until the total bid amount is paid.

Payment will be made under:

S-107, Truss Monitoring, per lump sum.

ITEM S-108 STEEL BARRIER RAILING: This item consists of:

- Relocating existing steel barrier railing installed under a previous contract.
- Installing steel barrier railing and tubular (pipe) railing fabricated and provided by others. as shown in the project plans.

All costs associated with barrier and railing work under this contract shall be included in this item. Replacement of damaged steel barrier sections, as directed by the Project Engineer, shall be under this item at no direct pay.

Payment will be made at the contract linear foot price for relocating and installing steel barrier and tubular railing, which shall include all material, tools, equipment, labor, incidentals and the performance of all work necessary to complete the item.

Payment will be made under:

Item S-108, Steel Barrier Railing, per linear foot.

ITEM S-109, IMPACT ATTENUATORS (KINETIC): This item consists of furnishing and constructing a kinetic impact attenuator, generally referred to as a compression crash cushion, in accordance with plan details, manufacturer's recommended procedures and other requirements specified in this special provision. Kinetic Impact Attenuators shall be connected to a rigid backup wall to resist the impact loads. The backup wall shall be constructed in accordance with the plan details and may require some modification to achieve compatibility with the specific attenuator supplied by the contractor.

All attenuators must have been successfully crash tested and conform to the requirements of the NCHRP 350. Attenuators that do not meet the crash testing requirements of the NCHRP 350 will not be allowed on any Federal or State funded projects.

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The attenuators shall provide the necessary protection for the entire designated area on the plan.

The contractor shall submit information on the type, size and the manufacturer of the attenuator he intends to utilize for each location including proposed backup wall modification to the Bridge Design Section for review and approval. A copy of this information will be retained in the District Maintenance Office. The contractor shall not modify the configuration of the gore area for the sake of accommodating the installation of a narrower attenuator, unless it is substantiated that no other type of attenuator is available in the market for a wide gore application.

All units shall be assembled with corrosion resistant fasteners. Bolts, nuts and washers shall be American National Standard. Miscellaneous metal work shall be fabricated from either M1020 merchant quality or ASTM A 36 steel and after fabrication, shall be galvanized in accordance with Subsection 811.12. All welding shall be performed by a certified welder in accordance with Section 815.

Hazard marker panels will be furnished by the Department and the contractor shall attach the hazard markers by approved methods.

The contractor shall furnish the engineer a certified statement that the Impact Attenuators and the material used conform to the plans and specifications.

Kinetic Impact Attenuators will be measured per each.

Item S-109, Impact Attenuator (Kinetic), per each.

ITEM S-110, MAINTENANCE OF TRAFFIC: Reasonable provisions for maintaining local traffic through the length of the project and the life of the contract at no direct payment is a normal part of the contractor's responsibilities (2000 Standard Specifications Subsection 104.03). However, the project has additional requirements that require additional measures be taken. These measures are described in the project plans and specifications. This item shall provide payment for the additional measures needed to provide the work, personnel, and furnishing the equipment necessary to control traffic for conditions including, but not limited to:

- Permitting emergency vehicles responding to an emergency to move throughout the project area and cross the bridge during any time of closure.
- Reducing traffic to one lane for the placement of the concrete deck closure pours as described in the project plans.

All costs associated with lane and shoulder usage including traffic control plans, signing, police details, lighting, flagman, etc. needed to carry out the work as described under Section 713, Temporary Signs, Barricades, Barriers, and Pavement Markings and as amended by the Special Provisions shall be included in the bid price for Item No. 713(01), Temporary Signs and Barricades.

All cost associated with additional measures required for maintenance of traffic not paid under Item No. 713(01), Temporary Signs and Barricades, shall be paid under this item.

Payment will be made at the contract lump sum price for maintenance of traffic, which shall include all materials, tools, equipment, labor, incidentals and the performance of all work necessary to complete the item.

Payment will be made under:

Item S-110, Maintenance of Traffic, per lump sum.

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Payment Schedule for Maintenance of Traffic

Percent of Total Contract Amount Earned	Allowable Percent of Lump Sum Price for Maintenance of Traffic
Initial Installation	20
25	40
50	60
75	80
100	100

ITEM S-111, TRAFFIC ASSISTANCE: This item consists of furnishing vehicular traffic assistance to assist the flow of traffic across the bridge during construction by responding to smaller vehicles (cars, pickup trucks, small utility vehicles) in need of assistance, as outlined in this provision. It is not intended for the assistance of larger and heaver vehicles; the assistance of such vehicles is beyond the scope of this provision and not the direct responsibility of the contractor.

The contractor shall make all necessary arrangements to provide traffic assistance, in the form of vehicle assistance service / wrecker service, to clear any vehicular breakdowns on the elevated structure during construction. Traffic assistance is to be provided at all times when the contractor is actively working on the main bridge or at anytime one of two traffic lanes (Eastbank bound, Westbank bound, or both) is closed on the elevated structure. During times when the contractor is not actively working on the main bridge or there are no lane closures, traffic assistance shall be provided during the hours of 6 am to 6 pm, 7 days a week.

The contractor shall be ready to clear two-axle vehicles up to 8,600 lbs. gross vehicle weight by providing two available wreckers at the bridge site, one on the Eastbank side and one on the Westbank side of the bridge during the required times for traffic assistance. All other vehicles of heavier weight or with more than two-axles are beyond the scope of this provision. The clearing of vehicular accidents is not the direct responsibility of the contractor but shall be under the direction of the police, fire department, or other official emergency response personnel.

The contractor shall place police officers at the bridge site, one on the Eastbank side and one on the Westbank side, during the required times for traffic assistance or as directed by the Project Engineer. Utilization of police officers shall be according to the Special Provision for Subsection 107.07, Public Convenience and Safety. Police officers shall be paid at the vehicle rate and hourly rate according to the Special Provision for Subsection 107.07, Public Convenience and Safety, and shall be reimbursed by the Department with other law enforcement services according to said Special Provision.

Payment will be made at the contract lump sum price for traffic assistance, which shall include all material, tools, equipment, labor, incidentals and the performance of all work necessary to complete the item.

Payment will be made under:

Item S-111, Traffic Assistance, per lump sum.

ITEM S-112, CONSTRUCTION SCREENING: This item consists of furnishing and erecting temporary construction screening as shown in the Sequence of Construction in the project plans.

The purpose of the construction screening is to facilitate the flow of highway traffic across the bridge during construction. The construction screening shall provide a visual barrier

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to limit the motorist's ability to observe the construction activities that are occurring on the main bridge. The construction screening shall be constructed of material that will permit air to pass through it, but will limit visual observation through the screening. Construction screening shall be supported in such a manner that it can be removed within 24 hours notice from the Project Engineer. The contractor shall provide a means to notify his personnel when any portion of the construction screening comes loose and is within the region used by motor vehicles, so that corrective action can be taken immediately to secure the screening.

In the event that the National Weather Services issues a tropical storm or hurricane warning for the project area, those components of the construction screening that would cause an overstress condition on any bridge member or the span as a whole, or that may become detached, shall be removed immediately from the structure. The items to be removed and the parameters for removal shall be identified on the construction screening design calculations and drawings. The contractor shall also submit a detailed plan for removal of the necessary items. The plan shall demonstrate the contractor's ability to implement the plan including a description of the time frame, manpower requirements and equipment required to implement the plan. The removal and reinstallation of the construction screening due to high winds or approaching storms shall be included in the bid price for this item.

Construction screening shall be an open mesh polypropylene, polyethylene, or similar type fabric with a minimum weight of 3 oz / sq. yd. and a maximum weight of 6.5 oz / sq. yd. The material shall have minimum burst strength of 375 psi, minimum permeability of 350 cfm, and minimum puncture strength of 90 lbs. The material shall also have reinforced hems and shall be flame resistant. The contractor shall keep construction screening in a well maintained condition, to the approval of the Project Engineer.

Construction screening with all anticipated loads shall be reviewed and stamped by a civil engineer registered in the state of Louisiana and submitted for examination in accordance with Subsection 801.03(a) of the 2000 Standard Specifications and Special Provisions. The analysis shall ensure that the construction screening shall not surpass allowable construction loads (as defined in the project plans) for the bridge members or compromise the structural integrity of the bridge. The screening shall not foul highway or railroad clearances. Indicate the maximum permissible debris and wind loads permitted on the construction screening and describe its installation procedures.

Construction screening shall extend from Pier IV to Pier A and shall be in place and maintained during that portion of the project when roadway deck is being constructed within these limits.

Attachment requirements for construction screening shall be as follows:

- Permanent attachments or fasteners to bridge members or floor system will not be allowed.
- Welded connections and any other weldments are prohibited.
- No additional holes allowed in bridge members.
- No existing fasteners shall be removed.
- No cutting or burning of structural metalwork on the bridge is allowed.
- When cables are used, there shall be proper softening of cables to protect bridge members and prevent cables from being cut by bridge metalwork.

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Payment will be made at the contract lump sum price for construction screening, which shall include all material, tools, equipment, labor, incidentals and the performance of all work necessary to complete the item.

Payment will be made under:

Item S-112, Construction Screening, per lump sum.

ITEM S-113, WEB-ENABLED CAMERA SYSTEM: This item consists of providing a live feed from a video camera documenting construction progress of the approaches and main bridge deck widening. The contractor shall direct the live feed to the project's website. The video cameras shall be placed as shown on the plan details.

General: The webcam system shall be an integrated, professional-grade, high definition system designed specifically for the construction industry as a turnkey package including camera and related hardware, mounting equipment, software, data transmission wiring, website hosting, image hosting and storage and online interface for the system and technical support.

Submittals: Submittals to be provided are as follows:

A. Product Data
B. Shop Drawings for power, signal, and control wiring and grounding from source to cameras and showing camera and equipment installation locations.
C. Closeout Submittals:
    1. Digital Images: Submit digital still images exactly as originally recorded in the digital camera without alternation, manipulation, editing, or modifications using image editing software.
        a. Date and Time: Include date and time in filename for each image.
        b. Format: Submit a sortable/identifiable archive of all digital still images in DVD format or on an external hard drive.
    2. Time-Lapse "Movie": Compile select digital still images into a time lapse movie-like sequence of the construction period. Optimize images included and run-time length of movie to suit the Project Engineer.
    3. Maintenance Data: For camera system.

System Requirements: The camera system shall consist of a tamper and impact resistant, discreet, fixed mount enclosure with integrated fix camera, lens and controller.

The camera shall have the ability to take a high-resolution digital still image of the construction site at a set time interval, at least every 15 minutes, and upload the still images over a wireless cellular modem to a secure, password-protected website.

Surge protection shall be provided to protect components from voltage surges originating external to equipment housing and entering through power, communication, or signal leads. The surge protection for external wiring of each conductor entry connection to components shall comply with the following:

Minimum Protection: 240 Joules surge energy rating: 0.0 nano-second surge response time.

Equipment: The system shall consist of the following equipment:

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A. Camera: The camera shall be an integrated high definition camera and lens assembly consisting of a charge coupled device with a remotely controlled focal length lens mounted as a permanent module with the following features.

1. Digital Still Image Resolution: Minimum sensor size of 3.2 or 6.0 megapixels and at an image resolution of not less than 2048 x 1536 or 2316 x 2112 pixels.
2. Memory: Unlimited remote storage.
3. Lens: 6.3 – 63 mm (36-380 mm equivalent in 35 mm photography) system capable of ten times (10x) optical zoom (include a wide angle conversion lens with a 0.66x factor). Provide capability to remotely control focal length lens to change resolution, focus, and zoom.
4. Focus Mode: iSEP auto, Spot AF, Selective AF target, Manual.
5. Metering Mode: Digital iESP multi-pattern auto TTL, Spot metering, Center Weighted metering.
6. Data Connection:
    a. In areas with cellular coverage, operate cameras via built-in cellular data connection provided and maintained by the system vendor.
    b. In areas without cellular coverage, operate cameras via a RJ-45 Ethernet data connection over broadband or satellite internet access provided and maintained by the contractor.
    c. In areas without cellular coverage, operate cameras via a RJ-11 data connection over a dedicated analog local telephone line provided and maintained by the contractor.
7. Electrical Operation: 120 VAC at maximum 83 Watts.

B. Camera Enclosure: Enclosure shall be of standard tamper and impact resistant housing of extruded aluminum, die cast aluminum and sheet aluminum body with factory applied powder coated finish. A sun shroud shall be provided to protect the enclosure from direct sun rays and reduce internal temperature by approximately 10 to 15 deg F.

Interface and Online Access:

A. Remote Access: The contractor shall provide an online interface system to allow viewing of all high-definition digital still images captured and stored during construction, from any location with internet access and with password protection. Images for references shall be maintained and available on the website at all times during construction and for not less than 30 days after construction.

B. Online Interface:
    1. The online interface system shall be accessible by an unlimited number of human users.
    2. System shall display project name.
    3. Navigator: Provide calendar based navigation system for selecting specific images.
    4. Zoom: Provide pan and zoom capability for zooming into high definition images.
    5. User Screen Viewing Options:

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a. Dynamic Calendar: Provide screen showing calendar in which each day displays an image for that day.
b. Project Dashboard: Provide screen allowing user to view multiple sites at one time.
c. Quad View: Provide screen showing four windows, allowing user to view last four days, weeks, or months on one screen.
d. Split Screen: Provide screen showing two discrete images side by side, from same camera or from two difference cameras.
e. Overlay Mode: Provide screen showing two discrete images overlaid, allowing user to determine differences between the two.
f. Full Screen: Provide screen maximizing view of images on users monitor.

6. Email: Provide capability to email photos with comments from within the system.
7. Slideshow: Provide capability to browse through images, moving forward and backward in time by individual image and by day.

Installation:

A. General:
1. Install camera system in accordance with manufacturer's printed instructions, State and Municipality codes and approved submittals.
2. Install units plumb and at angles to provide maximum field of view of on-site and as directed by the Project Engineer.
3. Securely and rigidly anchor products in place.
4. Connect cameras to data cable.
5. The location connection detail of any camera, cables, etc. connected to the existing railroad structure shall be submitted to the Chief Engineer of the New Orleans Public Belt Railroad through the Project Engineer for approval.

B. Position cameras as shown on the project plans and as directed by the Project Engineer.
1. Install cameras at elevation that will provide uncompromised visual coverage.
2. Install cameras so that position of sun and man-made light sources will not come into direct contact with field of view of camera at any time during construction.

Field Quality Control: Cameras shall be tested on site prior to mounting units in its predetermined position.

Cleaning and Adjusting: Installed items shall be cleaned using methods and materials recommended in writing by the manufacturer. Cameras shall be checked and adjusted to ensure proper operation and function.

Operation, Termination and Removal:

A. Maintenance: Maintain camera equipment in good operating condition on a 24-hour basis unit removal.

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B. Termination and Removal: Remove camera system as directed by the Project Engineer.
   1. Camera system including associated appurtenances and mounting equipment shall become the property of the Department.
   2. Camera system shall be delivered in its original packaging as directed by the Project Engineer.

Measurement and Payment: Measurement of the Web-Enabled Camera System will be per each. Payment will be made the contract unit price for the accepted web-enabled camera system measured as noted above, which will be full compensation for furnishing, operating and maintaining the cameras for the exclusive use during the life of the contract and when cameras are no longer needed on the project shall be delivered to a location determined by the Project Engineer.

Payment will be made under:

Item S-113, Web-Enabled Camera System, per each.

ITEM S-114, VIBRATION MONITORING: The contractor shall obtain and pay for the services of a testing lab acceptable to the Project Engineer to conduct seismic monitoring of vibrations during pile driving and other heavy equipment operations in areas that are not normally subjected to such operations. The lab shall employ the services of a vibration specialist engineer who in conjunction with the lab shall render complete reports and interpretations of the data obtained including the possible effects of the measured vibrations on adjacent and surrounding structures including the existing railroad approach trestles. The vibrations shall be measured by means of a portable seismograph, which directly measures particle velocity (rate of ground movement) in three mutual perpendicular directions (longitudinal, transverse, and vertical). Probes shall be located at various locations as directed by the vibration specialist engineer. If peak particle velocity levels exceed 2.5mm (0.1 inches) per second at historic structures or 6.4mm (0.25 inches) per second at non-historic structures and the railroad approach trestles, then the contractor shall terminate the driving operations and notify the Project Engineer. The contractor will be required to adjust the pile driving operation to bring the vibration levels into the acceptable limits, prior to restarting work. All cost for adjusting the pile driving operation will be included in the price bid for the piling. In addition to daily reports, a complete report of the vibration study, including seismographs shall be furnished to the Project Engineer after the conclusion of the driving of all piles.

In addition to the probe locations required above, probes shall be located at distances of 300 ft and 500 ft from the pile driving location. The 500 ft. distance is a nominal value. The specific limits of vibration monitoring are shown in the plans.

Historic structures are identified and their locations are shown in the project environmental documents.

Before any pile driving is performed, ambient vibration readings shall be taken on a monthly basis for a minimum of 3 months throughout the area defined in the plans and specifications to be monitored.

Payment: Payment for vibration monitoring will be made at the contract lump sum price and shall be full compensation for furnishing all materials, tools, equipment, labor, services, and

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incidentals required to perform all work as described above, where indicated on the plans or as directed by the Project Engineer.

Payment will be made under:

Item S-114, Vibration Monitoring, per lump sum.

ITEM S-115, CONSTRUCTION SITE SURVEY: This item consists of a pre-construction survey, video and construction photos in accordance with the following:

The contractor, prior to mobilization onto the job site, shall conduct a detailed survey and videos of the job site, surrounding area and access routes. This survey shall be accomplished under the direct supervision of a Louisiana Registered Engineer who is familiar with construction work and practices in the New Orleans area. The contractor shall submit the name and qualifications of this engineer to the Project Engineer for review and approval prior to any survey/photographic work. The contractor shall bear all costs associated with the use of this engineer. The Consultant Engineer shall view and approve the video and pre-construction photos prior to any mobilization. This survey is intended to document existing conditions prior to construction.

The contractor shall make every attempt to gain permission from property owners for access to private property for documenting pre-construction conditions. The contractor shall send a certified, return receipt requested introductory letter (wording to be reviewed by the engineer) informing the property owner of the survey and requesting permission to survey the existing conditions. If the property owner refuses access, the contractor shall notify the engineer and log all contacts with the property owner.

Survey: Locations and elevations (data) shall be taken of existing bridge structures, house and building slabs, driveway pavement, and fence within 500 ft of the project site. The data shall be recorded and produced under the supervision of a registered licensed surveyor. Data on abutting drives, walks, and fence shall be taken at approximately 25 ft intervals and at the point of juncture with any structure to which they are attached. In addition, data shall be taken of all corners of house and building slabs within the survey area. Three (3) copies of all field notes with sketches clearly showing locations and elevation shall be delivered to the engineer.

Pre and Post Construction Photographs: Prior to beginning the work and upon completion of the work, a series of photographs shall be made to show the existing and improved conditions. Photographs shall be taken of the approach trestles within the project limits as well as the approach spans immediately adjacent to the project limits.

Pre and Post Construction Videos: Prior to mobilization and again upon the completion of the work, the contractor shall videotape all areas of the approach trestles, streets, and fronts of residences within 500 ft of the project limits. Additionally, views shall include the street proper, fronts of residences, sidewalk and grass areas. Views shall clearly show any existing damage prior to the commencement of the work. Travel speed of camera for roadway videos shall be not greater than 50 ft per minute. The 500 ft. distance is a nominal value. The specific limits of the construction site survey are shown in the plans.

Residential & Commercial Video Survey: Prior to mobilization, the contractor shall individually videotape the interior and exterior of all residences and commercial buildings within

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500 ft of the project limits as per above. All interior walls, ceiling and any existing damage shall be videotaped. The 500 ft. distance is a nominal value. The specific limits of the construction site survey are shown in the plans.

Monthly Progress Videos: The contractor shall provide a monthly video of the construction, traffic signage and street condition. Monthly video shall show a walk through of the project area, showing all construction, traffic signage and existing conditions of the streets. Five (5) copies of the monthly progress video as per below shall be delivered.

All videotapes shall be produced on ½", S-VHS format with accompanying audio. Master field videos shall be edited onto an S-VHS Hi-Fi format, SP speed setting, edit tape. Videos shall be identified on screen with the date made. Edit tape shall be titled prior to each new video sequence and after every 30 minutes of tape time. Title shall include the project name, tape name and number, location, and date made. Four (4) VHS Hi-Fi format, SP speed setting copies of the S-VHS edit tape, along with the S-VHS edit tape shall be delivered to the engineer. In lieu of S-VHS media and format, other superior video media and format may be used.

Payment: Payment for existing site survey, videos and construction photos will be made at the contract lump sum price and shall be full compensation for furnishing all materials, tools, equipment, labor, and incidentals required to perform all work as described above, where indicated on the plans or as directed by the Project Engineer.

Payment will be made under:

Item S-115, Construction Site Survey, per lump sum.

ITEM S-116, TEST DRILLER SHAFT (9-FT. DIAMETER): This item consists of furnishing all labor, equipment, materials, and incidentals necessary for constructing the test drilled shaft and installing Osterberg Cell (O-Cells) load test setup at the location(s) shown in the plans. The test shaft shall be constructed in the identical manner in which the production shafts will be constructed (including permanent casing) and to the dimensions specified in the plans and in accordance with these specifications, except the reinforcing cage is omitted. An approved engineering consultant shall be used to instrument the test drilled shaft and supervise the installation of the O-Cells for use during the load test program. The same engineering consultant shall be used to conduct the O-Cell load test under the Item S-117, "Load Testing a Drilled Shaft" contained herein. The contractor shall supply CSL nondestructive testing and any instrumentation specified herein. When the testing is completed the upper portion of the test pile shall be removed to the limits shown in the plans.

Approved Engineering Consultants: There are three pre-approved engineering consultants qualified to perform the necessary instrumentation and O-Cell installation in this special provision. The engineering consultant shall be selected from one of the following:

LOADTEST, Inc.
2631 NW 41st Street, Suite D
Gainesville, FL 32606
Phone (800) 368-1138 or (352) 378-3717
FAX (352) 378-3934
Contact Person: Jack Hayes

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David K. Crapps, Inc.
4509 NW 23rd Avenue, Suite 19
Gainesville, FL 32606
Phone (352) 378-2792
FAX (352) 372-9808
Attention: Dr. David Crapps

GZA GeoEnvironmental, Inc.
1 Edgewater Drive
Norwood, MA 02062
Phone (781) 278-3700
FAX (781) 278-5701
Contact Person: John Regan

Should another engineering consultant be proposed to perform the necessary work, approval shall be obtained from the Geotechnical Design Engineer. Documentation of previous load testing experience utilizing the O-Cells shall be submitted to the Geotechnical Design Engineer.

Soil Boring and Sampling: A soil boring shall be taken at each test shaft location prior to drilling the test shaft. The soil boring shall extend to a minimum depth of 50 feet beyond the bottom of the depth of the proposed drilled shaft shown in the plans. Soil sampling shall be performed along the entire length of the boring. Soil samples shall be obtained at a maximum interval of 5 feet. The soil samples shall be turned over to the Geotechnical Design Engineers for examination and testing. Within 7 calendar days of receiving the samples, the Geotechnical Design Engineers shall advise the contractor through the Project Engineer if the depth of proposed test and production shafts will be adjusted as a result of the findings from the soil borings.

Test Drilled Shaft Schedule: The trial shaft shall be constructed and the methods accepted before construction of any test shafts. The test shafts, O-Cell Load Tests, CSL Testing, and all reports shall be completed and accepted before construction of any production drilled shafts required in accordance with Section 814. The test shaft shall be allowed to remain undisturbed for a minimum of 14 calendar days after construction, or as directed by the engineer, before beginning loading operations. The drilled shaft shall be concreted in a manner similar to that specified for production shafts. The concrete shall have a minimum compressive strength of 3,800 psi (26.2 MPa) at the time of load testing. High early strength concrete may be used to obtain this strength at an earlier time to prevent testing delays. At least eight (8) concrete compression test cylinders shall be made by the contractor from the concrete used in the test shaft. At least two (2) cylinders shall be tested prior to the load test and at least two (2) cylinders shall be tested on the day of the load test.

Test Drilled Shaft Construction:

(a) Test Drilled Shaft: prior to the construction of the production drilled shafts, the contractor shall construct two (2) non-production test shafts. The location and dimensions of the

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test shaft shall be as shown in the plans. One test shaft shall be subjected to post grouting to verify the effectiveness of this technique. The other test shaft shall not be post grouted.

The methods of construction, including excavation, casing, reinforcement placement, final shaft cleaning, concrete placement, etc. shall be the same as for the production shafts, except as modified for the load test instrumentation and testing requirements. For the trial shaft, the reinforcement cage shall be installed in the same number of sections and sequencing as required for the production shafts located directly beneath the existing bridge structure. For the load test shafts, the reinforcement cage can be installed as a unit, without splices.

For the drilled shaft(s) shown on the plans to be used for testing, the contractor shall construct the drilled shaft(s) using the approved shaft installation techniques.

Failure to adequately construct the trial shaft or test shaft to the satisfaction of the engineer will be cause for the engineer to reject the trial shaft or test shaft and require adjustments in methods and/or equipment by the contractor to eliminate unsatisfactory results. Unsatisfactory results may include, but are not limited to the following:

1. Inability to excavate, clean, or adequately stabilize the excavation within tolerances;
2. Inability to place the reinforcing cage and concrete within the required time limitations;
3. Inability to adequately place concrete, which includes sealing tremie or pump lines, maintaining the required concrete head, or protecting concrete from contamination;
4. Significant voids or anomalies in the shaft as determined by Crosshole Sonic Logging (CSL) testing or other nondestructive testing methods which are approved in writing prior to their use

If the engineer rejects the trial shaft or test shaft, the contractor shall construct additional trial shaft(s) or test shaft(s) at no additional cost to the Project and with no increase in contract time.

(b) Nondestructive Testing (NDT): Crosshole Sonic Logging (CSL) will be required for all trial shafts, test shafts and production shafts, in accordance with Subsection 814.19. The contractor shall install access tubes. CSL Testing will be performed by the Geotechnical Design Engineer.

(c) Additional Concrete Test Specimens: In addition to the quality assurance requirements specified in Section 805, eight (8) additional concrete cylinder specimens for compressive strength and elastic modulus testing will be required for each test drilled shaft. The Geotechnical Design Engineer will conduct these tests. The results of this testing will be used in analyzing instrumentation results.

Instrumentation:

(a) General: The load test instrumentation shall measure the test load applied bi-directionally by the O-Cells to the shaft and its distribution into the various soil layers through side friction and end bearing. This will allow adjustments, if necessary, to the design calculations and settlement estimates in order to provide information for the final drilled shaft designs. The instrumentation required for the test drilled shaft shall consist of O-Cells and attachments, vibrating wire sisterbars, displacement monitoring devices, and LVDT or LVWDT gages for monitoring the expansion of the O-cells. The contractor shall furnish and install all instrumentation stated herein, as shown on the Drawings, and as directed by the engineering consultant.

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(b) Osterberg Load Cells: The contractor shall provide all equipment and materials required to install the O-Cells and remove the load test apparatus after testing. The contractor shall furnish the O-Cells as shown on the plans, to be obtained from LOADTEST, Inc., 2631 NW 41st Street, Suite D, Gainesville, FL 32606 (Phone 800-368-1138 or 352-378-3717, FAX 352-378-3934). Each Osterberg Cell shall be equipped with all necessary hydraulic lines, fittings, pressure source, pressure gage, telltale devices, and displacement-monitoring devices. Due to the size of the drilled shaft and loads, multiple O-cells will be required for each level of O-cells.

O-Cell Requirements:

(a) O-Cell Setup: Loads applied by the O-Cells shall be applied concentric with the longitudinal axis of the test drilled shaft so that the load acting on the shaft at any time may be accurately determined and controlled. Bearing plates welded to the O-Cells shall be designed to transmit the required loads evenly throughout the drilled shaft cross-section. The diameter of the bearing plates shall be no larger than the shaft diameter minus 12 inches (300 mm). Bearing plates shall have holes bored through them to allow free flow of concrete and allow access of a tremie or pump line below the O-Cells for delivery of concrete. O-Cell fabrication and installation shall also allow for the post grouting of the drilled shaft. Load testing schematics detailing the load test setup (O-Cell bearing plates, reinforcement cage and/or placement frame, etc.) shall be supplied with the drilled shaft installation plan for approval.

(b) Calibration of the O-Cells: Each O-Cell shall be calibrated prior to shipping the assembly to the job site. Copies of the calibration data shall be furnished to the Project Engineer and the Geotechnical Design Engineers prior to the start of the load tests.

(c) Miscellaneous Materials: Materials for carrier frame steel bearing plates and/or other devices needed to adapt the O-Cells to the rebar cage, shall be supplied and/or manufactured as required.

(d) Material Disposal: Materials supplied, which do not become part of the finished structure become the responsibility of the contractor at the conclusion of the load test and shall be removed from the job site.

Equipment: The contractor shall provide all equipment and personnel required to install the O-Cells and remove the load test apparatus.

Osterberg Cell Test Shaft Construction Procedure: After the test drilled shaft excavation has been completed, the contractor shall construct the test drilled shaft in accordance with Section 814 using the approved shaft installation techniques.

The O-Cells, hydraulic supply lines and other attachments shall be assembled and made ready for installation under the direction of the engineering consultant, in a suitable area, adjacent to the test drilled shaft, to be provided by the contractor.

The contractor shall install the O-Cells, the placement frame or reinforcing steel cage assembly, and a concrete pipe tremie or pump line in the test shaft excavation under the direction of the engineering consultant. The O-cell assembly shall be welded to the steel reinforcing cage in conjunction with construction of the cage. The plane of the bottom plate(s) of the O-cell(s) shall be set at right angles to the long axis of the cage. The contractor shall use the utmost care in handling the placement frame/test equipment assembly so as not to damage the instrumentation during installation. The contractor shall limit the deflection of the reinforcing steel cage to 2 feet (600 mm) between pick up points while lifting the cage from horizontal to vertical position. The contractor shall provide bracing, strong backs, etc., to maintain the

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deflection within the specified tolerance. The O-cell assembly must remain perpendicular to the long axis of the reinforcing cage throughout the lifting and installation process.

When the test shaft excavation has been completed, inspected and accepted by the Geotechnical Design Engineer, the O-cell assembly and the reinforcing steel may be installed. The preferred method is to install the O-cell assembly and deliver the seating layer using a tremie pipe extending through the O-cell assembly to the base of the shaft. Placement of post grouting tubes shall be such that they are not blocked by the placement of the concrete or grout providing a level base for the O-cells at the bottom of the shaft.

Concrete shall be placed continuously by tremie or pump line starting at the base of the shaft in the same manner specified for the production shafts. Concrete placement shall be monitored carefully so that the O-Cells and placement frame or reinforcing steel cage is seated and is not displaced upward.

During the period required to perform the load test, no casings may be vibrated into place in the foundation area near the load test. All load testing and evaluation shall be completed prior to the installation of the production shafts. If the test apparatus shows any signs of negative effects due to construction activities, such activities shall cease immediately until the test is completed.

After completion of the load test, and at the direction of the project engineer, the contractor shall remove any equipment, material, waste, etc., which are not to be part of the finished structure. In addition, the O-cells, all hydraulic lines, and any voids outside the O-cells shall be grouted at the completion of the load tests. Finally, test drilled shafts shall be removed to a depth of three feet below the river bottom/ground surface.

Measurement and Payment: Payment for each test drilled shaft constructed for the Osterberg Cell load testing method will be made at the contract unit price per each, which shall be full compensation for all labor, materials, and equipment, required for construction of the test drilled shaft including soil boring, soil sampling, engineering consultant services, nondestructive testing (CSL testing), instrumentation, permanent casing, and incidentals necessary to assemble and install the drilled shaft and remove the loading system after completion of testing.

Payment will be made under:

Item S-116, Test Drilled Shaft (9-Ft. Diameter), per each.

ITEM S-117, LOAD TESTING DRILLED SHAFT (9 FT. DIAMENTER): This item consists of furnishing all labor, equipment, materials and incidentals necessary for load testing a drilled shaft using bi-directional loaded Osterberg Cell(s) (O-Cell) as specified herein. The approved engineering consultant responsible for instrumenting the test shaft and supervising the installation of the O-Cell in the Special Item Test Drilled Shaft contained elsewhere, shall also be responsible for performing the O-Cell load testing. The engineering consultant shall be responsible for conducting the O-Cell load test and collecting the data, as approved by the engineer, with the contractor providing auxiliary equipment and services as detailed herein. The engineering consultant shall also be responsible for preparing a load test report that presents the data and conclusions from the load tests.

Load Testing Instrumentation/Equipment: The contractor shall provide the necessary instrumentation and equipment to, conduct the load test and collect the test results.

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(a) Data Collection: The engineering consultant shall record the loads, displacements, and vibrating wire strainmeter data using automated electronic data logging equipment. The data shall be stored in an electronic data spreadsheet (MS Excel format *.xls) for submittal of the data with the O-Cell load test results. The data stored in the spreadsheet shall be clearly presented with headings and units displayed.

(b) Displacement Monitoring: For each O-Cell, displacement measurements shall be made of the following: upward top-of-shaft displacement (a minimum of 2 movement indicators required), downward shaft end bearing displacement (minimum of 2 movement indicators required), shaft compression (a minimum of 2 movement indicators required). Total expansion of an O-cell may be measured and used to determine downward end bearing shaft movement. Dial gages, digital dial indicators, LVDTs (Linear Variable Differential Transducer) or LVWDTs (Linear Vibrating Wire Displacement Transducer) used to measure end bearing and side shear movement shall have a minimum travel of 4 inches (100 mm) and have a precision of at least 0.001 inches (0.025 mm). End bearing movement may be alternatively monitored directly or with a combination of telltales attached to the top of the O-cells and LVDT/LVWDT gages to measure O-cell expansion. Instrumentation used for measuring O-cell expansion shall have a minimum travel of 6 inches (150 mm) and have a precision of at least 0.001 inches (0.025 mm). Dial gages, digital indicators, LVDTs or LVWDTs used to measure shaft compression shall have a minimum travel of 1 inch (25 mm) and have a precision of at least 0.0001 inches (0.0025 mm). Due to the size of the drilled shaft and loads, multiple O-cells will be required for each level of O-cells. A minimum of two displacement gages shall be used to monitor top of shaft displacement. Sister-bar strain gages shall be provided on opposite sides of the test shafts at the levels shown on the drawings.

(c) Survey Level: The contractor shall provide a survey level during the load test to monitor relative displacement of the shaft head as a check on the top of shaft displacement monitoring gauges. A separate survey level shall be used to monitor any vertical displacement of the reference during the load test. Unless approved otherwise by the engineer, level survey precision shall be 0.001 foot (0.3 mm). Alternately, the surveyor may read an engineer's scale attached to the shaft head. The first readings shall be taken before application of the first load increment; intermediate readings shall be made immediately before a load or unload increment and after the final unload increment. A final reading shall be made at the time of the last recovery reading or as directed by the engineer.

(d) Reference System: The contractor shall provide a stable wooden or steel reference system. The reference system shall consist of either two reference beams positioned on each side of the test drilled shaft and internally braced to form a rigid frame or one reference beam positioned above the test drilled shaft. The beam(s) shall be simply supported at the ends a minimum distance of three shaft diameters or 15 feet (4.6 m) (whichever is greater) from the center of the test drilled shaft. The supports shall be sufficient to ensure horizontal and vertical stability of the reference system.

(e) Shelter: The contractor shall provide a temporary tent or shelter sufficient to cover the reference beams, displacement monitoring gauges, and personnel from direct sunlight and inclement weather during the load testing. The minimum size of the shelter shall be 30 feet by 30 feet (9.14 m by 9.14 m).

(f) Electrical Power: The contractor shall provide 110 volt, 30 amps of AC electric power to the load test site during the installation of the instrumentation and during the load testing.

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(g) Potable Water: The contractor shall provide potable water from an approved source to be mixed with a water-soluble oil provided by the engineering consultant to form the hydraulic fluid used to pressurize the O-Cell.

(h) Air Compressor: The contractor shall provide an air compressor (a minimum 185 cubic feet (5.24 cu m) per minute, 125 psi (850 kPa)) for pump operation during the load test(s).

(i) The contractor shall provide equipment and labor sufficient to erect the protected work area and reference beam system to be constructed as directed by the engineering consultant.

(j) The contractor shall provide materials, equipment and labor for placement frame or steel reinforcing cage, steel bearing plates and/or other devices needed to attach O-cell(s) to steel reinforcing cage, as required. Materials supplied, which do not become part of the finished structure, become the responsibility of the contractor at the conclusion of the load test and shall be removed from the job site.

Load Testing Procedure:

(a) Loading Increments: The test drilled shaft shall be tested in general accordance with *ASTM D1143 Standard Test Method for Piles Under Static Axial Compressive Load.* Load will be applied utilizing the Quick Load Test Method for Individual Piles in increments of 10 percent of the design load (i.e., 5 percent of the ultimate load), as specified in the plans, until the ultimate capacity is approached. For the remainder of the load test, the loading increments shall be reduced to 5 percent of the design load (2.5 percent of the required ultimate load).

(b) Loading Procedure: Each increment of load shall be held constant for 8 minutes between loadings. Instrument system readings shall be taken at 1, 2, 4 and 8 minutes after reaching and maintaining the required load. Each load increment shall be applied immediately after the complete set of displacement and internal instrumentation readings (i.e., vibrating wire strainmeters) are taken and verified. Loads are applied at the prescribed intervals until the ultimate capacity of the shaft is reached in either end bearing or side shear component, until the maximum capacity or maximum stroke of the O-Cell is reached or unless otherwise directed by the engineer. When the ultimate load is reached in either end bearing or side shear as noted by rapid displacement under constant load, the loading system shall be allowed to equalize by taking readings at 4-minute increments until three consecutive readings indicate that the equilibrium load has been achieved. The engineering consultant may elect to hold the maximum applied load up to one hour.

(c) Unloading Procedure: The load shall be removed in decrements of approximately 25 percent of the maximum load placed on the test drilled shaft. Instrument system readings shall be taken at 1, 2 and 4 minutes after reaching the unloading test load. Each decrement of load shall be removed after instrument system readings are completed. The final recovery of the shaft shall be recorded until movement is essentially complete for a period up to one hour after reaching zero load. Additional cycles of loading and unloading using similar procedures may be required by the Geotechnical Design Engineer following completion of the initial test cycle.

(d) Load Test Monitoring: The engineering consultant shall monitor the load test during loading by plotting the load versus settlement curve for both shaft friction and shaft bearing. This shall assist the Geotechnical Design Engineer in assessing the progress of the load test and when the failure load is approaching.

(e) Ultimate Drilled Shaft Capacity: The ultimate drilled shaft capacity shall be determined by the Geotechnical Design Engineer from analysis of the load settlement curves and

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analysis of the internal instrumentation monitored during load testing. In the event additional loading cycles are required, the load shall be applied in 10 increments and removed in four decrements.

Reporting of Osterberg Load Testing Results: Within four working days after the load test, the engineering consultant shall submit the preliminary load testing results to the Geotechnical Design Engineer for analysis. A CD with an electronic data file (MS Excel *.xls format) containing load-testing data shall be submitted with the preliminary load testing report. Alternatively, the preliminary results and electronic data file may be submitted to the Geotechnical Design Engineer via e-mail. The final report of the load testing shall be submitted to the engineer within 21 calendar days after completion of the load test. Unless otherwise specified by the engineer, the contractor shall supply five (5) copies of the final O-Cell load test report, as prepared by the engineering consultant, to the engineer. The elastic modulus and concrete cylinder strength test results shall be provided to the engineering consultant within one (1) day of the load test. The load testing report shall contain but not be limited to the following components:

1. Test drilled shaft general information
2. Discussion of test results
3. Summary of test drilled shaft dimensions, elevations, areas, weights, etc.
4. Schematic section of test drilled shaft
5. Load-movement curves for shaft side shear and shaft end bearing
6. Equivalent top load curve
7. Load distribution curves along the drilled shaft from strain data
8. End bearing creep limit curve
9. Side shear creep limit curve
10. Field data and reduction of load/settlement readings and vibrating wire strainmeter readings
11. Calibration of the O-Cell and instrumentation
12. Equivalent top load method
13. O-Cell method for determining creep limits
14. Drilled Shaft Installation Log prepared by the drilled shaft contractor including:
    - Detailed record of shaft excavation
    - Bottom cleaning
    - Bottom inspection
    - Installation of reinforcement
    - Concrete placement
    - Base grouting
15. Soil Boring(s)

Measurement and Payment: Payment for loading and testing a test drilled shaft will be made at the contract unit price per each drilled shaft load test completed and accepted. Payment shall include all costs related to the performance of the load test including the testing services and load testing reports by the engineering consultants.

Payment will be made under:

Item S-117, Load Testing Drilled Shaft (9 Ft. Diameter), per each.

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ITEM S-118, POST GROUTING DRILLED SHAFT (9 FT. DIAMETER): This item consists of furnishing all labor, equipment, materials and incidentals necessary for post grouting a drilled shaft as specified herein.

The intent of post or tip grouting is to optimize the design of the drilled shaft foundations by preloading and improving the bearing materials below the shaft base. Tip-grouting shall be performed on one of the test shafts to demonstrate procedures and determine grouting criteria. Load testing of the tip-grouted test shaft shall be completed prior to production shaft construction and post grouting of production shafts.

The tip-grouting shall be performed by a specialty firm with documented experience of successfully performing tip-grouting of drilled shaft tips on at least 3 similar projects in the last 5 years.

The concrete strength of the drilled shaft shall be 3,800 psi minimum before beginning tip-grouting.

Contractor shall have any necessary licenses or agreements with patent holders for the post grouting technique that he proposes to use. This Item shall govern for the pressure grouting of the drilled shaft bottom as shown and described in United States Patent No. US 6,371,698 or as directed by the Engineer. The contractor will contact and enter into a license agreement with SynchroPile, Inc., (P.O. Box 13238, San Antonio, TX 78213; Phone No. 210-355-6546; phil.king@synchropilke.com)".

Tip grouting of production shafts shall be performed using the same equipment and procedures as used for the successful test shafts, as determined by the Project Engineer.

Materials and Equipment: The Contractor shall supply all required materials, equipment, and man power required to effectively tip-grout the bottoms of the drilled shafts. This equipment includes, but is not limited to:

a. A grout pump capable of supplying 800 psi of grout pressure. The grout plant shall have a capacity of one cubic foot per minute at 650 psi. The grout pump shall be a single or double stage hydraulic piston type. The plant shall be equipped with a colloidal mixer and an agitated holding tank.
b. Grout pump instrumentation, including a pressure gage measured at the grout delivery port, water meter, and volume measurement capability.
c. Potable water supply delivered to the grout pump.
d. Grout tubing sufficient to resist the applied grout pressure and length of the shaft reinforcement cage with an additional 5 feet for each shaft.
e. Survey level to record upward movement of the tip-grouted drilled shafts during grouting.
f. Grout delivery assembly for the shaft tip supplied by the tip-grouting specialty firm or equal
g. Grout system must provide uniform grouting at the base of the drilled shaft.
h. Grout lines and tubing shall be capable of being flushed for re-grouting if necessary.

Preparation for Grouting: The Contactor shall notify the Engineer of the drilled shaft installation and tip-grouting schedule 30 days prior to commencing construction of the shaft. The Contractor shall affix the grout distribution assembly to the bottom of the reinforcing cage as directed by the Specialty Firm and approved by the Engineer. The grout distribution assembly can be the type that rests directly on the bottom of the shaft excavation or a system that encases

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the grout pipes in the concrete at the base of the shaft. Care shall be taken during handling and placement of the cage so as not to damage the grout distribution assembly.

Procedure of Tip-Grouting Shaft Bottom: The tip-grouting process shall be performed in accordance with the grouting criteria set by the Engineer based on the results of the test shaft, and the following:

a. Survey and record the shaft elevation to a benchmark.

b. Using the intended grout pump, fill pump reservoir with water and and flush pump lines and shaft access lines simultaneously until residual drilling fluid is expelled from all shaft access lines and clear water is returned. Each access lines shall be fitted with a sacrificial in-line valve capable of sustaining the design grout pressure.

c. Mix a sufficient amount of neat cement grout. Grout shall consist of Type I-II Portland cement and water with a water cement ratio of 0.5. It may be necessary to introduce admixtures to improve workability. The mix design shall be submitted to the Engineer for review. NO SAND MIXES SHALL BE USED. The grout shall be mixed thoroughly with the high efficiency mixer until it is in a semi-colloidal suspension.

d. The grout cube strength shall be at least 2,000 psi at the time of superstructure construction in accordance with ASTM-C109/C109M-98, Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (using 2-inch cube specimens). Note that all grout access lines and/or CSL tubes, whether used for the tip grouting operation or not, shall be grouted as specified herein.

e. Connect grout tubes to grout pump and pump cementitious grout with open return side access lines (one at a time) and pump grout until competent grout is returned from each line. Close all return lines and steadily pump grout into the toe of the shaft until the design grout pressure is sustained. If separate grout circuit pipes are used, perform tip grouting sequentially in each grout circuit line, as described herein. Fluctuating peak pressures observed at the pump shall not be interpreted as sufficient, but rather the sustained gage pressure. The grouting process shall be continuous from the time of commencing. A minimum net volume of 5 cubic feet shall be pumped to the toe by the time the design pressure is achieved to ensure that an artificial pressure is not induced by access line blockage. It may be necessary to grout in stages to meet the design pressure as determined by the specialty grouting firm. The second stage of grouting, if needed, shall also be performed sequentially using all of the grout circuit lines.

f. Grout pressure, grout volume, and shaft top upward displacement and time of grouting shall be continuously monitored and recorded during tip-grouting operations. Grouting records shall be submitted to the Project Engineer within 24 hours after completion of grouting at each drilled shaft location (test and production shafts).

g. Discontinue grouting when one of the following criteria is met or as directed by the Engineer.

   i. Design pressure is achieved while pumping a minimum net volume of 5 cubic feet to the toe of the shaft. Pressure <u>shall not</u> be locked in upon completion of grouting.

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ii. Upward surveyed displacement shall be as determined from the load test program, but not more than 0.25 inches. If the design pressure has not been attained when the limiting displacement has been attained, the grout lines shall be fully flushed with clear water and remedial side shear improvement steps must be taken. Such remedial actions shall be approved by the Engineer. Once these remedial steps have been taken, tip grouting shall resume wherein the displacement criteria shall start anew.

iii. Should the grout pressure not be achieved by an upper limit of 30 cubic feet while the shaft has not exceeded the upward displacement criterion, one or more of the following approaches shall be taken: (1) if the pressure is still increasing with additional grout volume, the grouting can be continued to the desired design grout pressure; (2) the water cement ratio can be reduced systematically by an interval of 0.05 and grouting resumed until the design pressure can be achieved (the practical lower limit for w/c ratios of grout is 0.4); (3) the grout lines shall be fully flushed with clear water and re-grouted after the previously placed grout reaches initial set. If needed, the second stage of grouting shall be performed after initial set of the grout from the first stage of grouting (4 hours, minimum, after completion of the first stage of grouting.

h. Upon completion re-survey the elevation of the top of shaft, record upward displacement, net grout volume, maximum sustained grout pressure.

Tip-Grouting Operations Report: Contractor shall provide a report to the Project Engineer on the Tip-Grouting Operations. This report shall include at least the following:

a. Date and time of grouting.
b. Name of firm and individuals performing the tip-grouting.
c. Identification number and plan location for each grout line.
d. Tabulations of all grouting records including grout pressure and grout volume versus time for each grout line, for each stage of grouting.
e. Plots of pump pressure and grout volume placed versus time.
f. Plots of load at the bottom of the shaft versus time, determined both by the measured grout pressure assumed to apply over the full base area, and from the embedded strain gages.
g. Grout mix used, and any changes to the grout mix during tip-grouting.
h. A summary of maximum sustained grout pressure and the total volume of grout injected.

Measurement and Payment: Payment for post grouting drilled shafts will be made at the contract unit price per each drilled shaft on which post grouting is completed and accepted. Payment shall include all costs related to the post grouting process and all work needed to complete the item.

Payment will be made under:
Item S-118, Post Grouting Drilled Shaft (9 FT. Diameter), per each.

ITEM S-119, GROUNDWATER MONITORING: This item consists of furnishing all labor, equipment, materials and incidentals necessary for groundwater monitoring and any required corrective measures as described and detailed in the project plans.

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Payment will be made at the contract lump sum price for groundwater monitoring, which shall include all material, tools, equipment, labor, incidentals and the performance of all work necessary to complete the item.

Payment will be made under:

Item S-119, Groundwater Monitoring, per lump sum.

ITEM S-120, BACKWALL MOUNTED SIGN POST: This item consists of fabricating and installing sign mounting post attached to the impact attenuator backwall at the locations shown on the project plans. The work shall conform to applicable project plan details and 2000 Standard Specifications as amended by the Supplemental Specifications, all as directed by the Project Engineer. This specification is for one post.

Sign mounting post shall be constructed of ASTM A36 steel and hot dipped galvanized in accordance with ASTM A123.

Payment will be made at the contract unit price for backwall mounted sign post, which shall include all material, tools, equipment, labor, incidentals and the performance of all work necessary to complete the item.

Payment will be made under:

Item S-120, Backwall Mounted Sign Post, per each.

ITEM S-121, TOP OF BARRIER SIGN MOUNT: This item consists of fabricating and installing sign mount attached to the top of the barrier at the locations shown on the project plans. The work shall conform to applicable project plan details and 2000 Standard Specifications as amended by the Supplemental Specifications, all as directed by the Project Engineer.

Sign mounts shall be constructed of ASTM A36 steel and hot dipped galvanized in accordance with ASTM A123.

Payment will be made at the contract unit price for top of barrier sign mounts, which shall include all material, tools, equipment, labor, incidentals and the performance of all work necessary to complete the item.

Payment will be made under:

Item S-121, Top of Barrier Sign Mount, per each.

ITEM S-122, PIER REVETMENT SYSTEMS: This item consists of furnishing all labor, equipment, materials and incidentals necessary to provide and install pier revetment systems as described and detailed in the project plans.

General:

Summary:

A. Section Includes: Polymeric Marine Mattress system with structural geogrid, braid, mechanical connection elements, stone infill and a geotextile underlayer. Design details including mattress thickness shall be shown on the Contract Drawings, on the approved Shop Drawings and as directed by the Engineer. Work consists of:

1. Providing system supplier representative for pre-construction conference with the contractor and the Engineer.

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2. Furnishing geogrids, braid, mechanical connection elements and stone fill materials as specified herein and shown on the Contract Drawings. Geogrid material shall include sufficient quantities to form lifting hoops for the units.
3. Fabricating, filling and placing Polymeric Marine Mattress units in accordance with this Section and in reasonably close conformity with the lines, grades and dimensions shown on the Contract Drawings or established by the Engineer. Some pre-fabrication of the units may be accomplished prior to delivery to the site.

Alternates:

1. Metallic materials will not be considered as an alternate to polymeric materials for the pier revetment system.
2. Alternate geogrid materials shall not be used unless submitted to the Engineer and approved in writing by the Engineer. The Engineer shall have absolute authority to reject or accept alternate materials based on the requirements of this Section and the Engineer's judgment. Certain material properties of the structural geogrid are critical to the fabrication, lifting and placement, and serviceability of this application. The structural geogrid must satisfy the requirements of this Section, regardless of any previous approval of the geogrid by the Project Engineer of other types of applications. Coated geogrids and geogrids composed of small diameter filaments shall not be allowed for constructing Polymeric Marine Mattress units for the pier revetment system. In order to be considered, submittal packages for alternate geogrid materials must include:
   a. A list of 10 comparable projects, in terms of size and applications, in the United States, where the results of using the specific alternate geogrid material can be verified after a minimum of 3 years of service life.
   b. A sample of the alternate geogrid material and certified specification sheets.
   c. Recommended fabrication and installation instructions.
   d. Additional information as required at the discretion of the Engineer.

References:

A. American Association of State Highway and Transportation Officials (AASHTO)
   1. Standard Specification for Highway Bridges (2000 Interim Revisions).
B. American Society for Testing and Materials (ASTM):
   1. D 1388 Test Method for Stiffness of Fabrics
   2. D 4355 Deterioration of Geotextiles from Exposure to Ultraviolet Light and Water (Xenon-Arc Type Apparatus).
   3. D 4439 Standard Terminology for Geosynthetics.
   4. D 4759 Standard Practice for Determining the Specification Conformance of Geosynthetics.
   5. D 5732 Stiffness of Nonwoven Fabrics Using the Cantilever Test.

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6. D 5818 Practice for Obtaining Samples of Geosynthetics from a Test Section for Assessment of Installation Damage.
7. D 6637 Determining Tensile Properties of Geogrids by the Single or Multi-Rib Tensile Method.

C. Geosynthetic Institute:
1. GG1-87 Standard Test Method for Geogrid Rib Tensile Strength.
2. GG2-05 Standard Test Method for Geogrid Junction Strength.

D. Environmental Protection Agency
1. EPA 9090 Compatibility Test for Wastes and Membrane Liners.

Definitions:

A. Polymeric Marine Mattress – A non-metallic compartmental structure filled tightly with stone prior to installation. Filling is achieved while each unit is positioned on edge prior to installation. Units are comprised of structural geogrid, braid, and mechanical connection elements fabricated to allow placement and provide containment of aggregate fill.

B. Geogrid – An integrally formed grid structure manufactured of a stress resistant high density polyethylene (HDPE) and/or polypropylene (PP) material with molecular weight and molecular characteristics which impart high resistance to:
1. Loss of load capacity or structural integrity when the geogrid is subjected to mechanical stress in installation
2. Deformation when the geogrid is subjected to applied force in use
3. Loss of load capacity or structural integrity when the geogrid is subjected to long-term environmental stress.

C. Minimum Average Roll Value – Value based on testing and determined in accordance with ASTM D 4759.

D. True Tensile Modulus in Use – The ratio of tensile strength to corresponding strain (e.g. 1%). The tensile strength is measured via GRI GG1 as modified by AASHTO Standard Specification for Highway Bridges, 1997 Interim, using a single rib having a greater of 3 junctions or 8 inches and tested at a strain rate of 10 percent per minute based on this gauge length without deforming test materials under load before measuring such resistance or employing "secant" or "offset" tangent methods of measurement so as to overstate tensile properties. Values shown are minimum average roll values.

E. Junction Strength – Breaking tensile strength of junctions when tested in accordance with GRI GG2-05 as modified by AASHTO Standard Specification for Highway Bridges, 2000 Interim, using a single rib having the greater of 3 junctions or 8 inches and tested at a strain rate of 10 percent per minute based on this gauge length. Values shown are minimum average roll values.

F. Flexural Stiffness (also known as Flexural Rigidity) -Resistance to bending force measured via ASTM D 5732-95 and ASTM D 1388-96 using specimens of width two ribs wide, with transverse ribs cut flush with exterior edges of longitudinal ribs (as a "ladder"), and of length sufficiently long to enable measurement of the overhang dimension. The overall Flexural Rigidity is calculated as the square root

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of the product of machine-and cross-machine-direction Flexural Rigidity values. Values shown are minimum average roll values.

G. Resistance to Installation Damage – Resistance to loss of load capacity or structural integrity when subjected to mechanical stress in installation measured via ASTM D 5818 in a crushed stone classified as a poorly graded gravel with a maximum 2 inch particle size (GP). Values shown are typical values.

H. Resistance to Long Term Degradation – Resistance to loss of load capacity or structural integrity when subjected to chemically aggressive environments measured via immersion testing per EPA 9090.

I. Ultraviolet Stability – The ratio of tensile strength after exposure to the tensile strength prior to exposure, with exposure per ASTM D 4355 and tensile strengths measured via GRI GG1-87 as discussed above for "True Tensile Modulus in Use."

Submittals:

A. Submit product samples of:
   1. Geogrid
   2. Braid
   3. Mechanical connection elements

B. Shop Drawings – Submit details of typical sections and connections.

C. Submit geogrid product data sheet and certification from the manufacturer that the geogrid product supplied meets the requirements of sub-part 2.02 of this Section.

D. Submit manufacturer's general recommendations and instructions for fabrication, filling, installation and repair.

Quality Assurance:

A. Pre-Construction Conference – Prior to the installation of the units, the contractor shall arrange a meeting at the site with the system supplier and, where applicable, the system installer. The Project Engineer shall be notified at least 3 days in advance of the time of the meeting.

Delivery, Storage and Handling

A. Storage and Protection:
   1. Prevent excessive mud, wet concrete, epoxy, or other deleterious material from coming in contact with and affixing to mattress materials.
   2. Store at temperatures above -20 degrees F (-29 degrees C).
   3. Rolled materials may be laid flat or stood on end.

Products:

Manufacturers:

A. An approved source of the geogrid is Tensar Earth Technologies, Inc., Atlanta, GA, their designated representative or an approved equivalent.

Materials:

A. Structural Geogrid:

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1. Unless otherwise called out on the Construction Drawings or Shop Drawings or directed by the Engineer, the structural geogrid type shall be:
   a. Type 1 for the internal diaphragms of the units.
   b. Type 2 for the top, bottom and sides of the units.
2. The structural geogrid shall be produced from virgin resin and classified as high density polyethylene (HDPE) and / or polypropylene (PP) and shall possess complete continuity of all properties throughout its structure.
3. The structural geogrid shall accept applied force in use by positive mechanical interlock (i.e. direct mechanical keying) with:
   a. Compacted soil or construction fill materials,
   b. Contiguous sections of itself when overlapped and embedded in compacted soil or construction fill materials, and
   c. Rigid mechanical connection elements such as bodkins, pins or hooks.
4. The structural geogrid shall have the following characteristics:

PROPERTY	UNITS	TYPE 1	TYPE 2
True 1% Tensile Modulus in Use (MD)	kN/m (lb/ft)	750 (51,400)	1,650 (113,090)
Junction Strength (MD)	kN/m (lb/ft)	48.60 (3,330)	100.8 (6,908)
Flexural Stiffness	mg-cm	670,000	6,600,000
Resistance to Installation Damage	% GP	85	85
Resistance to Long Term Degradation	%	100	100
Ultraviolet Stability (Retained Strength @ 500 hours)	%	100	100

B. Mechanical Connection Elements:
   1. The mechanical connection elements shall be as shown on the Construction Drawings and Shop Drawings and shall be composed of high density polyethylene (HDPE) and / or polypropylene (PP), unless otherwise approved by the Engineer.
   2. The mechanical connection used shall be bodkin type, unless otherwise approved by the Engineer

C. UV Stabilized Braid:
   1. The braid used for tying and lacing in the fabrication of the units shall be 8-strand hollow-core braid composed of high density polyethylene (HDPE). Each strand shall consist of a bundle of monofilament HDPE.
   2. The braid shall have a nominal diameter of not less than 3/16 inch and a breaking strength of not less than 400 lbs on a test specimen 36 inches in length.
   3. The braid shall be UV stabilized with a minimum carbon black content of 2.0% by weight.

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D. Stone Fill Materials:
   1. The stone fill shall be sound and durable, free of cracks, soft seams, and other structural defects.
   2. Unless other shown on the Construction Drawings or Shop Drawings or approved by the Engineer:
      a. The stone fill shall possess a specific gravity of at least 2.16.
      b. The loss when the stone is subjected to the Los Angeles Abrasion Test shall not exceed 40%.
      c. The D_{50} of stone used shall be 4 inches. The minimum diameter shall be 1-1/2 inch across the smallest dimension of the stone. The maximum diameter of stone used shall be 6 inches.
   3. Contingent on approval by the Engineer, recycled, processed concrete meeting these requirements may be used as stone fill.

Execution:

Examination

A. The contractor shall check the geogrid, braid and mechanical connection elements upon delivery to verify that the proper material has been received. These materials shall be inspected by the contractor to be free of flaws or damage occurring during manufacturing, shipping, or handling.

Final Fabrication and Filling

A. Mechanical Connections -The joints where the ends and baffles of each unit join the top or bottom of the unit shall be made with a mechanical connection between geogrid elements as shown on the Construction Drawings and Shop Drawings.

B. Seaming - Unless otherwise shown on the Construction Drawings or Shop Drawings or approved by the Engineer:
   1. All cut ends of braid material shall be knotted within ½ inch to 2 inches of the end to prevent raveling of the braid material. The braid material shall be securely knotted to the geogrid at all ends of all stitched seams, and at a spacing not to exceed 6 feet along any stitched seam. Pieces of braid material may be spliced end to end by securely knotting.
   2. The stitches along each seam shall be sufficiently tight to close the gap between the adjacent pieces of geogrid. The braid material shall be stitched through each pair of apertures along each seam at least once. The spacing of stitches shall be reasonably uniform at approximately 6 (minimum) stitches per foot along the entire length of each seam.
   3. Seaming to connect adjacent units is not required.

C. Filling - Unless otherwise shown on the Construction Drawings or approved Shop Drawings or approved by the Engineer:
   1. Each unit shall be filled and the fill shall be packed while the unit is supported in an upright position resting on its side with the open side facing upward and the long direction of the compartments running vertical. Each compartment shall be filled in lifts and each lift shall be tightly packed, except the final lift. The typical lift height shall not exceed 3 feet (loose) or 2.5 feet (packed). The final lift height shall not exceed 9

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inches in height and should overfill each compartment by approximately 2 inches.

2. Packing of the stone fill material and complete filling of each compartment shall be accomplished by rodding and / or vibration. The degree of filling and packing shall be adequate to achieve complete filling as evidenced by tightly confined stone particles, tensioned interior, snug bodkin connections, slight bulging of each compartment, and no evidence of air space between compartments during lifting. Excessive bulging of the unit or displacement on the interior, such as caused by overpacking or inadequate support, shall not be allowed.
3. Lifting hoops shall be formed by joining the top and bottom layers of grid from each unit by means of approved mechanical connections.
4. When filling and fabrication of a unit are complete, the unit shall be rotated to a horizontal position resting on its bottom in order to facilitate subsequent lifting.
5. Filling shall be accomplished in a manner that does not cause excessive damage to the geogrid, mechanical connection elements or the braid.

Preparation

A. Subgrade - The subgrade soil shall be prepared as indicated on the Construction Drawings or as directed by the Project Engineer.

B. Geotextile Underlayer:
   1. The geotextile underlayer shall be installed as indicated on the Construction Drawings or as directed by the Engineer.
   2. The Engineer may approve placing the geotextile simultaneously with the units by pre-attaching the geotextile material to each unit with provision for sufficient overlap of the geotextile.

Installation:

A. Position - The units shall be placed at the proper elevation, alignment and orientation as shown on the Construction Drawings or as directed by the Engineer.

B. Placement Procedures:
   1. The procedure used in placement of the units shall be in accordance with the recommendations of the system supplier and as approved by the Engineer.
   2. For lifting of each unit, a spreader beam and / or spreader bars shall be used in a manner that the unit is not subjected to severe bending or distortion and that the top and bottom layers of geogrid are tensioned uniformly across their width. Units should generally be lifted from a horizontal position.
   3. Personnel shall stay clear of the area beneath units and rigging during lifting. Tag lines and / or divers may be required to facilitate proper placement of the units.

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C. Splicing and Anchoring -Where applicable, splicing and / or anchoring of the units shall be accomplished as shown on the Construction Drawings, the approved Shop Drawings or as directed by the Engineer.

Repair:

A. Any units damaged during fabrication, filling, or installation shall be repaired in a approved by the Engineer or shall be replaced by the contractor. Any such measures required shall be at no additional cost to the Project.

B.

Measurement and Payment: Payment will be made at the contract lump sum price for pier revetment systems, which shall include all material, tools, equipment, labor, incidentals and the performance of all work necessary to complete the item. Payment shall be for all pier revetment systems shown in the plans.

Payment will be made under:

Item S-122, Pier Revetment Systems, per lump sum.

ITEM S-123, STRUCTURAL METALWORK (ERECT): This item consists of furnishing all labor, equipment, materials and incidentals necessary to erect structural metalwork provided by others as described and detailed in the project plans.

Section 807 of the DOTD Standard Specifications, as well as all other referenced sections of the Standard Specifications and supplemental specifications for structural metalwork shall apply to this pay item. Work in this pay item shall consist of erecting structural metalwork provided by others as well as any required touch up painting as a result of erecting the components and painting field bolted connections.

Payment will be made at the contract lump sum price for erecting structural metalwork, which shall include all material, tools, equipment, labor, incidentals and the performance of all work necessary to complete the item.

Payment will be made under:

Item S-123, Structural Metalwork (Erect), per lump sum.

ITEM S-124, DRY STANDPIPE FOR FIRE PROTECTION: This section of the specifications includes the furnishing and installation of the Fire Protection systems as described herein and as indicated on the contract drawings.

In general, the scope of the fire protection work consists of providing four independent dry standpipe risers to serve the bridge structure. Each standpipe riser shall be provided with fire (pumper) truck connections at the base of the riser (ground level) and at the top of the riser (bridge level).

All fire hose connections shall be threaded to suit Jefferson Parish Fire Department equipment. The contractor shall confirm all fire hose thread connection requirements with the Jefferson Parish Fire Department prior to purchasing and installing the final connections. Threaded connections at the ground level shall be female hose threads to accept male threaded hoses. Threaded connections at the bridge level shall be male hose threads to accept female threaded hoses.

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Design Criteria: Each standpipe shall be designed as a dry standpipe in accordance with NFPA 14 (2003 edition) and NFPA 502 (2004 edition) requirements unless otherwise stated in this special provision. The standpipes shall be capable of providing 1000 gpm at the bridge level connection at a residual pressure of 100 psig. Water shall be supplied at the base of the standpipe via a fire pumper truck taking suction from a fire hydrant supplying water at a residual pressure of 10 psig.

The contractor shall arrange with the Jefferson Parish Fire Department (Fire Chief Dennis M. Guidry) to conduct a full flow acceptance test on each standpipe at the completion of the project to confirm that the design criteria has been met. The contractor shall take all pressure and flow readings and be responsible for all and any fees associated with the full scale tests.

Submittals: Submit under provisions of Section 801 – General Requirements for Structures.

Product Data: Provide manufacturers catalogue information. Indicate valve, fittings and accessory components data and ratings.

Operation and Maintenance Data: Submit under provisions of Section 801 – General Requirements for Structures.

Quality Assurance:

Standpipe Systems: Perform work to NFPA 14 Standards.

Welding Materials and Procedures: Perform to ASME Code.

Valves: Bear UL and FM label or marking. Provide manufacturer's name and pressure rating marked on valve body.

Deliver, Storage and Handling:

Deliver, store, protect and handle products to site under provisions of Division 1.

Deliver and store valves in shipping containers with labeling in place.

Provide temporary protective coating on cast iron and steel valves.

Provide temporary end caps and closures on piping and fittings. Maintain caps in place until installation.

Shop Drawings:

Product Data: Include rated capacities and indicate materials, finishes, dimensions, required clearances and methods of assembly of components for the following:

Pipe and Fittings
Valves
Fire Department Connection Headers
Pipe Mounting Brackets

Products:

Piping: The standpipe system shall consist of galvanized iron steel pipe joined with grooved fittings and couplings.

Steel pipe shall conform to ASTM A53; Schedule 40 for all pipe sizes, galvanized.

Malleable iron fittings shall conform to ANSI/ASME B16.3, screwed type. Cast iron fittings shall conform to ANSI/ASME b16.4, screwed type. All fittings shall be rated for 250 psig minimum working pressure.

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Grooved Fittings: Fittings shall be cast or ductile iron conforming to ASTM A-536 with grooved or shouldered ends for direct connection to grooved piping system.

Grooved Couplings: Rigid couplings, equal to "Victaulic" Style 07 Zero-Flex for all connections except at elbows. Elbows shall be joined using standard flexible couplings, equal to "Victaulic" Style 77 to allow for expansion and contraction of piping.

Valves: Refer to the Contract Drawings for information. All valves shall be rated for 250 psig minimum working pressure and all handles shall be painted red.

All valves used for fire hose connections shall be threaded to National Hose Threads to suit Jefferson Parish thread requirements. The contractor shall confirm this with the Jefferson Parish Fire Department prior to purchasing the valves.

Fire Department Connections: Fire Department Connections shall consists of a steel header, fabricated from schedule 40 steel piping, with the number and type of connections as detailed on the Contract Drawings. All outlet pipes shall be welded to the header and the entire assembly shall be hot dipped galvanized after fabrication. Welding to galvanized piping shall not be permitted.

Execution:

General Requirements:

Piping systems shall be grooved and assembled as directed by the fitting/coupling manufacturer written requirements.

Remove scale and foreign material from the inside and outside of pipe and fittings before assembly.

Installation:

Install piping in accordance with NFPA 14 for standpipe and hose systems.

Route all piping in an orderly manner. Refer to the structural Drawings for details of pipe alignment, location and supports.

Maintain gradient of piping to allow for complete drainage of the standpipes.

Install piping to allow for expansion, contraction and movement without stressing pipe and joints. All joints shall be made with grooved, standard rigid couplings, equal to "Victaulic" Style 07 Zero-Flex couplings to provide for rigidity. All 6" diameter elbows shall be coupled to the piping system using grooved, standard flexible couplings, equal to "Victaulic Style 77 couplings to allow for movement in the joints.

No welding shall be permitted on the galvanized piping system. The contractor shall "make-up" all galvanized piping system by using grooved couplings and fittings. Where the contractor welds outlets to the fire department inlet/outlet headers, the finished piping assembly shall be hot dip galvanized after welding is performed. Cold galvanized spray coatings will not be permitted.

Flush the entire system in accordance with NFPA requirements.

Payment: Payment will be made at the contract lump sum price for dry standpipe for fire protection, which shall include all material, installation, tools, equipment, labor, incidentals and the performance of all work necessary to complete the item.

Payment will be made under:

Item S-124, Dry Standpipe for Fire Protection, per lump sum.

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ITEM S-125, SOIL BORINGS: This item consists of installing and furnishing all labor, equipment, materials and incidentals necessary to obtain soil borings at the bents noted in the project plans, perform laboratory soil analysis, and the generation of reports detailing the findings of the work.

General: The results of the borings and laboratory testing will be used to establish pile order lengths and the estimated pile tip elevation for each foundation. The borings shall therefore be performed in the early phases of the contract sufficiently in advance of the schedule for ordering pile lengths.

Soil borings shall be taken at the locations shown in the plans. Where field conditions do not permit the borings to be taken at these locations, an alternate location shall be proposed for approval. The required number, locations, and maximum depth of the borings are noted in the plans.

All borings shall be advanced using rotary drilling technique. Casing shall be required at the ground surface, and advanced by drilling as necessary to maintain a stable borehole.

Soil samples shall not be obtained by driving and removing casing.

No boring shall be abandoned before reaching the specified depth without the prior approval of the Project Engineer. The contractor shall backfill abandoned borings as specified herein.

The sequence of exploration will be determined by contractor.

As no roads or other access has been established to the designated boring locations, the contractor shall evaluate the site conditions to determine the support capacity of the soil for drilling equipment, and the need to provide temporary mats, access roads, or other measures as required to access the boring locations.

The contractor shall obtain the actual coordinates and surface elevation at each boring location by survey methods using the project coordinate system and datum.

Undisturbed samples of cohesive or semi-cohesive subsoils shall be obtained at 5-ft intervals using a 3-in. diameter thinwall Shelby tube sampler. Representative portions of extruded samples shall be preserved for further testing. Samples of cohesionless materials shall be obtained at maximum 5-ft intervals during the performance of in situ Standard Penetration Tests. These samples will also be preserved for further testing.

Utilities: It shall be the responsibility of the contractor to contact the appropriate utility companies for field location of their utilities prior to beginning any drilling activities. The contractor shall employ all reasonable precautions and methods to ensure adequate clearance from existing utilities, other structures and obstructions. Hand augering and/or small hand dug pits (up to 6-foot deep) shall be used in areas where buried utilities are potentially present. In the event such damage to known utilities does occur, the contractor shall be liable therefore, and it shall notify the affected owner and the Project Engineer immediately, make or have made all necessary repairs and bear the expense thereof and all damage caused thereby.

If the contractor finds he cannot safely work at a location shown on the drawings, either because of utilities, other structures or obstructions that may be damaged, he shall so notify the Project Engineer in order that another location may be designated.

Quality Standards: The work shall be performed in accordance with ASTM D 420, "Standard Recommended Practice for Investigating and Sampling Soil and Rock for Engineering

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Purposes," and all applicable ASTM Standards referenced therein. If there is a conflict between the ASTM Standards and these provisions, then these provisions shall govern.

The contractor, technician and drilling foreperson shall have documented experience with exploration techniques including conventional soil drilling and sampling. The contractor shall use experienced and qualified geotechnical engineers, geologists and/or specialized technicians to provide full-time inspection of all boring operations, to determine the type of samples to obtain at any depth, for classification of recovered soil samples, for identification and documentation of unusual conditions encountered during drilling, and for preparation of the boring logs. The contractor shall provide the Project Engineer with a list of personnel and appropriate equipment that can perform the work described herein prior to commencement of the drilling program. This list shall include the amount of experience in years that each proposed driller and technician has had with each of the techniques given above. Equipment should be listed with respect to manufacturer, age and condition.

Drilling and Sampling:

A mud pit shall not be excavated. If required, a mud tub and recirculation system shall be furnished by the contractor for use during drilling.

The drilling rigs and equipment shall be clean of all contaminating fluids, such as obvious leaks from hydraulic lines, couplings and fittings, in order to avoid contamination of the boring and work area. The drilling machines shall be hydraulic-feed, rotary drill rigs in good working condition, and capable of securing satisfactorily samples of the required diameter at the maximum depth. Supplies for drilling shall include all casings, drill rods, bits, samplers, pipe, pumps, water, tools, sample jars, and any other equipment required to perform the required work.

A. Rotary Drilling:

Rotary wash drilling shall be used to advance the borings. To support the borehole, casing and/or drilling mud (bentonite or mud slurry) as approved by the Project Engineer shall be used. When casing is used, it shall be advanced in the soil by a series of operations which consist of driving the casing to the depth to be sampled, cleaning out the hole to the bottom of the casing by approved methods and performing standard penetration test or obtaining undisturbed samples of the materials ahead of the casing and repeating this sequence until the required depth is reached.

The casing shall be an extra heavy pipe. The casing shall also have a minimum nominal inside diameter of 3 3/8 inches and adequate for the required sampling equipment. It shall be sunk vertically through pavement, earth, water, and other materials, including obstructions to the required depth.

Washing ahead of the casing to facilitate driving will not be permitted unless approved by the Project Engineer and, where so approved a record shall be kept of the elevations between which the water was used in driving. The use of water for cleaning out the casing between the samples will generally be allowed. Washing through the split spoon sampler in lieu of a properly designed bit will not be permitted. The washing bit shall be designed to direct the water jet upward. The amount of water shall be the minimum required to clean the casing properly and raise the soil particles to the surface. In no event shall the material below the bottom of the casing where a sample is to be taken be disturbed by the cleaning process. The inside wall of the casing shall be kept clean of drilled materials.

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Removal of Drill Casing: The casing shall be removed from the borehole upon completion of the work, and it shall remain the property of the contractor.

When drilling below the groundwater level, drilling water or slurry inside the boring should be maintained higher than the surrounding groundwater elevation to assure a positive static water head. This is required to avoid sand boiling and blowing up at the bottom of the borehole. If required, water or slurry shall be added to maintain the fluid level inside the borehole during drilling and withdrawal of the drilling rods.

The contractor shall maintain the stability of the borehole at all times.

B. Split-Spoon Sampling:

1. Split spoon samples shall be taken using a standard safety hammer at the ground surface and at 5-foot intervals thereafter, at every change in soil formation.
2. The split-spoon samplers shall be brushed until all visible material from prior sampling is removed, then rinsed with water. This procedure shall be performed before the initial sample is taken and shall be repeated before each successive sample is taken.
3. Standard Penetration Test samples shall be obtained by driving a split-spoon sampler, having an outside diameter (O.D.) of 2 inches, an ID of 1-3/8 inches, and a length of 24 inches in the split-barrel section, conforming to ASTM D 1586. Core retainers shall be used when necessary to hold the sample.
4. At all times, the split-spoon sampler shall be equipped at the top with a reliable check valve. Spring retainers shall be used when necessary to avoid loss of sample. If a sample is not obtained on the first attempt, the operation shall be repeated. If a sample is not obtained on the second attempt, the boring shall be advanced and cleaned to the bottom of the disturbed soil zone or as directed by the Project Engineer and the sampling procedure repeated.
5. To facilitate determination of the relative resistance of the various strata, the split-spoon samplers shall be driven by a standard safety hammer specifically manufactured for the Standard Penetration Test, weighing 140-pounds and dropping a distance of 30 inches. The number of blows for each 6 inches of penetration shall be recorded for 24 inches of penetration. Sampling shall continue until 50 blows for 6 inches or less of penetration is achieved. The blows for the smaller amounts of penetration shall be observed and recorded with a note of the actual amount of penetration obtained.
6. The sampler shall be driven into soil which has not been disturbed by chopping, washing, hydrostatic imbalance, or other cause. A positive hydrostatic pressure shall be applied by adding water into the casing to prevent instability due to upward flow of water during or before sampling.

C. Undisturbed Shelby Tube and Piston Samples of Cohesive Soils:

Before taking any undisturbed sample, the borehole shall be cleaned out thoroughly to the required sampling depth. The cleanout procedure shall be applied carefully such that the soil to be sampled is subject to minimum disturbance.

The taking of an undisturbed sample in cohesive soils shall be accomplished by the use of a thin wall tube sampler or piston sampler that provides a soil sample of approximately 3 inches in diameter. The end of the sampling tube shall be drawn

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in so that the I.D. of the cutting edge shall be 1/64 inch less than the I.D. of the sampler tube. The piston sampler shall be a stationary piston type sampler, Sprague and Henwood No. A15119 or Acker No. 1510B for 3-1/2 inch borings or hydraulically operated Osterberg type sampler, or equivalent.

In order to obtain a sample as undisturbed as possible, the sampler shall be forced down in one continuous movement without hammering, by means of a block and tackle arrangement or hydraulic jack. The rate of downward movement shall be approximately 4 inches per second. After the sampler has been forced into the soil for the required depth, the sampler shall remain undisturbed for not less than ten minutes. The drill rod shall then be rotated by hand a minimum of two revolutions to shear the end of the sample, the sampler slowly withdrawn from the hole, and the tube containing the sample detached from the sampler. After the tube is detached, the length of the sample recovered shall be measured to the nearest 1/8 inch, noted and compared with the depth pushed. Undisturbed samples to be acceptable for payment shall have a minimum recovery of seventy percent (70 percent) unless otherwise authorized by the Project Engineer.

D. Preserving Samples:

1. Split-Spoon Samples: Each sample shall be preserved. The container for preserving driven samples shall be 16 ounce wide-mouth, round, airtight, clear glass jars with teflon-faced screw-tops. The sample storage jars shall be furnished by the contractor.

   The specimens shall be placed in the jars as soon as taken. If there is a change in soil type in the spoon, a different jar shall be used for each soil and so labeled. The jars shall be tightly capped and shall be suitably boxed in numerical sequence, marked and identified with legible labels. The labels on the body of the jars shall show the date, boring number, number of blows per each six (6) inches of penetration, sample number, depth at which sample was taken, and identification of material. Each jar lid shall be marked to show the boring number, sample number, sample depth, and number of blows per six (6) inches of penetration. Additionally, each box of samples shall be clearly and permanently marked on the top and all four sides with the project name, date, boring number and samples contained therein.

2. Undisturbed Samples: After the undisturbed sample tube is detached from the sampler, the length of the sample recovered shall be measured to the nearest one-eighth (1/8) inch, noted and compared with the depth pushed. Both ends of the specimen shall be sealed with at least a one (1) inch thick layer of microcrystalline wax (non-shrinking) to protect the specimen. The remaining voids shall be filled with moist sand or similar material as approved by the Project Engineer and the tube capped with plastic or metal end caps and sealed with friction tape and microcrystalline wax as specified in ASTM D 1587. The tube shall be marked for identification including project number, boring number, sample number and sample depth. Tubes shall be marked Top and Bottom to show the position of the sample as it was taken. Undisturbed samples shall be carefully boxed, and shipped with each sample container surrounded by soft packing so that these samples may be safely transported. Care must be taken when handling undisturbed samples to avoid shock, or jar, which may affect the

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character of sample. Undisturbed samples shall be transported in a vertical upright position with the top side up. The undisturbed samples must be protected from freezing. When approved by the Project Engineer, samples may be extruded in the field and suitably wrapped and stored to avoid disturbance to the sample. The contractor shall supply appropriate shipping boxes and transport the samples to the test laboratory.

Storage of Soil Samples: At the completion of the boring program, recovered soil samples shall be delivered to the contractor testing laboratory.

3. The contractor shall temporarily store recovered samples until they are delivered to the testing laboratory. The temporary storage area shall be heated to minimum temperature of 45°F to prevent freezing of the samples. The samples shall be stored on suitably constructed shelves. The shelves shall meet the following requirements: no more than 4 sample boxes shall be stacked vertically per shelf, and the maximum shelf height shall not be greater than 5.5 feet above the ground, the lowermost shelf level shall be a minimum of six inches above the floor level.
4. The costs of storage and transporting recovered samples are considered incidental to the sampling operations, and no separate payment will be made.

E. Water Supply

The contractor shall be responsible to supply each drill site with sufficient quantities of water to perform the drilling operation. The supply of the water shall include all equipment and work necessary to provide water to the drill site. The providing of water for drilling shall be considered incidental to the work. The cost shall be included in the unit prices bid for the other items. No separate payment will be made for providing the water to perform the drilling operation.

Abandoned Holes and Obstructions: Should the casing or apparatus be removed from a boring, or should the boring be abandoned without the permission of the Project Engineer, or should a boring be started for any reason and not carried to the required depth, or should the contractor fail to keep complete records of materials encountered or furnish the required samples, the contractor shall make an additional boring at a location selected by the Project Engineer, and no payment shall be made for either the abandoned boring or any samples or cores obtained therein.

Should the contractor encounter an obstruction before reaching the required depth, the contractor shall move a few feet to the side, to a location approved by the Project Engineer, and redrill the boring.

Abandonment of borings shall be documented and the information provided to the Project Engineer. Documentation shall include the depth and number of the boring, the date the boring was completed, and other pertinent data.

Backfilling of the Boreholes: The ground surface which has been disturbed, either at or in the vicinity of a borehole, shall be restored to its original condition as soon as is practicable, following completion of boring operations at that borehole.

Boreholes shall be properly backfilled with cement grout to within one foot of the surface. The top one foot shall be restored to its original conditions using the material of the

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type that was removed for the top one foot. Grout shall be placed by tremie method using a tremie that extends to the bottom of the hole.

Backfilling boreholes shall be considered incidental to the testing work, and all costs therefore shall be included in the bid item.

Boring Logs: A detailed log shall be prepared for each boring. The boring log shall be prepared in accordance with DOTD procedures, and shall contain at least the following information:

1) Date and time for start and completion of the boring
2) Location coordinates and surface elevation, noting datum used
3) Name of driller
4) Description of the drilling method used
5) Size and maximum depth of casing used
6) Description and dimensions of sampling devices used
7) Depth to top and bottom of each sample obtained; sample number; sample type; and sample recovery in inches
8) Complete description of each soil sample obtained, in accordance with applicable ASTM specifications
9) For Standard Penetration Tests, the number of hammer blows for each 6-inch increment of penetration, and the SPT N-value
10) The observed groundwater level
11) The depth to the bottom of hole
12) A description of any unusual observation or conditions encountered during drilling

Typed logs shall be prepared and submitted to the Project Engineer within seven calendar days following completion of the boring. All boring logs shall be signed and sealed by a geotechnical engineer who is a Professional Engineer licensed in the State of Louisiana.

The soil descriptions on the boring logs shall be revised, as appropriate, based on the results of the laboratory soil tests.

Laboratory Soil Testing: Following receipt of the soil boring logs, the Project Engineer will assign a laboratory testing program, including index tests, natural moisture contents, grain size analyses, and other tests determined by the Project Engineer.

The contractor shall perform the laboratory soil tests designated by the Project Engineer at a certified testing laboratory. The testing laboratory will be subject to the approval of the Project Engineer.

At least 50% of all Shelby tube sample in clays shall be tested to obtain:

- Atterbury limits
- Moisture content
- Strength tests, either unconfined compression test or unconsolidated undrained triaxial test.

The contractor may perform additional laboratory soil testing for his own purposes.

All laboratory soil tests shall be performed in accordance with the applicable ASTM test specification.

A report of all laboratory soil testing for any laboratory test order shall be submitted to the Project Engineer, the Geotechnical Engineers, and the DOTD within one calendar month of receiving the laboratory test order. The report shall include plots of grain size distribution for

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each grain size test, plots of Atterberg Limit points on a standard Plasticity Chart for each Atterberg Limit determination, and a summary table of natural moisture contents. Reports for other types of laboratory tests shall be provided as directed by the Engineer.

The results of the drilling and testing shall be presented on DOTD core boring sheets providing the following information:

- Soil type and color
- Classification
- Wet density
- Moisture content
- Liquid limit
- Plasticity index
- q_u
- SPT or UU
- Failure Mode
- Sample number
- Depth
- Elevation
- Date taken
- Location
- Latitude
- Longitude

Copies of soil boring logs and soils analysis shall be provided to the Project Engineer, the Geotechnical Engineers, and the DOTD for review and acceptance.

Additional Borings and Laboratory Analysis: Depending on the findings during or after the soil borings are being taken, the Project Engineer may direct the contractor to:

- Obtain additional borings with associated laboratory analysis for samples obtained from these additional borings
- Extend the depth of project borings that have not been drilled and perform laboratory analysis for the samples obtained per these special provisions. Maximum extended depth shall not exceed 10 percent of the soil boring depth shown for that boring in the plans.

No additional payment shall be made for additional borings or extended depth borings that do not exceed 5 percent of the total length of all soil borings for the project.

All additional borings and laboratory analysis results shall be included in the report and core boring sheets.

Measurement and Payment: Payment will be made at the contract lump sum price for soil borings, which shall include all material, installation, tools, equipment, labor, incidentals, laboratory testing and the performance of all work necessary to complete the item.

Payment will be made under:

Item S-125, Soil Borings, per lump sum.

FOR INFORMATION ONLY

ITEM S-126, REMOVAL OF TRUSS MONITORING SYSTEM: This item consists of removing the truss monitoring system and all associated equipment that was installed under a previous contract. The contractor shall remove the truss monitoring system and all associated equipment upon approval from the Project Engineer. The contractor shall clean and spot paint any damaged metalwork as a result of removing the truss monitoring system as described in Special Provision S-101, Cleaning, Painting and Waste Disposal/ Recycling of Existing Bridge Metalwork Faying Surfaces. The method of removal of strain gauges for each marker type shall be approved by the Project Engineer.

Payment: Payment will be made at the contract lump sum price for removal of truss monitoring system.

Payment will be made under:

Item S-126, Removal of Truss Monitoring System, per lump sum.

ITEMS S-201 THRU S-215, SEWER RELOCATION: These items consist of constructing new gravity sewer lines, manholes, service connections and tie-ins to existing lines and other associated work and constructing a new sewer pumping station. These items of work shall include all compensation received by the contractor for furnishing all tools, equipment, supplies, manufactured articles, labor, operations and incidentals necessary to complete the work.

This work shall be performed in accordance with plan details, Specifications for Huey P. Long Bridge Widening Water and Sewer Relocation, which includes the Jefferson Parish Department of Engineering Gravity Sanitary Sewer System General Standard Notes and as directed by the Project Engineer.

At which time the proposal is received by prospective bidders, the Specifications referred to in the above paragraph shall be furnished by means of a compact disc (CD).

Payment for this work will be made under:

Item S-201, Sewer Force Main (10" HDPE), per linear foot.
Item S-202, Sewer Force Main (16" HDPE), per linear foot.
Item S-203, Sewer Manhole (Dia. 4')(Depth: Under 10'–1"), per each.
Item S-204, Sewer Manhole (Dia. 4')(Depth: 10'-1" to 12'-0"), per each.
Item S-205, Sewer Manhole (Dia. 4')(Depth: Over 12'), per each.
Item S-206, Sewer Manhole To Be Raised, per each.
Item S-207, Removal of Sewer Manholes, per each.
Item S-208, Air Release Valve and FRP Manhole, per each.
Item S-209, New Sewer Lift Station, per lump sum.
Item S-210, Removal of Old Lift Station, per lump sum.
Item S-211, Remove and Replace Concrete Roadway, Sidewalk, and Driveway, per square yard.
Item S-212, Verification of Existing Utilities, per lump sum.
Item S-213, Sewer Force Main Tie-In (16" HDPE), per each.
Item S-214, Sewer Force Main Tie-In (10" HDPE), per each.
Item S-215, Concrete Conflict Box, per lump sum.

ITEMS S-301 THRU S-307, WATER RELOCATION: These items consist of constructing water mains, service connections, water valves, fire hydrants and. associated work. These items of work shall include all compensation received by the contractor for furnishing all tools,

FOR INFORMATION ONLY

equipment, supplies, manufactured articles, labor, operations and incidentals necessary to complete the work.

This work shall be performed in accordance with plan details, Specifications for Huey P. Long Bridge Widening Water and Sewer Relocation, which includes the Jefferson Parish Department of Engineering Water Distribution System General Standard Notes and as directed by the Project Engineer.

At which time the proposal is received by prospective bidders, the Specifications referred to in the above paragraph shall be furnished by means of a compact disc (CD).

Payment for this work will be made under:

Item S-301, Pipe Fittings (Ductile Iron Bends, Tees, Wyes, Etc., per ton.
Item S-302, Removal of Water Line with Fittings, per linear foot.
Item S-303-A, Joint Restrainers (4" Ductile Iron), per each.
Item S-303-B, Joint Restrainers (8" Ductile Iron), per each.
Item S-303-C, Joint Restrainers (10" Ductile Iron), per each.
Item S-303-D, Joint Restrainers (12" Ductile Iron), per each.
Item S-303-E, Joint Restrainers (14" Ductile Iron), per each.
Item S-304-A, Fire Service Line (6" C-900), per linear foot.
Item S-304-B, Fire Service Line (8" C-900), per linear foot.
Item S-305-A, Fire Service Tap (6" C-900), per each.
Item S-305-B, Fire Service Tap (8" C-900), per each.
Item S-306-A, Mechanical Joint Adaptor (4"), per each.
Item S-306-B, Mechanical Joint Adaptor (6"), per each.
Item S-306-C, Mechanical Joint Adaptor (8"), per each.
Item S-306-D, Mechanical Joint Adaptor (10"), per each.
Item S-306-F, Mechanical Joint Adaptor (12"), per each.
Item S-306-F, Mechanical Joint Adaptor (14"), per each.
Item S-307, Bollards, per each.

ITEMS S-741-01 THRU S-741-05, S-741-13, AND S-741-15, WATER RELOCATION: These items consist of constructing water mains, service connections, water valves, fire hydrants and. associated work. These items of work shall include all compensation received by the contractor for furnishing all tools, equipment, supplies, manufactured articles, labor, operations and incidentals necessary to complete the work.

This work shall be performed in accordance with plan details, the Department's Supplemental Specifications entitled "Section 741, Water Distribution System" included elsewhere herein, and as directed by the Project Engineer.

Payment will be made under:

Item S-741-01-A, Water Line (8" HDPE), per linear foot.
Item S-741-01-B, Water Line (12" HDPE), per linear foot.
Item S-741-01-C, Water Line (14" HDPE), per linear foot.
Item S-741-01-D, Water Line (12" Ductile Iron), per linear foot.
Item S-741-01-E, Water Line (4" C-900), per linear foot.
Item S-741-01-F, Water Line (6" C-900), per linear foot.
Item S-741-01-G, Water Line (8" C-900), per linear foot.
Item S-741-01-H, Water Line (10" C-900), per linear foot.
Item S-741-01-I, Water Line (12" C-900), per linear foot.

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Item S-741-01-J, Water Line (14" C-900), per linear foot.
Item S-741-02-A, Gate Valve (4" w/Cover), per each.
Item S-741-02-B, Gate Valve (6" w/Cover), per each.
Item S-741-02-C, Gate Valve (8" w/Cover), per each.
Item S-741-02-D, Gate Valve (10" w/Cover), per each.
Item S-741-02-E, Gate Valve (12" w/Cover), per each.
Item S-741-03-A, Tapping Sleeve and Valve Assembly, (Up to 4"), per each.
Item S-741-03-B, Tapping Sleeve and Valve Assembly (6"), per each.
Item S-741-03-C, Tapping Sleeve and Valve Assembly (8"), per each.
Item S-741-04, Fire Hydrant, per each.
Item S-741-05-A, Water Service Line (Up to 4" HDPE), per linear foot.
Item S-741-05-B, Water Service Line (6" HDPE), per linear foot.
Item S-741-05-C, Water Service Line (8" HDPE), per linear foot.
Item S-741-13, Removing Fire Hydrant, per each.
Item S-741-15-A, Casing (24" Steel, Bored), per linear foot.
Item S-741-15-B, Casing (30" Steel, Bored), per linear foot.

ITEMS S-742-01 THRU S-742-04, SEWER RELOCATION: These items consist of constructing new gravity sewer lines, service connections and tie-ins to existing lines and other associated work. These items of work shall include all compensation received by the contractor for furnishing all tools, equipment, supplies, manufactured articles, labor, operations and incidentals necessary to complete the work.

This work shall be performed in accordance with plan details, the Department's Supplemental Specifications entitled "Section 742, Sanitary Sewer Systems" included elsewhere herein, and as directed by the Project Engineer.

Payment will be made under:

Item S-742-01-A, Sanitary Sewer Pipe (8" PVC)(Depth: Under 10'-1"), per linear foot.
Item S-742-01-B, Sanitary Sewer Pipe (10" PVC)(Depth: 10'-1" to 12'-0"), per linear foot.
Item S-742-01-C, Sanitary Sewer Pipe (12" PVC)(Depth: 12'-0"), per linear foot.
Item S-742-01-D, Sanitary Sewer Pipe (15" PVC)(Depth: (10'-1" to 12'-0"), per linear foot.
Item S-742-01-E, Sanitary Sewer Pipe (18" PVC)(Depth: 10'-1" to 12'-0"), per linear foot.
Item S-742-01-F, Sanitary Sewer Pipe (18" PVC)(Depth: Over 12'-0"), per linear foot.
Item S-742-01-G, Sanitary Sewer Pipe (24" PVC)(Depth: 12'-0"), per linear foot.
Item S-742-02, Adjusting Sanitary Sewer House Connections, per each.
Item S-742-03, Adjusting Sanitary Sewer Service Lines, per linear foot.
Item S-742-04-A, Casing (24" Steel), per linear foot.
Item S-742-04-B, Casing (36" Steel), per linear foot.

FOR INFORMATION ONLY

CONTRACT TIME (03/05): The entire contract shall be completed in all details and ready for final acceptance in accordance with Subsection 105.17(b) within **one thousand eight hundred twenty-five (1825) calendar days.**

Prior to assessment of contract time, the contractor will be allowed 30 calendar days from the date stipulated in the Notice to Proceed to commence with portions of the contract work including but not limited to assembly periods, preparatory work for materials fabrications such as test piles, or other activities which hinder progress in the beginning stages of construction. Prior to issuance of the Notice to Proceed, the Department will consider extending the assembly period upon written request from the contractor justifying the need for additional time.

The contractor shall be responsible for maintenance of traffic from the beginning of the assembly period. During the assembly period, the contractor will be allowed to do patching and other maintenance work necessary to maintain the roadway with no time charges when approved by the engineer.

If the contractor begins regular construction operations prior to expiration of the assembly period, the assessment of contract time will commence at the time construction operations are begun.

FOR INFORMATION ONLY

STATE PROJECT NOS. 005-10-0037, 006-01-0021, 006-02-0064, 006-25-0001, 006-30-0041, 063-03-0051 AND 063-04-0035

PART 2 OF 2

FOR INFORMATION ONLY

LOUISIANA
DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT
SUPPLEMENTAL SPECIFICATIONS

STANDARD PROVISIONS
GENERAL LIABILITY POLICIES

GENERAL INSTRUCTIONS

1. STANDARD LANGUAGE: This form is expressed in standard language which may not be amended and no part of which may be omitted except (a) as indicated by these instructions, or (b) as indicated in reference notes shown below referring to specific portions of the form, or (c) by an endorsement which states an amendment or exclusion of some provision of the form in accordance with the provisions of a manual rule, the form of which endorsement has been approved, if required, by the supervising authority of the State in which the policy is issued.

2. OPTIONAL SEQUENCE AND ARRANGEMENT: The several parts of the form, viz. "Insuring Agreements," "Exclusions," "Conditions" and "Declarations" may appear in the policy in such sequence as the company may elect and the sequence and arrangement of the several provisions of those parts are also optional with the company.

3. DESCRIPTIVE HEADINGS--IDENTIFYING OR INDEXING DESIGNATIONS: The descriptive headings of the parts of the form (as quoted above) and of the major insuring agreements ("Bodily Injury Liability," "Property Damage Liability," etc.) are standard expressions which may not be amended or omitted, but all other identifying or indexing designations (such as "Coverage A," "Defense, Settlement, Supplementary Payments," "Cancellation," etc.), including literal or numerical designations or paragraphs or phrases, may be amended or omitted at the company's option. When such identifying or indexing designations, used for the purpose of reference in the text of the form or any endorsement form applicable thereto, are amended or omitted, descriptive designations shall be substituted.

4. ADDITIONAL COVERAGES OR COMPANIES, EXPLANATORY OR CONNECTIVE LANGUAGE: When policies are issued to provide insurance in this form together with insurance covering other risks, the addition of necessary explanatory or connective language which does not amend the expression of this form is permissible and the introductory language of the "Insuring Agreements" which provides for the issuance of a policy by 2 companies may be used and, if necessary, paraphrased to permit such policies to be issued by more than 2 companies.

5. DECLARATIONS--INCLUDING OTHER RISKS: A common set of declarations may be used in those cases where policies in this form are issued with policies covering other risks.

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6. INSTALLMENT PREMIUM PAYMENT: Policies written to provide for payment of premium in installments may provide for lapse or suspension of the policy upon default of payment when due.

7. ADDITION OF COVERAGE BY ENDORSEMENT: When insuring agreements and other provisions relating to any particular class of insurance are added to this policy by endorsement, such additional insurance must be expressed in approved standard language relating to the particular class and must be subject to all standard provisions applicable to that class by the expressions of the endorsement or of the policy or of both taken together.

8. DEFINITION OF "STANDARD" AND "APPROVED": "Standard language" or "approved standard language" when used in these instructions means the form and endorsements either prescribed or approved by the insurance supervising authority of the State in which policy forms and endorsements are approved or prescribed. In those States where supervising authorities do not have the authority to approve or prescribe policies, forms and endorsements, the terms mean the forms and endorsements adopted by the companies for use in such States.

9. PREMIUM STATEMENT: The statement with respect to payment of premium may be amended by an endorsement to make necessary provision with respect to payment of premium, payment of additional premium and return of premium and dividends under the policy.

10. SPECIAL CONDITIONS FOR MUTUALS, RECIPROCALS, AND PARTICIPATING STOCK COMPANIES: When the policy is issued by a mutual company, a reciprocal association or a participating stock company having special provisions applicable to its membership or policyholders, such provisions, when approved by the supervising authority of the State in which the policy is issued if such approval is required, may be inserted in the policy.

BLANK INDEMNITY COMPANY
BLANK INSURANCE COMPANY

[1]

Railroad Protective Liability Policy No. (State or Federal Highway Projects)

[1]Matter in box may be included, omitted or amended at the option of the company.

FOR INFORMATION ONLY

DECLARATIONS

Item 1. Named Insured _____

Address _____
(Street No. Town or City Parish or County State)

Item 2. Policy Period: From _____ to _____
12:01 A.M. Central Standard (or Daylight) Time at the designated job site as stated herein.

Item 3. The insurance afforded is only with respect to such of the following coverages as are indicated [in Item 6] by specific premium charge or charges. The limit of the company's liability against such coverages shall be as stated herein, subject to all the terms of this policy having reference thereto. (A statement may be added that a definite notation may be made in the premium column to show that a particular coverage is not afforded.)

Coverages		Limits of Liability
Blank Indemnity Company	A-Bodily Injury Liability	$ each person $ each occurrence
Blank Insurance Company	B-Property Damage Liability C-Physical Damage to Property	$ each occurrence $ aggregate

Item 4. Name and Address of Contractor _____

Item 5. Name and Address of Governmental Authority for whom the work by the Contractor is being performed _____

Item 6. Designation of Job Site & Description of Work

Premium Bases	Rates Coverage A Coverages B & C	Advance Premiums Coverage A Coverages B & C
Contract Cost Rental Cost	Per $100 of Cost Per $100 of Rental Cost	

If Policy Period more than 1 year:

Premium is payable: On effective date of Policy $ 1st Anniversary

$ 2nd Anniversary

Date and Place of Issue _____

{Countersigned { _____ 20 __, at _____}
By_____

A. Renewal of policy number.
B. The name insured is a corporation.
C. Endorsement serial numbers.
D. Rating plan or premium discount.

(For policy issued by one company)

(Name and Location of Indemnity Company)

A (type of company) insurance company, herein called the company

agrees with the insured, named in the declarations made a part hereof, in consideration of the payment of the premium and in reliance upon the statements in the declarations made by the name insured and subject to all of the terms of this policy:

(For policy issued by two companies)

(Name and Location of Indemnity Company)
and
(Name and Location of Insurance Company)

Each a (type of company) insurance company, herein called the company,

severally agree with the insured named in the declarations made a part hereof, in consideration of the payment of the premium and in reliance upon the statements in the declarations made by the named insured and subject to all of the terms of this policy, provided the Blank Indemnity

Company shall be made the insurer with respect to coverage ——————
and no other and the Blank Insurance Company shall be the insurer with respect to coverage——————and no other.

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INSURING AGREEMENTS

I. COVERAGE A - BODILY INJURY LIABILITY: To pay on behalf of the insured all sums which the insured shall become legally obligated to pay as damages because of bodily injury, sickness, or disease, including death at any time resulting therefrom, hereinafter called "bodily injury," either (1) sustained by any person arising out of acts or omissions at the designated job site which are related to or are in connection with the work described in Item 6 of the Declarations, or (2) sustained at the designated job site by the contractor or any employee of the contractor, or by any employee of the governmental authority specified in Item 5 of the declarations, or by any designated employee of the insured, whether or not arising out of such acts omissions.

COVERAGE B - PROPERTY DAMAGE LIABILITY: To pay on behalf of the insured all sums which the insured shall become legally obligated to pay as damages because of physical injury to or destruction of property, including loss of use of any property due to such injury or destruction, hereinafter called "property damage" arising out of acts or omissions at the designated job site which are related to or are in connection with the work described in Item 6 of the declarations.

COVERAGE C - PHYSICAL DAMAGE TO PROPERTY: To pay for direct and accidental loss of or damage to rolling stock and their contents, mechanical construction equipment, or motive power equipment, hereinafter called loss, arising out of acts or omissions at the designated job site which are related to or are in connection with the work described in Item 6 of the declarations; provided such property is owned by the named insured or is leased or entrusted to the named insured under a lease or trust agreement.

II. DEFINITIONS

(a) Insured - The unqualified word "insured" includes the name insured and also includes any executive officer, director or stockholder thereof while acting within the scope of his duties as such.

(b) Contractor - The word "contractor" means the contractor designated in Item 4 of the declarations and includes all subcontractors of said contractor but shall not include the name insured.

(c) Designated employee of the insured - The words "designated employee of the insured" mean:

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(1) Any supervisory employee of the insured at the job site.

(2) Any employee of the insured while operating, attached to or engaged on work trains or other railroad equipment at the job site which are assigned exclusively to the contractor, or

(3) Any employee of the insured not within (1) or (2) who is specifically loaned or assigned to the work of the contractor for prevention of accidents or protection of property, the cost of whose services is borne specifically by the contractor or by governmental authority.

(d) Contract - The word "contract" means any contract or agreement to carry a person or property for a consideration or any lease, trust or interchange contract or agreement respecting motive power, rolling stock or mechanical construction equipment.

III. DEFENSE, SETTLEMENT, SUPPLEMENTARY PAYMENTS: With respect to such insurance as is afforded by this policy under coverages A and B, the company shall:

(a) Defend any suit against the insured alleging such bodily injury or property damage and seeking damages which are payable under the terms of this policy, even if any of the allegations of the suit are groundless, false or fraudulent, but the company may make such investigation and settlement of any claim or suit as it deems expedient;

(b) Pay, in addition to the applicable limits of liability:

(1) All expenses incurred by the company, all costs taxed against the insured in any such suit and all interest on the entire amount of any judgment therein which accrues after entry of the judgment and before the company has paid or tendered or deposited in court that part of the judgment which does not exceed the limit of the company's liability thereon;

(2) Premiums on appeal bonds required in any such suit, premiums on bonds to release attachments for an amount not in excess of the applicable limit of liability of this policy, but without obligation to apply for or furnish any such bonds;

(3) Expenses incurred by the insured for such immediate medical and surgical relief to others as shall be imperative at the time of the occurrence;

(4) All reasonable expenses other than loss of earnings, incurred by the insured at the company's request.

FOR INFORMATION ONLY

IV. POLICY PERIOD, TERRITORY: This policy applies only to occurrences and losses during the policy period and within the United States of America, its territories, or possessions, or Canada.

EXCLUSIONS

This policy does not apply:

(a) to liability assumed by the insured under any contract or agreement except a contract as defined herein;

(b) to bodily injury or property damage caused intentionally by or at the direction of the insured;

(c) to bodily injury, property damage or loss which occurs after notification to the named insured of the acceptance of the work by the governmental authority, other than bodily injury, property damage or loss resulting from the existence or removal of tools, uninstalled equipment and abandoned or unused materials;

(d) under Coverages A (l), B and C, to bodily injury, property damage or loss, the sole proximate cause of which is an act or omission of any insured other than acts or omissions of any designated employee of any insured;

(e) under Coverage A, to any obligation for which the insured or any carrier as his insurer may be held liable under any workmen's compensation, unemployment compensation or disability benefits law, or under any similar law; provided that the Federal Employers' Liability Act, U. S. Code (1946) Title 45, Sections 51-60, as amended, shall for the purposes of this insurance be deemed not to be any similar law;

(f) under Coverage B, to injury to or destruction of property (i) owned by the named insured or (ii) leased or entrusted to the named insured under a lease or trust agreement.

(g) 1. Under any Liability Coverage, to injury, sickness, disease, death or destruction.

(a) with respect to which an insured under the policy is also an insured under a nuclear energy liability policy issued by Nuclear Energy Liability Insurance Association, Mutual Atomic Energy Liability Underwriters or Nuclear Insurance Association of Canada, or would be an insured under any such policy but for its termination upon exhaustion of its limit of liability; or

(b) resulting from the hazardous properties of nuclear material and with respect to which (l) any person or organization is required to maintain financial protection pursuant to the Atomic Energy Act of 1954, or any law amendatory thereof or (2) the

FOR INFORMATION ONLY

insured is, or had this policy not been issued would be, entitled to indemnity from the United States of America, or any agency thereof, under any agreement entered into by the United States of America, or any agency thereof, with any person or organization.

2. Under any Medical Payments Coverage, or under any Supplementary-Payments provision relating to immediate medical or surgical relief, to expenses incurred with respect to bodily injury, sickness, disease or death resulting from the hazardous properties of nuclear material and arising out of the operation of a nuclear facility by any person or organization.

3. Under any Liability Coverage, to injury, sickness, disease, death or destruction resulting from the hazardous properties of nuclear material, if

(a) The nuclear material (1) is at any nuclear facility owned by, or operated by or on behalf of, an insured or (2) has been discharged or dispersed therefrom;

(b) The nuclear material is contained in spent fuel or waste at any time possessed, handled, used, processed, stored, transported or disposed of by or on behalf of an insured; or

(c) The injury, sickness, disease, death or destruction arises out of the furnishing by an insured of services, materials, parts of equipment in connection with the planning, construction, maintenance, operation or use of any nuclear facility, but if such facility is located within the United States of America, its territories or possessions or Canada, this exclusion (c) applies only to injury to or destruction of property at such nuclear facility.

4. As used in this exclusion:

"hazardous properties" include radioactive, toxic or explosive properties;

"nuclear material" means source material, special nuclear material or byproduct material;

"source material," "special nuclear material," and "byproduct material" have the meanings given them in the Atomic Energy Act of 1954 or in any law amendatory thereof;

"spent fuel" means any fuel element or fuel component, solid or liquid, which has been used or exposed to radiation in a nuclear reactor;

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"waste" means any waste material (1) containing byproduct material and (2) resulting from the operation by any person or organization of any nuclear facility included within the definition of nuclear facility under paragraph (a) or (b) below;

"nuclear facility" means

(a) any nuclear reactor,

(b) any equipment or device designed or used for (1) separating the isotopes of uranium or plutonium, (2) processing or utilizing spent fuel, or (3) handling, processing or packaging waste,

(c) any equipment or device used for the processing, fabricating or alloying of special nuclear material if at any time the total amount of such material in the custody of the insured at the premises where such equipment or device is located consists of or contains more than 25 grams of plutonium or uranium 233 or any combination thereof, or more than 250 grams of uranium 235,

(d) any structure, basin, excavation, premises or place prepared or used for the storage or disposal of waste,

and includes the site on which any of the foregoing is located, all operations conducted on such site and all premises used for such operations;

"nuclear reactor" means any apparatus designed or used to sustain nuclear fission in a self-supporting chain reaction or to contain a critical mass of fissionable material;

with respect to injury to or destruction of property, the word "injury" or "destruction" includes all forms of radioactive contamination of property.

(h) Under Coverage C, to loss due to nuclear reaction, nuclear radiation or radioactive contamination, or to any act or condition incident to any of the foregoing.

CONDITIONS

[The conditions, except conditions 3, 4, 5, 6, 7, 8, 9, 10, 11 and 12 apply to all coverages. Conditions 3, 4, 5, 6, 7, 8, 9, 10, 11 and 12 apply only to the coverage noted thereunder.]

1. Premium: The premium bases and rates for the hazards described in the declarations are stated therein. Premium bases and rates for hazards not so described are those applicable in accordance with the manuals in use by the company.

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The term "contract cost" means the total cost of all work described in Item 6 of the declarations.

The term "rental cost" means the total cost to the contractor for rental of work trains or other railroad equipment, including the renumeration of all employees of the insured while operating, attached to or engaged thereon.

The advance premium stated in the declarations is an estimated premium only. Upon termination of this policy the earned premium shall be computed in accordance with the company's rules, rates, rating plans, premiums and minimum premiums applicable to this insurance. If the earned premium thus computed exceeds the estimated advance premium paid, the company shall look to the contractor specified in the declarations for any such excess; if less, the company shall return to the said contractor the unearned portion paid.

In no event shall payment of premium be an obligation of the named insured.

2. Inspection: The named insured shall make available to the company records of information relating to the subject matter of this insurance.

The company shall be permitted to inspect all operations in connection with the work described in Item 6 of the declarations.

3. Limits of Liability - Coverage A: The limit of bodily injury liability stated in the declarations as applicable to "each person" is the limit of the company's liability for all damages, including damages for care and loss of services, arising out of bodily injury sustained by 1 person as the result of any 1 occurrence; the limit of such liability stated in the declarations as applicable to "each occurrence" is, subject to the above provision respecting each person, the total limit of the company's liability for all such damage arising out of bodily injury sustained by 2 or more persons as the result of any 1 occurrence.

4. Limits of Liability - Coverages B and C: The limit of liability under coverages B and C stated in the declarations as applicable to "each occurrence" is the total limit of the company's liability for all damages and all loss under coverages B and C combined arising out of physical injury to, destruction or loss of all property of one or more persons or organizations, including the loss of use of any property due to such injury or destruction under coverage B, as the result of any 1 occurrence.

Subject to the above provisions respecting "each occurrence," the limit of liability under coverages B and C stated in the declaration as "aggregate" is the total limit of the company's liability for all damages and all loss under coverages B and C combined arising out of physical injury to, destruction or loss of property, including the loss of use of any property due to such injury or destruction under coverage B.

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Under coverage C, the limit of the company's liability for loss shall not exceed the actual cash value of the property, or if the loss is of a part thereof the actual cash value of such part, at time of loss, not what it would then cost to repair or replace the property or such part thereof with other of like kind and quality.

5. Severability of Interests - Coverages A and B: The term "the insured" is used severally and not collectively, but the inclusion herein of more than one insured shall not operate to increase the limits of the company's liability.

6. Notice: In the event of an occurrence or loss, written notice containing particulars sufficient to identify the insured and also reasonably obtainable information with respect to the time, place and circumstances thereof, and the names and addresses of the injured and of available witnesses, shall be given by or for the insured to the company or any of its authorized agents as soon as practical. If claim is made or suit is brought against the insured, he shall immediately forward to the company every demand, notice, summons or other process received by him or his representative.

7. Assistance and Cooperation of the Insured - Coverages A and B: The insured shall cooperate with the company and, upon the company's request, attend hearings and trials and assist in making settlements, securing and giving evidence, obtaining the attendance of witnesses and in the conduct of suits. The insured shall not, except at his own cost, voluntarily make any payment, assume any obligation or incur any expense other than for such immediate medical and surgical relief to others as shall be imperative at the time of accident.

8. Action Against Company - Coverages A and B: No action shall lie against the company unless, as a condition precedent thereto, the insured shall have fully complied with all the terms of this policy, nor until the amount of the insured's obligation to pay shall have been finally determined either by judgment against the insured after actual trial or by written agreement of the insured, the claimant and the company.

Any person or organization or the legal representative thereof who has secured such judgment or written agreement shall thereafter be entitled to recover under this policy to the extent of the insurance afforded by this policy. No person or organization shall have any right under this policy to join the company as a party to any action against the insured to determine the insured's liability. Bankruptcy or insolvency of the insured or of the insured's estate shall not relieve the company of any of its obligations hereunder.

9. Action Against Company - Coverage C: No action shall lie against the company unless, as a condition precedent thereto, there shall have been full compliance with all the terms on this policy nor until 30 days after proof of loss is filed and the amount of loss is determined as provided in this policy.

FOR INFORMATION ONLY

10. Insured's Duties in Event of Loss - Coverage C: In the event of loss the insured shall:

(a) protect the property, whether or not the loss is covered by this policy, and any further loss due to the insured's failure to protect shall not be recoverable under this policy; reasonable expenses incurred in affording such protection shall be deemed incurred at the company's request.

(b) file with the company, as soon as practicable after loss, his sworn proof of loss in such form and including such information as the company may reasonably require and shall upon the company's request, exhibit the damaged property.

11. Appraisal - Coverage C: If the insured and the company fail to agree as to the amount of loss, either may, within 60 days after the proof of loss is filed, demand an appraisal of the loss. In such event the insured and the company shall each select a competent appraiser, and the appraisers shall select a competent and disinterested umpire. The appraisers shall state separately the actual cash value and the amount of loss and failing to agree shall submit their differences to the umpire. An award in writing of any two shall determine the amount of loss. The insured and the company shall each pay his chosen appraiser and shall bear equally the other expenses of the appraisal and umpire.

The company shall not be held to have waived any of its rights by any act relating to appraisal.

12. Payment of Loss - Coverage C: The company may pay for the loss in money but there shall be no abandonment of the damaged property to the company.

13. No Benefit to Bailee - Coverage C: The insurance afforded by this policy shall not enure directly or indirectly to the benefit of any carrier or bailee, other than the named insured, liable for loss to the property.

14. Subrogation: In the event of any payment under this policy, the company shall be subrogated to all the insured's rights of recovery therefor against any person or organization and the insured shall execute and deliver instruments and papers and do whatever else is necessary to secure such rights. The insured shall do nothing after loss to prejudice such rights.

15. Application of Insurance: The insurance afforded by this policy is primary insurance.

16. Three Year Policy: A policy period of 3 years is comprised of 3 consecutive annual periods. Computation and adjustment of earned premium shall be made at the end of each annual period. Aggregate limits of liability as stated in this policy shall apply separately to each annual period.

FOR INFORMATION ONLY

17. Changes: Notice to any agent or knowledge possessed by any agent or by any other person shall not effect a waiver or a change in any part of this policy or stop the company from asserting any right under the terms of this policy; nor shall the terms of this policy be waived or changed, except by endorsement issued to form a part of this policy [signed by ——— ———————————————(here insert titles of authorized company officials or representatives); provided, however, changes may be made in the written portion of the declaration by ——————————(here insert titles of authorized company representatives) when initialed by such ——————————— (here insert titles of authorized company representatives) or by endorsement issued to form a part of this policy signed by such ——————————————

(here insert titles of authorized company representatives)].

18. Assignment: Assignment of interest under this policy shall not bind the company until its consent is endorsed hereon.

19. Cancellation: This policy may be cancelled by the named insured by mailing to the company written notice stating when thereafter the cancellation shall be effective. This policy may be cancelled by the company by mailing to the named insured, contractor and governmental authority at the respective addresses shown in this policy written notice stating when not less than 30 days thereafter such cancellation shall be effective. The mailing of notice as aforesaid shall be sufficient proof of notice. The effective date and hour of cancellation stated in the notice shall become the end of the policy period. Delivery of such written notice either by the named insured or by the company shall be equivalent to mailing.

If the named insured cancels, earned premium shall be computed in accordance with the customary short rate table and procedure. If the company cancels, earned premium shall be computed pro rata. Premium adjustment may be made either at the time cancellation is effected or as soon as practical after cancellation becomes effective, but payment or tender of unearned premium is not a condition of cancellation.

20. Declarations: By acceptance of this policy the named insured agrees that such statement in the declarations as are made by him are his agreements and representations, that this policy is issued in reliance upon the truth of such representations and that this policy embodies all agreements existing between himself and the company or any of its agents relating to this insurance.

FOR INFORMATION ONLY

(For policy issued by one company)

In witness whereof, the Blank Indemnity Company has caused this policy to be signed by this president and a secretary at _____ and countersigned on the declarations page by a duly authorized agent of the company.

(FACSIMILE OF SIGNATURE) (FACSIMILE OF SIGNATURE)
Secretary President

(For policy issued by two companies)

In witness whereof, the Blank Indemnity Company has caused this policy with respect to coverages _____ and such other parts of the policy as are applicable thereto, to be signed by its president and a secretary at _____, and countersigned on the declarations page by a duly authorized agent of the company.

(FACSIMILE OF SIGNATURE) (FACSIMILE OF SIGNATURE)
Secretary President

In witness whereof, the Blank Insurance Company has caused this policy, with respect to coverages _____ and such other parts of the policy as are applicable thereto, to be signed by its president and a secretary at _____, and countersigned on the declarations page by a duly authorized agent of the company.

(FACSIMILE OF SIGNATURE) (FACSIMILE OF SIGNATURE)
Secretary President

FOR INFORMATION ONLY

LOUISIANA
DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT
SUPPLEMENTAL SPECIFICATIONS
(FOR 2000 STANDARD SPECIFICATIONS)

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FOR INFORMATION ONLY

LOUISIANA
DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT
SUPPLEMENTAL SPECIFICATIONS

The 2000 Louisiana Standard Specifications for Roads and Bridges and supplemental specifications thereto are amended as follows.

SECTION 101 – GENERAL INFORMATION, DEFINITIONS AND TERMS

Subsection 101.03 – Definitions (11/04), Pages 3 – 12.

Delete the third paragraph and substitute the following.

Assembly Period. Time the contractor is given to acquire approvals of required drawings, brochures, and other submittals, assemble or relocate asphaltic concrete plants or portland cement concrete plants, begin the purchase and assembly of materials, perform maintenance patching only, perform selective clearing or structural removal if utility relocations are involved, perform construction layout, perform pile tests, erect or install a project site laboratory, conduct preexisting site survey, install erosion control items, install fencing if existing fencing is removed during clearing, and perform bleeder ditching to prevent water table rise during winter months. The contractor will not be charged contract time during an assembly period.

SECTION 102 – BIDDING REQUIREMENTS:

Subsection 102.03 – Contents of Bidding Documents (05/02), Pages 14 and 15.

Delete the second sentence of the second paragraph and substitute the following.

The construction proposal will state the time in which the work must be completed, and the date, time and place of opening bids.

Subsection 102.08 – Irregular Bids (02/04), Pages 17 and 18.

Add the following subparagraphs.

(m) If the bidder is disqualified in accordance with Subsection 108.04.

(n) If the bidder is debarred in accordance with Part XIII-B of Chapter I of LRS 48.

(o) If the bidder is disqualified for Proposal/Bid Guaranty forfeiture or non-payment in accordance with Subsection 103.07.

Subsection 102.09 – Proposal/Bid Guaranty (05/02), Pages 18 and 19.

Delete the text of this subsection and substitute the following:

Each bid shall be accompanied by a proposal/bid guaranty in an amount not less than five percent of the total bid amount when the bidder's total bid amount as calculated by the Department in accordance with Subsection 103.01 is greater than $250,000. No proposal/bid guaranty is required for projects when the bidder's total bid amount as calculated by the Department is $250,000 or less. The official total bid amount for projects that include alternates is the total of the bidder's base bid and all alternates bid on and accepted by the Department. The

proposal/bid guaranty submitted by the bidder shall either be a certified check, cashier's check, bidder's company check, postal money order, bank money order or bid bond made payable to the Louisiana Department of Transportation and Development or as specified.

When the proposal/bid guaranty submitted by the bidder is a bid bond, this bond shall be on the "Bid Bond" form provided in the construction proposal; on a form that is materially the same in all respects to the "Bid Bond" form provided, or an electronic form that has received Department approval prior to submission. The bid bond shall be filled in completely, shall be signed by an authorized officer, owner or partner of the bidding entity, or each entity representing a joint venture; shall be signed by the surety's agent or attorney-in-fact; and shall be accompanied by a notarized document granting general power of attorney to the surety's signer. The bid bond shall not contain any provisions that limit the face amount of the bond.

When a bid bond is used it will be written by a surety or insurance company that is in good standing and currently licensed to write surety bonds in the State of Louisiana by the Louisiana Department of Insurance and also conform to the requirements of LSA-R.S. 48:253.

All signatures required on the bid bond may be original, mechanical reproductions, facsimiles or electronic. Electronic signatures must have written Departmental approval prior to use.

Subsection 102.13 – Withdrawal of Bids Due to Mistake (05/02), Pages 19 – 21.

Delete Heading (a) and substitute the following:

(a) Criteria:

(1) Withdrawal of Bid: The Department may allow a bidder to withdraw a bid after the scheduled time of bid opening in accordance with state law upon a determination that:

a. A mistake was in fact made in preparation of the bid; and,

b. The mistake in the bid is of a mechanical, clerical or mathematical nature and not one of bad judgment, careless inspection of the work site, or in reading the plans and specifications; and,

c. The mistake is found to be in good faith and was not deliberate or by reason of gross negligence; and,

d. The mistake is patently obvious on the face of the bid; and,

e. The notice of the mistake, request for withdrawal of the bid by reason of the mistake, and written evidence of the mistake, is delivered to the DOTD Chief Engineer within 72 hours after the bid opening, excluding Saturdays, Sundays, and legal holidays. The written evidence of the mistake supplied to the DOTD Chief Engineer shall be duly sworn before a Notary Public as original, unaltered documents used in the preparation of the bid or any other facts relevant to the bidder's request to withdraw the bid as evidence of the existence of a mistake; and,

f. The sworn, written evidence furnished to the DOTD Chief Engineer within 72 hours of the bid opening, excluding Saturdays, Sundays, and legal holidays, constitutes clear and convincing evidence of the bidder's mistake.

(2) Other bid protests: The Department may also allow a bidder to protest any matter regarding the bidding or award of a contract after the scheduled time of bid opening in accordance with the following provisions:

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a. The protest of a bidder must be submitted in writing and, specifically set forth the grounds and/or reasons for the protest; and,

b. The written protest must be delivered to the DOTD Chief Engineer within 72 hours after notice of bid rejection, irregularity or any other action regarding the bidding of the contract, excluding Saturdays, Sundays, and legal holidays.

SECTION 103 – AWARD AND EXECUTION OF CONTRACT:

Subsection 103.05 – Payment, Performance, and Retainage Bonds (01/02), Pages 23 and 24.

Delete the text of this subsection and substitute the following:

At the time of execution of the contract, the successful bidder shall furnish the following bonds on the forms provided by the Department.

(a) Payment bond in a sum equal to one hundred percent (100%) of the contract amount.

(b) Performance bond in a sum equal to one hundred percent (100%) of the contract amount.

(c) Retainage bond in a sum equal to five percent (5%) of the contract amount for contract amounts greater than $500,000 unless an election is made to have the Department withhold five percent (5%) of the contract amount; and, retainage bond in a sum equal to ten percent (10 %) of the contract amount for contract amounts equal to or less than $500,000 unless an election is made to have the Department withhold ten percent (10 %) of the contract amount.

The bonds shall be written by a surety or insurance company that is in good standing and currently licensed to write surety bonds in the State of Louisiana by the Louisiana Department of Insurance and also conform to the requirements of LSA-R.S. 48:255.

All signatures required on the "Bond Form" shall be original signatures, in ink, and are not to be mechanical reproductions or facsimiles.

Subsection 103.07 – Failure to Execute Contract (01/02), Pages 24 and 25.

Delete the text of this subsection and substitute the following:

Failure by the bidder to comply with Subsection 103.06 will be cause for cancellation of the award and forfeiture of the proposal/bid guarantee. For those projects wherein a proposal/bid guarantee was not provided with the bid, failure to comply with Subsection 103.06 will be cause for cancellation of the award and bidder to be disqualified from bidding or subcontracting for a period of one year from the award date. Awards, which were cancelled, may then be made to the next lowest responsible bidder or the work may be readvertised for bids, at the Department's discretion.

Should a proposal/bid guaranty be required to be forfeited by the bidder to the Department or other named obligee, and if for any reason the full amount of the proposal/bid guaranty is not collected or collectable by the Department upon demand, the bidder will be disqualified from bidding or subcontracting for a period of one year from the date of non-payment.

SECTION 104 – SCOPE OF WORK:

Subsection 104.03 – Maintenance of Traffic (06/01), Page 27.

Delete the third sentence of the third paragraph and substitute the following:

FOR INFORMATION ONLY

The contractor shall maintain existing drainage and also provide and maintain in a safe condition all temporary approaches or crossings, intersections with roads, streets, businesses, parking lots, residences, garages and farms, at no direct pay.

SECTION 105 – CONTROL OF WORK:

Subsection 105.05 – Cooperation by Contractor (04/01), Page 33.

Delete the third paragraph and substitute the following:

The contractor shall have on the work site at all times, as the contractor's agent, a competent representative capable of reading and understanding the plans and project specifications and experienced in the type of work being performed, who shall receive and execute directions from the engineer. At the preconstruction conference or upon request, the contractor shall furnish the engineer written notice of the name and home telephone number of the representative. The representative shall have authority to execute orders or directions of the engineer without delay and to promptly supply such materials, equipment, tools, labor and incidentals as required. The representative shall be furnished regardless of the amount of work sublet.

Subsection 105.15 – Maintenance During Construction (05/02), Page 38.

Add the following:

The contractor shall maintain the roadway in a satisfactory condition to allow traffic to safely travel through the work zone at the posted speed limit.

Subsection 105.16 – Failure to Maintain Roadway or Structure (05/02), Page 39.

Delete the text of this subsection and substitute the following.

If the contractor fails to comply with Subsections 104.03 and 105.15, the engineer will immediately notify the contractor in writing of such noncompliance. If the contractor fails to remedy the condition within 24 hours after receipt of the written notice, the Department will have the option to immediately remedy the condition with its own in-house forces or by another contractor, and the cost thereof will be deducted from payments for the work.

When the condition requires more immediate remedy due to hazard to life, health and property, the engineer will immediately remedy the condition as above and the costs thereof will be deducted from payments for the work.

Subsection 105.19 – Value Engineering Proposals (03/05), Pages 40 - 44.

Delete the fifth sentence of the seventh paragraph and substitute the following.

Proposed changes in basic configuration and design of a bridge, hydraulic capacity of drainage facilities, typical roadway section, type or minimum thickness of pavements, or changes in grade or alignment which do not meet the geometric standards of the project as conceived, will not be considered as acceptable VE Proposals. Typically, changes in materials for roadway sections will not be considered as acceptable VE proposals.

FOR INFORMATION ONLY

SECTION 107 – LEGAL RELATIONS AND RESPONSIBILITY TO PUBLIC:

Subsection 107.07 – Public Convenience and Safety (02/06), Page 53.

Delete the third paragraph and substitute the following:

When the contractor works at night, adequate artificial lighting shall be provided in accordance with Subsection 105.20. Signs, flaggers or other traffic controls shall also be provided to protect workers, the work and the traveling public. When such work affects traffic safety, the contractor shall submit to the engineer for approval a plan of lighting, signing, flagmen or other traffic controls. If the approved plan proves inadequate after work begins, the contractor shall make such changes as directed. If the engineer finds that the night work is so hazardous as to preclude the beginning or require the discontinuing of such work, the contractor shall immediately cease all such operations.

SECTION 108 – PROSECUTION AND PROGRESS:

Subsection 108.04 – Prosecution of Work (03/05), Pages 69 and 70.

Delete the third paragraph of Heading (b) and substitute the following.

During the period of disqualification, the contractor will not be permitted to bid on contracts nor be approved as a subcontractor on contracts. Any bid submitted by the contractor during the period of disqualification will be considered irregular under Subsection 102.08. The period of disqualification shall continue until the contractor completes the work on the contract within the foregoing percentages or until all work on the contract has been satisfactorily completed. Should the surety or the Department take over prosecution of the work, the contractor shall remain disqualified for a period of one year from the completion of the project, unless debarment proceedings are instituted.

When the Department of Transportation and Development is not the contracting agency on the project, the second paragraph under Heading (c) is deleted.

Subsection 108.09 – Default and Termination of Contract (09/04), Pages 73 – 75.

Delete the second sentence of subparagraph (c) and substitute the following.

Within thirty days of receipt of such notification, the surety shall present to the Department either a plan to assume performance of the contract and procure completion of the project, or provide the Department in writing with a reasonable response for the contractor's default.

SECTION 109 – MEASUREMENT AND PAYMENT:

Subsection 109.04 – Compensation for Alterations of the Contract (11/02), Pages 80 – 82.

Delete Heading (f) and substitute the following.

When the Department authorizes the work to be performed by an approved subcontractor(s), the contractor will be paid the actual and reasonable cost of such subcontracted work computed as outlined above, plus an additional allowance of 10 percent of the first $50,000 of the total cost of all subcontracted work and 5 percent of the total cost of all subcontracted work that exceeds $50,000. Reimbursement for bond costs will be in accordance with Heading (b).

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SECTION 201 – CLEARING AND GRUBBING:

Subsection 201.02 General Construction Requirements (06/02), Page 88.

Delete the fifth sentence and substitute the following.

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 Nurserymen (AAN).

SECTION 202 – REMOVING OR RELOCATING STRUCTURES AND OBSTRUCTIONS:

Subsection 202.02 – General Construction Requirements (07/05), Pages 91 – 95.

Add the following.

The contractor shall provide a DEQ accredited asbestos inspector to inspect any structure that is to be removed or relocated for the existence of asbestos and the condition thereof. Copies of the inspection report for each structure shall be provided to the project engineer.

Add the following to Heading (c).

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 elsewhere in the standard specifications. 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 Department's Materials and Testing Section for verification prior to profiling materials for landfill acceptance.

Delete the second paragraph of Heading (f) and substitute the following.

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 (0.3 m) 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.

Add the following to Heading (h).

When the existing shoulder underdrain at the pavement edge is to remain in place and in service and removal of the shoulder surfacing and base is required, the work shall be done in such manner as to avoid damaging the existing shoulder underdrains. Damaged shoulder underdrains shall be satisfactorily repaired at no direct pay.

Add the following headings.

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(i) 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 Department.

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 days following each shipment.

(j) 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 Department. All materials that are not designated to be salvaged by the Department 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 days following each shipment.

(k) 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.

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Subsection 202.05 – Measurement (07/05), Page 97.

Delete the fourth paragraph and substitute the following.

When an item is included for the removal of bridges, the removal of the approach slabs, superstructure, and substructure will be considered part of the work unless otherwise shown on the plans.

Add the following.

Removing steel members of structures protected by paint containing lead or other hazardous materials, or creosoted timbers or lumber, and transporting them to the designated recycling center or landfill will be considered part of the work when shown on the plans and will not be measured for payment.

When a structure to be removed or relocated is shown on the plans to contain universal wastes, the removal, storage and transport of the universal waste to an approved disposal site or destination facility will not be measured for payment but will be included in the structure to be removed or relocated.

Subsection 202.06 – Payment (07/05), Pages 97 – 99.

Add the following to the second paragraph.

Payment for removal of bridges will include removal of the approach slabs, superstructure and substructure.

Delete the last sentence of the third paragraph and substitute the following.

When a structure is found to contain friable or non-friable asbestos and it has not been identified on the plans as containing asbestos, payment for the removal and disposal of the asbestos will be made in accordance with Subsection 109.04, including the cost of all testing.

Payment for inspection to determine the presence and condition of asbestos by DEQ certified asbestos abatement contractors or subcontractors will be included in the appropriate pay items for the removal or relocation of structures.

Add the following:

Payment for removing steel members of a structure identified on the plans as being protected by paint containing lead or other hazardous materials, or creosoted timbers or lumber, and transporting them to the designated recycling center or landfill, will be included in the bid price for removal or relocation of the structure. When a structure is found to have steel members protected by paint containing lead or other hazardous materials, or creosoted timber or lumber, and it has not been identified on the plans as such, payment for removal and transport of the members to a licensed recycling center or landfill will be made in accordance with Subsection 109.04.

When the plans show that a structure to be removed or relocated contains a universal waste, payment for the removal of the universal waste will be included in the contract unit price for the removal or relocation of the structure which will also include all equipment, labor, and, materials required for the removal, storage, and transport of the universal waste in accordance with LAC Title 33, Part V, Chapter 38. When a structure to be removed or relocated is found to contain a universal waste and it is not identified as such on the plans, payment for the removal, storage and transport of such universal waste in accordance with LAC Title 33, Part V, Chapter 38 will be made in accordance with Subsection 109.04.

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SECTION 203 – EXCAVATION AND EMBANKMENT:

Subsection 203.04 – Muck Excavation (06/01), Page 101.

Delete the text of this subsection and substitute the following:

Muck excavation consists of the removal of saturated or unsaturated mixtures of soils, organic matter, and debris that are unsuitable for foundation material. Materials, which will decay or produce subsidence in the embankment, or materials containing decaying stumps, roots, logs, humus or other material are not satisfactory for use in the embankment. The engineer will determine the material to be classified as muck and to be removed. Material, which cannot be used, shall be removed and disposed of in accordance with Subsection 202.02.

Subsection 203.05 – Borrow (12/04), Pages 101 and 102.

Add the following.

Soils contaminated with hazardous or toxic materials shall not be used for borrow material.

Subsection 203.06 – Soil Usage (11/02) Pages 102 – 104.

Delete Headings (a) and (b) and substitute the following:

(a) Usable Soils: Usable 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.

(b) Selected Soils: Selected soils are natural soils with a maximum PI 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 also a PI of 10 or less will not be allowed. Soils to be used for in-place cement stabilization shall be in accordance with Subsection 302.02(a).

Subsection 203.07 – General Requirements (12/04), Pages 104 – 107.

Delete the term "maximum dry weight density" and substitute "maximum dry density".

Delete the fifth sentence of the third paragraph and substitute the following:

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 established in accordance with DOTD TR 418 or the lifts shall be reprocessed and recompacted until these requirements are met.

Subsection 203.09 – Nonplastic Embankment (05/01), Pages 108 and 109.

Delete the term "maximum dry weight density" from Heading (d) and substitute "maximum dry density".

Subsection 203.14 – Measurement (03/02), Pages 111 – 113.

Delete the first and second paragraphs of Heading (b) and substitute the following.

The measurement of quantities will be computed by the average end area method and will be that area bound by (1) the original ground line established by location (plan) cross sections (if accurate) or new original cross sections obtained by the contractor, and (2) the final theoretical pay line as shown on the plans, or established by the engineer, adjusted for field changes.

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After clearing and grubbing operations, the contractor will take original cross sections for the entire length of the project. All original cross section shall be taken in the presence of a designated DOTD employee. Cross sections shall be taken at sufficient intervals to accurately determine earthwork quantities, not to exceed 100 linear feet (30 lin m). The cross sections shall be taken in accordance with DOTD procedures, and results must be furnished to the Department in a format satisfactory to the engineer. The Department reserves the right to take additional cross sections as needed to verify the contractor's cross sections. In the event the cross sections do not verify, the contractor will investigate and reconcile any differences.

The original cross sections will be used to determine the accuracy of the location cross sections by using random sections not farther apart than 1000 linear feet (300 lin m) and centerline elevations at intervals of 100 linear feet (30 lin m). The location cross sections will be considered to be usable if the average of the differentials do not exceed ±0.3 foot (±0.1m). For significant portions of the project with obvious errors between location and original cross sections, the contractor's original field cross sections will be used, and will not be part of the verification process. In all cases where location sections are unavailable, new originals are to be taken and used.

Add the following to Heading (b)(1):

No payment will be made to the contractor to recompute new plan quantities.

SECTION 301 – CLASS I BASE COURSE:

Subsection 301.06 – Mixing of Soil Cement, Cement Stabilized Sand Shell, and Cement Stabilized Sand Clay Gravel (04/02), Page 130.

Delete the first sentence of the fourth paragraph and substitute the following:

Optimum moisture of the mixture will be determined in accordance with DOTD TR 415 or TR 418.

Subsection 301.16 – Acceptance Requirements (11/02), Pages 136 – 140.

Delete the third sentence of the second paragraph and substitute the following:

The percent cement being incorporated into the mixture shall not be more than 0.1 percent by weight (mass) of the total material below the approved percent cement, or operations shall be discontinued until corrections have been made.

Delete the sentence in Heading (a)(3) and substitute the following.

When any test value is less than that required in Table 301-1, compaction shall continue until the specified density is obtained.

SECTION 302 – CLASS II BASE COURSE:

Subsection 302.02 – Materials (01/03), Page 143.

Add the following to the first paragraph:

Geotextile Fabric	203.11 & 1019

Delete the seventh sentence of Heading (a) and substitute the following:

Soils may be blended to adjust the percentages of sand or silt to meet specification requirements; however, in-place blending will not be allowed. The District Laboratory Engineer

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will approve materials prior to blending and the final product. Soils that do not meet PI requirements shall not be blended or treated to reduce PI.

Subsection 302.04 – General Construction Requirements (12/04), Page 144.

Add the following:

If an aggregate base course is to be placed on untreated or lime-treated soils, a Class D geotextile separator fabric will be required.

Subsection 302.05 – Mixing (04/02), Pages 144 – 146.

Delete the term "maximum dry weight density" from Heading (a)(1) and substitute "maximum dry density".

Subsection 302.13 – Measurement (09/02), Pages 153 and 154.

Add the following:

Geotextile fabric used beneath the base course will not be measured for payment.

Subsection 302.14, - Payment (09/02), Page154.

Add the following:

Payment for geotextile fabric will be included in the contract unit price for base course.

SECTION 303 – IN-PLACE CEMENT STABILIZED BASE COURSE:

Subsection 303.02 – Materials (05/01), Page 155.

Delete the third paragraph and substitute the following:

Soils or soil-aggregate combinations furnished by the contractor for stabilization in accordance with this section shall comply with the requirements of Subsection 302.02(a).

Subsection 303.04 – Preparation of Roadbed (05/01), Pages 156 and 157.

Delete the term "maximum dry weight density" and substitute "maximum dry density".

Subsection 303.05 – Mixing (05/01), Pages 157 and 158.

Delete the first sentence of the fourth paragraph and substitute the following:

Optimum moisture of the mixture will be determined in accordance with DOTD TR 415 or TR 418.

SECTION 304 – LIME TREATMENT:

Subsection 304.07 – Compacting and Finishing (05/01), Pages 167 and 168.

Delete the term "maximum dry weight density" from Heading (a) and substitute "maximum dry density".

SECTION 305 –SUBGRADE LAYER:

Subsection 305.02 – Materials (09/02), Pages 173 and 174.

Add the following to the first paragraph:

Geotextile Fabric	203.11 & 1019

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Subsection 305.04 – Construction Requirements (12/04), Pages 174 and 175.

Add the following sentence to Heading (a)(2):

The bid price for pay item 305-01, Subgrade Layer, will be adjusted for the actual percentage of cement required.

Add the following to Heading (b):

If an aggregate subgrade layer is used, a Class D geotextile fabric will be required to separate the aggregate subgrade layer from untreated soil.

Delete the term "maximum dry weight density" from Heading (d) and substitute "maximum dry density".

Subsection 305.05 – Measurement (12/02), Page 175.

Add the following:

Geotextile fabric used beneath the subgrade layer will not be measured for payment.

Subsection 305.06 – Payment (12/02), Pages 175 and 176.

Add the following:

Payment for geotextile fabric will be included in the contract unit price for subgrade layer.

SECTION 306 – SCARIFYING AND COMPACTING ROADBED:

Subsection 306.02 – Construction Requirements (05/01), Page 177.

Delete the term "maximum dry weight density" and substitute "maximum dry density".

SECTION 401 – AGGREGATE SURFACE COURSE:

Subsection 401.04 – Shoulder Construction (05/01), Pages 184 and 185.

Delete the term "maximum dry weight density" from Headings (b) and (c) and substitute "maximum dry density".

SECTION 402 – TRAFFIC MAINTENANCE AGGREGATE:

Subsection 402.02 – Materials (05/02), Page188.

Delete the text of this subsection and substitute the following.

Aggregate for maintenance of traffic shall be stone, wash gravel, recycled portland cement concrete, reclaimed asphaltic pavement (RAP), or shell satisfactory to the engineer.

SECTION 507 – ASPHALTIC SURFACE TREATMENT:

Subsection 507.02 – Materials (07/02), Pages 278 and 279.

Delete the last paragraph and substitute the following.

Hot asphalt shall be smooth and homogeneous and shall comply with the specifications for gelled asphalt or PAC-15 as shown in Table 1002-11.

Delete Tables 507-1 and 507-2 and substitute with Tables 507-1 and 507-2 contained elsewhere herein.

Delete Table 507-3.

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Table 507-1
Asphaltic Surface Treatment (AST) Requirements
(Emulsion)

TYPE AST	Course No.	TYPE A[1]		TYPE B[1]		TYPE C[1]	TYPE D			TYPE E[2] (Interlayer)
Agg. Friction Rating		I, II		I, II, III		I, II, III	I, II, III, IV			I, II, III, IV
Asphalt Emulsion		CRS-2P		CRS-2P		CRS-2P	CRS-2P			CRS-2P
Application Temp. Minimum Maximum		160°F (70°C) 175°F (80°C)		160°F (70°C) 175°F (80°C)		160°F (70°C) 175°F (80°C)	160°F (70°C) 175°F (80°C)			160°F (70°C) 175°F (80°C)
Number of Applications		2	1	2	1	1	3	2	1	2
Asphalt Emulsion[3] Application Rates Per Course	1	0.39 (1.77)	0.41 (1.86)	0.39 (1.77)	0.31 (1.40)	0.41 (1.86)	0.46 (2.08)	0.39 (1.77)	0.31 (1.40)	0.39 (1.77)
	2	0.29 (1.31)	---	0.29 (1.31)	---	---	0.36 (1.63)	0.29 (1.31)	---	0.29 (1.31)
	3	---	---	---	---	---	0.26 (1.18)	---	---	---
Aggregate[4] Application Rates Per Course	1	S2-0.0111 (S2-0.010)	S2-0.0111 (S2-0.010)	S2-0.0111 (S2-0.010)	S3-0.0075 (S3-0.007)	S2-0.0111 (S2-0.010)	S1-0.0200 (S1-0.018)	S2-0.0111 (S2-0.010)	S3-0.0075 (S3-0.007)	S2-0.0111 (S2-0.010)
	2	S3-0.0075 (S3-0.007)	---	S3-0.0075 (S3-0.007)	---	---	S2-0.0111 (S2-0.010)	S3-0.0075 (S3-0.007)	---	S3-0.0075 (S3-0.007)
	3	---	---	---	---	---	S3-0.0075 (S3-0.007)	---	---	---

[1] Only lightweight aggregate, crushed slag or crushed stone shall be used for Types A, B or C Asphaltic Surface Treatment.
[2] Lightweight aggregate will not be allowed.
[3] Application rates are in gallons of asphalt emulsion per square yard (liters of asphalt emulsion per sq m) of AST.
[4] Size aggregate and application rates. For example, S2 is Size 2 aggregate and 0.0111 is the application rate in cubic yards of aggregate per square yard (0.010 cu m of aggregate per sq m) of AST.

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Table 507-2
Asphaltic Surface Treatment (AST) Requirements
(Hot Application)

TYPE AST	Course No.	TYPE A[1]		TYPE B[1]		TYPE C[1]	TYPE D			TYPE E[2] (Interlayer)
Agg. Friction Rating		I, II		I, II, III		I, II, III	I, II, III, IV			I, II, III, IV
Asphalt Cement[3]		Gelled Asphalt or PAC-15		Gelled Asphalt or PAC-15		Gelled Asphalt or PAC-15	Gelled Asphalt or PAC-15			Gelled Asphalt or PAC-15
Application Temp. Minimum Maximum		300°F (149°C) 360°F (182°C)		300°F (149°C) 360°F (182°C)		300°F (149°C) 360°F (182°C)	300°F (149°C) 360°F (182°C)			300°F (149°C) 360°F (182°C)
Number of Applications		2	1	2	1	1	3	2	1	2
Asphalt Cement[4] Application Rates Per Course	1	0.30 (1.36)	0.31 (1.40)	0.30 (1.36)	0.24 (1.09)	0.31 (1.40)	0.36 (1.63)	0.30 (1.36)	0.24 (1.09)	0.30 (1.36)
	2	0.23 (1.04)	---	0.23 (1.04)	---	---	0.28 (1.27)	0.23 (1.04)	---	0.23 (1.04)
	3	---	---	---	---	---	0.20 (0.91)	---	---	---
Aggregate[5] Application Rates Per Course	1	S2-0.0111 (S2-0.010)	S2-0.0111 (S2-0.010)	S2-0.0111 (S2-0.010)	S3-0.0075 (S3-0.007)	S2-0.0111 (S2-0.010)	S1-0.0200 (S1-0.018)	S2-0.0111 (S2-0.010)	S3-0.0075 (S3-0.007)	S2-0.0111 (S2-0.0010)
	2	S3-0.0075 (S3-0.007)	---	S3-0.0075 (S3-0.007)	---	---	S2-0.0111 (S2-0.010)	S3-0.0075 (S3-0.007)	---	S3-0.0075 (S3-0.007)
	3	---	---	---	---	---	S3-0.0075 (S3-0.007)	---	---	---

[1] Only lightweight aggregate, crushed slag or crushed stone shall be used for Types A, B or C Asphaltic Surface Treatment.
[2] Lightweight aggregate will not be allowed.
[3] See Table 1002-11.
[4] Application rates are in gallons of asphalt cement per square yard (liters of asphalt cement per sq m) of AST.
[5] Size aggregate and application rates. For example, S2 is Size 2 aggregate and 0.0111 is the application rate in cubic yards of aggregate per square yard (0.010 cu m of aggregate per sq m) of AST.

SECTION 508 – STONE MATRIX ASPHALT:

Subsection 508.01, Description (03/03), Page 288.

Delete the fourth sentence and substitute the following.

Mineral filler and/or fibers shall be used to control draindown.

Subsection 508.02, Materials (03/03), Pages 288 and 289.

Delete the sentence in Heading (a), Asphaltic Cement, and substitute the following.

Asphalt cement shall be PG76-22m as listed on QPL 41 and complying with Section 1002.

Delete the first sentence of Heading (c), Additives, and substitute the following.

Additives shall meet the requirements of Subsection 502.02(b) except mineral filler and/or fibers will be required.

Delete the sentence in Heading (c)(2), Mineral Filler, and substitute the following.

Mineral filler shall comply with Subsection 1003.06(a)(6).

Delete the first sentence of Heading (c)(3), Fibers, and substitute the following.

A cellulose or mineral fiber, pre-approved by the Department, shall be used to prevent draindown or to serve as a filler.

Subsection 508.03, Job Mix Formula (JMF)(03/03), Page 289.

Delete the fifth sentence of the first paragraph and substitute the following.

An anti-strip additive shall be included in accordance with Section 502.

Delete Heading (a), Marshall Design.

Subsection 508.04, Validation (03/03), Page290.

Delete the second sentence and substitute the following.

Validation will be on the first sublot and will include the QC and QA results on mixture gradation, percent asphalt cement, volumetrics, asphalt draindown, percent anti-strip additive, and moisture susceptibility testing.

Subsection 508.05, Quality Control (03/03), Page290.

Delete the first sentence of the first paragraph and substitute the following.

Percent asphalt cement, gradation, G_{mm}, and volumetrics shall be measured in accordance with Section 502. A lot size shall be 5000 tons (5000 Mg) and a sublot size shall be 1000 tons (1000 Mg).

Delete Heading (b), Marshall Design.

Subsection 508.06, Acceptance Testing (03/03), Pages 290 and 291.

Delete the fifth sentence of the first paragraph and substitute the following.

Plant acceptance tests will include, percent anti-strip, air voids, VMA and gradation [No. 4 and No. 200 (4.75 mm and 75 μm) sieves].

Delete Heading (b), Marshall Design.

Delete the sentence in Heading (f), Surface Tolerance and substitute the following.

Surface tolerance will be measured in accordance with Section 502.

Subsection 508.07, Acceptance for Pay (03/03), Pages 291-293.

Delete the second sentence of the first paragraph and substitute the following.

Acceptance is based on Plant Acceptance Tests and Roadway Acceptance Tests as follows:

Delete Heading (a), Asphalt Cement Properties.

Delete the first sentence of Heading (c)(2), Surface Tolerance, and substitute the following.

The percent payment reported for surface tolerance will be for the entire lot in accordance with Section 502.

Delete the second sentence of Heading (d), Total Percent Payment.

Subsection 508.10, Compaction (03/03), Page293.

Add the following.

Excessive rippling of the mat surface will not be accepted. Ripples are small bumps in the pavement surface, which usually appear in groups in a frequent and regular manner. Specifically, a ripple is visible on the profilograph trace, but does not necessarily appear above or below the 0.2 inch (5 mm) blanking band required by DOTD TR 641. There shall be no more than 12 ripples or peaks in any 100-foot (30 m) section. Rippling indicates a problem with the paving operation or mix that requires immediate corrective action by the contractor; otherwise operations shall cease. Unacceptable areas shall be corrected at no direct pay.

Subsection 508.11, Measurement (03/03), Page 293.

Delete the first sentence and substitute the following.

SMA will be measured by the ton (Mg) lot in accordance with Subsection 502.13(a) and as amended herein.

Subsection 508.12, Payment (03/03), Pages 293 and 294.

Delete the second sentence and substitute the following.

Payment will be made at an adjusted contract unit price per lot in accordance with Table 508 -2.

Delete Tables 508-1 and 508-2 and substitute with Tables 508-1 and 508-2 contained herein.

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Table 508-1
Stone Matrix Asphalt (SMA) Mix Properties

A. MIXTURE REQUIREMENTS					
GRADATION			VOLUMETRICS		
US Sieve (Metric Sieve)	Percent Passing	JMF Tolerance, %	Properties	Requirements	Tolerance
3/4 inch (19 mm)	100	±4	Air Voids, %		
1/2 inch (12.5 mm)	90 - 100	±4	Superpave Gyratory Compactor	4.0	±1.0
3/8 inch (9.5 mm)	75 Max.	±4	(@ 100 revolutions)		
No.4 (4.75 mm)	24 - 34	±4	VMA, %	16.0 minimum	
No.8 (2.36 mm)	16 - 28	±4	VFA, %	For Info. Only	
No. 30 (600 µm)	12 - 25	±3	G_{mb} (Control Only)	Per JMF	±0.022
No. 50 (300 µm)	11 - 22	±3	G_{mm} (Control Only)	Per JMF	±0.020
No. 200 (75 µm)	7 - 13	±1			
B. PAVEMENT DENSITY REQUIREMENTS					
Density, Minimum 94.0 % (Percent of Theoretical Maximum Specific Gravity, AASHTO T 209) Travel Lanes Density, Minimum 92.0 % (Percent of Theoretical Maximum Specific Gravity, AASHTO T 209) Shoulders					
C. SURFACE TOLERANCE REQUIREMENTS					
Surface Tolerance Variation - Refer to Section 502, Table 502-3					

Table 508-2
Payment Adjustment Schedules

Values shall be based on average of sublots unless otherwise noted:	Percent of Contract Unit Price Per Lot			
	100	95	80	50 or Remove[1]
A. Asphalt Properties, % (Reference Table 1002-1)	---	---	---	---
B. Plant Acceptance:				
Anti-Strip Additive, % Below JMF per Sublot	---	0.2 or More Below	---	---
% Air Voids, Average Sublot % Deviation from JMF Limits/Lot	0.0 - 0.1	0.2 - 0.3	0.4 - 0.5	0.6 and Greater
% VMA, Average Sublot % Deviation from JMF Below the Minimum Limit/Lot	0.0 - 0.2	0.3 - 0.5	0.6 - 0.8	0.9 and Greater
Aggregate Gradation, Average Sublot % Deviation from JMF Limits/Lot				
No. 4 (4.75 mm)	0.0 - 1.0	1.1 - 2.0	2.1 - 3.0	3.1 and Greater
No. 200 (75 µm)	0.0 - 0.5	0.6 - 1.0	1.1 - 2.0	2.1 and Greater
C. Roadway Acceptance:				
Roadway Density, Average Individual Sublot % Deviation from Minimum	0.0	0.1 - 1.0	1.1 - 2.5	2.6 and Greater
Surface Tolerance, Profilograph Reading in inches/mile (mm/km) (Reference Table 502-7)	---	---	---	---

[1] At the option of the engineer.

SECTION 509 – COLD PLANING ASPHALTIC PAVEMENT

Subsection 509.03, Construction Requirements (03/02), Pages 297-299.

Delete the eighth paragraph of Heading (a), General, and substitute the following.

The DOTD encourages reclamation and recycling of all materials obtained within the project limits. All reclaimed asphaltic pavement (RAP) material to be retained by the DOTD for its recycling program, or by other government entities, shall be hauled by the contractor to the storage facility indicated on the plans and stockpiled as directed. The contractor may also be required to retain a specified percentage or quantity of the RAP generated by the project. When so specified, the bidder shall indicate in his bid the value of the retained material that he used in calculating his bid.

Delete Heading (b) and substitute the following.

(b) The surface tolerance requirements of the cold planed surface for single lift overlays shall meet the requirements for binder course in Sections 501 and 502.

Subsection 509.04, Measurement (03/02), Page 299.

Delete this subsection and substitute the following.

Measurement of cold planing will be made by the square yard (sq m) of asphaltic concrete surfacing satisfactorily removed. The quantity of asphaltic concrete surfacing to be removed from a project and retained by the contractor will be measured by the cubic yard (cu m), theoretical in-place plan quantity, and will be credited to the Department by treating it as a negative quantity in the Schedule of Pay Items.

Subsection 509.05, Payment (03/02), Page 299.

Delete this subsection and substitute the following.

Payment for cold planing of asphaltic pavement will be made at the contract unit price per square yard (sq m), which includes the costs for removing, hauling and stockpiling of RAP material retained by either the Department or the contractor. The value of the RAP material retained by the contractor will be credited to the Department at the contract unit price for the retained material.

Payment for temporary pavement markings will be included under appropriate pay items.

Payment will be made under:

Item No	Pay Item	Pay Unit
509-01	Cold Planing Asphaltic Pavement	Square Yard (Sq m)
509-02	Contractor Retained Reclaimed Asphaltic Pavement	Cubic Yard (Cu m)

SECTION 601 – PORTLAND CEMENT CONCRETE PAVEMENT:

Subsection 601.02 - Materials (06/05), Page 302.

Add the following to the first paragraph.

Aggregates 1003.

Delete the second paragraph and substitute the following.

The contractor shall furnish either Type B or D concrete. The same type of concrete shall be used throughout the project, unless otherwise authorized in writing.

Subsection 601.09 – Joints (06/05), Pages 310 – 317.

Delete the fourth paragraph of Heading (i) and substitute the following.

Dowel bars with slightly damaged coatings may be used with the approval of the engineer provided the bars are lightly oiled or greased prior to placement.

Delete the first sentence of the fourth paragraph of Heading (k) and substitute the following.

The concrete used for full depth pavement patching repair shall be the same type used throughout the project. If approved by the engineer, full depth patching can be substituted with Type E concrete.

Add the following paragraph to Heading (k).

Concrete used for panel replacement repair shall be the same type used throughout the project. If approved by the engineer, Class A concrete can be substituted for panel replacement pavement repair.

Subsection 601.17 - Opening to Traffic (09/02), Page 331.

Delete the text of this subsection and substitute the following.

The pavement shall not be opened to traffic until standard test specimens complying with Subsection 601.07 have attained a compressive strength of 3,000 psi (21.0 MPa) when tested in accordance with DOTD TR 230. For regular portland cement concrete, if the compressive strength tests are not conducted, the pavement shall not be opened to traffic until 14 days after concrete has been placed. For concrete containing fly ash or ground granulated blast-furnace slag, the pavement shall be closed to all traffic, including vehicles of the contractor, until the test specimens have attained a compressive strength of 3,000 psi (21.0 MPa). The pavement shall be cleaned and joints sealed in accordance with Subsection 601.13 prior to opening to traffic.

SECTION 602 – PORTLAND CEMENT CONCRETE PAVEMENT REHABILITATION:

Subsection 602.07 - Full Depth Corner Patching of Jointed Concrete Pavement (06/05), Pages 339 – 341.

Delete the first sentence of the seventh paragraph and substitute the following.

Concrete for pavement patching shall be Type E complying with Section 901.

Subsection 602.08, Full Depth Patching of Jointed Concrete Pavement (06/05), Pages 341 and 342.

Delete the first sentence of the eighth paragraph and substitute the following.

Concrete for pavement patching shall be Type E complying with Section 901.

Subsection 602.09, Partial Depth Patching of Jointed Concrete Pavement (06/05), Pages 343 – 345.

Delete the first sentence of the first paragraph of Heading (b)(1) and substitute the following.

Portland cement concrete for pavement patching shall be Type E complying with Section 901, except that a Grade F aggregate shall be used.

Subsection 602.10, Patching Continuously Reinforced Concrete Pavement (06/05), Pages 345 – 347.

Delete the first sentence of the eighth paragraph and substitute the following.

Concrete for pavement patching shall be Type E complying with Section 901.

Subsection 602.18, Payment (06/01), Page 358.

Delete Pay Item No. 602-15, Cross-Stitching Longitudinal Joints.

Delete Pay Item No. 602.16, Cross-Stitching Random Longitudinal Joints and substitute the following.

Item No. 602-16 Cross-Stitching Random Longitudinal Cracks Linear Foot (lin m)

SECTION 701 – CULVERTS AND STORM DRAINS:

Subsection 701.02 – Materials (08/04), Pages 361 – 363.

Delete the text of this subsection and substitute the following.

701.02 Materials. Materials shall comply with the following:

Usable Soil	203.06(a)
Selected Soil	203.06(b)
Plastic Soil Blanket	203.10
Flowable Fill	710
Mortar	702.02
Portland Cement Concrete	901
Granular Material	1003.07
Bedding Material	1003.08
Concrete Sewer Pipe	1006.02
Reinforced Concrete Pipe	1006.03
Reinforced Concrete Pipe Arch	1006.04
Gasket Materials	1006.06
Plastic Pipe	1006.07
Sewer Pipe	1006.07
Split Plastic Coupling Bands	1006.07(d)(4)
Plastic Yard Drain Pipe	1006.09
Bituminous Coated Corrugated Steel Pipe and Pipe Arch	1007.02
Structural Plate for Pipe and Pipe Arch	1007.04
Corrugated Aluminum Pipe and Pipe Arch	1007.05
Coupling Bands	1007.09
Reinforcing Steel	1009
Geotextile Fabric	1019

(a) Quality Assurance: Manufacturing plants will be periodically inspected for compliance with specified manufacturing methods, and material samples will be randomly obtained for laboratory testing for verification of manufacturing lots. Materials approved at the manufacturing plant will be subject to visual acceptance inspections at the jobsite or point of delivery.

(b) Side Drain Pipe or Side Drain Pipe Arch: When the item for Side Drain Pipe or Side Drain Pipe Arch is included in the contract, the contractor has the option of furnishing reinforced concrete pipe or reinforced concrete pipe arch, corrugated metal pipe or corrugated metal pipe arch, or plastic pipe, unless otherwise specified.

(c) Cross Drain Pipe or Cross Drain Pipe Arch: When the item for Cross Drain Pipe or Cross Drain Pipe Arch is included in the contract, the contractor has the option of furnishing reinforced concrete pipe or reinforced concrete pipe arch, corrugated metal pipe or corrugated metal pipe arch, or plastic pipe, unless otherwise specified.

(d) Storm Drain Pipe or Storm Drain Pipe Arch: When the item for Storm Drain Pipe or Storm Drain Pipe Arch is included in the contract, the contractor has the option of furnishing reinforced concrete pipe or reinforced concrete pipe arch, or plastic pipe, unless otherwise specified.

FOR INFORMATION ONLY

(e) Material Type Abbreviations:

(1) Reinforced Concrete Pipe:

RCP	Reinforced Concrete Pipe
RCPA	Reinforced Concrete Pipe Arch

(2) Corrugated Metal Pipe:

CAP	Corrugated Aluminum Pipe
CAPA	Corrugated Aluminum Pipe Arch
CMP	Corrugated Metal Pipe
CMPA	Corrugated Metal Pipe Arch
CSP	Corrugated Steel Pipe
CSPA	Corrugated Steel Pipe Arch
BCCSP	Bituminous Coated Corrugated Steel Pipe
BCCSPA	Bituminous Coated Corrugated Steel Pipe Arch

(3) Plastic Pipe:

PP (or PCP)	Plastic Pipe
PVCP (or PVC)	Polyvinyl Chloride Pipe
RPVCP (or RPVCCP)	Ribbed Polyvinyl Chloride Pipe
CPEPDW (or CPECP)	Corrugated Polyethylene Pipe (Double Wall)

(f) Joint Type Abbreviations:

T1	Type 1 Joint
T2	Type 2 Joint
T3	Type 3 Joint

(g) Yard Drain Pipe: When the item for Yard Drain Pipe is included in the contract, the contractor has the option of furnishing concrete sewer pipe, plastic yard drain pipe or plastic pipe in accordance with Section 1006 unless otherwise specified.

Subsection 701.06 – Joining Pipe, (07/02), Pages 364 – 366.

Delete the second sentence of the second paragraph in Heading (b) and substitute the following.

For pipe equal to or less than 36 inches (900 mm) in diameter, any approved method for joining pipe may be used which does not damage the pipe.

Subsection 701.08 – Backfilling (09/05), Pages 366 and 367.

Delete this subsection and substitute the following.

701.08 BACKFILLING.

(a) General: Prior to backfilling, pipes found to be damaged or out of alignment or grade shall be removed and reinstalled, or replaced.

Type A backfill material shall be stone, recycled portland cement concrete, or flowable fill.

Type B backfill material shall be stone, recycled portland cement concrete, flowable fill, selected soils, or granular material.

When Type A backfill material is used, geotextile fabric shall be placed in accordance with plan details prior to placing backfill material. Care shall be taken to prevent damage to geotextile fabric during placement of backfill material.

Adjacent rolls of fabric shall be overlapped or sewn. When rolls are overlapped, the overlap shall be a minimum of 18 inches (450 mm), including the ends of the rolls. The top layer of the fabric shall be parallel with adjacent rolls and in the direction of backfill 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 shall be submitted to the Materials and Testing Section for approval.

Damaged fabric shall be either removed and replaced with new fabric or covered with a second layer of fabric extending 2 feet (0.6 m) in each direction from the damaged area.

(b) Backfill Applications:

(1) Paved Areas: Cross drains 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 in Heading (c) below.

(2) Nonpaved Areas: Pipe 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.

(c) Placement and Compaction: 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.

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.

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.

The 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 direct pay.

FOR INFORMATION ONLY

(1) Backfill Methods:

a. General: Compaction by flooding will not be allowed.

b. 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.

c. 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.

d. Flowable Fill: Flowable fill shall be in accordance with Section 710.

e. 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 pay.

(2) Density Requirements: Maximum dry density will be determined in accordance with DOTD TR 415 or TR 418 and in-place density determined in accordance with DOTD TR 401.

Subsection 701.09 – Inspection of Pipe (07/02), Pages 367 and 368.

Delete the fifth paragraph of Heading (a) and substitute the following.

The mandrel shall be a rigid, nonadjustable, odd-numbered legged (minimum 9 legs) mandrel having a length not less than its nominal diameter or 24 inches (600 mm), whichever is less. The minimum diameter at any point shall be 5.0 percent less than the base inside diameter of the pipe being tested. The mandrel shall be fabricated of steel, aluminum or other approved material fitted with pulling rings at each end. The nominal pipe size and outside diameter of the mandrel shall be stamped or engraved on some segment other than a runner. A suitable carrying case shall be furnished.

Subsection 701.13 – Payment (08/04), Page 370.

Add the following to Heading (a), Payment.

When plastic pipe is specified on the plans or elected to be used by the contractor, payment will be made at the contract unit price per linear foot (lin m) of the types and sizes specified in accordance with the payment schedule of Table 701-1.

FOR INFORMATION ONLY

Table 701-1
Payment Schedule for Plastic Pipe

Percent Payment	Stage of Completeness
75	After placement and backfill has been completed
25	After the pipe has met vertical deflection requirements in accordance with Subsection 701.09(a)

Add the following pay item to the second paragraph of Heading (e).

Item No.	**Pay Item**	**Pay Unit**
701-16	Plastic Pipe (Extension)	Linear Foot (Lin m)

SECTION 702 – MANHOLES, JUNCTION BOXES, CATCH BASINS, AND END TREATMENTS:

Subsection 702.02 – Materials (06/02), Page371.

Delete "Manholes, Frames, Grates and Covers" from the first paragraph and substitute the following.

Frames, Grates and Covers for Manholes, Catch Basins and Junction Boxes 1018.04.

Delete the second sentence of the second paragraph.

Subsection 702.03 – Quality Assurance (06/02), Page 371.

Delete the second sentence of the first paragraph and substitute the following.

Material samples will be randomly obtained for laboratory testing for verification of manufacturing lots.

Subsection 702.07 – Payment (06/01), Page 374.

Delete the first sentence of the second paragraph and substitute the following:

The concrete in cast-in-place manholes, junction boxes, catch basins, and culvert end treatments and safety ends will be identified by lots and shall be subject to pay adjustments in accordance with Table 901-4 and Note 1 therein.

SECTION 704 – GUARD RAIL

Subsection 704.03 – General Construction Requirements (01/05), Pages 380 and 381.

Add the following to subparagraph (d), Guard Rail End Treatments.

All end treatments shall bear a label indicating the manufacturer and exact product name of the end treatment along with its assigned NCHRP 350 test level. This label shall resist weathering and shall be permanently affixed to the railing in such a way as to be readily visible.

SECTION 705 – FENCES:

Subsection 705.06 - Chain Link Fence and Gates (06/01), Pages 384 and 385.

Delete the second sentence of the first paragraph of Heading (a) and substitute the following:

Portable mixing of concrete in accordance with Subsection 901.10(g) will be permitted for small quantities of concrete.

SECTION 706 – CONCRETE WALKS, DRIVES AND INCIDENTAL PAVING:

Subsection 706.01 – Description (12/03), Page 387.

Delete this subsection and substitute the following.

This work consists of furnishing and constructing portland cement concrete walks, handicapped curb ramps, drives and incidental paving slabs in accordance with these specifications and in conformity with lines, grades and dimensions shown on the plans or established.

Subsection 706.03 – Construction Requirements (12/03), Pages 387 and 388.

Add the following.

(g) Detectable Warning Surface for Handicap Ramps: Handicapped curb ramps installed shall be equipped with a detectable surface warning system consisting of raised truncated domes as a transition between the sidewalk and the street as required by the Americans with Disabilities Act, 28 CFR Part 36, ADA Standards for Accessible Design. These standards are further described in the Americans with Disabilities Act Accessibility Guidelines (ADAAG), Section 4.29.2.

Detectable warnings (truncated domes) shall be installed on the ramp surface over the full width of the ramp throat for a distance of 24 inches (600 mm) in the direction of travel from the back of the curb. Truncated domes shall be laid out on a square or triangular grid in order to allow enough space for wheelchairs to roll between the domes.

Light reflectance of the truncated domes and the underlying surface must meet the 70 percent contrast requirement of ADAAG.

Subsection 706.04 – Measurement (12/03), Page 388.

Add the following.

Handicapped curb ramps included in the construction of a concrete walk, including the detectable surface warning system, will not be measured for payment.

SECTION 707 – CURBS AND GUTTERS:

Subsection 707.12 – Payment (06/01), Pages 392 and 393.

Delete the first sentence of Heading (b) and substitute the following:

The concrete in the curbs and/or gutters will be identified by lots and shall be subject to pay adjustments per linear foot (lin m) in accordance with Table 901-4.

SECTION 709 – STEEL CATTLE GUARDS:

Subsection 709.05 – Payment (06/01), Page 397.

Delete the second sentence and substitute the following:

The concrete placed in cattle guards will be identified by lots and shall be subject to pay adjustments in accordance with Table 901-4 and Note 1 therein.

SECTION 713 – TEMPORARY SIGNS, BARRICADES, BARRIERS AND PAVEMENT MARKINGS:

Subsection 713.08 – Payment (06/01), Pages 414 and 415.

Delete the third sentence of the second paragraph and substitute the following:

The concrete in temporary precast barriers furnished by the contractor will be identified by lots and shall be subject to pay adjustments in accordance with Table 901-3 and Note 1 therein.

SECTION 714 – SLAB SODDING

Subsection 714.08 – Measurement (07/03), Page 417.

Delete Heading (b), Water.

Subsection 714.09 – Payment (07/03), Page 417.

Delete the first sentence of the first paragraph and substitute the following.

Payment for slab sodding will be made at the contract unit price.

Delete Pay Item No. 714-02, Water.

SECTION 717 – SEEDING:

Subsection 717.06 – Temporary Seeding (06/01), Page 423.

Add the following to Table 717-1, Temporary Seeding. Type G, Seed Mixtures, is amended to add Unhulled Bermuda.

Subsection 717.08 – Measurement (07/03). Page 424.

Delete the second sentence and substitute the following.

Topsoil, fertilizer, and agricultural lime will be measured in accordance with Sections 715 and 718.

Subsection 717.09 – Payment (07/03), Page 424.

Delete the second sentence of the first paragraph and substitute the following.

Payment for topsoil, fertilizer, and agricultural lime will be made in accordance with Sections 715 and 718.

SECTION 719 – LANDSCAPING:

Subsection 719.07 – Period of Establishment and Replacement (05/05), Pages 433 – 435.

Delete the first paragraph of Heading (a) and substitute the following.

The contractor shall care for planted and mulched areas for a period of establishment, which shall be one full growing season, after provisional acceptance is made. A growing season

shall begin April 16 and extend one full year until April 16 of the next year. The contractor can complete planting any time during the planting season specified in Subsection 719.06(a) prior to April 16. If the contractor completes planting prior to April 16, the growing season shall begin at provisional acceptance and extend to April 16 of the following year. Any extension of the planting season past April 15 shall result in an extension of the period of establishment to October 31 of the following year. During the period of establishment, the contractor shall preserve plants in a healthy, growing condition. Such plant establishment work shall include cultivation, weeding, watering, pruning, controlling insects, pests and disease and other work determined necessary by the engineer to ensure healthy plant growth.

Subsection 719.08 – Measurement (07/03), Page 435.

Delete the second paragraph.

SECTION 723 – GRANULAR MATERIAL:

Subsection 723.03 – Construction Requirements (06/01), Page 442.

Delete the text of this subsection and substitute the following:

Materials shall be placed, properly shaped and uniformly compacted by approved methods to a minimum of 95 percent of maximum dry density. Maximum dry density will be determined in accordance with DOTD TR 415 or TR 418 and in-place density will be determined in accordance with DOTD TR 401. Granular materials shall not be displaced during subsequent operations.

SECTION 724 – PAVEMENT PATCHING, WIDENING AND JOINT REPAIR:

Subsection 724.02 – Materials (09/02), Page 444.

Delete the second paragraph and substitute the following.

Asphaltic concrete for patching and widening may be any type mixtures listed in Section 501 or 502, except that the 1/2-inch (12.5 mm) nominal size mixture shall not be used. Asphaltic concrete for joint repair shall be incidental paving wearing course complying with Section 501 or 502. Asphalt tack coat shall comply with Section 504.

SECTION 729 – TRAFFIC SIGNS AND DEVICES:

Subsection 729.02 – Materials (01/06), Pages 457 & 458.

Delete the second paragraph and Table 729-1 and substitute the following.

Reflective sheeting for the permanent signs of Table 729-1 shall meet the requirements of ASTM D 4956 Type IX.

FOR INFORMATION ONLY

Table 729-1
Permanent Signs for Use with ASTM D 4956
Type IX Reflective Sheeting

Sign	MUTCD Number
Stop	R1-1
Yield	R1-2
4-Way	R1-3
All Way	R1-4
Do Not Enter	R5-1
Wrong Way	R5-1a
Chevrons	W1-8
No Passing Zone Pennants	W14-3
Type 3 Object Marker	OM-3 (Right & Left)
Type 2 Object Marker	-------
Guardrail End Decals	-------

Subsection 729.03 – General Requirements (08/02), Pages 458 and 459.

Delete Heading (c) and substitute the following.

(c) Material Sampling and Certification: Material sampling and certification for sign faces, sign mountings and U-channel posts shall be in accordance with the Materials Sampling Manual.

Subsection 729.04 – Fabrication of Sign Panels and Markers (01/06), Pages 459 – 462.

Delete the third paragraph of Heading (c) and substitute the following.

ASTM D 4956 Type IX reflective sheeting shall be applied with an orientation determined by the engineer to obtain the optimum entrance angle performance. Fabricated vertical splices in ASTM D 4956 Type IX reflective sheeting will be allowed only when the horizontal dimension of the sign face or attached shield is in excess of the maximum manufactured width of the sheeting. Fabricated vertical splices in ASTM D 4956 Type IX reflective sheeting will also be allowed when the specified orientation will create excessive sheeting waste.

Subsection 729.09 – Payment (06/01), Pages 465 – 467.

Delete the second sentence of Heading (f) and substitute the following:

The concrete in footings will be identified by lots and shall be subject to pay adjustments in accordance with Table 901-4 and Note 1 therein.

SECTION 730 – ELECTRICAL SYSTEMS:

Subsection 730.02 – Equipment and Materials (05/04), Pages 468 and 469.

Delete the third line of the seventh paragraph and substitute the following.

Portland Cement Concrete (Classes M and S) 901

Subsection 730.09 – Payment (06/01), Page 474.

Delete the second sentence and substitute the following:

The concrete in foundations for light poles, high mast poles, and other electrical equipment will be identified by lots and shall be subject to pay adjustments in accordance with Table 901-4 and Note 1 therein.

SECTION 732 – PLASTIC PAVEMENT MARKINGS:

Subsection 732.02 – Materials, (05/02), Page 478.

Delete the fourth sentence of the second paragraph in Heading (a) and substitute the following.

Glass beads used on drop-on application to molten plastic shall be shipped in moisture resistant sacks (packages).

Subsection 732.03 – Construction Requirements (05/02), Pages 478 – 484.

Delete the eighth sentence of the first paragraph of Heading (a) and substitute the following.

Glass beads shall be applied to the molten surface of completed stripes by either a single drop or a double drop application depending on the thickness of the thermoplastic striping as shown in Table 1015-15. The first bead drop shall be applied by a gravity bead dispenser attached to the striping machine in such a manner that beads are dispensed simultaneously with the thermoplastic material at a controlled rate of flow on installed lines. The second bead drop shall be applied immediately after the first bead drop by a gravity bead dispenser attached to the striping machine.

Delete the second sentence of the second paragraph of Heading (d)(1) and substitute the following.

Immediately after application of the markings, glass beads for a single drop application shall be applied at a minimum rate of 300 pounds per mile (85 kg/km) for a 4-inch (100 mm) solid line stripe. Glass beads for a double drop application shall be applied at a rate of 211 pounds per mile (60 kg/km) for the first drop on a 4-inch (100 mm) solid line and 211 pounds per mile (60 kg/km) for the second drop.

Subsection 732.04 – Measurement (05/02), Pages 484 and 485.

Delete Heading (c) and substitute the following.

Removal of existing pavement markings for undivided highways will be measured by the linear mile (km) of full roadway width including shoulders. For divided highways, the full roadway width including shoulders and ramps will be measured separately for each direction of travel. Removal of pavement markings will include removal of lane lines, edge lines, gore markings, symbols, and raised pavement markings.

SECTION 733 – CONCRETE ROADWAY BARRIERS:

Subsection 733.05 – Payment (06/01), Page 487.

Delete the second and third sentences of the first paragraph and substitute the following:

The concrete in cast-in-place roadway barriers will be identified by lots and shall be subject to pay adjustments in accordance with Table 901-4 and Note 1 therein. The concrete in precast roadway barriers will be identified by lots and shall be subject to pay adjustments in accordance with Table 901-3 and Note 1 therein.

SECTION 736 – TRAFFIC SIGNALS:

Subsection 736.13 – Vehicle and Pedestrian Signal Heads (04/04), Page 498.

Add the following.

A 12-inch (300 mm) light emitting diode (LED) traffic signal lamp unit shall be provided as part of a new traffic signal head or as a retrofitted replacement into a new or existing signal housing in accordance with Section 1020, the plans and these specifications including all materials, tools, equipment, labor and incidentals necessary to complete the work.

Installation of a retrofitted replacement LED traffic signal lamp unit into a new or existing signal housing shall only require removal of the existing lens and incandescent lamp, fitting of the new unit securely in the housing door, and connecting the new unit to existing electrical wiring or terminal block by means of simple connectors. The LED retrofit shall not require the removal of the reflector. The existing wiring for the incandescent socket shall remain in place, but shall be disconnected from the terminal block, and neatly coiled adjacent to the terminal block with connectors taped with electrical tape to prevent accidental short circuits.

If proper orientation of the LED traffic signal lamp unit is required for optimum performance, prominent and permanent directional marking(s), such as an "UP arrow", for correct indexing and orientation shall exist on the unit.

The contractor shall neatly inscribe the installation date on the back of each LED traffic signal lamp unit.

Each LED traffic signal lamp unit shall be provided with the following documentation:

1. Complete and accurate installation wiring guide.
2. Contact name, address, and telephone number for the representative, manufacturer, or distributor for warranty replacement.

Each LED traffic signal lamp unit shall be individually packaged, and delivered securely bound on pallets. Each package shall be labeled with the manufacturer's name, individual serial number, manufactured date, model, and batch or lot number.

Subsection 736.21 – Measurement (04/04), Pages 502 and 503.

Delete Heading (c), Jacking or Boring Conduit, and substitute the following.

(c) Jacked or Bored Conduit: Jacked or bored conduit will be measured by the linear foot (lin m) of conduit furnished and installed. Measurement will include the conduit, fittings, excavation, backfilling and duct markers.

Delete Heading (e), Signal Heads, and substitute the following.

Signal heads will be measured per each head installed and/or retrofitted, and accepted. Measurement will include disconnect hangers, traffic signal wiring attached to overhead span, closure caps, mounting hardware, LED traffic signal lamp units, head programming, mounting connections and hardware.

Subsection 736.22 – Payment (07/03), Pages 503 and 504.

Delete the first sentence of the second paragraph and substitute the following:

The concrete in foundations for signal supports, signal controllers, and other signal equipment will be identified by lots and shall be subject to pay adjustments in accordance with Table 901-4 and Note 1 therein.

Delete Pay Item No. 736-03, Jacking or Boring Conduit (Size & Type), and substitute the following.

736-03	Jacked or Bored Conduit (Size & Type)	Linear Foot (lin. m)

SECTION 737 – PAINTED TRAFFIC STRIPING:

Subsection 737.03 – Equipment (03/02), Page 505.

Delete Heading (d) and substitute the following.

(d) Equipment shall provide a gravity bead dispenser for drop-on application of glass beads.

Subsection 737.06 – Application (03/02), Page 506.

Delete the first sentence of the second paragraph of Heading (b) and substitute the following.

Glass beads shall be applied at the same time, but in a separate operation, at the rate of 12 pounds of beads per gallon of paint (1.44 kg/L). Beads shall be applied at a rate of 10 miles per hour (16 km/h) or less.

SECTION 738 – MULCH SODDING

Subsection 738.06 – Payment (07/03), Page 509.

Delete the second sentence of the first paragraph.

SECTION 739 – HYDRO-SEEDING

Subsection 739.03 – Hydro-Seeding General (12/04), Pages 510 and 511.

Delete the first paragraph and substitute the following.

Hydro-seeding shall consist of mixing and applying seed, commercial fertilizer, water management gel, 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.

SECTION 740 – CONSTRUCTION LAYOUT:

Subsection 740.01 – Description (07/04), Page 512.

Delete the second sentence and substitute the following.

The work consists of establishing lines and grades, taking all cross sections, and staking out the construction work in accordance with these specifications, plan details, and as directed.

Add the following.

This work also includes assistance in the coordination of utility relocation activities to ensure that the placement of relocated facilities will not conflict with required construction.

Subsection 740.02 – Construction Requirements (07/04), Pages 512 and 513.

Add the following.

The contractor shall provide sufficient qualified staff, of at least one employee, on site during relocation periods. The contractor shall provide any necessary survey work to ensure there are no utility conflicts with required construction. The contractor shall provide daily documentation of utility relocation activities for incorporation into the project diaries.

Subsection 740.03 – Measurement (07/04), Page 513.

Add the following.

Utility Oversight and Coordination will be measured as a lump sum which will include all labor, materials, and incidentals required to complete the work.

Subsection 740.04 – Payment (07/04), Page 513.

Add the following.

Payment for Utility Oversight and Coordination will be made at the contract lump sum price.

Payment will be made under:

Item No.	Pay Item	Pay Unit
740-02	Utility Oversight and Coordination	Lump Sum

SECTION 801 – GENERAL REQUIREMENTS FOR STRUCTURES:

Subsection 801.04 – Temporary Bridge Works (04/02), Page 522.

Delete the text of this subsection and substitute the following:

Guidance on the design and construction of all temporary bridge works is contained in two AASHTO publications: "Guide Design Specifications for Bridge Temporary Works" 1995 and "Construction Handbook for Bridge Temporary Works" 1995. These specifications should be followed to ensure the safe design and construction of temporary bridge works.

All field welding of temporary works shall be done by certified welders.

SECTION 805 – STRUCTURAL CONCRETE:

Subsection 805.02 – Materials (12/02), Pages 559 and 560.

Delete Table 805-1, Classes and Uses of Concrete and substitute the following:

FOR INFORMATION ONLY

Table 805-1
Classes and Uses of Concrete

Concrete Class	Use
A or A(M)	Concrete exposed to sea water, and all other concrete except as listed herein.
AA or AA(M)	Cast-in-place bridge superstructure
D	Pier footings
F	Dams and flood control structures
P or P(M)	Precast bridge members
P(X)	Precast-prestressed bridge girders
R	Nonreinforced sections
S	Underwater sections

Subsection 805.03 – Handling and Placing Concrete and Precast Units (12/02), Pages 560 – 564.

Add the following to the second paragraph of Heading (a):

For concrete containing fly ash or ground granulated blast-furnace slag, the deck shall be closed to all traffic, including vehicles of the contractor, until the test specimens have attained a compressive strength of 3,200 psi (22.0 MPa).

Subsection 805.11 – Removal of Falsework and Forms (12/02), Pages 569 and 570.

Add the following to the second paragraph:

For concrete containing fly ash or ground granulated blast-furnace slag, only Method 1 shall be used.

Subsection 805.14 – Prestressed Concrete (12/02), Pages 576 – 585.

Add the following to the fourth paragraph of Heading (a):

This office shall also contain two separate telephone lines, one dedicated to the telephone and the other dedicated to a computer.

Subsection 805.18 – Payment (06/01), Pages 588 and 589.

Add the following to Heading (d):

Acceptance and payment for bridge superstructure and substructure will be made on a lot basis at the contract unit price per span, adjusted in accordance with the following provisions. A lot will be considered an identifiable pour as described in Heading (a) of this subsection. Acceptance and payment for each cast-in-place bridge superstructure and substructure lot will be in accordance with Table 901-3 and Note 1 therein. Acceptance for each precast bridge superstructure and substructure lot will be in accordance with Table 901-2.

Add the following to Heading (e):

Acceptance and payment for reinforced concrete box culverts will be made on a lot basis at the contract unit price per linear foot (linear meter), adjusted in accordance with the following provisions. A lot will be considered an identifiable pour as described in Heading (a) of this subsection. Acceptance and payment for each cast-in-place reinforced concrete box culvert lot

will be in accordance with Table 901-3 and Note 1 therein. Acceptance for each precast reinforced concrete box culvert will be in accordance with ASTM C 1433 (C 1433M).

SECTION 807 – STRUCTURAL METALS:

Subsection 807.04 – Minimum Shop Requirements for Fabrication of Major Bridge Members (04/02), Pages 597 and 598.

Delete the heading and text of this subsection and substitute the following:

MINIMUM SHOP REQUIREMENTS FOR FABRICATION OF STEEL STRUCTURES.

The contractor (fabricator) shall provide sufficient lifting capacity, physical plant and equipment for the fabrication of structural steel. The cranes in each working area shall have a combined rated capacity equal to the lifting weight of the heaviest assembly fabricated for shipment unless alternate lifting and turning facilities are approved.

Lifting chains shall be provided with adequate softeners to prevent damage to the corners of material during lifting and turning. When hooks are used for lifting, they shall have sufficient width of jaw and throat to prevent damage to the flanges or to the web-to-flange welds.

Spreader beams, or multiple cranes, shall be provided for lifting plates and long slender members to prevent overstress and distortion from handling.

Shops shall have sufficient enclosed floor spaces to allow oxygen cutting, air carbon arc gouging, assembly and welding to be performed inside, except that shop assembly of field connections for trusses, girders and arches may be performed outside the shop buildings. The fabrication of major steel bridge components (includes all bridge structures other than unspliced rolled beam bridges) shall only be by fabrication shops having a current AISC Certification for Major Steel Bridges. Current AISC Certification for Simple Steel Bridges will be required for fabrication of highway sign structures, secondary members of bridges (such as cross frames), and unspliced rolled beam bridges. Structures that have fracture critical members shall require an AISC Fracture Critical Endorsement to the fabricator's Simple or Major Steel Bridge Certification. The contractor will be required to provide the engineer with documentation of the certification prior to beginning fabrication.

The engineer may approve limited fabrication and welding outside the shop, provided the fabricator has made provisions to ensure that the quality of the work produced outside the shop buildings will not be adversely affected by weather or other conditions.

All cutting, fitting and welding shall be done in areas that are kept dry. Areas for automatic and semiautomatic welding shall be kept at a temperature not lower than 40°F (5°C) for at least 1 hour before work begins and at all times when work is being performed.

Subsection 807.05 – Inspection (04/02), Pages 598 and 599.

Add the following to the sixth paragraph of Heading (a).

This office shall also contain two separate telephone lines, one dedicated to the telephone and the other dedicated to a computer. The contractor or fabricator shall be responsible for paying all utility bills.

Subsection 807.08 – Straightening Material and Curving Rolled Beams and Welded Girders (05/05), Page 600.

Delete the third sentence of the paragraph of Heading (a) and substitute the following.

Heat straightening of ASTM A 709, Grade 100 (A 709M, Grade 690), and A 709, Grade 100W (A 709M, Grade 690W) steel shall be done only under rigidly controlled procedures, each application subject to approval of the engineer.

Subsection 807.21 – Connections Using High Strength Bolts (05/05), Pages 607 – 623.

Delete the paragraph of Heading (e)(2) and substitute the following.

When the plans specify the steel as unpainted ASTM A 709, Grade 50W (A 709M, Grade 345W), A 709, Grade HPS 50W (A 709M, Grade HPS 345W), A 709, Grade HPS 70W (A 709M, Grade HPS 485W), or A 709, Grade 100W (A 709M, Grade 690W) contact surfaces within joints shall be thoroughly cleaned by Commercial Blast Cleaning in accordance with Subsection 811.06(c) or other approved methods that will remove all dirt, oil, grease, rust scale, loose mill scale, weld slag and other foreign matter, and shall remain unpainted.

Subsection 807.30 – Bent Plates (05/05), Pages 625 & 626.

Delete the fourth and fifth paragraphs and substitute the following.

Allowance for springback of ASTM A 709, Grade 100 (A 709M, Grade 690), and A 709, Grade 100W (A 709M, Grade 690W) steel should be about three times that for structural carbon steel. For brake press forming, the lower die span should be at least 16 times the plate thickness. Multiple hits are advisable.

If shorter radii are essential, plates shall be bent hot at a temperature not greater than 1150°F (620°C), except for ASTM A 709, Grade 100 (A 709M, Grade 690), and A 709, Grade 100W (A 709M, Grade 690W) steel. If ASTM A 709, Grade 100 (A 709M, Grade 690), and A 709, Grade 100W (A 709M, Grade 690W) steel plates to be bent are heated to a temperature greater than 1125°F (610°C), they must be requenched and tempered in accordance with the producing mill's practice. Hot-bent plates shall conform to the requirements herein for cold-bent plates.

Subsection 807.47 – Straightening Bent Material and Cambering (05/05), Page 632.

Delete the first paragraph of Heading (a) and substitute the following.

Straightening of plates, angles, other shapes and built-up members, when permitted, shall be done by methods that will not produce fracture or other damage. Distorted members shall be straightened by mechanical means or, if approved, by supervised application of a limited amount of localized heat, except that heat straightening of ASTM A 709, Grade 100 (A 709M, Grade 690), and A 709, Grade 100W (A 709M, Grade 690W) steel shall be done only under rigidly controlled procedures, each application subject to approval of the engineer. In no case shall the maximum temperature of ASTM A 709, Grade 100 (A 709M, Grade 690), and A 709, Grade 100W (A 709M, Grade 690W) steel exceed 1125°F (610°C), nor shall the temperature exceed 950°F (510°C) at weld metal or within 6 inches (150 mm) of weld metal. Heat shall not be applied directly on weld metal. In all other steels, the temperature of the heated area shall not exceed 1150°F (620°C) (a dull red) as controlled by temperature indicating crayons, liquids or bi-metal thermometers.

Delete the paragraph of Heading (b) and substitute the following.

Correction of errors in camber in welded beams and girders of ASTM A 709, Grade 100 (A 709M, Grade 690), and A 709, Grade 100W (A 709M, Grade 690W) steel shall be done only under rigidly controlled procedures, each application subject to approval.

Subsection 807.52 – Weathering Steel (05/05), Pages 633 & 634.

Delete the first paragraph and substitute the following.

When ASTM A 709, Grade 50W (A 709M, Grade 345W), A 709, Grade HPS 50W (A 709M, Grade HPS 345W), A 709, Grade HPS 70W (A 709M, Grade HPS 485W), or A 709, Grade 100W (A 709M, Grade 690W) weathering steel is specified to be left unpainted, the following modifications in the requirements of this subsection shall apply.

Subsection 807.53 – Measurement (05/05), Pages 634 & 635.

Delete the eighth paragraph of Heading (a) and substitute the following.

ASTM A 709, Grade 36 (A 709M, Grade 250), A 709, Grade 50 (A 709M, Grade 345), A 709, Grade 50W (A 709M, Grade 345W), A 709, Grade HPS 50W (A 709M, Grade HPS 345W), A 709, Grade HPS 70W (A 709M, Grade HPS 485W), A 709, Grade 100 (A 709M, Grade 690), or A 709, Grade 100W (A 709M, Grade 690W) steel shall include all steel classified as such in the plans or specifications.

Subsection 807.54 – Payment (05/05), Page 636.

Delete Pay Item 807-04 Steel (ASTM A 709, Grade 70W) (A 709M, Grade 485W).

Add the following Pay Items.

Item No.	Pay Item	Pay Unit
807-07	Steel (ASTM A 709, Grade HPS 50W) (A 709M, Grade HPS 345W)	Pound (kg)
807-08	Steel (ASTM A 709, Grade HPS 70W) (A 709M, Grade HPS 485W)	Pound (kg)
807-09	Steel (ASTM A 709, Grade 100W) (A 709M, Grade 690W)	Pound (kg)

SECTION 810 – BRIDGE RAILINGS AND BARRIERS:

Subsection 810.09 – Payment (06/01), Pages 659 and 660.

Delete the fourth sentence and substitute the following:

Payment for each lot will be subject to adjustments in accordance with Table 901-3 and Note 1.

SECTION 811 – PAINTING AND PROTECTIVE COATINGS:

Subsection 811.01 – Description (08/05), Page 661.

Delete the second paragraph and substitute the following.

Unless otherwise specified, an approved zinc paint system shall be used for coating metal surfaces requiring painting.

Subsection 811.03 – Materials (08/05), Page 661.

Add the following:

(d) Corrosion Inhibiting Alkyd Paint shall comply with Subsection 1008.06.

(e) Zinc Paint Systems for New Steel and 100 Percent Bare Existing Steel: The zinc paint system shall be an approved system listed on QPL 78. Each system shall be tested in accordance with AASHTO R 31 and meet the requirements of Subsection 1008.07.

The contractor has the option of using any one of these systems; however, no modifications or combinations of the systems will be permitted and the same system shall be used throughout the project.

Subsection 811.04 – Painting Metal (08/05), Pages 661 and 662.

Add the following:

(c) Corrosion Inhibiting Alkyd Paint System: Corrosion Inhibiting Alkyd Paint shall be a non-polluting pigmented alkyd paint to be used in a three-coat paint system on properly prepared structural steel surfaces to be permanently exposed. The contractor has the option of using either System A or System B, however, whichever system is selected shall be used on the entire project. The primer and intermediate coats shall be tinted for color contrast.

The minimum dry film thickness of the coatings shall be as follows:

Prime Coat	-	2.0 mils (50 μm)
Intermediate Coat	-	2.0 mils (50 μm)
Aluminum Topcoat	-	2.0 mils (50 μm) - AASHTO M69, Type I

(d) Zinc Paint Systems for New Steel and 100 Percent Bare Existing Steel: The specified dry film thickness of coatings shall be as published in QPL 78.

Subsection 811.08 – Application (08/05), Pages 664 & 665.

Add the following:

(c) Zinc Paint Systems for New Steel and 100 Percent Bare Existing Steel: Each coat of paint shall be applied with airless or conventional spray equipment. The spray equipment shall apply paint in a fine, even spray. If thinning of paint is allowed, it shall be done in accordance with the paint manufacturer's recommendations, but in no case shall exceed 10 percent. An approved oil/moisture trap shall be placed between air supply and pressure pot. Fluid pressure shall be regulated to deliver a uniform and wet coat of material from the spray gun.

On surfaces inaccessible to spray equipment, paint shall be applied with brush or approved daubers to ensure coverage.

(1) Primer (Shop Primer): Primer for new steel shall be applied after fabrication with one coat of the inorganic zinc paint applied at the shop. The dry-to-handle curing time shall be based on the temperature and relative humidity requirements of the manufacturer's product data sheet curing schedule. A 72 hour curing time will be required for steel painted at the shop before it can be shipped.

(2) Field Painting: Primer for existing steel and damaged areas of newly erected steel with a shop primer coat of inorganic zinc paint shall be applied after the steel is blast cleaned in accordance with Subsection 811.06(b) or power tool cleaned to bare metal in accordance with SSPC SP11 with an approved organic zinc paint system listed on QPL 78. Each coat of paint

shall be applied in accordance with the dry film thickness requirements listed on QPL 78 and allowed to cure in accordance with temperature and relative humidity requirements of the manufacturer's product data sheet curing schedule.

(3) Intermediate Coat and Topcoat: Unless otherwise specified, intermediate coat and topcoat paint for new steel shall be applied after field erection, field spot painting and cleaning of primer surfacing. Dust film, dry spray, overspray or other residue shall be removed prior to painting. The use of sand paper for cleaning is acceptable, provided the minimum dry film thickness of primer remains.

SECTION 813 – CONCRETE APPROACH SLABS:

Subsection 813.10 – Payment (06/01), Page 677.

Delete the last sentence of the second paragraph and substitute the following:

Acceptance and payment for each lot will be made in accordance with Table 901-3 and Note 1.

SECTION 814 – DRILLED SHAFT FOUNDATIONS:

Subsection 814.23 – Payment (06/01), Pages 703 and 704.

Delete the fifth sentence of the second paragraph of Heading (a) and substitute the following:

Acceptance and payment for each lot will be made in accordance with Table 901-3 and Note 1.

SECTION 901 – PORTLAND CEMENT CONCRETE:

The term "Ground Iron Blast-Furnace Slag is deleted and replaced by the term "Ground Granulated Blast Furnace Slag" throughout Section 901.

Subsection 901.06 – Quality Control of Concrete (03/04), Pages 713 - 715

Add the following to Heading (a).

In developing mix designs for portland cement concrete pavement Types B and D, the proportions of the aggregate sizes to be used shall meet the requirements of Subsection 1003.02(c). All gradation calculations shall be based on percent of dry weight (mass). The percent of the total aggregates retained on each sieve shall be determined mathematically based on the proportions of the combined aggregate blend, and checked for conformance with Table 1003-1A.

Add the following to Heading (b).

When producing concrete for Types B and D pavements, gradations shall be determined daily on each stockpile of aggregate to be used. All gradation calculations shall be based on percent of dry weight (mass). Upon determination of the gradation of each stockpile, the percent of the total aggregates retained shall be determined mathematically based on the proportions of the combined aggregate blend, and checked for conformance with Table 1003-1A.

Delete the first paragraph of Heading (c) and substitute the following.

The contractor may vary the proportions of the aggregate sizes as reviewed and accepted, but in no case shall they be varied so as to materially affect the volume of concrete. If the

proportions of the aggregate sizes used do not satisfy the gradation requirements of Subsection 1003.02(c) due to changes in the gradation of one or more stockpiles, the proportions shall be adjusted to bring the combined aggregates back within specification limits. These minor adjustments for gradation will not require a new mix design. The mix produced shall be uniform and within the specification limits of Table 901-2. When plant operations do not produce a uniform mix, plant operations will be discontinued.

Delete the first sentence in the third paragraph of Heading (c) and substitute the following.

Adjustments to the proportions of the sizes of aggregates shall not cause the minimum cement factor to deviate from that accepted on the mix design.

Add the following Heading (d).

(d) Acceptance and Verification for Types B and D Pavements: Sampling and testing for acceptance and verification for concrete for Types B and D pavements shall be in accordance with the provisions of the Materials Sampling Manual, except as follows:

(1) Gradation testing for acceptance will not be required.

(2) Verification tests will be performed by the District Laboratory to assure conformance to the gradation of the total combined aggregates shown in Table 1003-1A at the frequency of one sample per aggregate size per lot, with a maximum of one sample per aggregate size per day. Samples are to be obtained from the aggregate feed (conveyor) belt as described in the Materials Sampling Manual, DOTD Designation S101, Aggregates and Aggregate Mixtures.

(3) Upon determination of the gradation of each aggregate size sampled, the percent retained based on the dry weight (mass) of the total combined aggregates will be determined mathematically based on the proportions of the combined aggregate blend, and checked for conformance with Table 1003-1A.

(4) If the results of the verification sample indicate that the combination of aggregates being used does not meet the requirements of Subsection 1003.02(c), the aggregates shall be re-sampled and tested again. If the results of the second verification sample indicate that the combination of aggregates being used does not meet the requirements of Subsection 1003.02(c), the contractor will be notified and required to make adjustments to his operations to produce a mix meeting these specifications. No concrete from this plant shall be placed on DOTD projects until the adjustments are made and approved by the District Laboratory Engineer. An additional verification sample may be required prior to resuming operations.

<u>Subsection 901.07 – Substitutions (06/05), Pages 715 and 716.</u>

Delete this subsection and substitute the following.

901.07 SUBSTITUTIONS. Mixtures may be substituted with approval in accordance with Table 901-1.

Table 901-1
Portland Cement Concrete Mixture Substitutions

Structural Class[1]	Substitute
AA(M)	No Substitutions
AA	AA(M)
A(M)	AA(M), AA
A	AA(M), AA, A(M)
D	No Substitutions
F	No Substitutions
P(X)	No Substitutions
P(M)	No Substitutions
P	P(M)
S	No Substitutions
Minor Structure Class[1]	
M	AA(M), AA, A(M), A, B
R	AA(M), AA, A(M), A, B, M
Y	No Substitutions
Pavement Type[1,2]	
B	D
D	B
E	No Substitutions

[1]The mixture being substituted shall meet the requirements of Table 901-2 and the mix design for its class or type. The compressive strength of the substituted mix shall meet the strength requirements of the original mixture specified.

[2]When justified in writing and approved by the engineer, small irregular areas of paving projects using Types B or D concrete may be substituted with Class A concrete.

Subsection 901.08 – Composition of Concrete (12/05), Pages 716 – 719.

Delete the second paragraph of Heading (a) and substitute the following.

For concrete placements having a least dimension of 48 inches (1200 mm) or greater, or if designated on the plans or the project specifications as being mass concrete, the allowable cement type shall be Type II portland cement, Type IP portland-pozzolan cement, or Type IS portland blast furnace slag cement. The cement or combination of cement and fly ash or ground granulated blast furnace slag, shall be certified to generate a heat of hydration of not more than 70 calories/gram (290 kJ/kg) at 7 days.

Delete the fourth paragraph of Heading (a) and substitute the following:

The contractor will be permitted partial substitution on a pound (kilogram) for pound (kilogram) basis of fly ash, grade 100 or grade 120 ground granulated blast-furnace slag for portland cement in concrete mixes only when using Type I, I(B) or II portland cement. The contractor may use a maximum of 25 percent fly ash by weight (mass) of cement for concrete pipe, up to 20 percent fly ash by weight (mass) of cement for other minor structures and concrete pavement, and up to 15 percent fly ash by weight (mass) of cement for structural concrete. When substituted at the ready-mix plant, the contractor may use the substitution rate of grade

100 or grade 120 ground granulated blast-furnace slag conforming to Subsection 1018.28 up to 45 percent by weight (mass) of cement for minor structures (including concrete pipe), structures, and pavement. If the producer wants to increase the substitution rate of grade 100 or grade 120 ground granulated blast-furnace slag above 45 percent up to a maximum of 50 percent, the cement and slag must be blended at the cement plant or terminal. The blended cement containing over 45 percent of grade 100 or grade 120 ground granulated blast-furnace slag must be in compliance with Subsection 1001.04 for portland blast-furnace slag cement.

Delete the third sentence of the fifth paragraph of Heading (b) and substitute the following:

When the ambient air temperature is 85°F (30°C) or above, the water-reducing admixture shall be the set-retarding type, except for concrete containing fly ash or ground granulated blast furnace slag where this choice is optional.

Delete the first sentence of the second paragraph of Heading (c) and substitute the following:

Because of the absorptive nature of lightweight aggregate and the inability to obtain a true saturated surface dry condition for determining free moisture, a maximum amount of water cannot be specified for Class Y concrete.

Delete Heading (d) and substitute the following.

(d) Aggregate: All aggregates for use in portland cement concrete shall meet the requirements of Subsection 1003.01.

(1) Coarse Aggregate: Coarse aggregate, except for gradations for Types B and D pavements, shall be the grade specified in Table 901-2 and shall comply with the requirements of Subsection 1003.02(b).

(2) Fine Aggregate: Fine aggregate, except for gradations for Types B and D pavements, shall comply with the requirements of Subsection 1003.02(a).

(3) Aggregates for Types B and D Pavements: Aggregates shall comply with the requirements of Subsection 1003.02(c).

<u>Subsection 901.11 – Temperature Limitations, (12/02), Pages 726 and 727.</u>

Delete Heading (c) and substitute the following:

(c) Cold Weather Limitations: Mixing and concreting operations for concrete mixes not containing ground granulated blast-furnace slag or Type IS cement shall be discontinued when a descending air temperature in the shade and away from artificial heat reaches 40°F (5°C), and shall not be resumed until an ascending air temperature in the shade and away from artificial heat reaches 35°F (2°C) provided the high temperature forecasted by the U.S. Weather Service is above 40°F (5°C). For concrete mixes containing ground granulated blast-furnace slag or Type IS cement, operations shall be discontinued at a descending air temperature in the shade and away from artificial heat of 55°F (13°C) and can resume at a temperature of 50°F (10°C) and rising provided the high temperature forecasted by the U.S. Weather Service is above 55°F (13°C). Production shall not begin until the temperature at the point of placement is within the above limitations. Concrete shall not be placed if the temperature is forecasted by the U.S. Weather Service to be less than 35°F (2°C) within the 24 hour period following placement.

When concrete placement at lower air temperatures is authorized in writing, aggregates may be heated by either steam or dry heat prior to being placed in the mixer. The apparatus used shall heat the mass uniformly and shall be arranged to prevent occurrence of overheated areas. If the air temperature is less than 35°F (2°C) at the time of placing concrete, the engineer may require water or aggregates to be heated to not less than 70°F (20°C) nor more than 150°F (65°C). After placement the concrete shall be protected by additional covering, insulating materials, or other methods approved by the engineer.

Table 901-2, Master Proportion Table for Portland Cement Concrete (06/05), Page 728.

Delete this table and substitute the following.

Table 901-2
Master Proportion Table for Portland Cement Concrete

	Average Compressive Strength, psi (MPa) at 28 days	Grade of Coarse Aggregate	Min. Cement, lb/yd^3 (kg/m^3) of Concrete [9]	Maximum Water/Cement ratio, lb/lb(kg/kg) [1,9]	Total Air Content (Percent by volume) [4]	Slump Range [10], inches (mm)		
						Non-Vibrated	Vibrated	Slip Form Paving [2]
Structural Class [11]								
AA(M)	4400 (30.4)	A, P	560 (332)	0.44	5±1	2-5 (50-125)	2-4 (50-100)	N.A.
AA	4200 (29.0)	A, P	560 (332)	0.44	5±1	2-5 (50-125)	2-4 (50-100)	N.A.
A(M)	4400 (30.4)	A, P	510 (302)	0.53	5±2	2-5 (50-125)	2-4 (50-100)	N.A.
A	3800 (26.2)	A, F [8], P	510 (302)	0.53	5±2	2-5 (50-125)	2-4 (50-100)	1-2.5 (25-65)
D	3300 (22.8)	A, B, D, P	420 (249)	0.58	5±2	2-5 (50-125)	1-3 (25-75)	N.A.
F	3400 (23.5)[5]	A,P	460 (273)	0.44	5±1	2-5 (50-125)	2-4 (50-100)	N.A.
P(X)	7500 (51.7)[5]	A, F [8], P	700 (415)	0.40	5±2	N.A.	2-10 (50-250)	N.A.
P(M)	6000 (41.4)[5]	A, F [8], P	600 (356)	0.44	5±2	N.A.	2-6 (50-150)[7]	N.A.
P	5000 (34.5)[5]	A, F [8], P	560 (332)	0.44	5±2	N.A.	2-6 (50-150)[7]	N.A.
S	3800 (26.2)	A,P	650 (385)	0.53	5±2	6-8 (150-200)	N.A.	N.A.
Minor Structure Class [11]								
M	3000 (20.7)	A, B, P	470 (279)	0.53	5±2	2-5 (50-125)	2-4 (50-100)	1-2.5 (25-65)
R	1800 (12.4)	A, B, D, P	370 (219)	0.70	5±2	2-5 (50-125)	2-4 (50-100)	N.A.
Y	3000 (20.7)	Y	560 (332)	-[3]	6-9	N.A.	1-3 (25-75)	N.A.
Pavement Type [11]								
B	4000 (27.6)[6]	N/A [13]	475 (282)	0.53	5±2	N.A.	2-4 (50-100)	1-2.5 (25-65)
D	4000 (27.6)[6]	N/A [13]	450 (267)	0.53	5±2	N.A.	2-4 (50-100)	1-2.5 (25-65)
E	4000 (27.6)[6]	A, F[12], P	600 (356)	0.40	5±2	N.A.	2-4 (50-100)	1-2.5 (25-65)

N.A. – Not Applicable

[1] Except for Class AA, AA(M), or F concrete, the maximum volume of water; gal. (L), shall be reduced 5 percent when a water-reducing admixture is used, and 10 percent when an air-entraining admixture, or air-entraining and water-reducing admixtures, is used. When the coarse aggregate portion of the mix is 100 percent crushed aggregate, the water may be increased by 5 percent provided the maximum water listed in Table 901-2 is not exceeded.

[2] Also slump range for other concrete placed by extrusion methods.

[3] Refer to Subsection 901.08(c).

[4] Total air content ranges when air-entrainment is allowed or specified. Air content shall be designed at midrange.

[5] Values shown represent the minimum compressive strengths allowed.

[6] Average compressive strengths for Pavement Type concrete shall be 3600 psi (24.8 MPa) when air-entrainment is used.

[7] No more than a 2 inch (50 mm) slump differential for any design pour.

[8] Grade F coarse aggregate shall be used only when specified or permitted. The minimum cement content shall be increased when this aggregate is used.

[9] For mixes including partial replacement of cement with fly ash or ground granulated blast furnace slag, the minimum cement and maximum water contents shown apply to the total cement and fly ash or ground granulated blast furnace slag content of the mix. Additional cement may be required to achieve minimum compressive strength.

[10] When a slump range is specified in other sections, that range shall govern.

[11] See Subsection 901.08(a) for allowable types of cement.

[12] For use in partial depth patching.

[13] Aggregate grading shall comply with the requirements of Subsection 1003.02(c).

FOR INFORMATION ONLY

Tables 901-3E and 901-3M, Acceptance and Payment Schedules for Cast-In-Place Structural Concrete (03/04), Pages 729 and 730.

Delete these tables and substitute the following.

FOR INFORMATION ONLY

Table 901-3E
Acceptance and Payment Schedules
Cast-In-Place Structural Concrete

Average Compressive Strength per Lot, psi (28 to 31 days)					
Class A or S	Class AA	Class A(M) or AA(M)	Class D	Class F	Percent of Contract Price[1]
3800 & above	4200 & above	4400 & above	3300 & above	3400 & above	100
3400-3799	3800-4199	4200-4399	3000-3299	---	98
3000-3399	3500-3799	4000-4199	2500-2999	---	90
below 3000	below 3500	below 4000	below 2500	below 3400	50 or remove and replace[2]

Table 901-3M
Acceptance and Payment Schedules
Cast-In-Place Structural Concrete

Average Compressive Strength per Lot, MPa (28 to 31 days)					
Class A or S	Class AA	Class A(M) or AA(M)	Class D	Class F	Percent of Contract Price[1]
26.2 & above	29.0 & above	30.4 & above	22.8 & above	23.5 & above	100
23.5-26.1	26.2-28.9	29.0-30.3	20.7-22.7	---	98
20.7-23.4	24.1-26.1	27.6-28.9	17.2-20.6	---	90
below 20.7	below 24.1	below 27.6	below 17.2	below 23.5	50 or remove and replace[2]

[1]When concrete is part of an item or not a direct pay item, lot sizes, sampling and acceptance testing for the required quantities will be in accordance with Subsection 805.18. The value for each cubic yard (cu m) required will be assessed at $250 ($330) for the purpose of applying payment adjustment percentages. The amount of payment adjustment for the quantity of concrete involved will be deducted from payment.

Acceptance and payment schedules shall apply to the contract item itself for cast-in-place piling.

[2]When the average compressive strength of any batch in a lot is less than 4000 psi (27.6 MPa) for Class A(M) or AA(M), less than 3500 psi (24.1 MPa) for Class AA, less than 3000 psi (20.7 MPa) for Class A or S , less than 2500 psi (17.2 MPa) for Class D, or less than 3400 psi (23.5 MPa) for Class F, an investigation will be made. If concrete is allowed to remain in place, payment will be based on the average compressive strength for the lot. If concrete is not allowed to remain in place, the identifiable deficient areas shall be removed and replaced at no direct pay.

When the average compressive strength for a lot is less than 4000 psi (27.6 MPa) for Class A(M) or AA(M), less than 3500 psi (24.1 MPa) for Class AA, less than 3000 psi (20.7 MPa) for Class A or S , less than 2500 psi (17.2 MPa) for Class D, or less than 3400 psi (23.5 MPa) for Class F, an investigation will be made. If concrete is allowed to remain in place, payment for the lot will be based on 50 percent of the contract price.
Any cores obtained in these investigations will be used for evaluation purposes only and payment will be based on original acceptance samples.

FOR INFORMATION ONLY

Tables 901-4E and 901-4M, Acceptance and Payment Schedules for Cast-In-Place Minor Structure Concrete (06/05), Pages 729 and 730.

Delete these tables and substitute the following.

Table 901-4E

Acceptance and Payment Schedules
Cast-In-Place Minor Structure Concrete

Average Compressive Strength, psi (28 to 31 days)		
Class M or Y	Class R	Percent of Contract Price [1]
3000 & Above Below 3000	1800 & Above Below 1800	100 50 or Remove [2]

Table 901-4M
Acceptance and Payment Schedules
Cast-In-Place Minor Structure Concrete

Average Compressive Strength, MPa (28 to 31 days)		
Class M or Y	Class R	Percent of Contract Price [1]
20.7 & Above Below 20.7	12.4 & Above Below 12.4	100 50 or Remove [2]

[1]When concrete is part of an item or not a direct pay item, sampling and acceptance testing for the required quantities shall be in accordance with this section. The value for each cubic yard (cu m) of concrete required will be assessed at $250 ($330) for the purpose of applying payment adjustment percentages. The amount of payment adjustment for the quantity of concrete involved will be deducted from payment.

[2]When the average compressive strength is less than 3,000 psi (20.7 MPa) for Class M or Y, and 1,800 psi (12.4 MPa) for Class R, an investigation will be made. If concrete is allowed to remain in place, payment will be based on 50 percent of the contract price.

Any cores obtained in these investigations will be used for evaluation purposes only. Payment will be based on original acceptance samples.

SECTION 1001 – HYDRAULIC CEMENT:

Subsection 1001.01 – Portland Cement (11/04), Page 733.

Add the following subheading.

(c) Process Additions: Process additions may be used in amounts not to exceed 3 percent by weight (mass) 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.

Subsection 1001.04 – Portland Blast-Furnace Slag Cement (09/02), Page 734.

Delete the fourth sentence and substitute the following:

Grade 100 and grade 120 ground granulated blast-furnace slag for use in Type IS cement shall comply with AASHTO M 302.

SECTION 1002 – ASPHALT MATERIALS AND ADDITIVES:

Subsection 1002.01 – Asphalt (03/03), Page 735.

Delete the second sentence of the third paragraph.

Delete the fifth paragraph and substitute the following.

When asphalt materials sampled at the point of delivery do not comply with specification requirements, and in the opinion of the engineer have resulted in an unsatisfactory product based on an investigation, the materials shall be removed and replaced or otherwise corrected at no direct pay.

Subsection 1002.02 – Asphalt Material Additives (03/03). Pages 735-744.

Delete Tables 1002-01, 1002-02, 1002-05, and 1002-11 and substitute the following.

Table 1002-1 (03/03)
Performance Graded Asphalt Cements

Property	AASHTO Test Method	PG76-22m[1]	PG70-22m[1]	PG64-22[1]	PG58-28[1]
Test on Original Binder					
Rotational Viscosity @ 135°C, Pa·s [2]	T 316	3.0	3.0	3.0	3.0
Dynamic Shear, 10 rad/s, G*/Sin Delta, kPa	T 315	1.00+ @ 76°C	1.00+ @ 70°C	1.30+ @ 64°C	1.00+ @ 58°C
Flash Point, °C	T 48	232+	232+	232+	232+
Solubility, % [3]	T 44	99.0+	99.0+	99.0+	99.0+
Separation of Polymer, 163°C, 48 hours, °C difference in R & B from top to bottom [5]	ASTM D 7173 AASHTO T 53	2-	2-	---	---
Force Ductility Ratio (f_2/f_1, 4°C, 5 cm/min., f_2 @ 30 cm elongation)	T 300	0.30+	---	---	---
Force Ductility, 4°C, 5 cm/min, 30 cm elongation, kg	T 300	---	0.23+	---	---
Tests on Rolling Thin Film Oven Residue	T 240				
Mass loss, %	T 240	1.00-	1.00-	1.00-	1.00-
Dynamic Shear, 10 rad/s, G*/Sin Delta, kPa	T 315	2.20+ @76°C	2.20+ @ 70°C	2.20+ @ 64°C	2.20+ @ 58°C
Elastic Recovery, 25°C, 10 cm elongation, % [4]	T 301	60+	40+	---	---
Ductility, 25°C, 5 cm/min, cm	T 51	---	---	100+	---
Test on Pressure Aging Vessel Residue	R 28				
Dynamic Shear, @ 25°C, 10 rad/s, G* Sin Delta, kPa	T 315	5000-	5000-	5000-	5000- @ 19°C
Bending Beam Creep Stiffness, S, MPa @ -12°C.	T 313	300-	300-	300-	300- @ -18°C
Bending Beam Creep Slope, m value,@ -12°C	T 313	0.300+	0.300+	0.300+	0.300+ @ -18°C

[1] PG76-22m or PG70-22m shall be required in the top two lifts of all hot mix asphalt construction for roadways; PG64-22 may be used in base course and incidentals; When 20-30% RAP is used in the base course PG 58-28 is required.

[2] The rotational viscosity will be measured to determine product uniformity. The rotational viscosity measured by the supplier shall be noted on the Certificate of Delivery. A binder having a rotational viscosity of 3.0 Pa·s or less will typically have adequate mixing and pumping capabilities. Binders with rotational viscosity values higher than 3.0 Pa·s should be used with caution and only after consulting with the supplier as to any special handling procedures and guarantees of mixing and pumping capabilities.

[3] Not all polymers are soluble in the specified solvents. If the polymer modified asphalt digested in the solvent will not pass the filter media, a sample of the base asphalt used in making the polymer modified asphalt should be tested for solubility. If the solubility of the base asphalt is at least 99.0%, the material will be considered as passing.

[4] AASHTO T 301 except the standard v-shaped sides for the specimen mold shall be replaced by straight-sided inserts of the same length, so that the specimen will contain a section 1 cm x 1 cm x 3 cm.

[5] Prepare samples per ASTM D 7173. Determine softening point of top and bottom per AASHTO T 53.

FOR INFORMATION ONLY

Table 1002-2 (03/03)
PG 70-22m Alternate[1]

Property	AASHTO Test Method	PG 70-22m Alternate[2] Specification
Test on Original Binder:		
Rotational Viscosity @ 135°C, Pa·s[3]	T 316	3.0-
Dynamic Shear, @ 70°C and 10 rad/s, G*/Sin Delta, kPa	T 315	1.50+
Flash Point, °C	T 48	232+
Solubility, %[4]	T 44	99.0+
Softening Point, Ring & Ball, °C	T 53	70.0+
Tests on Rolling Thin Film Oven Residue:	T 240	
Mass Loss, %	T 240	1.00-
Dynamic Shear, @ 70°C and 10 rad/s, G*/Sin Delta, kPa	T 315	2.20+
Tests on Pressure Aging Vessel Residue:	R 28	
Dynamic Shear, @ 25°C and 10 rad/s, G*Sin Delta, kPa	T 315	5000-
Bending Beam Creep Stiffness, S, @ -12°C, MPa	T 313	300-
Bending Beam Creep Slope, @ -12°C, m value	T 313	0.300+

[1] Use only with Superpave asphaltic concrete Level 1 and Level A mixes with less than 2500 ADT.

[2] Handling of all samples for testing shall be in accordance with ASTM D 4957, Section 7.2, which requires heating the sample in an oven maintained at 190° ± 2°C. Stir the sample occasionally until homogenous and pour in suitable container for testing. Pouring temperatures shall be 180° ± 2°C for all tests.

[3] The rotational viscosity will be measured to determine product uniformity. The rotational viscosity measured by the supplier shall be noted on the Certificate of Delivery. A binder having a rotational viscosity of 3.0 Pa·s or less will typically have adequate mixing and pumping capabilities. Binders with rotational viscosity values higher than 3.0 Pa·s should be used with caution and only after consulting with the supplier as to any special handling procedures and guarantees of mixing and pumping capabilities.

[4] Not all polymers are soluble in the specified solvents. If the polymer modified asphalt digested in the solvent will not pass the filter media, a sample of the base asphalt used in making the polymer modified asphalt should be tested for solubility. If the solubility of the base asphalt is at least 99.0%, the material shall be considered as passing.

FOR INFORMATION ONLY

Table 1002-5 (10/01)
Emulsified Polymerized Asphalt (CRS-2P)1

	Test Method	Percent of Contract Unit Price/Liter or Shipment[2]		
		Specifications	Deviatons	
		100	80	50 or Remove[3]
Viscosity, Saybolt Furol @ 50°C	AASHTO T 59	100-400	56-99 401-444	55- 445+
Storage Stability Test, 24 h, %	AASHTO T 59	1.0-	---	---
Settlement, 5 Day, %	AASHTO T 59	5.0-	---	---
Classification Test	AASHTO T 59	Pass	---	Fail
Particle Charge Test	AASHTO T 59	Pos.	---	Neg.
Sieve Test (Retained on 850 µm), %	AASHTO T 59	0.1-	---	---
Distillation:	AASHTO T 59			
Oil Distillate by Vol. of Emulsion, %		3.0-	---	---
Residue from Distillation, %		65+	61-64	60-
Tests on Residue by Distillation:				
Penetration, 25°C, 100 g, 5 s, dmm	AASHTO T 49	100-200	80-99 201-225	79- 226+
Softening Point (Ring & Ball), °C	AASHTO T 53	38.0-52.0	32.1-37.9 52.1-58.9	32.0- 59.0+
Solubility, %	AASHTO T 44	97.5+	---	---
Tests on Residue by Evaporation[4]:				
Force Ductility Ratio (f_2/f_1, 4°C, 5 cm/min, f_2 at second peak)	AASHTO T 300	0.30+	0.21-0.29	0.20-
Elastic Recovery, 10°C, 20 cm elongation, %	AASHTO T 301[5]	58+	51-57	50-

[1] The addition of latex, rubber or other additives to emulsified polymerized asphalt will not be allowed.
[2] When the unit of pay is not based on the liter, the deduction will be applied to the contract unit price.
[3] At the Department's option.
[4] The residue asphalt for running ductility tests, tensile stress test and elastic recovery test shall be obtained by means of residue by evaporation (Oven) rather than residue by distillation (Aluminum-alloy Still). The material supplier shall certify by independent testing that the Tensile Stress requirements have been attained.
[5] AASHTO T 301 except the standard v-shaped sides for the specimen mold shall be replaced by straight-sided inserts of the same length, so that the specimen will contain a section 1 cm x 1 cm x 3 cm.

Table 1002-11 (03/03)
Hot Applied Modified Asphalt Cements for Asphalt Surface Treatment[1]

Property	AASHTO Test Method	Gelled Asphalt		PAC 15	
		Spec.	Deviation	Spec.	Deviation
		100	90 or Remove	100	90 or Remove
Tire Rubber Content, %	---	---	---	5+	---
Penetration @ 25°C, 100 g., 5 s, dmm	T 49	55-100	54- 101+	75-125	74- 126+
Viscosity, @ 60°C, Pa·s	T 202	100+	99-	150+	149-
Rotational Viscosity @ 135°C, Pa·s[2]	T 316	0.7-3.0	0.6- 3.1+	3.0-	3.1+
Force Ductility Ratio, f_2/f_1, 4°C, 5cm/min, f_2 @ 30 cm elongation	T 300	---	---	0.30+	0.29-
Softening Point, °C	T 53	53+	52-	45+	44-
Flash Point, °C	T 48	230+	228-	230+	228-
Solubility, %	T 44	99.0+	---	---	---
Separation of Rubber, 163°C, 48 hours difference in R & B from top to bottom sample, °C	DOTD TR 326	---	---	2-	---
Tests on Residue from Rolling Thin Film Oven Test:	T 240				
Elastic Recovery, 25°C, 10 cm elongation, %	T 301[3]	---	---	55+	54-
Penetration Retention 25°C, RTFO/Original	T 49	---	---	0.60+ 1.00-	0.59- 1.01+
Viscosity Ratio, 60°C, RTFO/ Original	T 202	2.5-	2.6+	---	---

[1]Handling of all samples for testing shall be in accordance with ASTM D 4957, Section 7.2, which requires heating the sample in an oven maintained at 195° ± 2°C. Stir the sample occasionally until homogenous and pour in suitable container for testing. Pouring temperatures shall be 180° ± 2°C for all tests.

[2]The rotational viscosity will be measured to determine product uniformity. The rotational viscosity measured by the supplier shall be noted on the Certificate of Delivery. A binder having a rotational viscosity of 3.0 Pa·s or less will typically have adequate mixing and pumping capabilities. Binders with rotational viscosity values higher than 3.0 Pa·s should be used with caution and only after consulting with the supplier as to any special handling procedures and guarantees of mixing and pumping capabilities.

[3]AASHTO T 301 except the standard v-shaped sides for the specimen mold shall be replaced by straight-sided inserts of the same length, so that the specimen will contain a section 1 cm x 1 cm x 3 cm.

FOR INFORMATION ONLY

SECTION 1003 – AGGREGATES:

Subsection 1003.02 – Aggregates for Portland Cement Concrete and Mortar (06/05), Pages 746-749.

Delete the first paragraph and substitute the following.

All aggregates for use in portland cement concrete shall comply with the requirements of Subsection 1003.01. Aggregates for use in Types B and D pavement concrete shall also conform to the requirements of Subsection 1003.02(c).

Delete the first sentence of Heading (a) and substitute the following.

Sand shall be a natural silica sand from a source listed in QPL 2.

Delete the second paragraph of Heading (a) and substitute the following.

Fine aggregate for all portland cement concrete except Types B and D pavements shall conform to the following gradations:

Concrete Sand

U.S. Sieve	Metric Sieve	Percent Passing
3/8 inch	9.5 mm	100
No. 4	4.75 mm	95-100
No. 16	1.18 mm	45-90
No. 50	300 µm	7-30
No. 100	150 µm	0-7
No. 200	75 µm	0-3

Mortar Sand

U.S. Sieve	Metric Sieve	Percent Passing
No. 4	4.75 mm	100
No. 8	2.36 mm	95-100
No. 100	150 µm	0-25
No. 200	75 µm	0-10

Delete Heading (b)(1) and substitute the following.

(1) Uncrushed Coarse Aggregate: Uncrushed coarse aggregate for all portland cement concrete except Types B and D pavements shall comply with Table 1003-1.

Delete Table 1003-1, Portland Cement Concrete Aggregates and substitute the following:

FOR INFORMATION ONLY

Table 1003-1
Portland Cement Concrete Aggregates

Percent Passing						
U.S. Sieve	Metric Sieve	Grade A (Size 57)	Grade B (Size 467)	Grade D (Size 357)	Grade F ---	Grade P (Size 67)
2 1/2 inch	63 mm	---	---	100	---	---
2 inch	50 mm	---	100	90-100	---	---
1 1/2 inch	37.5 mm	100	85-100	---	---	---
1 inch	25.0 mm	90-100	---	35-70	---	100
3/4 inch	19.0 mm	---	35-70	---	100	80-100
1/2 inch	12.5 mm	25-60	---	10-30	90-100	---
3/8 inch	9.5 mm	---	10-30	---	---	20-55
No. 4	4.75 mm	0-10	0-5	0-5	15-60	0-10
No. 8	2.36 mm	0-5	---	---	0-15	0-5
No. 16	1.18 mm	---	---	---	0-5	---
No. 200	75 µm	0-1	0-1	0-1	0-1	0-1

Delete the first sentence of Heading (b)(2) and substitute the following.

Crushed coarse aggregate for all portland cement concrete except Types B and D pavements shall comply with the uncrushed coarse aggregate gradations, except that when the material finer than the No. 200 (75 µm) sieve consists of the dust fraction from crushing, essentially free of clay or shell, this percentage shall be 0-2 percent.

Add the following.

(c) Aggregates for Types B and D Pavements:

For the combined aggregates for the proposed portland cement concrete pavement mix, the percent retained based on the dry weight (mass) of the total aggregates shall meet the requirements of Table 1003-1A for the type of pavement specified in the plans. Additionally, the sum of the percents retained on any two adjacent sieves so designated in the table shall be at least 13 percent of the total combined aggregates. The maximum amounts by weight (mass) of deleterious materials for the total aggregate shall be the same as shown in Subsection 1003.02(b).

FOR INFORMATION ONLY

Table 1003-1A
Aggregates for Types B and D Pavements

U.S. Sieve	Metric Sieve	Percent Retained of Total Combined Aggregates	
		Pavement Type	
		Type B	Type D
2 1/2 inch	63 mm	0	0
2 inch	50 mm	0	0-20
1 1/2 inch	37.5 mm	0-20	0-20
1 inch	25.0 mm	0-20	5-20
3/4 inch	19.0 mm	5-20	5-20
1/2 inch	12.5 mm	5-20	5-20
3/8 inch	9.5 mm	5-20	5-20
No. 4	4.75 mm	5-20	5-20
No. 8	2.36 mm	5-20	5-20
No. 16	1.18 mm	5-20	5-20
No. 30	600 µm	5-20	5-20
No. 50	300 µm	0-20	0-20
No. 100	150 µm	0-20	0-20
No. 200	75 µm	0-5	0-5
Note: For the sieves in the shaded areas, the sum of any two adjacent sieves shall be a minimum of 13 percent of the total combined aggregates.			

Each type of aggregate to be used in the proposed mixture shall be sampled and tested individually. The percent of total combined aggregates retained shall be determined mathematically based on the proportions of the combined aggregate blend. All gradation calculations shall be based on percent of dry weight (mass).

Subsection 1003.03 – Base Course Aggregates (05/01), Pages 749 – 751.

Delete the second paragraph of Heading (d) and substitute the following:

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.

Delete Heading (e) and substitute the following:

(e) Recycled Portland Cement Concrete: 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 with the following gradation.

FOR INFORMATION ONLY

U.S. Sieve	Metric Sieve	Percent Passing
1 1/2 inch	37.5 mm	100
1 inch	25.0 mm	90-100
3/4 inch	19.0 mm	70-100
No. 4	4.75 mm	35-65
No. 40	425 µm	12-32
No. 200	75 µm	0-8

The fraction of recycled portland cement concrete passing the No. 40 (425 µm) sieve shall be non-plastic.

Delete the last sentence of Heading (f)

Subsection 1003.06, Aggregates for Asphaltic Mixtures (02/02), Pages 754 – 757.

Delete the first word of the second sentence of Heading (a) and substitute "Coarse".

Delete the first sentence of Heading (a)(2) and substitute the following:

Fine aggregates shall comply with the requirements of Sections 501, 502, or 508 as applicable. Fine aggregates for Superpave mixtures shall also comply with the specification requirements for angularity and sand equivalent as shown in Section 502, Table 502-4.

Delete the first sentence of Heading (a)(2)b and substitute the following:

Sand equivalent shall be determined in accordance with DOTD TR120.

Add the following to Heading (a)(3):

For non-Superpave mixtures, the sand equivalent of the portion of the natural sand in the mixture passing the No. 4 (4.75mm) sieve shall not be less than 35 when tested in accordance with DOTD TR120. For Superpave mixtures, the sand equivalent of the portion of the natural sand in the mixture passing the No. 4 (4.75mm) sieve shall be as shown in Section 502, Table 502-4 when tested in accordance with DOTD TR120.

SECTION 1005 – JOINT MATERIALS FOR PAVEMENTS AND STRUCTURES:

Subsection 1005.02 – Poured and Extruded Joint Sealant (6/02), Pages 763 and 764.

Delete Heading (a) and substitute the following.

(a) Hot Poured Rubberized Asphaltic Type: This material shall comply with ASTM D6690, Type II. The sealant and backer materials shall be approved products listed in QPL 67. Backer materials of the appropriate size shall comply with ASTM D5249, Type I.

Subsection 1005.04 – Combination Joint Former/Sealer (11/05), Pages 765 and 766.

Delete Heading (a) and substitute the following.

(a) Description: This joint former/sealer is intended for use in simultaneously forming and sealing a weakened plane in portland cement concrete pavements.

The material shall consist of an elastomeric strip permanently bonded either mechanically or chemically at the top of each of two rigid plastic side frames and covered with a removable plastic top cap. Side frames shall be of such configuration that when the sealer is inserted into plastic concrete and vibrated, a permanent bond forms between side frames and concrete.

Delete Heading (b)(1) and substitute the following.

FOR INFORMATION ONLY

(1) Elastomer: The elastomer strip portion of the material shall be manufactured from vulcanized elastomeric compound using polymerized chloroprene or thermoplastic vulcanizate as the base polymer, and shall comply with the following requirements:

Property	ASTM Test Method	Requirements	
		Polymerized Chloroprene	Thermoplastic Vulcanizate
Tensile Strength, kPa, Min.	D 412	12,400	7,400
Elongation at Break, % Min.	D 412	200	400
Hardness, Shore A	D 2240	65 ± 10	65 ± 10
Properties after Aging, 70 h @ 100°C	D 573		
Tensile Strength, % Loss, Max.		20	20
Elongation, % loss, Max.		25	25
Hardness, pts. increase, Max.		10	10
Ozone Resistance, 20% strain or bentloop, 300 pphm in air, 70 h @ 40°C	D 1149	no cracks	no cracks
Oil Swell, IRM 903, 70 h @ 100°C, wt change, % Max.	D 471	45	75

Delete Headings (b)(2) and (b)(3) and substitute the following:

(2) Bond of Elastomer to Plastic: The force required to shear the elastomer from the plastic shall be a minimum of 5.0 pounds per linear inch (90 g/mm) of sealer when tested in accordance with DOTD TR 636.

(3) Bond of Plastic to Cement Mortar: This bond will be evaluated and shall meet the following requirements:

The force required to separate the cement mortar from the plastic shall be a minimum of 5.0 pounds per linear inch (90 g/mm) of sealer when tested in accordance with DOTD TR 636.

SECTION 1006 – CONCRETE AND PLASTIC PIPE:

Subsection 1006.01 – General (09/02), Page 768.

Delete Heading (a)(4) and substitute the following:

(4) Portland cement with ground granulated blast-furnace slag 1018.28.

Delete the second paragraph of Heading (a) and substitute the following:

The concrete pipe manufacturer may use up to 45 or 50 percent grade 120 ground iron blast-furnace slag as a substitution for portland cement on a pound-for-pound (kilogram for kilogram) basis in accordance with Subsection 901.08. Fly ash may be substituted up to 25 percent.

Delete Heading (h) and substitute the following.

Regardless of the ASTM specifications utilized, if concrete pipe is to be accepted based upon cored samples, all samples shall meet the minimum concrete strengths specified. No more than three (3) joints of pipe shall be tested per maximum of 300 joints or three (3) days

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consecutive production, whichever is less, unless approved by the engineer. All coring shall be performed by the manufacturer as directed by the engineer.

Subsection 1006.03 – Reinforced Concrete Pipe (07/02), Page 769.

Delete the first sentence and substitute the following.

Reinforced concrete pipe shall be from an approved product source listed in QPL 77, and shall comply with ASTM C 76, amended as follows:

Subsection 1006.04 Reinforced Concrete Pipe Arch (07/02), Page 769.

Delete the first sentence and substitute the following.

Reinforced concrete pipe arch shall be from an approved product source listed in QPL 77, and shall comply with ASTM C 506, amended as follows:

Subsection 1006.06 Gasket Materials (07/02), Pages 770 – 772.

Delete Heading (b) and substitute the following.

(b) Flexible Plastic Gaskets: 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 QPL 4.

Subsection 1006.07 – Plastic Culvert Pipe (08/04), Pages 770 – 772.

Delete this subsection and substitute the following.

1006.07 Plastic Pipe: Plastic pipe and joint systems shall be approved products listed in QPL 66.

(a) Storm Drains: Plastic pipe for storm drains shall be Ribbed Polyvinyl Chloride Pipe (RPVCP). Ribbed Polyvinyl Chloride Pipe shall comply with ASTM F 794 or ASTM F 949, Series 46 with UV inhibitors. The resin shall have a minimum cell classification of 12454-C in accordance with ASTM D 1784.

(b) Cross Drains: Plastic pipe for cross drains shall be Ribbed Polyvinyl Chloride Pipe (RPVCP). Ribbed Polyvinyl Chloride Pipe shall comply with ASTM F 794 or ASTM F 949, Series 46 with UV inhibitors. The resin shall have a minimum cell classification of 12454-C in accordance with ASTM D 1784.

(c) Side Drains: Plastic pipe for side drains shall be one of the following:

(1) Ribbed Polyvinyl Chloride Pipe (RPVCP): Ribbed Polyvinyl Chloride Pipe shall comply with ASTM F 794 or ASTM F 949, Series 46 with UV inhibitors. The resin shall have a minimum cell classification of 12454-C in accordance with ASTM D 1784.

(2) Corrugated Polyethylene Pipe (Double Wall) (CPEPDW): Corrugated Polyethylene Pipe (Double Wall) shall comply with AASHTO M 294, Type S. The minimum cell classification shall be 335400C in accordance with ASTM D 3350.

(d) Joints for Plastic Pipe: Joints shall be approved by the DOTD Materials Engineer Administrator and listed on the QPL. Joint gasket materials shall comply with Subsection 1006.06. Joint requirements are as follows:

(1) Type 1 Joints (T1): These joints shall provide a soil tight joint.

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(2) Type 2 Joints (T2): These joints shall pass a 5 psi (35 kPa) hydrostatic pressure test.

(3) Type 3 Joints (T3): These joints shall pass a 10 psi (70 kPa) hydrostatic pressure test.

(4) Joints With Split Coupling Bands: 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 (300 mm) wide. The band shall be secured to the pipe with a minimum of five stainless steel or other approved corrosion resistant circumferential bands.

Subsection 1006.08 – Plastic Underdrain Pipe (08/04), Page 772

Delete this subsection and substitute the following.

1006.08 Plastic Underdrain Pipe: Plastic pipe for underdrains shall be perforated or nonperforated, as specified, and shall be an approved product listed on QPL 73 and one of the following.

(a) Corrugated Polyethylene Pipe (Single Wall) (CPEPSW): Corrugated Polyethylene Pipe (Single Wall) shall be perforated and shall comply with AASHTO M 252, Type C. Perforations shall comply with AASHTO M 252. Corrugated Polyethylene Pipe (Single Wall) shall not be used as shoulder outlet underdrain pipe.

(b) Polyvinyl Chloride Pipe (PVCP): Polyvinyl Chloride Pipe shall comply with AASHTO M 278 or ASTM D 3034, SDR 35. Perforations, if specified, shall comply with AASHTO M 252.

(c) Corrugated Polyethylene Pipe (Double Wall) (CPEPDW): Corrugated Polyethylene Pipe shall comply with AASHTO M 252, Type S. Perforations, if specified, shall comply with AASHTO M 252.

Subsection 1006.09 – Plastic Yard Drain Pipe (08/04), Page 773.

Delete this subsection and substitute the following.

1006.09 Plastic Yard Drain Pipe:

(a) Pipe: Plastic pipe for yard drains shall be an approved product listed on QPL 73 and one of the following:

(1) Polyvinyl Chloride Pipe (PVCP): Polyvinyl Chloride Pipe shall comply with AASHTO M 278 or ASTM D 3034, SDR 35.

(2) Corrugated Polyethylene Pipe (Double Wall) (CPEPDW): Corrugated Polyethylene Pipe (Double Wall) shall comply with AASHTO M 252, Type S, with a resin of minimum cell classification of 324420C in accordance with ASTM D 3350 or AASHTO M 294, Type S, with a resin of minimum cell classification of 335400C in accordance with ASTM D 3350.

(3) Ribbed Polyvinyl Chloride Pipe (RPVCP): Ribbed Polyvinyl Chloride Pipe shall comply with ASTM F 794 or ASTM F 949.

(b) Joints: Gaskets for joining plastic yard drain pipe shall comply with the requirements of Subsection 1006.06.

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SECTION 1007 – METAL PIPE:

Subsection 1007.07 – Polymer Coated Corrugated Steel or Aluminum Pipe and Pipe Arch (05/04), Page 776.

Delete this subsection.

SECTION 1008 – PAINTS:

Subsection 1008.02 – Three-Coat Waterborne Paint System (Two Primers And One Topcoat) (04/02), Pages 780 – 782.

Delete the text of this subsection and substitute the following:

The Three-Coat Waterborne Paint System (Two Primers and One Topcoat), shall be an approved system listed on QPL 68. Each system shall be tested for a minimum of 1500 hours in a salt spray (fog) apparatus and fluorescent UV-Condensation Exposure Apparatus in accordance with ASTM B 117 and G 53. The paint system shall show no rusting, checking, cracking, delamination or undercutting. There shall be only slight chalking or discoloration and there shall be no blisters larger than number 8 when rated in accordance with ASTM D 714.

Standard X-ray and infrared curves will be made of all approved coatings in accordance with ASTM D 5380 and DOTD TR 610. When the project sample deviates from these curves, the material represented by the sample will be rejected.

The following specification is not a formula. The manufacturer assumes all responsibility in formulating products which meet these specification requirements in laboratory testing, field application, and performance.

Each paint system shall comply with the following requirements.

(a) Primer:

(1) System A

a. Pigment: The pigment shall be composed of the following materials:

	Percent By Weight (mass)
Zinc Phosphate Dihydrate, Min.	22
Red Iron Oxide (ASTM D 3722), Min.	10
Barium Sulfate (ASTM D 602), Min.	50

The balance of the pigment shall include any application aids, thixotropes, tinting pigments, etc. which may enhance the performance of the material.

b. Vehicle: The vehicle shall be composed of a minimum of 80 percent resin solution with the balance being water, surfactants, antifoam additives, stabilizers, pH adjusters, etc. The resin shall be of vinyl acrylic copolymer latex having a pH between 1 and 2 and a chlorine content of 64 percent based on latex solids.

c. Mixed Paint: The mixed paint shall have the following properties:

PROPERTY	TEST METHOD	REQUIREMENT
Pigment, % by wt., Min.	ASTM D 3723	23
Weight/gallon, pounds, Min.	ASTM D 1475	12
Solids, % by wt. Min.	ASTM D 3723	60
Non-volatile in Vehicle, % by wt., Min.	ASTM D 3723	49
Viscosity, Ku	ASTM D 562	70 - 90
Fineness of Grind, Hegman Scale, Min.	ASTM D 1210	5
Dry to Touch, Minutes, Max.	ASTM D 1640	30
Dry Through, Hours, Max.	ASTM D 1640	1
PH	ASTM E 70	4.5 - 5.5
Sag, Lenetta, Mils, Min.	ASTM D 4400	12

(2) System B (Color Contrasting Primers)

a. First Coat Primer: See heading 1008.02(a)(1)a.

b. Second Coat Primer: The second coat primer shall meet the vehicle requirements of the first coat primer. The second coat primer pigmentation shall be changed to allow for color contrast between the first coat red primer, second coat primer and gray topcoat.

(b) Topcoat:

(1) Pigment: The pigment shall be composed of 95 percent by weight of Titanium Dioxide ($Ti0_2$) in accordance with ASTM D 476. The balance of the pigments shall include any application aids, thixotropes, tinting pigments, etc., which may enhance the performance of the material.

(2) Vehicle: The vehicle shall be composed of a minimum of 87 percent solution with the balance being water, dispersant, rheological modifiers, stabilizers, etc. The resin shall be a 41.5 percent solids small particle size aqueous dispersion copolymer consisting of acrylic, acrylonitrile and styrene monomers. The resin shall have a personal modulus between 38°C and 42°C and a pH between 7.2 and 7.8.

(3) The topcoat shall be tinted to match the standard "Louisiana Gray" topcoat available from the Materials and Testing Section. The paint shall have the following properties:

PROPERTY	TEST METHOD	REQUIREMENT
Pigment, % by wt., Min.	ASTM D 3723	13
Weight/gallon, pounds, Min.	ASTM D 1475	9.2
Solids, % by wt. Min.	ASTM D 3723	46
Non-volatile in Vehicle, % by wt., Min.	ASTM D 3723	39
Viscosity, Ku	ASTM D 562	90 - 110
Fineness of Grind, Hegman Scale, Min.	ASTM D 1210	5
Dry to Touch, Minutes, Max.	ASTM D 1640	30
Dry Through, Hours, Max.	ASTM D 1640	2
Sag, Resistance, Lenetta, Mils, Min.	ASTM D 4400	12

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Subsection 1008.06 – Corrosion Inhibiting Alkyd Paint System (04/02), Page 783.

Add the following:

1008.06 CORROSION INHIBITING ALKYD PAINT SYSTEM. The Corrosion Inhibiting Alkyd Paint System shall be a three-coat paint system applied to properly prepared structural steel surfaces that are permanently exposed to weather. The paint shall be compatible with basic lead silico chromate paint. Either System A or System B can be used, however, whichever system is selected shall be used on the entire project. The corrosion inhibiting pigment in System A shall be zinc hydroxy phosphite and the corrosion inhibiting pigment in System B shall be calcium borosilicate. The primer and the intermediate coats shall be tinted for color contrast. An aluminum topcoat in accordance with AASHTO M69, Type I shall be applied in both systems.

SPECIFIC REQUIREMENTS: Test methods shall be the latest in effect. The manufacturer assumes all responsibility in formulating products which meet these specifications requirements.

Systems A and B shall comply with the following requirements.

PROPERTY	TEST METHOD	REQUIREMENT SYSTEM A MIN	SYSTEM A MAX	SYSTEM B MIN	SYSTEM B MAX
PRIMER					
Pigment, % by wt	ASTM D 2371	50	--	53	--
Vehicle, % by wt	ASTM D 2371	--	50	--	47
Weight/gallon, pounds @ 77°F	ASTM D 1475	12.3	--	11.4	--
Water, %		--	0.5	--	0.25
Coarse Particle and Skins (Total Residue Retained on No. 325 Sieve Based on Paint), %	ASTM D 185	--	1.0	--	1.0
Fineness of Grind (North Std)	ASTM D 1210	5	--	5	--
Viscosity (Stormer-Krebs Units) @ 77°F	ASTM D 562	70	80	75	85
Dry Through, Hours	ASTM D 1640	18	--	18	--
Non-volatile in Vehicle, % by wt	ASTM D 2369 & ASTM D 2372	66	--	57	--

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PROPERTY	TEST METHOD	REQUIREMENT SYSTEM A MIN	SYSTEM A MAX	SYSTEM B MIN	SYSTEM B MAX
INTERMEDIATE COAT					
Pigment, % by wt	ASTM D 2371	50	--	44	--
Vehicle, % by wt	ASTM D 2371	--	50	--	56
Weight/gallon, pounds @ 77°F	ASTM D 1475	12.3	--	10.2	--
Water, %		--	0.25	--	0.25
Coarse Particle and Skins (Total Residue Retained on No. 325 Sieve Based on Paint), %	ASTM D 185	--	1.0	--	1.0
Fineness of Grind (North Std)	ASTM D 1210	5	--	5	--
Viscosity (Stormer-Krebs Units) @ 77°F	ASTM D 562	70	80	75	85
Dry Through, Hours	ASTM D 1640	--	18	--	10
Non-volatile in Vehicle, % by wt	ASTM D 2369 & ASTM D 2372	66	--	45	--

SYSTEM A

Vehicle: The vehicle shall consist of not less than 66.0 percent non-volatile vehicle. The balance shall be combined drier and thinner.

The non-volatile vehicle shall be composed of raw linseed oil and alkyd resin combined in the approximate proportions of 1:1 respectively by weight. The alkyd resin furnished as a solution shall meet the requirements of Federal Specifications TT-R-266C Type I, Class A. The raw linseed oil shall meet the requirements of ASTM D234.

The volatile vehicle shall be mineral spirits meeting the requirements of Rule 66.

PRIMER PIGMENT	PERCENT BY WEIGHT MIN	MAX
Zinc hydroxy phosphite, ASTM D 4462	73.0	75.0
Red Iron Oxide (98% Fe203)	24.0	26.0
Organo Montmorillonite	0.75	--

INTERMEDIATE PIGMENT	PERCENT BY WEIGHT MIN	MAX
Zinc hydroxy phosphite, ASTM D 4462	75.0	77.0
Titanium Dioxide, Rutile Non Chalking, ASTM D476	19.0	21.0
Organo Montmorillonite	0.75	--
Tinting Pigments*	--	--
Yellow Oxide	--	--
Red Oxide	3.0	3.5
Lampblack	--	--

*Tinting pigment may be added as predispersion pigment.

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SYSTEM B

PRIMER

PIGMENT	MIN	MAX
Calcium Boro-Silicate, ASTM D 4288	80.0%	--
Synthetic Iron Oxide, ASTM D 84, Class I	16.0%	18.0%
Organo Montmorillonite	1.0%	2.0%
VEHICLE		
Alkyd Resin Solution, Fed. Spec TT-R-266, Type I, Class A	43.0%	50.0%
Linseed Oil, ASTM D 234	20.0%	27.0%
Mineral Spirits, Fed. Spec TT-T-291E, Type II*	--	28.0%
Driers	1.0%	2.0%

* Small quantities of alcohols or alcohol/water mixtures may replace some mineral spirits where such materials are used as polar additives for the suspending aid.

INTERMEDIATE COAT

PIGMENT	MIN	MAX
Calcium Boro-Silicate, ASTM D 4288	80.0%	--
Synthetic Iron Oxide, ASTM D 84, Class I	17.5%	18.5%
Organo Montmorillonite	1.5%	2.5%
Lampblack	--	2.0%
VEHICLE		
Alkyd Resin Solution, Fed. Spec TT-R-266, Type I, Class A	65.0%	--
Mineral Spirits, Fed. Spec TT-T-291E, Type II*	--	34.0%
Driers	1.0%	1.5%

*Small quantities of alcohols or alcohol/water mixtures may replace some mineral spirits where such materials are used as polar additives for the suspending aid.

Section 1008, Paints (09/05), Page 780.

Add the following subsection.

1008.07 ZINC PAINT SYSTEMS FOR NEW STEEL AND 100 PERCENT BARE EXISTING STEEL FOR BRIDGES. The zinc paint system shall be an approved system listed on QPL 78. Each system shall be tested in accordance with AASHTO R 31 and meet the following requirements.

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Performance Requirements	Zinc Paint Systems Inorganic Zinc Primer	Zinc Paint Systems Organic Zinc Primer
Rust Criteria after 5000 hrs exposure to Salt Fog Resistance Test in accordance with ASTM B 117.		
Maximum Creep, mm - Evaluated in accordance with AASHTO R 31, Subsection 8.2.2.2.	4	4
Maximum Average Creep, mm - Evaluated in accordance with AASHTO R 31, Subsection 8.2.2.2.	2	2
Maximum length, mm - Evaluated in accordance with AASHTO R 31, Subsection 8.2.2.3.	3	15
Blister Criteria after 4000 hrs exposure to Salt Fog Resistance Test in accordance with ASTM B 117.		
Minimum Conversion # - Blistering evaluated in accordance with ASTM D 714. Blister size and frequency converted using blister value conversion table.	8	7
Rust Criteria after 5040 hrs exposure to Cyclic Weathering Resistance Test in accordance with ASTM D 5894.		
Maximum Creep, mm - Evaluated in accordance with AASHTO R-31, Subsection 8.2.2.2.	4	12
Maximum Average Creep, (mm) - Evaluated in accordance with AASHTO R 31, Subsection 8.2.2.2.	2	5
Blister Criteria after 4032 hrs exposure to Cyclic Weathering Resistance Test in accordance with ASTM D 5894.		
Minimum Conversion # - Blistering evaluated in accordance with ASTM D 714. Blister size and frequency converted using blister value conversion table.	9	8
Adhesion Criteria - Minimum pull-off strength shall be tested in accordance with ASTM D 4541.		
Minimum for both primer and PIT (Primer, Intermediate, Topcoat) panels.	(2.4 MPa) 350 psi	(4.1 MPa) 600 psi
Freeze Thaw Criteria – After 30 freeze/thaw cycles as defined in AASHTO R 31, Subsection 8.6.1 there shall be no loss of adhesion when compared with above adhesion results.		

Blister Value Conversion Table

Blister Size	Blister Frequency: Few	Medium	Medium Dense	Dense
#8	9	8	7	6
#6	8	7	6	5
#4	7	6	5	4
#2	6	5	4	3
#1	5	4	3	2

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Products to be used on projects will be sampled and tested and shall comply with the following requirements:

PROPERTY	TEST METHOD	Specification Acceptance[1]
Pigment Content.	ASTM D 2698	Target Value ±2.0%
Density	ASTM D 1475	Target Value ±0.25 lbs/gal (±0.03 kg/l)
Solids Content	ASTM D 2369	Target Value ±2.0%
Non-volatile in Vehicle Content	ASTM D 2698	Target Value ±2.0%
Viscosity, Ku	ASTM D 562	Target Value ±5KU
Dry to Touch	ASTM D 1640	Target Value ±10%
Dry Through	ASTM D 1640	Target Value ±10%
Sag, Lenetta	ASTM D 4400	Target Value ±10%
Infrared Spectrum	ASTM D 2621	[2]
X-Ray Diffraction	ASTM D 2321	[2]

[1]Target Values shall be established by the Materials Section upon qualification of the paint system.
[2] Standards for infrared spectrum and x-ray diffraction shall be kept on file and compared to project samples for acceptance purposes.

The topcoat shall be tinted to match the standard "Louisiana Gray" topcoat available from the Materials and Testing Section. When weathering steel is used for structural members, such as bridge girders, the ends of the members shall be painted with the zinc paint system for a distance of 1.5 times the member depth, not to exceed 10 feet (3m). The topcoat color shall match the color of the weathered steel.

SECTION 1009 – REINFORCING STEEL AND WIRE ROPE:

Subsection 1009.01 – Reinforcing Steel (07/05), Page 784.

Delete Headings (b) and substitute the following.

(b) Rail-Steel and Axle-Steel Deformed and Plain Bars shall comply with ASTM A 996 (A 996M).

Delete Heading (c).

SECTION 1010 – FENCE AND GUARD RAIL:

Subsection 1010.06 – Gates for Field and Line Type Fence (01/02), Page 792.

Delete Heading (a) and substitute the following.

(a) Gates: Steel used in fabricating gates shall be galvanized in accordance with ASTM A 653 Coating Designation G60 (A653M Coating Designation Z180).

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SECTION 1013 – METALS

Subsection 1013.01 – Structural Steel (05/05), Page 800.

Delete the second and third paragraphs and substitute the following.

Structural steel shall comply with ASTM A709 (A709M) specifications.

Longitudinal Charpy V-Notch Testing: When specified, the main load-carrying structural member components that are subject to tensile stress shall meet the longitudinal Charpy V-Notch requirements contained in the ASTM A709 (A709M) Supplemental Requirements in Table S1.2 for Non-Fracture Critical Impact Test Requirements and Table S1.3 for Fracture Critical Impact Test Requirements. Sampling and testing procedures shall be in accordance with ASTM A 673 (ASTM A 673M) and ASTM A 370 and the following requirements: the (H) frequency of heat testing shall be used for all steels except that for ASTM A 709, Grade 100 (ASTM A 709M, Grade 690) steel the (P) frequency of piece testing shall be used.

Tables 1013-1 through 1013-4 are deleted.

SECTION 1014 – TIMBER AND TIMBER PRESERVATIVES

Subsection 1014.06 – Quality Assurance (08/03), Page 811.

Delete Table 1014-2 and substitute the following.

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Table 1014-2
Minimum Retention of Preservative
(Pounds Per Cubic Foot (kg/cu m) of Wood)

Material and Usage	Creosote	Creosote-Solutions	Pentachloro-phenol	CCA[1]
Timber & Lumber				
Above Ground:				
Southern Pine or Douglas Fir	12.0 (192)	12.0 (192)	0.60 (9.6)	0.60 (9.6)
Land and Fresh Water:				
Southern Pine or Douglas Fir	16.0 (256)	16.0 (256)	N/A	0.80 (12.8)
Coastal Water:				
Southern Pine or Douglas Fir	20.0 (320)	20.0 (320)	N/A	2.50 (40.0)
Piles[3]				
Non-Foundation				
Land & Fresh Water:				
Southern Pine	16.0 (256)	16.0 (256)	N/A	0.80 (12.8)
Douglas Fir	17.0 (272)	17.0 (272)	N/A	1.00 (16.0)
Coastal Water:				
Southern Pine or Douglas Fir	20.0 (320)	20.0 (320)	N/A	2.50 (40.0)
Foundation				
Land & Fresh Water:				
Southern Pine	12.0 (192)	12.0 (192)	0.60 (9.6)	0.80 (12.8)
Douglas Fir	17.0 (272)	17.0 (272)	0.85 (13.6)	N/A
Coastal Water:				
Southern Pine or Douglas Fir	20.0 (320)	20.0 (320)	N/A	2.50 (40.0)
Poles				
Southern Pine	12.0 (192)	N/A	0.60 (9.6)	0.60 (9.6)
Douglas Fir	15.0 (240)	N/A	0.80 (12.8)	0.80 (12.8)
Fence				
Gate Posts/Braces	8.0 (128)	8.0 (128)	0.40 (6.4)	0.40 (6.4)
Guard Rail Posts/Spacer Blocks, Bridge Rails & Dead End Road Installations	12.0[2] (192)	N/A	0.60 (9.6)	0.60 (9.6)

[1] Material treated with Chromated Copper Arsenate (CCA) shall be conditioned by kiln drying prior to treatment.
[2] Timber guard rail posts, spacer blocks, bridge rails, poles and dead end road installations treated with creosote shall be steam flushed for a minimum of 1 hour at 240°F (116°C) after treatment.
[3] A foundation pile is one which is embedded in the ground and capped with concrete. Pile supported approach slab piles are classified as non-foundation.

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SECTION 1015 – SIGNS AND PAVEMENT MARKINGS:

Subsection 1015.04 – Sign Panels, (05/02), Pages 813 and 814.

Delete the first sentence of Heading (b) and substitute the following.

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.

Delete Heading (b)(2).

Delete Heading (b)(4) and substitute the following.

(4) 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 (1 mm) and 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 (16 mm). The thermoplastic for sign panels shall be either 0.40 inch (10 mm) thick thin wall, fluted substrate or 0.625 inch (16 mm) 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: The aluminum clad low density polyethylene plastic substrate shall be 0.080 inch (2 mm) thick. The 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 aluminum clad low density polyethylene shall have its manufacturer's approval for use on this substrate.

Subsection 1015.05 – Reflective Sheeting (01/06), Pages 814-819.

Delete this subsection and substitute the following.

1015.05 REFLECTIVE SHEETING. Reflective sheeting shall be one of the following types as specified on the plans and complying with ASTM D 4956 except as modified herein. The sheeting shall be an approved product listed in QPL 13.

Type I - A medium-intensity retroreflective sheeting referred to as "engineering grade" and typically enclosed lens glass-bead sheeting.

Type II - A medium-high-intensity retroreflective sheeting sometimes referred to as "super engineering grade" and typically enclosed lens glass-bead sheeting.

Type III A high-intensity retroreflective sheeting, that is typically encapsulated glass-bead retroreflective material.

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Type VI - An elastomeric-high-intensity retroreflective sheeting without adhesive. This sheeting is typically a vinyl microprismatic retroreflective material.

Type IX - A very high-intensity retroreflective sheeting having highest retroreflectivity at short distances as determined by the R_A values at 1° observation angle. This sheeting is typically an unmetalized microprismatic retroreflective element material.

Delete DOTD Type VII (Fluorescent Orange).

Add the following.

Type-X (Fluorescent Orange) - A super high-intensity retroreflective sheeting having highest retroreflectivity characteristics at medium distances. This sheeting is typically an unmetalized microprismatic retroreflective element material.

(a) Adhesive Classes: The adhesive required for retroreflective sheeting shall be Class 1 (pressure sensitive) or Class 2 (heat activated) as specified in ASTM D 4956.

(b) Identification Marks: Type II sheeting shall be distinguished by integral identification marks that cannot be removed or affected by physical or chemical methods without causing damage to the sheeting. The markings shall be inconspicuously placed on 12-inch (300-mm) centers and shall be visible from a distance of not more than 3 feet (1.0 m).

Delete Heading (c), Alternate Sheeting Type.

Delete Tables 1015-1 and 1015-2.

(d) Accelerated Weathering: Reflective sheeting, when processed, applied and cleaned in accordance with the manufacturer's recommendations shall perform in accordance with the accelerated weathering standards in Table 1015-3.

Delete Table 1015-3 and substitute the following.

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Table 1015-3
Accelerated Weathering Standards[2]

Type	Retroreflectivity[1]				Colorfastness[3]	
	Orange		All colors, except orange		Orange	All colors, except orange
I	Not used		2 years	50[4]	Not used	2 years
II	1 year	65[5]	Not used		1 year	3 years
III	1 year	80[6]	3 years	80[6]	1 year	3 years
III (for drums)	1 year	80[6]	1 year	80[6]	1 year	1 year
VI	1/2 year	50[7]	1/2 year	50[7]	1/2 year	1/2 year
IX	Not used		3 years	80[8]	Not used	3 years
X (Fluorescent Orange)	1 year	80[9]	Not used		1 year	Not used

[1]Percent retained retroreflectivity of referenced table after the outdoor test exposure time specified.
[2]At an angle of 45° from the horizontal and facing south in accordance with ASTM G7.
[3]Colors shall conform to the color specification limits of ASTM D 4956 after the outdoor test exposure time specified.
[4]ASTM D 4956, Table 5.
[5]ASTM D 4956, Table 7.
[6]ASTM D 4956, Table 8.
[7]ASTM D 4956, Table 13.
[8]ASTM D 4956, Table 3.
[9]ASTM D 4956, Table 4.

(e) Performance: Reflective sheeting for signs, when processed, applied and cleaned in accordance with the manufacturer's recommendations shall perform outdoors in accordance with the performance standards in Table 1015-4.

Delete Table 1015-4 and substitute the following.

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Table 1015-4
Reflective Sheeting Performance Standards

Type	Retroreflectivity[1] -- Durability[2]				Colorfastness[3]
	Orange		All colors, except orange		
I	Not used		7 years	50[4]	3 years
II	3 years	65[5]	Not used		3 years
III	3 years	80[6]	10 years	80[6]	3 years
IX	Not used		7years	80[7]	3 years
X (Fluorescent Orange)	3 years	80[8]	Not used		3 years

[1]Percent retained retroreflectivity of referenced table after installation and the field exposure time specified.
[2]All sheeting shall maintain its structural integrity, adhesion and functionality after installation and the field exposure time specified.
[3]All colors shall conform to the color specification limits of ASTM D 4956 after installation and the field exposure time specified.
[4]ASTM D 4956, Table 5.
[5]ASTM D 4956, Table 7.
[6]ASTM D 4956, Table 8.
[7]ASTM D 4956, Table 3.
[8]ASTM D 4956, Table 4.

Delete Heading (f) and substitute the following.

(f) Temporary Signs, Barricades, Channelizing Devices, Drums and Cones: Reflective sheeting for temporary signs, barricades and channelizing devices, shall meet the requirements of ASTM D 4956, Type III except that the initial sequence of temporary advanced warning construction signs used on the mainline of freeways and expressways shall meet the requirements of ASTM D 4956 Type X (Fluorescent Orange).

Reflective sheeting for vertical panels shall meet the requirements of ASTM D 4956, Type III.

Reflective sheeting for drums shall be a minimum of 6 inches (150 mm) wide and shall meet the requirements of ASTM D 4956, Type III, and the Supplementary Requirement S2 for Reboundable Sheeting as specified in ASTM D 4956. Reflective sheeting for traffic cone collars shall meet the requirements of ASTM D 4956, Type VI.

(g) Sheeting Guaranty. The contractor shall provide the Department with a guaranty from the sheeting manufacturer stating that if the retroreflective sheeting fails to

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comply with the performance requirements of this subsection, the sheeting manufacturer shall do the following:

Delete Table 1015-5 and substitute the following.

Table 1015-5
Manufacturer's Guaranty-Reflective Sheeting

Type	Manufacturer shall restore the sign face in its field location to its original effectiveness at no cost to the Department if failure occurs during the time period[1] as specified below		Manufacturer shall replace the sheeting required to restore the sign face to its original effectiveness at no cost to the Department if failure occurs during the time period[1] as specified below
	Orange	All colors, except orange	All colors, except orange
I	Not used	<5 years	5-7 years
II	<3 years	<5 years	5-10 years
III	<3 years	<7 years	7-10 years
IX	Not used	<5 years	5-10 years
X (Fluorescent Orange)	<3 years	Not used	Not used

[1]From the date of sign installation.

(1) Replacement sheeting for sign faces, material, and labor shall carry the unexpired guaranty of the sheeting for which it replaces.

(2) The sign fabricator shall be responsible for dating all signs with the month and year of fabrication at the time of sign fabrication. This date shall constitute the start of the guaranty obligation period.

Subsection 1015.09 - Raised Pavement Markers (10/03), Pages 821 and 822.

Delete Heading (b) and substitute the following.

(b) Reflectorized Markers: Reflectorized markers shall comply with ASTM D 4280, Designation H and Designation F. The type and color shall be in accordance with the plans and the MUTCD. The markers shall be either standard having approximate base dimensions of 4-by-4-inches (100-by-100-mm) and a maximum height of 0.80 inches (20 mm) or low profile having approximate base dimensions of 4-by-2-inches (100-by-50-mm) and a maximum height of 0.60 inches (15 mm).

Subsection 1015.13 – Glass Beads for Drop-on Application (05/02), Pages 829 and 830.

Delete this subsection and substitute the following.

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1015.13 Large Embedment Coated Glass Beads for Pavement Markings. Large embedment coated glass beads for use with painted traffic striping and flat thermoplastic striping shall be transparent, clean, colorless glass, smooth and spherically shaped, free from milkiness, pits, or excessive air bubbles and conform to the specific requirements for the class designated. The beads shall be non-flotation, embedment coated and conform to the following specific requirements.

(a) Gradation: The testing for gradation of the beads shall be in accordance with ASTM D 1214 and shall meet the gradation requirements specified below.

(1) Painted Traffic Striping: Glass beads for painted traffic striping shall meet the gradation requirements of Table 1015-14.

TABLE 1015-14
Gradation of Large Embedment Coated Glass Beads for
Painted Traffic Striping

U.S. SIEVE (METRIC SIEVE)	PERCENT RETAINED
No. 12 (1.7 mm)	0
No. 14 (1.4 mm)	0-5
No. 16 (1.18 mm)	5-20
No. 18 (1.00 mm)	40-80
No. 20 (850 µm)	10-40
No. 25 (710 µm)	0-5
PAN	0-2

(2) Flat Profile Thermoplastic Striping: Drop-on beads for flat profile thermoplastic striping shall meet the gradation requirements of Table 1015-15 as determined by the thickness of the striping.

TABLE 1015-15
Gradation of Embedment Coated Glass Beads for
Flat Profile Thermoplastic Striping

THICKNESS	NUMBER OF BEAD DROPS	APPLICATION #1	APPLICATION #2
40 mils	Single Drop	See Table 1015-14	N/A
90 mils or greater	Double Drop	See Table 1015-16	AASHTO M 247 Type I

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TABLE 1015-16
Gradation of Large Embedment Coated Glass Beads for
First Drop on Flat Thermoplastic Striping

U.S. SIEVE (METRIC SIEVE)	PERCENT RETAINED
No. 10 (2.0 mm)	0
No. 12 (1.7 mm)	0-5
No. 14 (1.4 mm)	5-20
No. 16 (1.18 mm)	40-80
No. 18 (1.00 mm)	10-40
No. 20 (850 µm)	0-5
PAN	0-2

(b) Roundness: The beads shall have a minimum of 80 percent rounds per screen for the two (2) highest sieve quantities. The remaining sieve fractions shall have no less than 75 percent rounds as determined by microscopic examination.

(c) Angular Particles: The beads shall have no more than three (3) percent angular particles per screen.

(d) Refractive Index: The beads shall have a refractive index of 1.50 to 1.52 when tested by the liquid immersion method.

(e) Embedment Coating: The large beads for thermoplastic striping shall be coated with an adhesion assuring coating. The smaller AASHTO M247 Type I beads shall be coated to provide free flowing characteristics when tested in accordance with AASHTO M247 Section 4.4.1. and assure adhesion. Glass beads shall be properly coated and conform to the requirements when tested as described in DOTD TR 530 Determination of Embedment Coating on Large Embedment Coated Glass Beads for Pavement Markings.

(f) Packaging and Marking: The beads shall be packaged in moisture proofed containers. Each container shall be stamped with the following information: Name and address of manufacturer, shipping point, trademark or name, the wording "Large Embedment Coated Glass Beads", class, weight, lot number and the month and year of manufacture. The container for the AASHTO M 247 Type I beads shall be similarly stamped except that the wording shall be "Glass Beads".

SECTION 1016 – PRECAST REINFORCED CONCRETE DRAINAGE UNITS:
Subsection 1016.01 – General (09/05), Page 831.

Delete Heading (a) and substitute the following.

(a) Portland Cement and Portland-Pozzolan Cement: Portland cement shall comply with Subsection 1001.01. Portland-pozzolan cement shall comply with Subsection 1001.02.

Delete Heading (e) and substitute the following.

The name or trademark of the manufacturer, the date of casting, the structure number or the station number as shown on the plans, and the lot number shall be indented into the concrete

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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.

Subsection 1016.02 – Precast Reinforced Concrete Box Culverts (09/05), Pages 831 and 832.

Delete the first sentence and substitute the following.

Precast reinforced concrete box culverts shall be approved products listed on QPL 77. The compressive strengths of the box culverts shall comply with ASTM C 76 (ASTM C 76M). Precast reinforced concrete box culverts shall comply with ASTM C 1433 (ASTM C 1433M) amended as follows:

Delete the first sentence of Heading (f) and substitute the following.

Culvert units shall be cured by one of the methods listed in ASTM C 1433.

Subsection 1016.03 – Precast Reinforced Concrete Manhole Sections (06/02), Page 832.

Delete the text of this subsection and substitute the following.

See Subsection 1016.04.

Subsection 1016.04 Precast Reinforced Concrete Catch Basins and Junction Boxes (06/02), Pages 832 and 833.

Delete this subsection and heading and substitute the following.

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:

(a) Materials:

(1) Precast reinforced concrete manholes, catch basins and junction boxes shall comply with the following Sections and Subsections:

Portland Cement Concrete, Class M	901
Reinforcing Steel	1009
Frames, Grates and Covers	1018.04

Portland cement concrete shall attain a minimum compressive strength of 4000 psi (27.5 MPa) before shipping of the units.

(2) Precast safety ends shall comply with Subsection 702.04(c).

(b) Casting Concrete: When multiple castings are to be made using the same forms, the engineer may require the use of metal forms. Concrete in each sectional unit shall be placed without interruption and shall be consolidated by the use of an approved vibrator, supplemented by hand-tamping as necessary, to force the concrete into the corners of forms and prevent formation of stone pockets or cleavage planes.

(c) Reinforcement: Reinforcement shall be as shown on the plans, and shall not vary more than 1/4 inch (6 mm) 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.

(d) Curing: Units shall be cured in accordance with Subsection 805.10 or Subsection 805.14(e).

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(e) Form Removal: Forms shall remain in place for 1 curing day in accordance with Subsection 805.11, Method 2.

(f) Joints and gasket material shall comply with Subsection 1006.06(b).

(g) 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:

(1) Fractures or cracks passing through the wall, except for a single end crack that does not exceed the depth of the joint.

(2) Surface defects indicating honeycombed or open texture that would adversely affect the function of the unit.

(3) Damaged or cracked ends, where such damage would prevent making a satisfactory joint.

(4) Any continuous crack having a surface width of 0.01 inch (0.25 mm) or more and extending for a length of 12 inches (300 mm) 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 QPL 49 as soon as forms are removed.

(h) Quality Assurance: Acceptability of units will be determined by results of compression tests on concrete cylinders and by inspection during manufacture to determine their compliance with the design and workmanship prescribed in these specifications and on the plans. Units will be rejected for defects in workmanship in accordance with Subsection 1016.04(g).

A minimum of four cylinders for source approval and verification shall be made and cured in accordance with DOTD TR 226 or DOTD TR 227 and tested in accordance with DOTD TR 230 for each pour. Additional cylinders shall be made in pairs and used to determine the strength for moving within the plant.

SECTION 1018 – MISCELLANEOUS MATERIALS:

Subsection 1018.04 – Manhole Frames, Grates and Covers (09/02), Page 838.

Delete the Heading name and substitute the following.

Frames, Grates and Covers for Manholes, Catch Basins, and Junction Boxes.

Subsection 1018.13 – Roofing Pitch (05/01), Page 843.

Delete the first sentence and substitute the following:

Roofing pitch shall comply with ASTM D 4586.

Subsection 1018.20 – Fiber Glass Roving (05/01), Pages 847 and 848.

Delete this subsection.

Subsection 1018.22 – Hardware Cloth (06/02), Page 848.

Delete the text of this subsection and substitute the following.

Hardware cloth shall comply with the requirements of ASTM A 740, have a minimum wire diameter of 0.041 inch (1.04 mm), and be constructed of 1/2 inch x 1/2 inch (12.5 mm x 12.5 mm) mesh galvanized in accordance with ASTM A 153.

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Subsection 1018.28 – Grade 120 Ground Iron Blast-Furnace Slag (09/02), Page 850.

Delete this subsection and substitute the following.

Ground Granulated Blast-Furnace Slag: Grade 100 and grade 120 ground granulated blast-furnace slag shall be from an approved source listed on QPL 70 and shall comply with AASHTO M 302, except alkali content calculated as sodium oxide equivalent shall not exceed 0.60 percent by weight.

SECTION 1019 – GEOTEXTILE FABRIC AND GEOCOMPOSITE SYSTEMS:

Subsection 1019.01 – Geotextile Fabric (09/02), Pages 851 and 852.

Add the following the Heading (b)(2).

Use	Classes
Base Course	D
Subgrade Layer	D

SECTION 1020 – TRAFFIC SIGNALS:

Subsection 1020.01 – Traffic Signal Heads (04/04), Pages 854 – 861.

Delete sub-heading (c)(1).

Delete sub-heading (c)(3) and substitute the following.

(3) 12-Inch (300 mm) LED Traffic Signal Lamp Unit (Mast Arm and Span Wire Mount):

a. General: The 12-inch (300 mm) LED traffic signal lamp unit shall be used in new traffic signal heads or as a retrofited replacement for existing incandescent signal lamps. No special tools will be required for installation. When used as a retrofitted replacement for existing incandescent signal lamps, the 12-inch (300 mm) LED traffic signal lamp unit shall fit into existing traffic signal housings without modifications.

If proper orientation of the LED traffic signal lamp unit is required for optimum performance, prominent and permanent directional marking(s), such as an "UP arrow", for correct indexing and orientation shall exist on the unit.

The manufacturer's name, individual serial number, manufactured date, model number, and batch number shall be permanently marked on the backside of the LED traffic signal lamp unit. A label shall be placed on the unit certifying compliance to ITE standards.

b. Physical and Mechanical Requirements: The LED traffic signal lamp unit shall be a single, self-contained device, not requiring on-site assembly for installation into a new or existing traffic signal housing.

The assembly and manufacturing process for the LED traffic signal lamp unit assembly shall be such as to assure all internal LED and electronic components are adequately supported to withstand mechanical shock and vibration from high winds and other sources.

Each LED traffic signal lamp unit shall be comprised of a UV stabilized polymeric outer shell, multiple LED light source, and a regulated power supply. LEDs are to be mounted on a polycarbonate positioning plate or conformally coated printed circuit (PC) board.

The external lens shall be smooth on the outside to prevent excessive dirt/dust buildup. The optical lens/appearance of the lamp shall reflect a light distribution look similar to that of an incandescent lamp.

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c. Optical and Light Output Requirements: The LEDs shall be manufactured using AlInGaP (Aluminum-Indium-Gallium-Phosphide) technology or other LEDs with lower susceptibility to temperature degradation than AlGaAs (Aluminum-Gallium-Arsenide). AlGaAs LEDs will not be allowed.

Each LED traffic signal lamp shall meet minimum laboratory light intensity values, color (chromaticity), and light output distribution as described in ITE VTCSH (Vehicle Traffic Control Signal Head Standard) part 2 of the specifications 6.4.2.1, 6.4.4.1, 6.4.4.2, 6.4.4.3, 6.4.5 and 6.4.6 as a minimum. The LED traffic signal lamp units shall be certified by the laboratory to meet initial luminous values that are at least 115 percent of the required minimum values in the tables below. The tables below replace the values in Table 1 of Section 4.1.1 of the ITE VTCSH. The 6.4.2.1 test shall include an expanded view with the following minimums:

Grid Specification for 12–Inch (300 mm) Red
(Minimum Luminous Intensity Values (candelas))
(Shaded area is ITE requirements for light intensity)

Degrees	27.5	22.5	17.5	12.5	7.5	2.5	-2.5	-7.5	-12.5	-17.5	-22.5	-27.5
22.5U												
17.5U			3			10	10			3		
12.5U			14			20	20			14		
7.5U			20			54	54			20		
2.5U			58			220	220			58		
2.5D			77	141	251	339	339	251	141	77		
7.5D	16	38	89	145	202	226	226	202	145	89	38	16
12.5D	16	22	34	44	48	50	50	48	44	34	22	16
17.5D	16	20	22	22	22	22	22	22	22	22	20	16
22.5D			7			10	10			7		
27.5D												

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Grid Specification for 12–Inch (300 mm) Green and Yellow
(Minimum Luminous Intensity Values (candelas))
(Shaded area is ITE requirements for light intensity)

Degrees	27.5	22.5	17.5	12.5	7.5	2.5	-2.5	-7.5	-12.5	-17.5	-22.5	-27.5
22.5U												
17.5U			7			20	20			7		
12.5U			27			41	41			27		
7.5U			41			108	108			41		
2.5U			115			441	441			115		
2.5D			154	283	501	678	678	501	283	154		
7.5D	32	77	178	291	404	452	452	404	291	178	77	32
12.5D	32	44	69	89	97	101	101	97	89	69	44	32
17.5D	32	41	44	44	44	44	44	44	44	44	41	32
22.5D			14			20	20			14		
27.5D												

Arrow Indications (candelas/m²)

	Red	Yellow	Green
Arrow Indication	5 500	11 000	11 000

LEDs for arrow indications shall be spread evenly across the illuminated portion of the arrow area. Arrow LED traffic signal lamp units shall be tested in conformance with California Test 3001.

Measured chromaticity coordinates of LED traffic signal lamp units shall conform to the chromaticity requirements of the following table, for a minimum period of 60 months, over an operating temperature range of -40°F (-40°C) to 165°F (74°C). Each LED traffic signal lamp unit shall meet the minimum requirements for light output for the entire range from 80 to 135 volts.

Chromaticity Standards

Red	Y: not greater than 0.308, or less than 0.998x
Yellow	Y: not less than 0.411, nor less than 0.995 – x, nor greater than 0.452
Green	Y: not less than 0.506 – 0.519x, nor less than 0.150 + 1.068x, nor greater than 0.730 – x

LED traffic signal lamp units tested shall be representative of typical production units. Optical testing shall be performed with LED traffic signal lamp units mounted in standard traffic signal section without visors or hood attached to the signal sections.

After burn-in, LED traffic signal lamp units shall be tested for rated initial luminous intensity in conformance with the provisions contained herein above. Before measurement, LED traffic signal lamp units shall be energized at rated voltage, with 100 percent on-time duty cycle,

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for a time period of 30 minutes. Test results for this testing shall record the current, voltage, total harmonic distortion (THD) and power factor (PF) associated with each measurement.

Photometric, luminous intensity and color measurements for yellow LED traffic signal lamp units shall be taken immediately after the units are energized. The ambient temperature for these measurements shall be 77°F (25°C). Test results for this testing shall record the current, voltage, total harmonic distortion (THD) and power factor (PF) associated with each measurement.

d. Electrical: Each LED traffic signal lamp unit shall incorporate a regulated power supply designed to electrically protect the LEDs and maintain a safe and reliable operation. The power supply shall provide capacitor filtered DC regulated current to the LEDs in accordance with the LED manufacturer's specification. Design of the power supply shall be such that the failure of an individual component or any combination of components cannot cause the LED traffic signal lamp unit to be illuminated after AC power is removed. The power supply must be current regulated.

The LED traffic signal lamp unit shall operate on a 60Hz AC line voltage ranging from 80 volts RMS to 135 volts RMS. The circuitry shall prevent flickering over this voltage range. Nominal rated voltage for all measurements shall be 117 volts RMS.

The LED traffic signal lamp unit shall be operationally compatible with all TS1, TS2, and 2070 controllers, conflict monitors with plus features, and malfunction management units. In the case of conflicts between specifications, the latest LADOTD specifications will control.

A circuitry shall be provided that will shutdown the LED traffic signal lamp unit and power supply when 85 percent ITE light intensity specifications as amended herein are not satisfied. The manufacturer may be required to effectively demonstrate this feature.

Each shipment shall be accompanied with a certified test report from an independent testing lab. Random testing of average production units shall be conducted to ensure compliance with specifications.

Two, color coded, 36 in. long, 600 V, 18 AWG minimum jacketed wires, properly terminated to the LED traffic signal lamp unit to prevent moisture, dust, and other environmental substances from entering the unit, conforming to the National Electric Code, and rated for service at 221°F (105°C), shall be provided for an electrical connection.

Individual LED's shall be wired so that a catastrophic failure of one LED light source will result in the loss of only one LED light source.

The LED traffic signal lamp unit shall operate with a minimum 0.90 power factor.

Total harmonic distortion (current and voltage) induced into an AC power line by an LED traffic signal lamp unit shall not exceed 20 percent.

LED traffic signal lamp units and associated on-board circuitry shall conform to the requirements in Federal Communications Commission (FCC) Title 47, SubPart B, Section 15 regulations concerning the emission of electronic noise.

e. Environmental Requirements: The LED traffic signal lamp unit shall be rated for use in the ambient operating temperature range of -40°F (-40°C) to 165°F (74°C). The unit shall consist of a housing that is a sealed watertight enclosure that eliminates dirt contamination and allows for safe handling in all weather conditions. Moisture resistance testing shall be

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performed on LED traffic signal lamp units in conformance with the requirements in NEMA Standard 250-1991 for Type 4 enclosures. Evidence of internal moisture after testing shall be cause for rejection.

f. Production Testing Requirements: Each new LED traffic signal lamp unit shall be energized for a minimum of 24 hours at an operating temperature of 140°F (60°C) in order to cause any electronic infant mortality to occur, and to ensure electronic component reliability prior to shipment. After the burn-in procedure is completed, each LED traffic signal lamp unit shall be tested by the manufacturer for rated initial intensity at rated operating voltage.

g. Certifications: The contractor shall submit a test report certified by an independent laboratory that is certified to test in accordance with ITE standards that the LED traffic signal lamp unit model to be furnished meets ITE Standards for light distribution as amended herein, chromaticity, and power (consumption, power factor and harmonic distortion).

h. Warranty: The manufacturer shall provide a written warranty against defects in material, workmanship, or intensity for LED traffic signal lamp units for a period of 60 months after their installation. The traffic signal lamp units shall be warranted to maintain, throughout the warranty period, minimum luminous intensity values that are shown in the tables in paragraph c above. During the warranty period the manufacturer may be required to test any LED traffic signal lamp unit that is suspected to not meet the minimum intensity requirements at no cost to the Department. Any LED traffic signal lamp unit that fails during the warranty period shall be replaced. Replacement LED traffic signal lamp units shall be provided within 5 days after receipt of failed LED traffic signal lamp units at no cost to the Department.

The measured chromaticity coordinates of light emitting diode traffic signal lamp units shall conform to the requirements for chromaticity in Section 8.04 and Figure 1 of the ITE VTCSH over the temperature range of -40°F (-40°C) to 165°F (74°C).

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LOUISIANA
DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT
SUPPLEMENTAL SPECIFICATIONS

SECTION 502
SUPERPAVE ASPHALTIC CONCRETE MIXTURES

Section 502 of the 2000 Standard Specifications is deleted and substituted with the following.

502.01 DESCRIPTION. These specifications are applicable to Superpave asphaltic concrete wearing, binder and base course mixtures of the plant mix type.

This work consists of furnishing and constructing one or more courses of asphaltic concrete mixture applied hot in conformance with these specifications and in conformity with the lines, grades, thicknesses and typical sections shown on the plans or established. The mixture shall consist of aggregates and asphalt with additives combined in proportions which meet the requirements of this section including Tables 502-2, 502-3 and 502-4. Equipment and processes shall conform to Section 503.

Changes in design level will not be allowed, however, substitutions will be allowed for mixes within the same design level without requiring a plan change as follows. Wearing course [0.75 inch (19 mm)] may be substituted for binder course. Binder course [1 inch (25 mm)] may be substituted for base course. Wearing course shall not be substituted for base course.

When any substitution is made, all specification requirements for the mixture used shall apply with the following exceptions. When wearing course is substituted for binder course, RAP will be allowed in accordance with binder course requirements in Table 502-4. The lift thickness placed shall be as specified in Subsection 502.07 and Table 502-4 for the mix type used.

Quality assurance requirements and design procedures shall be as specified herein elsewhere and in the latest edition of the Department's publication entitled "Application of Quality Assurance Specifications for Asphaltic Concrete Mixtures" which is hereby made a part of this contract by reference.

502.02 MATERIALS. The contractor shall keep accurate records, including proof of deliveries of materials for use in asphaltic concrete mixtures. Copies of these records shall be furnished to the engineer upon request. Materials shall comply with the following Subsections:

Asphalt	1002.01
Silicone and Anti-Strip Additives	1002.02
Aggregates	1003.01 & 1003.06
Reclaimed Asphaltic Pavement (RAP)	1003.01 & 1003.06
Hydrated Lime	1018.03(a)
Mix Release Agent	1018.26

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(a) Asphalt: The asphalt cement grades used shall be as specified in Table 502-1 using the design traffic load levels shown on the plans.

Asphalt cement shall be sampled in accordance with the Materials Sampling Manual and shall meet the requirements of Section 1002. If the asphalt cement does not comply with the requirements of Section 1002, mix production shall cease until proper asphalt material is supplied.

Table 502-1
Superpave Asphalt Cement Usage

Current Traffic Load Level	Mixture Type	Grade of Asphalt Cement
Level 1	Wearing Course	PG 70-22m
	Binder Course	PG 70-22m
	Base Course	PG 64-22
Level 2 and 3	Wearing Course	PG 76-22m
	Binder Course	PG 76-22m
	Base Course	PG 64-22
Level A	Incidental Paving	PG 70-22m

Base course mixtures containing 20 to 30 percent RAP shall use PG 58-28 asphalt cement.

When mixtures are specified for pavement patching, pavement widening, pavement joint repair, driveways, curbs, guardrail widening, islands, bike paths, parking lots, or temporary detour roads, PG 64-22 asphalt cement may be used in lieu of the modified asphalts.

Leveling courses shall use the same grade of asphalt cement as in the layer immediately above except when blade leveling is directed by the engineer, a PG 64-22 will be allowed.

PG 76-22m asphalt cement may be substituted for PG 70-22m or PG 64-22 asphalt cements at no increase in price. PG 70-22m asphalt cement may be substituted for PG 64-22 at no increase in price. When average daily traffic (ADT) is less than 2500, PG 70-22m Alternate asphalt cement may be substituted for PG 70-22m asphalt cement for Level 1 and Level A mixes at no increase in price.

If a wearing course is substituted for a binder course, or if a binder course is substituted for a base, the grade of asphalt cement required will be in accordance with the original mixture type shown in the plans and as specified in Table 502-1.

(b) Additives:

(1) Silicone: Silicone additives, when needed, shall be dispersed into the asphalt by methods and in concentrations given in QPL 22.

(2) Anti-Strip (AS): An anti-strip additive shall be added at the minimum rate of 0.5 percent by weight (mass) of asphalt and thoroughly mixed in-line with the asphalt cement at the plant. Additional anti-strip shall be added up to 1.2 percent by weight (mass) of asphalt in accordance with Subsection 502.03(b).

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When the amount of anti-strip additive is not in accordance with the approved job mix formula, production shall be discontinued until satisfactory adjustments are made.

(3) Hydrated Lime: Hydrated lime additive may be incorporated into all asphaltic concrete mixtures at the rate specified in the approved job mix formula. The minimum rate shall not be less than 1.5 percent by weight (mass) of the total mixture. Hydrated lime additive shall be added to and thoroughly mixed with aggregates in conformance with Subsection 503.02(e). Hydrated lime may be added as a mineral filler in accordance with Heading (c)(3).

(c) Aggregates: Aggregates shall meet the requirements of Table 502-4 and Section 1003.

(1) Friction Ratings: Friction ratings for coarse aggregates shall be determined in accordance with Subsection 1003.06. The friction ratings and allowable usage of aggregates shall be as shown in Table 502-2. Friction rating requirements shall apply only to the final lift of the travel lane wearing course.

Table 502-2
Aggregate Friction Rating

Friction Rating	Allowable Usage
I	All mixtures
II	All mixtures
III	All mixtures, except travel lane wearing courses with plan ADT greater than 7000[1]
IV	All mixtures, except travel lane wearing courses[2]

[1] When plan current average daily traffic (ADT) is greater than 7000, blending of Friction Rating III aggregates and Friction Rating I and/or II aggregates will be allowed for travel lane wearing courses at the following percentages. At least 30 percent by weight (mass) of the total aggregates shall have a Friction Rating of I, or at least 50 percent by weight (mass) of the total aggregate shall have a Friction Rating of II. The frictional aggregates used to obtain the required percentages shall not have more than 10 percent passing the No. 8 (2.36 mm) sieve.

[2] When the average daily traffic (ADT) is less than 2500, blending of Friction Rating IV aggregates with Friction Rating I and/or II aggregates will be allowed for travel lane wearing courses at the following percentages. At least 50 percent by weight (mass) of the total aggregate in the mixture shall have a Friction Rating of I or II. The frictional aggregates used to obtain the required percentages shall not have more than 10 percent passing the No. 8 (2.36 mm) sieve.

(2) Reclaimed Asphaltic Pavement (RAP): Reclaimed asphaltic pavement shall be stockpiled separate from other materials at the plant and will be subject to approval prior to use. Such stockpiles shall be uniform and free of soil, debris, foreign matter and other contaminants. Reclaimed materials that cannot be broken down during mixing or that adversely affect paving operations shall be screened or crushed to pass a 2 inch (50 mm) sieve prior to use.

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(3) Mineral Filler: Mineral filler complying with the requirements of Subsection 1003.06(a)(6) may be used in all mixtures.

(4) Natural Sand: Natural sand shall meet the requirements of Table 502-4 and Subsection 1003.06(a)(3).

502.03 DESIGN AND VALIDATION OF MIXTURES.

(a) General: It is the intent of these specifications that the mixtures produced and placed meet the requirements for 100 percent payment. The contractor shall be responsible for design, production, transportation and laydown of mixtures. Work shall meet the requirements of this section and be subject to acceptance by the Department.

The contractor shall exercise quality control over materials and their assembly, design, processing, production, hauling, laydown and associated equipment. Quality control is defined as the constant monitoring of equipment, materials and processes to ensure that mixtures produced and placed are uniform, within control limits, and meet specification requirements. When these specifications are not being met and satisfactory control adjustments are not being made, operations shall be discontinued until proper adjustments and uniform operations are established. Control shall be accomplished by a program independent of the Department's testing and shall ensure that the requirements of the job mix are being achieved and that necessary adjustments provide the specified results.

The contractor shall conduct such tests as necessary, in addition to the required tests, to design, control and place mixtures within specifications.

The quality of mixtures will be evaluated during two phases, mixture produced at the plant, and mixture hauled, placed and compacted. Quality of both phases will be evaluated continuously as stated herein elsewhere. A lot is a segment of continuous production of asphaltic concrete mixture from the same job mix formula produced for the Department at an individual plant. Plant quality control testing shall be conducted continuously throughout production independent of delivery points. Project site quality control testing shall be conducted on each project for the mix placed on that project.

When the plant is in operation, the contractor shall have a Certified Asphaltic Concrete Plant Technician at the plant or jobsite who is capable of designing asphaltic concrete mixes, conducting any test or analysis necessary to put the plant into operation and producing a mixture meeting specifications. Daily plant operations shall not begin unless the Certified Asphaltic Concrete Plant Technician is at the plant. The Asphaltic Concrete Technician certification will be awarded by the Department upon satisfactory completion of the Department's requirements.

(b) Job Mix Formula: The contractor shall design the mixtures for optimum asphalt content and comply with requirements of the Superpave Mix Design for the level of mixture in Table 502-4 in accordance with AASHTO PP 28. The job mix formula shall include the recommended formula, extracted gradation, and supporting design data. The recommended formula shall be submitted for approval to the District Laboratory Engineer on a properly completed Superpave Asphaltic Concrete Job Formula form with all supporting design data. No mixture shall be produced until the proposed job mix formula has been approved.

The contractor's proposed job mix formula shall indicate a single anti-strip additive rate which is 0.1 percent greater than the percentage which will yield a minimum Tensile Strength

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Ratio (TSR) of 80 percent up to a maximum of 1.2 percent anti-strip additive when tested in accordance with DOTD TR 322.

Permeability shall be tested by the contractor and reported on the job mix formula. Permeability tests shall be performed on 6 inch diameter by 4 inch tall (150 mm by 100 mm) specimens compacted to 93% ±1% of theoretical maximum specific gravity (G_{mm}). The maximum coefficient of permeability shall be 3.5 ft./day (125 x 10-5 cm/second) as measured in accordance with ASTM PS 129. These same specimens may be used in moisture sensitivity testing.

The job mix formula shall indicate a single rate of hydrated lime additive when used. The job mix formula rate of hydrated lime additive shall not be less than 1.5 percent by weight (mass) of total mixture.

The job mix formula shall indicate the optimum mixing temperature. The job mix formula limits for mix temperature will be ±25°F (±14°C) from the optimum mixing temperature.

The job mix formula is to be inside the control points as detailed in Table 502-3. Blending of aggregates, i.e., gravel and stone, will be allowed provided the final composite mixture and final product meets or exceeds all specifications requirements.

The plant shall be operated to produce, on a continuing basis, a mixture uniformly conforming to the approved job mix formula. When this is not the case, the contractor shall make satisfactory adjustments or cease operations. The District Laboratory Engineer may permit the contractor to submit a new Asphaltic Concrete Job Mix Formula form for approval. The contractor shall submit a new job mix formula whenever a plant begins initial operations for the Department in a specific location or whenever a plant experiences a change in materials or source of materials. A new job mix formula will also be required whenever there are significant changes in equipment, such as the introduction of a new crusher, drum mixer, burner, etc.

When reclaimed asphaltic pavement (RAP) is used in a roadway mix, the quantity of RAP shall be designated in the job mix formula and meet the requirements of Table 502-4. The engineer may require the contractor to reduce the percentage of RAP to meet acceptance requirements.

When the contractor changes a source of RAP, the new mix design shall be submitted, validated and approved if the type of aggregate changes (e.g. gravel to limestone) or the source change causes a change in acceptance tolerances. If the contractor determines that the source change will not cause a change in acceptance tolerances, the contractor may elect to integrate the new RAP source into the existing approved mix design provided the contractor submits a revised job mix formula cover sheet which shows the new source of RAP and other changes. A new validation will not be required. If subsequent acceptance tests indicate that the mix is out of tolerance, a new design will be required and appropriate payment adjustments will apply.

(c) Job Mix Formula (JMF) Validation: The first day's production or a maximum of 2000 tons (2000 Mg) of mix shall be used to validate a new JMF. The contractor and the Department, using the stratified random sampling approach, shall jointly take five (5) samples, one per sublot, during the first day's production or a maximum of 2000 tons (2000 Mg) of mix. The contractor may elect to exclude test results representing the first 250 tons (250 Mg) from the

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validation analysis in order to make slight adjustments to the mix. The remaining validation lot, up to 1750 tons (1750 Mg), shall be divided into five (5) equal sublots and tested for validation analysis. If excluded from validation, the 250 tons (250 Mg) will be paid in accordance with Table 502-8. Minimum testing shall include one theoretical maximum specific gravity (G_{mm}), one gyratory specimen compacted to N_{design}, one gyratory specimen compacted to N_{max}, and one oven extraction. As approved by the district laboratory engineer, the contractor and the Department shall jointly analyze the test results for the following parameters:

(1) Extracted Gradation
(2) Percent Extracted Asphalt Cement
(3) Percent Crushed Aggregate, (from cold feed blends)
(4) Theoretical Maximum Specific Gravity (Gmm) (aged for one hour)

The following parameters apply to samples aged for one hour in an oven at gyratory compaction temperature and compacted to N_{design}.

(5) Bulk Specific Gravity (G_{mb}) at N_{design}
(6) Percent G_{mm} at $N_{initial}$
(7) Percent Air Voids, VMA and VFA

The following parameters apply to samples aged for one hour in an oven at gyratory compaction temperature and compacted to N_{max}

(8) Bulk Specific Gravity (G_{mb}) at N_{max} measured and estimated
(9) Percent G_{mm} at N_{max} and Corrected percent G_{mm} at N_{design}
(10) Slope of the Gyratory Compaction Curve

The mean, standard deviation, Quality Index and percent within limits (PWL) of the test results shall be calculated in accordance with Subsection 502.12(g), Quality Level Analysis. The test data will be used to validate the JMF.

A JMF is considered validated if the following parameters are 90 percent within limits of the JMF and meet the specifications requirements.

(1) Extracted Gradations for the No. 8 and No. 200 (2.36 mm and 75 μm) sieves
(2) Theoretical Maximum Specific Gravity (G_{mm})
(3) Percent G_{mm} at $N_{initial}$ and N_{max}
(4) Percent Air Voids at N_{design}

Also for validation, all other parameters shall be within the specifications limits.

Should the JMF validate on all but one parameter, the contractor may make adjustments to the production and repeat the validation testing using the next day's production or a maximum of 2000 tons (2000 Mg). Should the JMF fail to validate on more than one parameter, the JMF will be considered non-valid, and the contractor will be required to submit a new JMF for approval. A previously approved JMF may be produced in lieu of the disapproved JMF. Upon validation of the JMF, the validation averages will be used for JMF target values. Payment for

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validation lots will be in accordance with acceptance pay parameters, except that five cores shall be obtained to determine density pay. After validating the JMF for mix properties, the contractor, witnessed by the Department, shall sample the next day's production and perform validation testing at the plant for DOTD TR 322 and AASHTO TP 4 specimens. When the validation results are less than 80 percent, no further production for that job mix formula or any proposed job mix formula substituted for that mix type will be accepted on any DOTD project having DOTD TR 322 requirements until a passing plant-produced Tensile Strength Ratio (TSR) value is verified by the Department. A previously validated and approved JMF may be produced in lieu of the disapproved JMF.

Validation is not required for mixture designs used solely for curbs, driveways, turnouts, crossovers, joint repair, leveling, guardrail widening, islands, bike paths, patching, widening, shoulders less than 10 feet (3.0 m) wide, and miscellaneous handwork, but the mixture must meet specifications requirements.

502.04 WEATHER LIMITATIONS. Asphaltic concrete mixtures shall not be applied on a wet surface or when the ambient temperature is below 50°F (10°C) for wearing courses and 40°F (5°C) for base and binder courses, except that material in transit, or a maximum of 50 tons (45 Mg) in a surge bin or silo used as a surge bin at the time plant operation is discontinued may be placed; however, mixture placed shall perform satisfactorily and meet specification requirements. Inclement weather will be sufficient reason to terminate or not begin production.

When base course materials are placed in plan thicknesses of 2 3/4 inches (70 mm) or greater, these temperature limitations shall not apply provided all other specification requirements are met. When a wearing course is substituted for a binder course mixture the temperature limitation for binder course shall apply.

502.05 SURFACE PREPARATION. The surface to be covered shall be approved prior to placing mixtures. The contractor shall maintain the surface until it is covered.

(a) Cleaning: The surface to be covered shall be swept clean of dust, dirt, caked clay, caked material and loose material by revolving brooms or other mechanical sweepers supplemented with hand equipment as directed. When mixtures are to be placed on portland cement concrete pavement or overlaid portland cement concrete, the contractor shall remove excess joint filler from the surface by an approved burning method. The contractor shall remove any existing raised pavement markers prior to asphaltic concrete overlay operations.

When brooming does not adequately clean the surface, the contractor shall wash the surface with water in addition to brooming to clean the surface.

When liquid asphalt is exposed to traffic for more than 2 calendar days, becomes contaminated, or degrades due to inclement weather, the liquid asphalt shall be reapplied at the initial recommended rate at no direct pay.

(b) Applying Liquid Asphalt Materials:

(1) Existing Pavement Surfaces: Before constructing each course, an approved asphalt tack coat shall be applied in accordance with Section 504. The contractor shall protect the tack coat and spot patch as required.

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(2) Raw Aggregate Base Course and Raw Embankment Surfaces: The contractor shall apply an approved asphalt prime coat to unprimed surfaces, or protect in place prime coat and spot patch as required with asphalt prime coat, in accordance with Section 505.

(3) Cement and Lime Stabilized or Treated Embankment and Base Course Surfaces: The contractor shall apply an approved asphalt curing membrane when none is in place, or protect the in place curing membrane and spot patch, as required, with asphalt material in accordance with Section 506.

(4) Other Surfaces: Contact surfaces of curbs, gutters, manholes, edges of longitudinal and transverse joints, and other structures shall be covered with a uniform coating of an approved asphalt tack coat complying with Section 504 before placing asphaltic mixtures.

502.06 JOINT CONSTRUCTION.

(a) Longitudinal Joints: Longitudinal joints shall be constructed by setting the screed to allow approximately 25 percent fluff and also overlapping the paver approximately 2 inches (50 mm) onto the adjacent pass. Prior to rolling, the overlapped mix shall be pushed back to the uncompacted side, without scattering loose material over the uncompacted mat, to form a vertical edge above the joint. The vertical edge shall then be compacted by rolling to form a smooth, sealed joint. Longitudinal joints in one layer shall offset those in the layer below by a minimum of 3 inches (75 mm); however, the joint in the top layer shall be offset 3 inches (75 mm) to 6 inches (150 mm) from the centerline of pavement when the roadway comprises two lanes of width, or offset 3 inches (75 mm) to 6 inches (150 mm) from lane lines when the roadway is more than two lanes. The narrow strip shall be constructed first.

Where adjacent paving strips are to be placed, the longitudinal edge joint of the existing strip shall be tacked.

(b) Transverse Joints: Transverse joints shall be butt joints formed by cutting back on the previously placed mixture to expose the full depth of the lift. An approved 10 foot (3.0 m) static straightedge shall be used to identify the location at which the previously placed mixture is to be cut back to maintain no greater than a 1/8 inch (3 mm) deviation in grade. The cut face of the previously placed mat shall be lightly tacked before fresh material is placed. The screed shall rest on shims that are approximately 25 percent of plan thickness placed on the compacted mat. Transverse joints shall be formed by an adequate crew. Transverse joints shall be checked by the engineer for surface tolerance using a stringline extended from a point 10 feet (3 m) before the joint to a point approximately 40 feet (12 m) beyond the joint. Any deviation in grade from the stringline in excess of 3/16 inch (5 mm) for roadway wearing courses and 1/4 inch (6 mm) for other courses shall be immediately corrected prior to the paving operation continuing beyond 100 feet (30 m) of the transverse joint. Additionally, the transverse joint shall meet the surface tolerance requirements of Table 502-3. The contractor shall make necessary corrections to the joint before continuing placement operations.

Transverse joints in succeeding lifts shall be offset at least 3 feet (1.0 m).

502.07 HAULING, PAVING AND FINISHING. Mixtures shall be transported from the plant and delivered to the paver at a temperature no cooler than 25°F (14°C) below the lower limit of

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the approved job mix formula. The temperature of the mix going through the paver shall not be cooler than 250°F (120°C).

No loads shall be sent out so late in the day that completion of spreading and compaction of the mixture cannot be completed during daylight, unless artificial lighting has been approved.

When segregation occurs, haul trucks shall be loaded with a minimum of three drops of mix, the last of which shall be in the middle.

Each course of asphaltic mixture shall be placed in accordance with the specified lift thickness. When no lift thickness is specified, or when substitute mixtures are utilized as specified in Subsection 502.01, mixtures shall be placed in accordance with Table 502-4.

With the engineer's approval, motor patrols may be used to fill isolated depressions in the initial layer, provided this construction does not result in unsatisfactory subsequent lifts.

(a) Coordination of Production: The contractor shall coordinate and manage plant production, transportation of mix and placement operations to achieve a high quality pavement and shall have sufficient hauling vehicles to ensure continuous plant and roadway operations. The engineer will order a halt to operations when sufficient hauling vehicles are not available.

On final wearing course construction under traffic with pavement layers of 2 inches (50 mm) compacted thickness or less, the contractor will be permitted to pave one travel lane for a full day. The contractor shall pave the adjacent travel lane the next work day. When the adjacent travel lane is not paved the next calendar day and the longitudinal joint is exposed to traffic for more than 3 calendar days, and it has been determined that the subsequent roadway edge is not true to line and grade as previously constructed, the entire length of exposed longitudinal joint shall be cut back to plan thickness to a vertical edge and heavily tacked. When pavement layers are greater than 2 inches (50 mm) compacted thickness, the contractor shall place approximately 1/2 of each day's production in one lane and the remainder in the adjacent lane.

Pavement shall be protected from traffic until it has sufficiently hardened to the extent the surface is not damaged.

(b) Paving Operations: When placing the final two lifts of asphaltic concrete on the roadway travel lanes, a material transfer vehicle (MTV), as described in Subsection 503.10, will be required to deliver mixtures from the hauling equipment to the paving equipment, and to prevent segregation of the asphaltic concrete hot mix. The MTV is required regardless of ADT. All mixtures shall flow through the paver hopper. Mixtures dropped in front of the paver shall be either lifted into the hopper or rejected and cast aside. Delivery of material to the paver shall be at a uniform rate and in an amount within the capacity of paving and compacting equipment. The paver speed and number of trucks shall be adjusted to have one truck waiting in addition to the one at the paver in order to maintain continuous paving operations. The height of material in front of the screed shall remain uniform.

During mixture transfer, the paver shall not be jarred or moved out of alignment. The level of mix in the paver hopper shall not drop so low as to expose the hopper feed slats.

Pavers shall be designed and operated to place mixtures to required line, grade and surface tolerance without resorting to hand finishing.

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Longitudinal joints and edges shall be constructed along lines established. Stringlines or other forms of longitudinal control shall be placed by the contractor for the paver to follow. The paver shall be positioned and operated to closely follow the established line. Irregularities in alignment shall be corrected by trimming or filling directly behind the paver.

After each load of material has been placed, the texture of the unrolled surface shall be checked to determine its uniformity. The adjustment of screed, tamping bars, feed screws, hopper feed, etc., shall be checked frequently and adjusted as required to assure uniform spreading of the mix to proper line and grade and adequate compaction. When segregation of materials or other deficiencies occur, paving operations shall be suspended until the cause is determined and corrected.

Surface irregularities shall be corrected directly behind the paver. Excess material forming high spots shall be removed. Indented areas shall be filled and finished smooth. Hand placement in accordance with Heading (c) for surface repair will be permitted. Material shall not be cast over the surface.

When paving and finishing operations are interrupted so that the mixture remaining in trucks, paver, paver hopper or on the pavement cools to such extent that it cannot be placed, finished or compacted to the same degree of smoothness and with the same texture and density as the uncooled mixture, the cooled mixture shall be removed and replaced at no direct pay.

When additional mix is required to increase superelevation in curves, the use of automatic slope control will be optional with the contractor.

The traveling reference plane method of construction will be required for airport runways unless designated otherwise on the plans. Pavers for roadway travel lanes shall be equipped with automatic screed and slope control devices used with an erected stringline, unless the contractor elects to use an approved automated base course grading machine. If the automated base course grading machine is used with an erected stringline, an approved traveling reference plane shall be used with the paver.

The following requirements shall apply for mechanical pavers:

(1) Traveling Reference Plane: An approved traveling reference plane shall be used. After the initial paving strip of each lift is finished and compacted, adjacent paving strips shall be placed to the grade of the initial paving strip using the traveling reference plane or shoe device to control grade and a slope control device to control cross slope.

On multilane pavements, the initial paving strip and the sequence of lane construction will be subject to approval.

When both outside edges of the paving strip being placed are flush with previously placed material, the slope control device shall not be used. A grade sensor is required for each side of the paver.

In superelevated curves, the cross slope shall be changed from that specified for tangents to that specified for superelevation in gradual increments while the paver is in motion so a smooth transition in grade is obtained. This change in cross slope shall be accomplished within the transition distance specified.

This is the minimum acceptable method and the contractor must meet or exceed current surface tolerance specifications.

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(2) Erected Stringline: An erected stringline shall consist of a piano wire or approved equal stretched between stakes set at no greater than 25 foot (7.5 m) intervals tensioned between supports so that there is less than 1/8 inch (3 mm) variance between supports when the sensor is in place. The stringline elevation will be verified by the Department using standard surveying practices.

The initial paving strip of the first lift shall be constructed using an erected stringline referenced to established grade. When permitted, mixtures required to level isolated depressions may be placed without automatic screed control. Subsequent lifts may be constructed by use of the traveling reference plane, provided surface and grade tolerances are met on the previous lift.

Only one grade sensor and the slope control device are necessary for roadways with a normal crown on tangent alignment. Superelevated curves will require the use of two grade sensors and two erected stringlines to obtain proper grade and slope; however, when the automatic screed control device is equipped with a dial or other device which can be conveniently used to change the cross slope in small increments, superelevated curves may be constructed using this device and one erected stringline.

After the initial paving strip of the first lift is finished and compacted, adjacent paving strips shall be laid using an approved traveling reference plane.

(3) Without Automatic Screed Control: When permitted, pavers without automatic screed control may be used for pavement patching, pavement widening, paved drives and turnouts.

(c) Hand Placement: When the use of mechanical finishing equipment is not practical, the mix may be placed and finished by hand to the satisfaction of the engineer. No casting will be allowed including casting the mixture from the truck to the grade. During paving operations material shall be thoroughly loosened and uniformly distributed. Material that has formed into lumps and does not break down readily will be rejected. The surface shall be checked before rolling and irregularities corrected.

502.08 COMPACTION.

(a) General: After placement, mixtures shall be uniformly compacted, by rolling while still hot, to at least the density specified in Table 502-3. If continuous roller operation is discontinued, rollers shall be removed to cooler areas of the mat, where they will not leave surface indentations. The use of steel wheel rollers which result in excessive crushing of aggregate will not be permitted.

The rolling pattern established by the contractor shall be conducted by experienced operators in consistent sequences and by uniform methods that will obtain specified density and smoothness. Individual roller passes shall uniformly overlap preceding passes to ensure complete coverage of the paving area. The speed and operation of rollers shall not displace, tear or crack the mat. Nonvibrating steel wheel rollers shall be operated with drive wheels toward the paver. Any operations causing displacement, tearing or cracking of the mat shall be immediately corrected.

Equipment which leaves tracks or indented areas which cannot be corrected in normal operations or fails to produce a satisfactory surface shall not be used. Operation of equipment

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resulting in accumulation of material and subsequent shedding of accumulated material into the mixture or onto the mat will not be permitted.

To prevent adhesion of mixture, wheels of steel wheel rollers shall be kept properly moistened, but excess water will not be permitted.

Pneumatic tire rollers shall be operated so that tires will retain adequate heat to prevent mix from adhering to tires. The pneumatic tire roller shall be operated at a contact pressure which will result in a uniform, tightly knit surface. The pneumatic tire roller shall be kept approximately 6 inches (150 mm) from unsupported edges of the paving strip; however, when an adjacent paving strip is down, the roller shall overlap the adjacent paving strip approximately 6 inches (150 mm).

Vibratory rollers may be used provided they do not impair the stability of the pavement structure or underlying layers. Vibratory rollers shall not be used on the first lift of asphaltic concrete placed over the asphalt treated drainage blanket. When mix is placed on newly constructed cement or lime stabilized or treated layers, vibratory rollers shall not be used for at least 7 days after such stabilization or treatment.

It is the responsibility of the contractor to determine the number, size, and type of rollers to sufficiently compact the mixture to the specified density and surface smoothness. The rolling equipment shall be capable of maintaining the pace of the paver and shall conform to Subsection 503.06.

The surface of mixtures after compaction shall be smooth and true to cross slope and grade within the tolerances specified. Mixtures that become loose, broken, contaminated or otherwise defective shall be removed and replaced with fresh hot mixture compacted to conform with the surrounding mixture.

Excessive rippling of the mat surface will not be accepted. Ripples are small bumps in the pavement surface which usually appear in groups in a frequent and regular manner. There shall be no more than 12 ripples or peaks in any 100-foot (30 m) section. Rippling indicates a problem with the paving operation or mix that requires immediate corrective action by the contractor; otherwise operations shall cease. Unacceptable areas shall be corrected at no direct pay.

(b) Rolling: After rolling, newly finished pavements shall have a uniform, tightly knit surface free of cracks, tears, roller marks or other deficiencies. Deficiencies shall be corrected at no direct pay and the contractor shall adjust operations to correct the problem. This may require the contractor to adjust the mix or furnish additional or different equipment.

(c) Hand Compaction: Along forms, curbs, headers, walls and at other places inaccessible to rollers, mixture shall be uniformly compacted to the satisfaction of the engineer with approved hand tampers or mechanical tampers, conforming to Subsection 503.07.

502.09 PAVEMENT SAMPLES. Samples shall be cores approximately 4 inches (100 mm) or 6 inches (150 mm) in diameter taken by an approved core drill. The contractor shall furnish samples cut from the completed work. The removed pavement shall be replaced with hot or cold mixture and refinished during the work day coring is performed. No additional compensation will be allowed for furnishing test samples and replacing the areas with new pavement. Samples shall be taken by the contractor in the presence of the engineer's representative from areas

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selected by the Department in accordance with Subsection 502.12(c)(3). When the design thickness is greater than 1.75 inches (45 mm), cores less than 1 3/8 inches (35 mm) thick shall not be used as pavement samples for payment determination.

Cores shall be transported to the plant in approved styrofoam transport containers or one gallon (4 L) friction top cans. Regardless of transport container used, the container will be sealed, signed, and dated by the inspector using an approved method. The individually wrapped core will also be sealed, signed, and dated by the inspector using an approved method. Any evidence of tampering with the core wrappings, sticker, or of opening the container or friction top can will result in the cores being rejected. Additional pavement samples will be required.

502.10 SURFACE TOLERANCE REQUIREMENTS.

(a) General: This subsection outlines the method of measuring surface tolerance and the acceptance limits for quality control and assurance, including corrective actions and/or payment adjustments for asphaltic concrete surface tolerance. Longitudinal surface profile shall be measured in inches per mile (mm per km) in accordance with DOTD TR 644 and reported as the International Roughness Index (IRI), as defined in the National Cooperative Highway Research Program (NCHRP) Report No. 228 and World Bank Technical Paper No. 46.

Control of transverse, cross slope and grade shall be measured in inches (millimeters) using an approved 10-foot (3.0 m) metal static straightedge. For shoulders, turnouts, crossovers, detour roads, parking areas and roadway sections less than 500 feet (150 mm) in length, the wearing course shall be tested and the surface deviations shall not exceed 1/2 inch (15 mm). Areas with surface deviations in excess of 1/2 inch (15 mm) shall be isolated and corrected by the contractor in accordance with Heading (e).

The contractor shall furnish an inertial profiler to measure both wheelpaths simultaneously with laser or infrared height sensing equipment. The contractor shall also furnish an approved 10 foot (3.0 m) metal static straightedge for transverse acceptance testing.

Surface tolerance testing will be required on wearing and binder courses for roadway travel lanes. It will be required on the wearing course only for shoulders, parking areas and airport runways and taxiways. For surface tolerance purposes, the wearing course is defined as the final lift placed. The binder course is defined as the last lift placed prior to the final lift.

Other lifts on which additional asphaltic concrete is to be placed shall be finished so that succeeding courses will meet the requirements of this subsection. Base courses on which portland cement concrete pavement is to be placed shall be finished so that the portland cement concrete pavement will meet the requirements of Section 601.

(b) Equipment: Inertial profilers shall be capable of testing the finished surface in the longitudinal direction for conformance to the surface tolerance requirements listed in this subsection.

The Department will evaluate and verify the accuracy of the inertial profiler annually using static and dynamic tests in accordance with DOTD TR 644. Approved profilers will have a DOTD decal indicating the date of profiler verification and profiler system parameter settings. These settings shall be verified by the inspector before the first day of binder course paving and randomly thereafter.

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For each project, a Department representative will observe the daily set up procedure and pre-operation tests which are performed by the contractor in accordance with the manufacturer's procedures and DOTD TR 644. A copy of the manufacturer's setup procedure, pre-operation procedures, and operating procedure for measuring surface tolerance shall be available at all times during measurement.

(c) Transverse, Cross Slope and Grade:

(1) Transverse Surface Tolerance: The contractor shall control the transverse surface finish. The Department will test the surface of the binder and wearing courses at selected locations in the transverse direction for conformance to the surface tolerance requirements of Table 502-3, which shall not be exceeded. The contractor shall make corrections as directed in accordance with Heading (e) "Correction of Deficient Areas."

(2) Cross Slope: When the plans require the section to be constructed to a specified cross slope, the contractor shall take measurements at selected locations, using a stringline, slope board or other comparable method. The contractor shall control the cross slope so that the values shown in Table 502-3 are not exceeded. Cross slope variations allowed in Table 502-3 shall apply to each lane constructed.

(3) Grade: When the plans require the pavement to be constructed to a grade, the contractor shall perform tests for conformance at selected locations, using a stringline or other comparable method. The contractor shall control grade variations so that the tolerances shown in Table 502-3 are not exceeded. Grade tolerances shall apply to only one longitudinal line, such as the centerline or outside edge of pavement. The contractor shall make corrections in accordance with Heading (e) of this subsection.

(d) Longitudinal Surface Tolerance:

(1) Quality Assurance:

a. Contractor Responsibilities: The contractor shall report an average IRI number in inches per mile (mm per km) and shall measure and report the average IRI value for each wheelpath on every 0.05-mile (0.08 km) segment of highway. The IRI values for the inside and outside wheelpaths shall be averaged and reported as the segment average and the mean of each segment average shall be reported as the sublot average. The contractor shall measure the top two lifts of the roadway travel lanes. Final acceptance will be based on the last measurement taken on the final wearing course of the travel lanes (the top or last lift placed). Measurement of the center two lanes will be required for airports.

b. Reporting: The average sublot values and individual IRI values shall conform to the requirements listed in Tables 502-7A and 502-7B. The contractor shall provide the engineer a copy of the IRI report. The contractor shall test the pavement during the first work day following placement, but in no case any later than 7 calendar days. The measurement of "short"segments, less than 264 feet (80 m) in length, shall be included in adjacent sublots. Isolated rough areas will not be allowed. Any 0.05-mile (0.08 km) segment and all individual wheelpath measurements of the binder and wearing courses shall meet the requirements of Table 502-7B. The contractor shall make corrections in accordance with Subsection 502.10(c). A DOTD inspector will be present for the final test run and will immediately receive a copy of the results.

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(2) Acceptance: The Department will review each sublot report provided by the contractor. Acceptance of each sublot will be in accordance with Tables 502-7A and 502-7B, based on the IRI profile report provided by the contractor. The Department may elect to perform and utilize independent ride quality test results for acceptance at any time.

(e) Correction of Deficient Areas: The contractor shall correct areas not meeting Table 502-7B requirements for individual wheelpath measurements in a 0.05-mile (0.08 km) segment.

(1) Deficiencies in Wearing Course: The contractor shall correct deficiencies in the final wearing course by diamond grinding and applying a light tack coat, removing and replacing, or furnishing and placing a supplemental layer of wearing course mixture at least 1 1/2 inches (40 mm) compacted thickness for the full width of the roadway meeting specification requirements at no direct pay. If the supplemental layer does not meet specification requirements to the satisfaction of the engineer, the contractor shall remove and replace or correct it by other methods approved by the engineer.

(2) Deficiencies in Binder Courses: The contractor shall correct deficiencies in binder course, transverse, cross slope, and grade measurements to meet specification requirements at no direct pay. Corrections shall be made before subsequent courses are constructed.

(3) Deficiencies in Shoulder Transverse, Cross Slope and Grade: The contractor shall correct deficiencies in these areas by grinding at the project engineer's direction.

(f) Exceptions and Exclusions:

(1) Excluded Areas: The Department will review the profile report obtained for each binder and wearing course on a sublot basis. In special cases or extenuating circumstances, the engineer may isolate or exclude sections of the profile. These special cases or extenuating circumstances may be curb and gutter sections that require the adjustment of cross-slope in order to maintain adequate drainage, manholes, catch basins, valve and junction boxes, street intersections, or other structures located in the roadway which cause abrupt deviations in the profile. This specification exclusion will not be used to simply isolate sections of road that are in poor condition when the project is let.

(2) Areas Outside Travel Lanes: Ramps less than 1500 feet (460 m), tapers, shoulders and medians, or sections of pavement surfaces as directed by the engineer such as 300 feet (90 m) from bridge ends, will not be included in the ride quality index for payment purposes, but shall have a maximum IRI average of 110 or less in a sublot.

502.11 DIMENSIONAL REQUIREMENTS. Mixtures that are specified for payment on a cubic yard (cu m) or square yard (sq m) basis shall conform to the following dimensional requirements. Overthickness and overwidth will be waived at no direct pay.

(a) Thickness: Thickness of mixtures will be determined in accordance with DOTD TR 602. Underthickness shall not exceed 1/4 inch (6 mm).

When grade adjustments are permitted for all mixtures except the final wearing course, areas with underthickness in excess of 1/4 inch (6 mm) shall be corrected to plan thickness at no direct pay by furnishing and placing additional mixture in accordance with Subsection 502.10(e). For the final wearing course, areas with underthickness in excess of the 1/4 inch (6 mm) shall be

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corrected to plan thickness at no direct pay by furnishing and placing a supplemental layer of wearing course mixture meeting specification requirements in accordance with Subsection 502.10(c) over the entire area for the full width of the roadway when grade adjustments are permitted.

When grade adjustments do not permit, the deficient underthickness area shall be removed and replaced at no direct pay.

(b) Width: The width of completed courses will be determined in accordance with DOTD TR 602. Underwidths shall be corrected by furnishing and placing additional mixture to a minimum width of 1 foot (0.3 m) and plan thickness at no direct pay.

502.12 QUALITY CONTROL AND ACCEPTANCE.

(a) Quality Control Requirements: For quality control purposes, the contractor shall obtain a minimum of two (2) samples of mixture from each sublot using a stratified random sampling approach. Test results for theoretical maximum specific gravity (G_{mm}) and measured bulk specific gravity (G_{mb}) at N_{max} and percent G_{mm} at $N_{initial}$, on samples of each sublot shall be reported. Control charts may be requested by the engineer if mixture problems develop. Quality control gyratory samples may be aged or unaged at the contractor's option, but the method chosen shall be used consistently throughout the project. If aged samples are used, report the measured G_{mb} @ N_{max}. If unaged samples are used, report the estimated G_{mb} @ N_{max}. One loose mix sample shall be taken from each sublot after placement of the mix in the truck. The mix shall be tested by the contractor at the plant for aggregate gradation, asphalt content and percent crushed aggregate. The mix shall be tested in accordance with DOTD TR 309, TR 323 and TR 306. The lot average and standard deviation shall be determined for aggregate gradation and asphalt content. The percent within limits (PWL) shall be determined on the Nos. 8 and 200 (2.36 mm and 75 µm) sieves and for G_{mm}. Corrective action shall be taken if these parameters fall below 90 PWL. For each lot, the contractor shall report all quality control data to the DOTD Certified Plant Technician. The full range of gradation mix tolerances will be allowed even if they fall outside the control points. The percent moisture in loose mix shall be reported once per lot. The District Laboratory Engineer may require re-validation of the mix when the average of the Quality Control data indicates non-compliance with the specified limits or tolerances.

(b) Acceptance Requirements: All Department inspection procedures, including sampling and testing, form the basis for acceptance of the asphaltic concrete. Any section of pavement that is obviously deficient shall be satisfactorily corrected or replaced. Sampling and testing shall be accomplished following a stratified sampling plan in accordance with the Materials Sampling Manual and specified test procedures. Times and locations shall be established by the engineer.

Acceptance testing for air voids will be conducted on the total lot quantity. Acceptance testing for pavement density, surface tolerance and dimensional tolerances will be conducted on that portion of the lot placed on each contract.

Pavement density and surface tolerance requirements will not be applied for short irregular sections, such as drives, aprons and turnouts; however, hot mix shall be placed to provide a neat, uniform appearance and shall be compacted by satisfactory methods. If placed in a separate lot, mixtures used for shoulders which are less than 10 feet (3.0 m) wide, curbs,

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driveways, turnouts, crossovers, joint repair, leveling, guardrail widening, islands, bike paths, patching, widening, and miscellaneous handwork will be paid in accordance with Section 502.12(c) and Table 502-8 as a small quantity lot. If placed at the same time and in the same lot as roadway travel lanes, then these items will be considered incidental to the roadway work and will be included in the roadway pay.

Shoulders that are 10 feet (3.0 m) wide or greater shall be placed in a lot separate from the roadway travel lanes and will be paid in accordance with Tables 502-4 and 502-6.

A standard lot is 5,000 tons (5000 Mg), of consecutive production of asphaltic concrete mix from the same job mix formula produced for the Department at an individual plant. A standard sublot is 1,000 tons (1000 Mg). Additional adjustments may be made to the standard lot size as specified in this subsection. The final sublot, at the end of a project lot, may be increased up to 150 percent to accommodate hauling unit capacity.

With good historical performance, and when agreed upon by the engineer and contractor, the sublot size may be increased to 2000 tons (2000 Mg). Twenty-four hour per day plant production usually necessitates such an increase.

(c) Small Quantity Lots: The engineer or contractor may decrease the size of an individual lot for any of the following conditions:

(1) The interval between continuous production exceeds 2 days.
(2) A new job mix formula is accepted.
(3) The final lot is less than 5,000 tons (5000 Mg).
(4) The total project quantity is less than 5000 tons (5000 Mg).

Only standard 1000 ton (1000 Mg) sublots will be allowed when determining pay for small quantity lots. For lots with less than 3000 tons (3000 Mg) of mix, each sublot will be paid individually in accordance with Table 502-8. For lots with 3 or 4 sublots, PWL calculations will be required in accordance with Table 502-6.

For projects, or separate locations within a project, requiring less than 250 tons (250 Mg), the job mix formula, materials, and plant and paving operations shall be satisfactory to the engineer. Sampling and testing requirements may be modified by the engineer and the payment adjustment for deviations waived.

(d) Inspection: Hot mix exhibiting deficiencies before placement such as segregation, contamination, lumps, nonuniform coating, excessive temperature variations or other deficiencies, apparent on visual inspection, shall not be placed.

Hot mix exhibiting deficiencies during placement, such as segregation, contamination, alignment deviations, variations in surface texture and appearance or other deficiencies, apparent on visual inspection, will not be accepted. Poor construction practices such as handwork, improper truck exchanges, improper joint construction, or other deficiencies, apparent on visual inspection, will not be accepted.

Deficiencies revealed by visual inspection after placement and before final acceptance shall be corrected at no direct pay.

(e) Sampling and Testing for Acceptance: The Department will take samples or perform tests as outlined in these specifications, to ensure that the asphaltic concrete conforms to Department standards, which include job mix limits, typical sections, material properties, and

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surface deviations. Plant acceptance tests will be performed for VFA and air voids in the specimen compacted to N_{design} to determine the acceptability of the asphaltic concrete at the plant unless directed otherwise by the engineer. If the average VFA for 5 samples is outside the specifications limits, satisfactory adjustments must be made or production shall be discontinued. The plant acceptance tests for air voids shall be subject to payment adjustments and sampling and testing in accordance with the requirements of Heading (f) below.

(f) Payment Adjustments: When the mix does not meet requirements in the areas listed in this section, the Payment Adjustment Schedule shown in Tables 502-6, 502-7 or 502-8 will be applied. Production of mix that is not eligible for 100 percent payment will not be allowed on a continuous basis. When test results demonstrate that payment adjustments are necessary, satisfactory adjustments shall be made, or production shall be discontinued.

The Department will pay the contractor at an adjusted rate as specified in Tables 502-6 or 502-8 for tests conducted by the Department on samples obtained from each lot of material, in accordance with the following Headings.

(1) Volumetric Properties: Testing for percent air voids will be conducted by the Department. Test results of mixture specimens compacted to N_{design} shall comply with Table 502-4 when tested in accordance with AASHTO TP 4 and DOTD TR 304. One sample will be taken from each of five (5) sublots. The data will be used to determine if the lot is outside acceptance limits shown in Table 502-4. If the lot is outside the acceptance limits, an adjustment in unit price for the lot will be made in accordance with Tables 502-6 or 502-8.

(2) Pavement Density: Acceptance testing for pavement density will be conducted by the Department. Three pavement samples for each mix use shall be obtained from each sublot within 24 hours after placement. Sampling shall be performed using the random number tables shown in DOTD S605. When this falls on a day the contractor is not working, sampling shall be done within 3 calendar days. The density requirement for each lot will be as shown in Table 502-3 determined in accordance with DOTD TR 304. Payment will be made in accordance with Table 502-6 using the total number of cores for the lot in accordance with Subsection 502.12(g). Payment for small quantity lots will be made in accordance with Table 502-8.

When the sampling location determined by random sampling falls within areas that are to be replaced or within 1 foot (0.3 m) of the unsupported pavement edge, another random sampling location will be used.

(g) Quality Level Analysis: The Quality Level Analysis is a statistical quality control/quality acceptance (QC/QA) method for validating Job Mix Formulas (JMF), contractors quality control, project acceptance and payment for all Superpave asphaltic concrete.

The mean $(\overline{X})$ is the average of a set of numbers. To determine the mean add the numbers (X_i) in the set and divide by the number of numbers (n) in the set.

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$$\text{Mean} = \overline{X} = \frac{X_1 + X_2 + X_3 + \ldots + X_n}{n} = \frac{\sum_{i=1}^{n} X_i}{n}$$

The standard deviation of a set of numbers measures the spread of the numbers in the set or the deviation from the mean. Calculate the standard deviation according to the following formula:

$$\text{Standard Deviation} = s = \sqrt{\frac{(X_1 - \overline{X})^2 + (X_2 - \overline{X})^2 + \ldots + (X_i - \overline{X})^2}{n-1}}$$

$$= \sqrt{\frac{\sum_{i=1}^{n} (X_i - \overline{X})^2}{n-1}}$$

A Quality Index is calculated using both the upper and lower specification limits (if applicable). The Quality Index calculated using the upper or higher specification limit is called the Upper Quality Index (Q_U). The Quality Index calculated using the lower specification limit is called the Lower Quality Index (Q_L).

To determine each Quality Index, the specification limits are added or subtracted from the mean of the test results and the result is divided by the standard deviation as shown below.

$$\text{Upper Quality Index} = Q_U = \frac{USL - \overline{X}}{s} \qquad \text{Lower Quality Index} = Q_L = \frac{\overline{X} - LSL}{s}$$

Where: USL = upper specification limit
LSL = lower specification limit

Table 502-5 is used to convert the Quality Index into the PWL value. A PWL is calculated for each Quality Index (upper and lower) and combined for a total PWL calculated in accordance with the formula:

$$PWL = PWL_L + PWL_U - 100$$

where: PWL_L = lower percent within limits
PWL_U = upper percent within limits

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In using Table 502-5, the appropriate columns corresponding to the number of test results must be used.

If a specification requirement does not have both an upper and lower limit only one Quality Index and PWL, upper or lower as appropriate, is calculated and the other PWL is equal to 100 in the total PWL calculation.

502.13 MEASUREMENT. Asphalt tack coat, prime coat or curing membrane will not be measured for payment.

(a) Weight Measurement: Asphaltic concrete will be measured by the ton of 2,000 pounds (Mg (1000 kg)) from printed weights as provided in Section 503. Stamped printer tickets will be issued for each truckload of material delivered. Material lost, wasted, rejected or applied contrary to specifications will not be measured for payment.

Estimated quantities of asphaltic concrete shown on the plans are based on 115 lb/sq yd/inch (2.46 kg/sq m/mm) thickness. The measured quantity of asphaltic mixtures will be multiplied by the following adjustment factor to obtain the pay quantity.

Theoretical Maximum Specific Gravity, (G_{mm}) (DOTD TR 327)	Adjustment Factor
2.340 - 2.360	1.02
2.361 - 2.399	1.01
2.400 - 2.540	1.00
2.541 - 2.570	0.99
2.571 - 2.590	0.98

The adjustment factor for mixtures with theoretical maximum specific gravities less than 2.340 or more than 2.590 will be determined by the following formulas:

Theoretical maximum specific gravity less than 2.340:

$$F = \frac{2.400}{S}$$

Theoretical maximum specific gravity more than 2.590:

$$F = \frac{2.540}{S}$$

where,
F = quantity adjustment factor
S = theoretical maximum specific gravity of mixture from approved job mix formula

(b) Volume or Area Measurement: The quantities for payment will be the design quantities specified in the plans and adjustments thereto. Design quantities will be adjusted when the engineer makes changes to adjust to field conditions or when design changes are

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necessary. Design quantities are based on the horizontal dimensions and compacted thickness of the completed course shown on the plans.

(c) Surface Tolerance Incentive Measurement: At the completion of construction of the wearing course travel lanes, the contractor, in the presence of a DOTD representative, shall measure a continuous profile from the start station to the end station of the construction project for the purpose of determining qualification for incentive pay under Subsection 502.14(e). Bridges and 300 feet (90 m) on each end of the bridge will be excluded from measurements for surface tolerance incentive pay.

502.14 PAYMENT. Payment for asphaltic concrete will be made at the contract unit price on a lot basis. When the mix does not conform to acceptance requirements, payment will be made at an adjusted price per unit of measurement in accordance with Subsection 502.12(f) and Tables 502-6 and 502-8 for both plant and roadway acceptance.

(a) General: Payment for asphaltic concrete will include furnishing all required materials, producing the mixtures, preparing the surfaces on which the mixtures are placed, hauling the mixtures to the work site, and placing and compacting the mixtures.

(b) Wearing Course Mixes: For wearing course travel lanes, adjustments in contract price for plant and roadway deficiencies or incentives will be based on the average of the percent payments for plant air voids, roadway density, and surface tolerance. For all other wearing course applications, payment adjustment will be based on the average of the percent payments for plant air voids and roadway density.

(c) Base, Binder and Shoulder Mixes: For base and binder courses for travel lanes and all shoulder mixes, adjustments in contract price for plant and roadway deficiencies or incentives will be based on the average of the percent payments for plant air voids and roadway density.

Final adjustments in unit price will be as described in Tables 502-6 and 502-8.

(d) Erected Stringline: When the use of an erected stringline is not specified, but directed by the engineer, an additional payment of $500 per contract plus $0.25 per linear foot ($0.75 per lin m) will be made for mixtures placed by the erected stringline method. When the use of an erected stringline is specified, no additional payment will be made.

(e) Incentive Pay: A surface tolerance incentive payment equal to 5 percent of the contract unit price for the theoretical travel lane quantity of the wearing course item will be paid if the contractor achieves a project average IRI of 45 or less as measured at the completion of the project. No lot of wearing course on the project shall be less than 100 percent for surface tolerance. Only projects that have no areas of grinding are eligible for incentive pay.

Payment will be made under:

Item No.	Pay Item	Pay Unit
502-01	Superpave Asphaltic Concrete	Ton (Mg)
502-02	Superpave Asphaltic Concrete	Cubic Yard (Cu m)
502-03	Superpave Asphaltic Concrete, (in (mm) Thick)	Square Yard (Sq m)

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Table 502-3
Superpave Requirements

A. REQUIREMENTS FOR EXTRACTED ASPHALT CEMENT AND AGGREGATE GRADATION					
U.S. (Metric) Sieve % Passing	1/2 inch (12.5 mm) Nominal	3/4 inch (19 mm) Nominal	1 inch (25 mm) Nominal	1.5 inch (37.5 mm) Nominal	Mix Tolerance[1]
2 inch (50 mm)	---	---	---	100	±4
1 1/2 inch (37.5 mm)	---	---	100	90-100	±4
1 inch (25 mm)	---	100	90-100	89 Max.	±4
3/4 inch (19 mm)	100	90-100	89 Max	---	±4
1/2 inch (12.5 mm)	90-100	89 Max	---	---	±4
3/8 inch (9.5 mm)	89 Max.	---	---	---	±4
No. 4 (4.75 mm)	---	---	---	---	±4
No. 8 (2.36 mm)	34-58	29-49	23-45	19-41	±3
No. 16 (1.18 mm)	---	---	---	---	±2
No. 30 (600 µm)	---	---	---	---	±2
No. 50 (300 µm)	---	---	---	---	±2
No 100 (150 µm)	---	---	---	---	±2
No. 200 (75 µm)	4.0-10.0	3.0-8.0	2.0-7.0	1.0-6.0	±0.7
Extracted Asphalt, %	---	---	---	---	±0.2
Mix Temperature	---	---	---	---	±25°F (±14°C)

B. PAVEMENT REQUIREMENTS			
Density, Min. 92.0 (% of Theoretical Maximum Specific Gravity, DOTD TR 327) Travel Lane Wearing, Binder and Base Courses			
Density, Min. 89.0 (% of Theoretical Maximum Specific Gravity, DOTD TR 327) Shoulders			
Surface Tolerance Variation, inches (mm)[2]	Transverse[3]	Cross Slope[3]	Grade[4]
Roadway Travel Lane Wearing Courses	1/8 (3)	3/8 (10)	1/2 (15)
Binder Courses	1/4 (6)	1/2 (15)	1/2 (15)
Shoulder Wearing Course	3/16 (5)	3/4 (20)	3/4 (20)

[1] Job Mix Formula based on validated mix design.
[2] For longitudinal surface tolerance requirements, see Subsection 502.10(d).
[3] Based on 10 feet (3.0 mm).
[4] Applicable only when grade is specified.

Table 502-4
Superpave Design, Control and Acceptance Limits

Nominal Max., Size Agg.	0.5 inch[1] (12.5 mm)	0.5 inch (12.5 mm)			0.75 inch (19 mm)			1.0 inch (25 mm)			1.5 inch (37.5 mm)		
Type of Mix	Incidental Paving	Wearing Course			Wearing or Binder Course			Binder or Base Course			Base Course		
Level[2,3] (10^6 ESAL)	A <0.3	1[4] <3	2 3-30	3 >30	1[4] <3	2 3-30	3 >30	1 <3	2 3-30	3 >30	1 <3	2 3-30	3 >30
Asphalt Binder	Table 502-1												
Coarse Agg. Friction Rating[2]	I,II,III	I,II,III			I,II,III			I,II,III,IV			I,II,III,IV		
Coarse Agg. Angularity, % Crushed, (Double Faced) + No. 4 (4.75 mm)	55	75	95	98	75	95	98	75	95	98	60	75	98
Fine Agg. Angularity, Min. % - No. 8 (2.36 mm)	40	40	45	45	40	45	45	40	45	45	40	40	45
Flat and Elongated Particles, % Max. (5:1)	10	10			10			10			10		
Sand Equivalent, Min. % (Fine Agg.) - No. 4 (4.75 mm)	40	40	45	50	40	45	50	40	45	50	40	45	50
Natural Sand - Max. %	NA	15			15			15			25		
RAP, Max. %[5,9]	15	15			15			20,30			30		
Compacted Mix Design													
VMA, Min. %[6]	13	13			12			11			10		
Air Voids, %[6,10]	2.5-4.5	2.5-4.5			2.5-4.5			2.5-4.5			2.5-4.5		
VFA, %[6]	68-78	68-78			68-78			68-78			68-78		
$N_{initial}$ 89 % max.[7] (Gyrations)	7	7	8[8]	9	7	8[8]	9	7	8[8]	9	7	8[8]	9
N_{design} 96±1 % (Gyrations)	75	75	100[8]	125	75	100[8]	125	75	100[8]	125	75	100[8]	125
N_{max} 98 % max. (Gyrations)	115	115	160[8]	205	115	160[8]	205	115	160[8]	205	115	160[8]	205
Moisture Sensitivity, TSR Min.	80	80			80			80			80		
Dust/Effective Asphalt Ratio, %	0.6 - 1.6	0.6 - 1.6			0.6 - 1.6			0.6 - 1.6			0.6 - 1.6		
Lift Thickness, inch (mm)	1.0-2.0 (25-50)	1.5-2.0 (40-50)			1.5-2.0 (40-50)			2.0-4.0[11] (50-100)			4.0+ (100+)		

[1]May be used for airports, joint repair, leveling, driveways, shoulders, curbs, guardrail widening, islands, bike paths, parking lots, turnouts, crossovers, detour roads, and other incidental items approved by the engineer.
[2]Mixtures designated as Level 1F, 2F, and 3F must meet the requirements for Level 1, 2, and 3 respectively. Additionally, Level 1F, 2F, and 3F must meet the friction rating requirements in Table 502-2 for travel lane wearing courses with ADT > 7000.
[3]Design ESALs are the anticipated project traffic level expected on the design lane over a 20 year design period. Regardless of the actual design life of the roadway, determine the design ESALs for 20 years and choose the appropriate N_{design} level.
[4]When Level 1 wearing course is specified, 1/2 inch (12.5 mm) nominal maximum size aggregate shall be used.
[5]Maximum 20 % Rap shall be allowed in all shoulder wearing course mixtures. RAP shall not be allowed for airports.
[6]Air voids, VMA and VFA are determined on samples compacted to N_{design}.
[7]For Level 1 mixtures, $N_{initial}$ will be 90.5 % max. For Level A mixes, $N_{initial}$ will be 91.5 % max.
[8]For 20 year ESAL counts from 3 to 10 million use 7, 75 and 115 gyrations for $N_{initial}$, N_{design} and $N_{maximum}$ respectively.
[9]For 1.0 inch (25 mm) nominal maximum size aggregate the maximum percent RAP for binder course is 20 percent and the maximum percent RAP for base course is 30 percent.
[10]Air voids design target is 3.5%.
[11] For 1.0 inch (25 mm) nominal maximum size aggregate the maximum lift thickness for base course is 4+ inches (100+ mm).

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Table 502-5
Quality Index Values for Estimating Percent Within Limits

PWL	n = 3	n = 4	n = 5 - 6	n = 7 - 9	n = 10 - 12	n = 13 - 15
99	1.16	1.47	1.68	1.89	2.04	2.14
98	1.15	1.44	1.61	1.77	1.86	1.93
97	1.15	1.41	1.55	1.67	1.74	1.80
96	1.15	1.38	1.49	1.59	1.64	1.69
95	1.14	1.35	1.45	1.52	1.56	1.59
94	1.13	1.32	1.40	1.46	1.49	1.51
93	1.12	1.29	1.36	1.40	1.43	1.44
92	1.11	1.26	1.31	1.35	1.37	1.38
91	1.10	1.23	1.27	1.30	1.32	1.32
90	1.09	1.20	1.23	1.25	1.26	1.27
89	1.08	1.17	1.20	1.21	1.21	1.22
88	1.07	1.14	1.16	1.17	1.17	1.17
87	1.06	1.11	1.12	1.12	1.13	1.13
86	1.05	1.08	1.08	1.08	1.08	1.08
85	1.03	1.05	1.05	1.05	1.04	1.04
84	1.02	1.02	1.02	1.01	1.00	1.00
83	1.00	0.99	0.98	0.97	0.96	0.96
82	0.98	0.96	0.95	0.94	0.93	0.92
81	0.96	0.93	0.92	0.90	0.89	0.89
80	0.94	0.90	0.88	0.87	0.85	0.85
79	0.92	0.87	0.85	0.83	0.82	0.82
78	0.89	0.84	0.82	0.80	0.79	0.78
77	0.87	0.81	0.79	0.77	0.76	0.75
76	0.84	0.78	0.76	0.74	0.72	0.72
75	0.82	0.75	0.73	0.71	0.69	0.69
74	0.79	0.72	0.70	0.67	0.66	0.66
73	0.77	0.69	0.67	0.64	0.63	0.62
72	0.74	0.66	0.64	0.61	0.60	0.59
71	0.71	0.63	0.60	0.58	0.57	0.56
70	0.68	0.60	0.58	0.55	0.54	0.54
69	0.65	0.57	0.55	0.53	0.51	0.51
68	0.62	0.54	0.52	0.50	0.48	0.48
67	0.59	0.51	0.49	0.47	0.46	0.45
66	0.56	0.48	0.46	0.44	0.43	0.42
65	0.53	0.45	0.43	0.41	0.40	0.40
64	0.49	0.42	0.40	0.38	0.37	0.37
63	0.46	0.39	0.37	0.35	0.35	0.34
62	0.43	0.36	0.34	0.33	0.32	0.31
61	0.39	0.33	0.31	0.30	0.30	0.29
60	0.36	0.30	0.28	0.27	0.26	0.26
59	0.32	0.27	0.25	0.24	0.24	0.23
58	0.29	0.24	0.23	0.21	0.21	0.21
57	0.25	0.21	0.20	0.19	0.18	0.18
56	0.22	0.18	0.17	0.16	0.16	0.15
55	0.18	0.15	0.14	0.13	0.13	0.13
54	0.14	0.12	0.11	0.11	0.10	0.10
53	0.11	0.09	0.08	0.08	0.08	0.08
52	0.07	0.06	0.06	0.05	0.05	0.05
51	0.03	0.03	0.03	0.03	0.03	0.03
50	0.00	0.00	0.00	0.00	0.00	0.00

Note 1: For negative values of Q_u or Q_L. PWL_U or PWL_L is equal to 100 minus the tabular PWL_U or PWL_L.
Note 2: If the value of Q_U or Q_L does not correspond exactly to a value in the table, use the next higher value.

FOR INFORMATION ONLY

Table 502-6
Payment Adjustments for Superpave

Payment adjustments will be based on specification limits.

A) PLANT ACCEPTANCE

Air Voids: The percent within limits (PWL) will be calculated for air voids for each lot and reported to the nearest whole number. Payment for plant acceptance will be in accordance with Table 502-6A.

Table 502-6A
Payment Adjustment Schedule for Plant Acceptance

Air Voids PWL	Percent Payment
100	103
88-99	100
71-87	98
51-70	90
21-50	80
≤20	50 or Remove[1]

[1]At the option of the Department after investigation.

B) ROADWAY DENSITY

The percent within limits (PWL) will be calculated for pavement density for each lot and reported to the nearest whole number. Payment for roadway density will be in accordance with Table 502-6B.

Table 502-6B
Payment Adjustment Schedule for Roadway Density

Roadway Density PWL	Percent Payment
98-100	105
89-97	100
79-88	98
61-78	90
31-60	80
≤30	50 or Remove[1]

[1]At the option of the Department after investigation.

C) SURFACE TOLERANCE (Final Wearing Course Travel Lanes Only)

Payment adjustments for surface tolerance for the final wearing course travel lanes will be based on the International Roughness Index (IRI) in accordance with Table 502-7 and Subsections 502.13 and 502.14. Percent payments will be determined for each sublot and averaged to determine payment for the lot.

D) TOTAL PAYMENT

The percent payment for the wearing course travel lanes will be the average of the percent payments for plant acceptance, roadway density, and surface tolerance for each lot. Incentive payment for surface tolerance will be in accordance with Subsection 502.14(e) and paid separately.

The percent payment for all other mix types will be the average percent payments for plant acceptance and roadway density for each lot.

All calculations for percent payment will be rounded to the nearest 1 percent.

FOR INFORMATION ONLY

Table 502-7A
Payment Adjustment Schedules for Longitudinal
Surface Tolerance, Maximum International Roughness Index,
inches per mile (mm per km)

Percent of Contract Unit Price (by Sublot)[1]	103%[2]	100%	90%	80%	50% or Remove[3]
Category A Multi-Lift New Construction and Overlays of More than two Lifts and all Interstates	<55 (<870)	<65 (<1030)	65-75 (1030-1180)	NA	>75 (>1180)
Category B One or Two Lift Overlays Over Cold Planed Surfaces, and Two-Lift Overlays Over Existing Surfaces[4]	<65 (1030)	<75 (<1180)	75-89 (1180-1400)	NA	>89 (>1400)
Category C Single-Lift Overlays Over Existing Surfaces	<75 (<1180)	<85 (<1340)	85-95 (1340-1500)	>95-110 (>1500-1740)	>110 (>1740)
Incentive Pay, Final Completion, Average of All Travel Lanes[5]	≤45 (≤710)				

[1]or portion of sublot placed on the project.
[2]Maximum payment for sublots with exception areas, exclusions or grinding is 100 percent.
[3]At the option of the engineer.
[4]Also applies to two-lift overlays on reconstructed bases without profile grade control.
[5]Only Category A projects with no grinding are eligible for incentive.

Table 502-7B
Individual Wheelpath Deficient Area Limits
Maximum International Roughness Index, inches per mile (mm per km)

Any 0.05 Mile (0.08 km) Segment	Wearing Course	Binder Course
Category A	89 (1400)	105 (1660)
Category B	99 (1560)	110 (1740)
Category C	110 (1740)	N/A

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Table 502-8
Payment Adjustment Schedule for Small Quantities of Superpave[1]

Parameter[2]	Percent of Contract Unit Price/Sublot		
	100	95	50 or Remove[3]
% Air Voids	2.5-4.5	1.5-2.4 or 4.6-5.5	<1.5 or >5.5
Average Roadway Density, % G_{mm}	≥ Lower limit	-0.1 to -0.9 below lower limit	-1.0 below Lower limit

[1]See Subsection 502.12(c), Small Quantity Lots.
[2]For plant acceptance, use one sample for percent air voids to determine pay. For roadway acceptance, use the average of three cores to determine density and pay. Determine surface tolerance in accordance with Table 502-7. The total percent payment for small quantities of Superpave mixtures will be the average of the percent payments for plant acceptance (air voids), roadway acceptance (density) and surface tolerance.
[3]At the option of the engineer.

FOR INFORMATION ONLY

LOUISIANA
DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT
SUPPLEMENTAL SPECIFICATIONS

SECTION 741
WATER DISTRIBUTION SYSTEM

The 2000 Standard Specifications are amended to include this Section 741.

741.01 DESCRIPTION: This work consists of furnishing the necessary materials and installing, relocating and adjusting water distribution systems in accordance with these specifications and in conformity with the lines and grades shown on the plans or established by the engineer.

741.02 MATERIALS: A certificate of compliance from the manufacturer showing the chemical and physical properties of the materials used and conformance with the specifications will be required for each item.

(a) Cast Iron and Ductile Iron Pipe:

(1) Cast Iron Pipe: Cast iron pipe shall be made of grey cast iron and shall conform to ANSI A 21.6 (centrifugally cast in metal molds) or A 21.8 (centrifugally cast in sand lined molds). Iron in the pipe shall have a bursting tensile strength of at least 21,000 psi (145 MPa) and the pipe shall have a ring modulus of rupture of at least 45,000 psi (310 MPa).

(2) Ductile Iron Pipe: Ductile iron pipe shall consist of ductile cast iron and shall conform to ANSI A 21.51 (centrifugally cast in metal or sand lined molds).

(3) Fittings: Fittings for cast iron or ductile iron pipe shall conform to ANSI A 21.10.

(4) Coating and Lining of Pipe: Cast iron and ductile iron pipe and fittings shall be asphalt or vinyl coated outside, as specified, and cement lined and seal coated inside in accordance with ANSI A 21.4.

(5) Joints: Pipe joints shall conform to ANSI A 21.11 with the following criteria used for joint selection.

a. Mechanical Joint (Type III) with alloy steel bolts and nuts.
b. Boltless single gasket push-on joint.
c. Submarine, flexible, ball and socket joint.
d. Flanged joint.

Pipe shall be installed with joint types (a) or (b) for mains under normal service conditions, joint type (c) for stream or canal crossings and when specified, joint type (d) for above ground installations such as pumps.

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(b) Gate Valves and Valve Boxes:

(1) Valves shall be non-rising stem, iron body, bronze mounted, double-disk gate valves conforming to AWWA C 500. Valves shall have mechanical joint ends except that valves used with 2 inches (50 mm) or less diameter pipe, or galvanized iron pipe, shall have threaded ends. Valves shall open counterclockwise and shall be operated by nut method. Operating nuts shall conform to that used by the utility system.

(2) Valve boxes shall be approved cast iron, 2-piece, heavy roadway type. Valve boxes for 12 inches (300 mm) or larger valves shall be of the 3-piece type with oval base. The term "water" shall be cast on each valve box cover.

(c) Tapping Sleeves and Valves: Tapping sleeves shall be the split- sleeve, mechanical joint type. Gate valve connections shall be mechanical joint. Sleeves shall meet the requirements for cast iron fittings except the cement lining will not be required. Minimum working pressure shall be that specified for the system.

(d) Fire Hydrants: Fire hydrants shall conform to AWWA Designation: C 502 for 3-way type hydrants with working pressure of 150 psi (1.0 MPa). Hydrants shall be compression type and inlet connections shall be mechanical joint bell. Two 2 1/2 inches (65 mm) hose nozzles and one 4 1/2 inches (115 mm) pumper nozzle shall be provided; hose connections shall have National Standard threads. Hydrants shall have bronze seal rings, automatic drain openings and 0-ring seals. Minimum valve openings of 4 inches shall be provided. Hydrants shall contain a breakaway feature at ground level consisting of breakaway bolts or flange and breakaway coupling on the rod. Main valve and valve seat shall be replaceable without digging up the hydrant. The hydrant exterior shall be painted with approved enamel and shall be repainted after installation (color: yellow).

(e) Plastic Pipe: Plastic pipe and tubing shall be polyvinyl chloride or polyethlene pipe and tubing.

(1) Polyvinyl chloride (PVC) pipe shall conform to ASTM D 2241 and be pressure rated at 200 psi (1.3 MPa) minimum. The pipe shall be made from polyvinyl chloride compounds conforming to Class 12454B (Type 1, Grade 1), ASTM D 1784.

(2) Polyethylene (PE) pipe and tubing shall conform to ASTM D 2239 (pipe) and D 2737 (tubing). Pipe or tubing shall be rated for use with water at 73.4°F (23°C) at a hydrostatic design stress of 630 psi (4.3 MPa). Pipe or tubing shall be made from polyethylene plastics conforming to Type III, Grade 3, ASTM D 1248.

(3) When specified, Schedule 40 PVC shall be in accordance with ASTM D 1785, Schedule 40, PVC 1120.

(4) Plastic pipe and fittings must bear the seal or "NSF" mark of the National Sanitation Foundation or other approved marking indicating approval for use in transporting potable water.

(5) Welding Solvent and Solvent Thinner shall conform to ASTM D 2564.

(f) Galvanized Steel Pipe: These pipes and fittings shall be galvanized steel seamless pipe conforming to ASTM A 53 (A 53M), standard weight. Fittings shall be malleable iron conforming to ANSI B 16.3 except the nipples and couplings shall be the same material as the pipe. Fittings shall be galvanized in accordance with ASTM A 53 (A 53M).

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(g) Copper Pipe or Tubing: This pipe shall conform to ASTM B 88, Type K. Copper fittings shall be of the cast pattern or wrought pattern. Fittings for rigid copper pipe shall be of the solder joint type. Fittings for conceded soft draw pipe may be the flared mechanical type. Unions shall be the ground joint type.

(h) Detection Wire for Plastic Pipe: An approved electrically conductive insulated wire or tape shall be installed directly over and on the center of the plastic pipe for its entire length within highway right-of-way to facilitate locating of line with an electronic pipe locator. Wire or tape must be connected to all fixtures and appurtenances.

741.03 CONSTRUCTION REQUIREMENTS:

(a) General:

(1) Handling: Pipe, fittings and other materials shall be carefully handled to prevent breakage or damage, especially to the cement mortar lining in pipe and fittings.

(2) Existing Underground Utilities and Obstructions: All water lines, gas lines, telephone conduits, drainage structures, etc. shall be located and protected by the contractor during construction.

(b) Trench Excavation:

(1) Excavation: Excavation shall conform to Subsections 701.03 and 701.04, and the following requirements.

a. Protection of Excavation: Sheeting, shoring and hand excavation shall be used as necessary for protection of the work. Sheeting shall be withdrawn as backfilling is being done, except where the engineer directs that the sheeting and shoring be left in place, or where the engineer permits the sheeting to be left in place. The contractor shall cut off any sheeting left in place at least 18 inches (450 mm) below finished grade. Sheeting and bracing will not be paid for directly.

b. Trench Depth: Minimum bury (depth from grade to top of pipe) under pavement or surfacing shall be 4 feet (1.2 m). Minimum bury under ditches and in other non-paved areas shall be 2 feet (0.6 m).

c. Bell Holes: Bell holes of ample depth and width shall be excavated in pipe trenches at each joint location to permit the joint to be properly made and the pipe barrel to rest firmly on the trench bottom.

(2) Under Pavement:

a. Removing Pavement: The contractor shall remove existing pavement as necessary for trench excavation. Pavement shall be cut back from the top edges of trenches at least 24 inches (0.6 m) on each side of the trench. The requirements of Section 724 shall be followed for removing and replacing pavement except that no separate payment will be made for this work.

b. Jacking and Boring: The contractor may elect to jack or bore pipe under existing pavement where practical; however, separate payment for jacked or bored pipe will only be made when jacking or boring of pipe is specified. Jacked or bored pipe shall be installed in accordance with Section 728.

FOR INFORMATION ONLY

(c) Connection to Existing Mains: Connection to existing mains shall be made with appropriate fittings as shown on the plans or as directed. When it is necessary to make such connections under pressure (i.e., when normal water service must be maintained) a tapping sleeve and valve shall be used. The contractor shall furnish the valve tapping machine and other equipment required.

(1) Location: The contractor shall, before opening pipe line trenches, locate the points where connections are to be made to existing pipe lines and shall uncover as necessary for the engineer to prescribe the types of connections and fittings to be installed.

(2) Interruption of Service: Connections to existing pipe lines shall be made at such times and in such manner as will meet operating requirements. No cut shall be made in existing lines until permission has been obtained as to time and manner of making cuts and connections.

(d) Laying Water Mains and Appurtenances:

(1) Sequence of Work: Excavation, cleaning, laying, jointing and backfilling shall be kept up as closely as possible. Pipe shall not be left in the trench overnight without completely jointing and capping. The contractor shall backfill and compact the trench as soon as possible after laying, jointing and testing is complete. Each day at the close of work, and when laying is not in progress, the exposed end of the pipe line in the trench shall be closed with an approved barrier of wood or metal. If it is necessary to cover the end of an uncompleted pipe line with backfill, the end of the pipe shall be closed using a satisfactory cap or plug.

(2) Alignment and Gradient: Pipe line alignment and gradient shall be straight, or shall be deflected to follow true curves as nearly as practical. Deflection of pipe lines shall be within the allowable laying deflection angle, both horizontal and vertical.

(3) Installation:

a. Connections: Connections which are made inside roadway shoulders, or curbs and gutters, shall be made with flexible joints.

b. Cutting: Where pipe or special castings are required to be cut, cutting shall be done using pipe cutters.

c. Gate Valves: Gate valves shall be installed and jointed as specified above for water mains. Installation of gate valves shall include valve boxes, where required.

d. Fire hydrants: Hydrants shall be installed and jointed as specified above for water mains. Installation of hydrants shall include vertical extension sections if required, pipe straps, concrete blocking, aggregate drain and backfill.

e. Concrete Blocking: Concrete blocking shall be Class R concrete conforming to Section 901 and shall be formed and poured at the backs of fittings, including elbows, tees, pipe plugs, fire hydrants and other locations shown on the plans or directed by the engineer.

f. Backfilling: Backfilling shall conform to Subsection 701.08 and these requirements.

When testing for leaks in open trenches, backfilling shall not be done until testing has been completed and leaks eliminated.

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Where adjacent pavements are to be retained, pavement removed for pipe line trenches shall be replaced in kind or when approved, with equal or better material. After backfilling, the contractor shall maintain a satisfactory riding surface until repaving is completed. No separate payment will be made for replaced pavement.

g. Testing and Disinfection:

1. Testing: When a section of pipe is approved for testing, the contractor shall furnish all materials, equipment and labor to properly carry out this operation. This shall include a test pump and means of accurate measurement of water necessary to maintain required pressure during testing. The contractor shall furnish, install and remove any temporary bulkheads, flanges, plugs and corporation stops at high points in pipe lines and at the test pump, as necessary.

A. Sequence of Testing: When conditions permit, pipe lines shall be tested before the trench is backfilled and before service lines are installed; however, if high pressure testing must be done after service lines are in place, they shall be shut off at the corporation stops.

After necessary joints, bulkheads, etc. have been installed, corporation stops, if no other means can be provided, shall be placed in the high points of the pipe line and at the pump as required, and the pipe blown free from air according to accepted procedure.

B. Test Pressure: Test pressure shall be 50 psi (0.3 MPa) higher than the designated class pressure of pipe and fittings. Leakage shall not exceed 15 gallons per inch (1.4 L/mm) of pipe diameter per mile (km) per 24 hours. The minimum test period shall be 2 hours. However, if additional testing is required the contractor shall perform the procedure at his expense. When service lines cannot be isolated (i.e., shut off from the section to be tested), or other conditions exist where pressure testing as described above may cause damage, the line may be tested under normal operating pressure when approved. This work shall be done in open trenches, where possible, and testing repeated until leaks are eliminated.

C. Leaks and Defective Materials or Workmanship: Joints which leak shall be remade. Cracked, broken or defective materials shall be replaced. Defective workmanship shall be corrected. After the above conditions have been corrected, the line shall be retested as described above until the line passes the requirements. The contractor shall receive no additional compensation for the corrections or retesting.

2. Disinfection: Pipe lines and appurtenances, both existing and new which are the responsibility of the contractor, shall be disinfected before being placed in service. The disinfection process may be done in conjunction with the pressure test and shall be in accordance with AWWA C 601 and these requirements.

A solution of calcium hypochlorite or sodium hypochlorite (such as HTH, Perchloron, Chlorox, etc.) liquid chlorine or other approved disinfectant shall be used to obtain a solution of at least 50 ppm of available chlorine throughout the pipe system. No chlorine shall be applied to pipe as lines are being laid.

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For this work, the contractor shall furnish suitable corporation stops, plugs or caps for the pipe, injection pumps, pipe connections and other equipment, and all labor required, at no additional cost to the Department.

While disinfectant is being applied to any section of the system, the water shall be allowed to escape at all extremities of this section until an orthotolidine test shows a deep orange color. The disinfectant shall be allowed to remain in the pipe at least 6 hours and tests shall be made to determine that a chlorine residual of at least 5 ppm remains. If there is not sufficient residual chlorine, disinfection shall be repeated. After disinfection, lines shall be thoroughly flushed to remove the chlorine. If bacteriological tests indicate that the lines are not free of coliform organisms, the disinfection procedure shall be repeated on that part of the system until proven to be free of contamination.

Disinfection shall be made in the presence of the engineer. The contractor shall notify the engineer at least 48 hours prior to the time lines are to be disinfected. The contractor shall furnish taps, corporation stops, tubing and faucets, and furnish labor to obtain samples of water from disinfected lines. These shall be collected and submitted to a biological laboratory of the State Board of Health. Copies of laboratory reports shall be submitted to the engineer. Disinfection shall be considered acceptable when reports indicate lines to be free of contamination. Lines shall be disinfected as soon after completion of testing as possible.

When tests are completed, test risers shall be removed and corporation stops plugged with an approved brass plug.

(e) Laying Service Lines and Appurtenances: Except as modified below, construction and installation of service lines shall conform to the requirements for laying water mains. Service lines shall include complete installation of the new pipe from the water main to the final location of the meter, or to such points as directed to connect with existing or future service lines and abutting property. Installation of service line pipe shall include necessary connections, including unions, valves, fittings, corporation stops, goosenecks where permitted, and curb stops.

(1) Excavation and Backfill:

a. Excavation: Excavation shall be done as specified elsewhere herein.

b. Backfill: Backfilling shall be done as specified herein after leakage test has been made under normal operation pressure in open trenches and leaks eliminated.

(2) Laying and Jointing: Jointing of copper pipe, galvanized steel pipe and plastic pipe shall be in accordance with standard practice for jointing water pipe and approved installation methods. Plastic pipe shall be placed in the trench to allow at least 1 percent additional length of pipe for thermal connection, and selected backfill material shall be placed and compacted to 6 inches above pipe before proceeding with normal backfill operations.

(f) Relocations, Adjustments and Removals:

(1) Water Valves, including valve boxes and fire hydrants, shall be relocated, adjusted to grade or removed as shown on the plans or as designated. The contractor shall protect all parts during the removing and relocating operation and shall replace all items lost or damaged at his expense. All lead or composition joints shall be melted out and each joint disconnected before being removed from the trench.

FOR INFORMATION ONLY

Relocated gate valves or fire hydrants shall be installed as specified for new gate valves or fire hydrants. Concrete blocking will be required for fire hydrants. Leakage tests shall be performed as specified above. Backfilling shall be done as specified herein. Concrete blocking and any additional pipe required in resetting the gate valve or fire hydrant at its new location will be paid for separately. Valve boxes, when they exist, shall be considered to be a part of the valve assembly and shall be removed with the valve.

(2) Existing water meters and boxes shall be relocated as shown on the plans or as designated. Relocation shall include removing the existing meter, meter box, all required pipe, unions and appurtenances, storage, protection where necessary, and reinstalling the meter, meter box and curb stop in the existing service line as directed. The contractor, with the engineer, shall inspect each meter before its removal to determine its condition. If a meter is defective, the contractor will be furnished a replacement meter for the installation.

(3) Existing water service lines shall be adjusted to grade, by excavating for, and lowering or raising the existing service lines and backfilling at the same location, as shown on the plans or directed. Any new materials or fittings required for the adjustment shall be furnished by the contractor without additional compensation. He shall also make any required changes in the connection at the main which are the result of this work. All leaks and damage caused by the contractor's operations shall be repaired at his expense. If a water meter is to be retained at the same location in an existing service line that is to be adjusted, the meter and box shall also be adjusted to proper grade. No additional compensation will be allowed for this adjustment.

(4) Existing water meter and water valve boxes shall be lowered or raised to the grade established on the plans or by the engineer.

(5) Existing house connections shall be adjusted as required. New pipe and fittings required to adjust house connections shall be equal in quality to that of the existing installation and meet requirements of the utility and code.

741.04 MEASUREMENT:

(a) Water Mains: Water mains will be measured by the linear foot (lin m) along the center, parallel to the slope of the pipe, from end to end of each installation through all fittings.

(b) Fittings: Pipe fittings will be considered subsidiary to the water line in which they are used.

(c) Gate valves, including boxes when required, will be measured by the number of each size installed.

(d) Tapping sleeve and valve assembly will be measured by the number of each size installed.

(e) Fire hydrants will be measured by the number of each installed.

(f) Service Lines: Service lines will be measured by the linear foot (lin m) from end to end, and from center of lines to ends of branches, including valves and fittings.

FOR INFORMATION ONLY

(g) Relocating Fire Hydrants, Water Valves and Water Meters: Existing fire hydrants, water valves and water meters will be measured by the number of each relocated, including relocation of boxes for such valves and meters.

(h) Adjusting Meter Boxes and Valve Boxes: Existing meter boxes and valve boxes adjusted to grade in their original locations will be measured by the number adjusted.

(i) Removal of Water Valves and Fire Hydrants: Existing water valves, including boxes when necessary, and fire hydrants will be measured by the number of each removed.

(j) Excavation and Backfill: Excavation and backfill will not be measured for payment.

(k) Concrete Blocking: Concrete blocking will be measured by the cubic yard (cu m) of concrete used.

(l) Adjusting Water House Connections: This item will be measured by the number of house connections adjusted.

(m) Adjusting Service Lines to Grade: This item will be measured in linear feet (lin m) of service line pipe lowered or raised, including valves, fittings, meters, boxes and other appurtenances. Measurement will be made from end to end of adjusted service line.

(n) Incidentals: Pavement removed and replaced, including sawing, testing, disinfection and detection wire for plastic pipe, will not be measured for payment.

(o) Casing will be measured by the linear foot (lin m) along the center, parallel to the slope of the casing.

(p) Butterfly valves, including boxes when required, will be measured by the number of each installed.

(q) Double strap saddles will be measured by the number of each installed.

741.05 PAYMENT:

(a) Water main pipe will be paid for per linear foot (lin m) for each size of pipe installed, which includes fittings, excavation, backfilling, removal and replacement of pavement, testing, sterilizing, and laying pipe in casing when required.

(b) Gate valves will be paid for per each, which includes box if required, and joint connections.

(c) Tapping sleeve and valve assemblies will be paid for per each, which includes joint connections.

(d) Fire hydrants will be paid for per each, which includes vertical extensions, joint connections, pipe straps and stone drain.

(e) Service line pipe will be paid for per linear foot (lin m), which includes excavation, backfilling, removal and replacement of pavement, testing, sterilizing, corporation and curb stops, goosenecks where required, fittings, jointing, connecting to the main, and laying pipe in casing when required.

(f) Relocating fire hydrant will be paid for per each, which includes crushed stone drain.

(g) Relocating water valve including box will be paid for per each, which includes excavation and backfill.

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(h) Relocating water meter including box will be paid for per each set, which includes excavation and backfill.

(i) Adjusting water house connections will be paid for per each, which includes necessary adjustment of service lines not exceeding 20 linear feet (6.1 lin m) per house connection, and required new pipe and fittings.

(j) Adjusting water service lines in excess of 20 linear feet (6.1 lin m) per house connection will be paid for per linear foot (lin m) of adjusted service line, which includes required new pipe and fittings.

(k) Adjusting meter boxes and valve boxes to grade will be paid for per each.

(l) Removal of water valves will be paid for per each, which includes valve box.

(m) Removal of fire hydrants will be paid for per each.

(n) Concrete blocking will be paid for per cubic yard (cu m).

(o) Casing will be paid for per linear foot (lin m), which includes excavation, backfilling, and removal and replacement of pavement.

(p) Butterfly valves will be paid for per each size, which includes box if required, and joint connections.

(q) Double strap saddles will be paid for per each, which includes joint connections.

(r) Payment will be made at the contract unit prices under:

Item No.	Pay Item	Pay Unit
741-01	Water Main (Size & Type)	Linear Foot (Lin m)
741-02	Gate Valve (Size)	Each
741-03	Tapping Sleeve and Valve Assembly (Size)	Each
741-04	Fire Hydrant	Each
741-05	Water Service Line (Size & Type)	Linear Foot (Lin m)
741-06	Relocating Fire Hydrant	Each
741-07	Relocating Water Valve	Each
741-08	Relocating Water Meter	Each
741-09	Adjusting Water House Connections	Each
741-10	Adjusting Water Service Lines	Linear Foot (Lin m)
741-11	Adjusting Water Valve and Meter Box	Each
741-12	Removing Water Valve Including Box	Each
741-13	Removing Fire Hydrant	Each
741-14	Concrete Blocking	Cubic Yard (Cu m)
741-15	Casing (Size & Type)	Linear Foot (Lin m)
741-16	Butterfly Valve (Size)	Each
741-17	Double Strap Saddle (Size)	Each

FOR INFORMATION ONLY

LOUISIANA
DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT
SUPPLEMENTAL SPECIFICATIONS

SECTION 742
SANITARY SEWER SYSTEMS

The 2000 Standard Specifications are amended to include this Section.

742.01 DESCRIPTION. This work consists of furnishing the necessary materials and installing, relocating and adjusting sanitary sewers and appurtenances in accordance with these specifications and in conformity with the lines and grades shown on the plans or established by the engineer.

Sewer manholes and junction boxes shall be constructed or reconstructed in accordance with the plans and Section 702.

The contractor shall coordinate his work activities with utility owners in accordance with Subsections 105.06 and 107.20 and shall observe all laws in accordance with Subsection 107.01.

742.02 MATERIALS. A certificate of compliance from the manufacturer showing the chemical and physical properties of the materials used and conformance with the specifications will be required in accordance with Subsection 106.04.

When the item "Sanitary Sewer Pipe" is included in the contract, the contractor has the option of furnishing any of the following materials unless otherwise specified.

(a) Cast Iron and Ductile Iron Pipe:

(1) Cast Iron Pipe: Cast iron pipe shall be made of gray cast iron and shall conform to ANSI A 21.6 (centrifugally cast in metal molds) or A 21.8 (centrifugally cast in sand lined molds). The iron in the pipe shall have a bursting tensile strength of at least 21,000 psi (145 MPa) and shall have a ring modulus of rupture of at least 45,000 psi (310 MPa). Pipe shall have thickness corresponding to Class 25 of A 21.6 or A 21.80.

(2) Ductile Iron Pipe: Ductile iron pipe shall consist of ductile cast iron and shall conform to ANSI A 21.51 (centrifugally cast in metal or sand lined molds). Pipe shall have thickness corresponding to Class 5 of A 21.51.

(3) Fittings: Fittings for cast iron or ductile iron pipe shall conform to ANSI A 21.10.

(4) Coating: The exterior and interior of pipe and fittings shall be covered with an approved bituminous coating in accordance with the above specifications.

(5) Joints: Pipe joints shall conform to ANSI A 21.11 and shall be the following types, as specified.

a. Mechanical Joint (Type III) with alloy steel bolts and nuts.
b. Boltless single gasket and push-on joint.
c. Submarine, flexible, ball and socket joint.
d. Flanged joint.

Flange bolts in contact with sewage or sludge shall be stainless steel or bronze.

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(b) Clay Pipe: Vitrified clay sewer pipe and fittings shall conform to ASTM C 700 and shall have compression joints conforming to ASTM C 425. Pipe 6 inches (150 mm) and under shall be "Standard Strength Clay Pipe", and above 6 inches (150 mm) shall be "Extra Strength Clay Pipe".

(c) Plastic Pipe:

(1) Acrylonitrile-Butadiene-Styrene (ABS): Pipe and fittings shall conform to ASTM D 2680 for composite-wall pipe, and ASTM D 2751 (SDR 35) for solid-wall pipe.

(2) Polyvinyl Chloride (PVC): Pipe and fittings shall conform to ASTM D 3034, Type PSM (SDR 35).

(3) Detection Wire for Plastic Pipe: An approved electrically conductive insulated wire or tape shall be installed on the center of the plastic pipe for its entire length within highway right-of-way to facilitate location of line with an electronic pipe locator. Wire or tape must be connected to all fixtures and appurtenances.

(d) Concrete Sewer Pipe: Nonreinforced concrete sewer pipe shall conform to ASTM C 14 (C 14M), Class 2. Joints shall be Type 3 in accordance with Subsection 1006.05.

(e) Reinforced Concrete Sewer Pipe: Reinforced Concrete Sewer Pipe shall conform to Subsection 1006.03. Joints shall be Type 3 in accordance with Subsection 1006.05.

742.03 MAINTENANCE OF SEWAGE FLOW. The contractor shall maintain continuous flow of sewage during relocation operations. No diversion of sewage flow into open trenches or streams will be permitted.

742.04 CONSTRUCTION REQUIREMENTS.

(a) General: Underground water lines, gas lines, telephone conduits, drainage structures, etc. shall be located and protected by the contractor during construction.

(b) Trench Excavation:

(1) Excavation: The requirements of Subsections 701.03 and 701.04 and these additional requirements shall be met.

a. Protection of Excavation: Sheeting, shoring and hand excavation shall be used as necessary for protection of the work. Sheeting in excavation shall be withdrawn as backfilling is being done, except where the engineer directs that sheeting and shoring be left in place, or where the engineer permits sheeting to be left in place at the contractor's expense. The contractor shall cut off sheeting left in place at least 18 inches (450 mm) below finished grade. Sheeting and bracing will not be paid for directly unless there is a contract item for this work or unless sheeting and bracing were left in place by order of the engineer. The pipe grade and line shall not be disturbed.

b. Minimum Trench Depth (Bury): Minimum bury under pavement or surfacing shall be 4 feet (1.2 m). Minimum bury under ditches shall be 24 inches (0.6 m). Minimum bury for installations parallel to roadway shall be 24 inches (0.6 m).

c. Joints and Bell Holes: Bell holes of ample depth and width shall be excavated in pipe trenches at each joint location to permit the joint to be properly made and

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the pipe barrel to rest firmly on the ditch bottom. The trench shall be dry when jointing and laying pipe.

(2) Under Pavement:

a. Removing Pavement: The contractor shall remove existing pavement as necessary for trench excavation. Pavement shall be cut back from top edges of trenches at least 24 inches (0.6 m) on each side of the trench. The requirements of Section 724 shall be followed for removing and replacing pavement except that no separate payment will be made for this work unless a pay item for pavement patching is provided.

b. Jacking and Boring: The contractor may jack or bore pipe under existing pavement where practical, but payment in these instances will be made under the item for installation in an open trench. Separate payment for jacked or bored pipe will be made when the plans or specifications require that the pipe be installed in that manner and an item is included in the contract. Pipe that is jacked or bored shall be installed in accordance with Section 728.

(c) Connections: No pipe shall be cut for connections except as indicated on the plans or directed. The cost for making connections, including connections to existing facilities, shall be included in the contract price for sewer pipe.

(1) Manhole Connections: The contractor shall use care in connecting new sewer lines to existing manholes and connecting existing sewer lines to new manholes to avoid infiltration of foreign substances. Manholes shall be cleaned of fallen masonry or debris.

(2) Connections for Future Use: Connections for future use shall be capped and sealed in accordance with the requirements for sealing joints.

(3) House Connections: Wyes and tees installed in a common sewer for house connections shall be installed as shown on the plans or as directed.

(d) Adjusting Sanitary Sewer House Connections and Service Lines: New pipe and fittings required to adjust house connections shall be equal in quality to that of the existing installation and meet the requirements of the utility and code.

742.05 TESTS. Completed sewer lines shall be tested with reflected light and shall show an unobstructed view between manholes. Infiltration shall not exceed 10 gallons per day per inch (1.5 L/mm per day) diameter per 100 feet (30 m) of pipe. On lines where flow indicates infiltration in excess of this amount, a leakage test shall be conducted at the contractor's expense by a method satisfactory to the engineer. Sewer lines showing excessive leakage or undue deviation from line or grade shall be repaired or replaced by the contractor at his expense.

742.06 MEASUREMENT.

(a) Excavation and Backfill: Excavation, foundation preparation material and backfill will not be measured for payment, with the following exception. If an item for Bedding Material is included in the contract, this item will be paid for within the limits specified and in accordance with Section 726.

(b) Sanitary Sewer Pipe: Pipe will be measured in linear feet (lin m) along the centerline of the pipe.

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(c) Wyes, Tees and Other Fittings: These items will not be measured separately but will be included in the overall measurement as indicated above.04/01

(d) Manholes: Sanitary or combination sewer manholes will be measured in accordance with Section 702.

(e) Adjustment of Existing Manholes: Adjustment of existing sanitary or combination sewer manholes will be measured in accordance with Section 702.

(f) Concrete Blocking: Concrete blocking will not be measured for payment.

(g) Adjusting Sanitary Sewer House Connections and Service Lines: Adjusting sanitary sewer house connections will be measured per each connection. Adjusting sanitary sewer service lines will be measured by the linear foot (lin m) of adjusted line.

(h) Casings: Casings will be measured by the linear foot (lin m) along the centerline of casing.

(i) Incidentals: Pavement removed and replaced, including sawing, connections, testing and detection wire for plastic pipe, will not be measured for payment.

742.07 PAYMENT:

(a) Sewer pipe installations, sanitary or combination, will be paid for at the contract price per linear foot (lin m), which includes furnishing and hauling all materials; excavation and backfill; connections; capping and sealing connections for future use; and the maintenance of continuous flow of sewage in existing sewers during relocating operations.
When a pay item for Bedding Material is included in the contract, payment will be in accordance with Section 726.

(b) Manholes and manhole adjustments will be paid for in accordance with Section 702.

(c) Payment for adjusting house connections will include adjustment of service lines not exceeding 20 linear feet (6.1 lin m) per house connection. Payment for service line adjustments in excess of 20 linear feet (6.1 lin m) per house connection will be made by the linear foot (lin m) of adjusted service line. Payment for these items includes required new pipe and fittings, and excavation and backfill.

(d) Casings will be paid for at the contract unit price per linear foot (lin m).

(e) Payment will be made under:

Item No.	Pay Item	Pay Unit
742-01	Sanitary Sewer Pipe (Size)	Linear Foot (Lin m)
742-02	Adjusting Sanitary Sewer House Connections	Each
742-03	Adjusting Sanitary Sewer Service Lines	Linear Foot (Lin m)
742-04	Casing (Size & Type)	Linear Foot (Lin m)

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LOUISIANA
DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT
SUPPLEMENTAL SPECIFICATIONS

SECTION 744
TRAFFIC CONTROL MANAGEMENT

The 2000 Standard Specifications are amended to include this Section 744.

744.01 DESCRIPTION: This work consists of providing traffic control management in compliance with the contract documents and the Manual on Uniform Traffic Control Devices (MUTCD), including the installation, inspection, maintenance, and removal of all traffic control devices on the project.

744.02 REQUIREMENTS: The contractor shall assign one or more authorized Traffic Control Supervisors (TCS) to provide traffic control management for the project. If the contractor assigns more than one TCS to provide traffic control management, then a weekly schedule identifying who will be in charge of providing traffic control management on a daily basis shall be submitted to the engineer by the contractor. The TCS shall have a set of all contract documents relating to traffic control or traffic staging and a current copy of the MUTCD and a current copy of Louisiana Work Zone Traffic Control Details readily available at all times.

Should the contractor utilize a subcontractor to provide traffic control management, the subcontractor's TCS shall meet all the requirements set forth herein.

The contractor may assign one or more Traffic Control Technicians (TCT) to assist the TCS in inspection and maintenance of Traffic Control Devices.

744.03 AUTHORIZATION: Prior to commencing work requiring traffic control management, the contractor shall submit to the engineer a copy of the TCS's and TCT's current authorization.

The Department will accept the TCS authorization of other approved agencies or firms only if all of the following minimum TCS requirements are met:

(a) Successful completion of a work zone traffic control supervisor course approved by the Department.

(b) Passing a written examination on the work zone traffic control supervisor course.

(c) After October 1, 2004, a minimum of one year full-time field experience, verified by the agency or firm, in work zone traffic control. This experience may be verified by the Department, at its discretion.

The Department will accept the TCT authorization of other approved agencies or firms only if all or the following minimum requirements are met.

(a) Successful completion of a work zone traffic control technician course approved by the Department.

(b) Passing a written examination on the work zone traffic control technician course.

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744.04 DUTIES: The TCS's responsibility shall be traffic control management, and the TCS shall be available to the engineer to address traffic control management issues as needed. The following is a listing of the TCS's primary duties:

(a) The TCS shall personally provide traffic control management and supervision services at the project site. The TCS may have other assigned duties, but must be readily available at all times to perform TCS duties as required in the contract. A minimum of one TCT shall be required on site during working hours.

(b) 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 (TCP), to ensure that the devices are performing effectively as planned for both safety and traffic operations. This shall be done at the initial installation of the devices and when any modifications and/or changes are made, in addition to the inspection of traffic control required in Subsection 744.06.

(c) The TCS shall be responsible for revisions requested by the contractor to the traffic control plan established in the contract and shall submit the new traffic control plan as follows:

Requests for revision in the traffic control plan must be made in writing to the engineer a minimum of 14 calendar days in advance of the needed revision. If in the opinion of the engineer, the requested revision falls within the scope of the existing contract drawings, the engineer may approve the revision. If the engineer determines that the requested revision is outside the scope of the existing contract drawings, the contractor will be required to submit plan change drawings to incorporate into the contract drawings. The plan change drawings must conform to the DOTD standards described below.

(1) Letter size original contract drawings --The plan change drawings must be submitted on high quality white 8 1/2 x 11 inch letter size paper. The drawings may be hand drafted or computer drafted and arranged in landscape format on the page. The text and drawings must be legible after reproduction on standard reproduction equipment. Left, bottom and right hand margins shall be at least 1/2 inch and the top margin shall be 1 inch.

(2) Full size original contract drawings -- The plan change drawings must be submitted on high-quality, 4-mil, double-matte film using a plotting or reproduction process that fuses the graphics to ensure durability. Repeated handling and friction due to stacking of plans shall not smear, flake or rub off the graphics. Improper plotter settings and plotter wear may cause inconsistent durability of the drawings. The contractor shall test samples of the submitted drawings for durability. Advance samples of matte films may be submitted for approval; however, the contract plans will be tested separately. Failures will result in rejection of the submittal. Drawing sizes shall be in accordance with Subsection 801.03(a).

Lettering on plan change drawings shall be of adequate size to facilitate a 50 percent reduction of plans. Additions or changes shall be made with a permanent type of waterproof ink made for this purpose. If revised cross sections are required, the cross-sections shall be plotted on standard plate cross-section sheets. The ground line, centerline elevation, and station numbers, as a minimum, shall be drawn in ink; the remaining information may be in pencil.

Regardless of size, all plan change drawings and documents required shall be identified with the DOTD project title and project number. All plans and calculations shall be signed and sealed by a professional civil engineer currently registered to practice in Louisiana.

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All plans submitted by the contractor shall conform to the quality standards adopted by DOTD, and the DOTD Chief Engineer may reject any plans not conforming to these standards.

Revisions to the TCP that are determined to be outside the scope of the original contract drawings must be approved by the DOTD District Traffic Engineering Division prior to implementation of the requested revision. In some cases on high traffic routes or high priority projects, the revisions must be approved by the HQ Traffic Operations Engineer.

(d) The TCS shall be responsible for the training of flagging personnel. This training will ensure that all flagging done on the project is in compliance with the MUTCD Part VI and Louisiana Work Zone Traffic Control Details.

(e) 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 Department recognizes that the contractor does not have direct control over the traffic control operations of the utility companies. The coordination provided 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.

(f)The TCS shall coordinate, in writing, all project activities with the appropriate law enforcement, fire control agencies, and other appropriate public agencies as determined at the pre-construction conference by the engineer. The TCS shall also invite the above agencies to the pre-construction conference.

(g) The TCS shall prepare and submit statements concerning road closures, delays, and other project activities to the news media on a weekly basis or more often as needed. News releases shall be submitted to the engineer for review and approval prior to the contractor's submittal to the news media.

(h) The TCS shall be responsible for notifying the engineer, or designee, immediately of all vehicular accidents and/or incidents related to the project traffic control. The time and date of notification shall be documented in the traffic control diary. The TCS shall also monitor and document queues that occur as necessary.

(i) The TCS assigned to the project shall attend the pre-construction conference and all project meetings.

(j) The TCS shall be responsible for the maintenance, cleanliness, replacement and removal of traffic control devices of the existing traffic control plan during working and non-working hours.

744.05 TRAFFIC CONTROL DIARY: The TCS shall maintain a project traffic control diary in a bound book. The contractor shall obtain a sufficient number of the diaries from the Louisiana Associated General Contractors (LAGC). The TCS shall keep the traffic control diary current on a daily basis, and shall sign each daily entry. Entries shall be made in ink in a standard format furnished by the engineer, and there shall be no erasures or white-outs. Incorrect entries shall be struck out and then replaced with the correct entry. Photographs and videotapes may be used to supplement the written text.

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The traffic control diary shall be available at all times for inspection by the engineer; and the diary shall be reviewed with the engineer on a weekly basis and a copy submitted to the engineer on a monthly basis. Failure to submit the monthly copy of the diary to the engineer shall result in the withholding of the next partial payment until the past due copies of the diary are submitted. The traffic control diary shall become the property of the Department at the completion of the project.

744.06 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" standard by the American Traffic Safety Services Association (ATSSA) 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 the motorist and construction personnel and/or not meeting the ATSSA standard.

Inspection of the traffic control devices shall be conducted by the TCS at the beginning and end of each workday, and as scheduled or directed by the engineer during the workday. The traffic control devices shall be inspected by the TCS on weekends, holidays, or other non-work days at least once per day. Traffic control devices shall be inspected by the TCS at least once a week during nighttime periods and the same night after any modifications or changes have been made in the traffic control devices.

744.07 FAILURE TO COMPLY: The engineer may suspend all or part of the contractor's operation(s) for failure to comply with the approved "Traffic Control Plan" or failure to correct unsafe traffic conditions within a reasonable period of time after such notification is given to the contractor in writing.

In the event that the contractor does not take appropriate action to bring the deficient traffic control into compliance with the approved traffic control plan or to correct the unsafe traffic conditions, the Department may proceed with the corrective action using its own forces, and such costs will be deducted from payments owed to the contractor.

If the contractor's operations are suspended, the normal assessment of contract time will not cease for the period required to correct these unsafe conditions and traffic control deficiencies. The contractor shall not be relieved of the responsibility to provide traffic control safety to the traveling public when a project is under full or partial project suspension. When a project is under suspension due to the contractor's failure to comply with this section, or when the contract is under stipulated damages, the contractor shall continue to provide traffic control management and no additional measurement or payment will be made. If suspensions or partial suspensions are requested by the contractor, the additional traffic control management costs will be at the contractor's expense.

744.08 ENGINEER MODIFICATIONS: The provisions included in the plans and specifications for handling and controlling traffic during construction may be changed by the

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engineer, with the approval of the DOTD District Traffic Operations Engineer, due to actual field conditions encountered. Such changes will be made by written instruction to the contractor and shall be considered an amendment to the plans and specifications as of the date of change.

744.09 MEASUREMENT: Traffic control management will be measured by the lump sum.

744.10 PAYMENT: Payment for traffic control management will be made at the lump sum contract price in accordance with the payment schedule of Table 744-1.

Table 744-1
Payment Schedule for Traffic Control Management

Percent of Total Contract Amount Earned	Allowable Percent of Lump Sum Price for Traffic Control Management
Initial Installation	20
25	40
50	60
75	80
100	100

Traffic control diaries will be incidental to traffic control management, and no separate measurement or payment will be made therefore.

Payment will be made under:

Item No.	Pay Item	Pay Unit
744-01	Traffic Control Management	Lump Sum

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Louisiana

Department of Transportation And Development

Traffic Control Standard

Number 18A

Revised
April 10, 2003

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Traffic Control Standard #18A
TRAFFIC SIGNAL CONTROL SYSTEM
Revised April 10, 2003

1.0 INTRODUCTION

This specification sets forth the minimum requirements for a shelf-mounted, digital, solid-state traffic control system including and to be furnished with time-based coordination, closed-loop system communication/coordination, multiple railroad/fire preemption sequences, and hardwired/telemetry interconnect capable of operating as both a master and secondary. All components needed to operate as both a master and secondary shall be provided for in each assembly. The system design shall be based on the requirements of NEMA Standards Publication No. TS-2, 1998. Controller sequencing referenced in this standard for diamond intersections emulates the design and standards from the Texas Department of Highways and the Texas Transportation Institute. The controller should have a database that conforms to section 3.5 of the current NEMA NTCIP specifications

All components and accessories shall comply with the NEMA testing requirements and a certification of compliance shall be presented with each bid for that equipment being offered. The operational requirements herein extend the requirement of NEMA controllers and supersede NEMA TS-2 where differences occur.

All equipment and operational characteristics specified herein shall be provided, except where noted.

2.0 CLOSED-LOOP COMPUTER OPERATING SYSTEM

The closed-loop central operating system shall be a traffic management program for hard-disk supported IBM personal computers and compatible equipment which creates a system network using the principle system components. The software shall operate using Microsoft's Windows operating system. The software shall be programmed resident for the operating system.

2.1 SOFTWARE DESCRIPTION

The software shall be loaded into the specified personal computer and operationally verified by the supplier. Back-up software shall be supplied on a compact disk.

The software shall be licensed to the agency for its use on a single computer or each computer specified in the system. Software improvements and enhancements to the supplied version shall be furnished to this agency at no additional cost. Software is supplied when indicated on the plans for a state job and will be specific to a highway district.

Programming displays, on the PC screen, shall aid the operator in entering data from the PC keyboard. These displays shall be arranged in using a tool bar format. The main tool bar shall allow the user to select a major function. A sub-tool bar shall be allowed for selection of a specific area within that function when it exists.

The central computer software shall provide rapid movement through menus, sub-menus and data base pages and limited only by the operating speed of the computer. Returning to the main menu or sub-menu shall be selected by pressing a single key.

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Menus and sub-menus shall not contain mnemonics or codes for descriptions. Additional screens shall be provided where necessary to explain keyboard procedure. All icons that are defined within a tool bar shall be described in a help line as the cursor is placed over that icon.

Traffic engineering terminology shall be used throughout the programming displays. Display organization and data entry approach shall allow system operators to program the central computer without using reference cards or manuals.

2.2 SOFTWARE FEATURES

Once the computer power-up routine is complete, the system shall be in monitor mode. It shall be possible for the operator to exit this mode and enter the user mode, and vice-versa.

In monitor mode, central computer shall continue to monitor events even if the printer is off-line. Upon restoration of the printer, it shall print a hard-copy of events occurring prior to and during printer off-line.

Central computer software shall provide:

a. Dynamic Displays
b. System Printouts
c. Data Base Management
d. Security
e. Directories
f. Data Back-up

2.3 DYNAMIC DISPLAYS

Central computer shall display the following in real-time color graphics selected from the menus:

a. Intersection Display
b. System Map Display

All text data shall be displayed in traffic engineering terms. Mnemonics shall be acceptable; however, the need for reference guides and manuals shall not be acceptable. All information shall be simultaneously and continuously displayed until canceled by the operator. Displays shall not affect system on-street operation. The displays shall have a minimum one second resolution.

2.3.1 Intersection Display

The central computer shall display the operation of any selected intersection controller within any selected system.

Each display shall be user-created to indicate the intersection configuration, including any "T" and standard diamonds, on a single screen display. The intersection display shall show as a minimum:

a. Intersection configuration layout for all possible phasing of intersection controllers including overlaps.
b. All vehicle signal indications, (R,Y,G) for each active phase.
c. All pedestrian signal indications: walk, flashing and solid don't walk, for all 16 active phases.

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d. Vehicle and pedestrian detector actuation for each displayed phase.
e. Cycle, offset, split or plan in effect.
f. Arterial master and intersection controller identifier numbers, including intersection street names.
g. Central computer and local intersection controller TOD clocks.

The display shall include dynamic statuses of the arterial master and the intersection controller. Arterial master status shall consist of operational status, cycle, offset, split, plan in effect, cycle length, cycle countdown, and status of special functions. System control mode status shall include manual, external, time-of-day, or traffic responsive operation. This status shall indicate whether the system is operating under plan, time-base coordination, or time-base backup.

Intersection controller dynamic data shall consist of operational status; non-interconnected coordination, coordination offset value, or free/plan indicator; split values based on cycle and split in effect; preemption status; and diagnostic indications. Operational status shall include on-line, off-line, failed, or disabled. If the intersection controller is off-line or failed, the conditions causing that failure shall be also displayed. All diagnostic indications having alarm status shall be shown flashing. Alarms, preempt call numbers, and preemptor in effect shall also be shown. If preempt is in a flashing operation, it shall be displayed as flashing.

2.3.2 System Map Display

System Map Display shall provide geometric layout of the system for a minimum of 32 intersections simultaneously and show real time display. The display shall also indicate the relative placements for a minimum of sixteen system detectors. Any intersection shall be selected to present a full screen display as stated the section 2.3.1.

A map editor shall permit the user to lay-out the intersections in their relative physical relationship to each other, place the system detectors anywhere along the approaches, and number the intersections appropriately. Five-legged intersections, central business district layouts (CBD), and angled approaches shall be possible.

A text editor shall permit the user to create a minimum of 50 20-character strings and place them on the display. This feature shall allow labeling streets, detector identification, or other points-of-interest. All text would preferably be placed at any angle on the screen. For instance, street names shall follow the angle of the drawn street (horizontal, vertical, or diagonally), if desired.

Display data shall include current system operating parameters, special function status, cycle countdown, zone control mode of operation, and consolidated intersection status.

Consolidated intersection status shall indicate if an intersection is on-line, free, has a coordination fault, is in preemption or flash, or has a communication failure.

2.4 SYSTEM PRINTOUTS

System printouts present system readiness and operational status and are used for analyzing system performance. The printouts shall be divided into four categories: Computer Events, Event Reports, Status Reports, and Logs, as detailed in this specification.

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2.4.1 Computer Events

The central computer shall provide a monitor mode of operation to receive status change and operating failure event reports from any arterial master or isolated controllers.

Events shall be switchable for display on the central computer terminal or printed as a hard copy when they are received. Events shall consist of system identification, time and date of event occurrence, device identification (if device diagnostic event), and event description.

The central computer shall store events in a hard disk file to produce event reports, as needed. It shall be possible to transfer event files to a storage diskette for historical record keeping. Event files shall be removed from hard disk after file transfer to storage diskette to prevent overflowing the hard disk.

2.4.2 Event Reports

Event report capability shall be provided for events occurring on one day or group of days from central computer files on the hard disk or storage diskette.

A directory search capability shall be provided that lists all event files for any system by date, on the selected disk drive. If one day is selected, the date shall be entered directly or by directory search. Directory search shall be used to select dates for event reports for a group of days.

It shall be possible to display and print events as received or sorted by event type. If event type selected is for a system device, it shall be possible to specify all devices or a single device.

Menus shall be provided to facilitate event type selection. Program operation shall allow interactive operation for preparing an event report for any combination of event type and system device.

2.4.3 Status Reports

Status reports shall be generated by the arterial master controller in response to a manual command by the operator at the central computer. These reports shall present an immediate record of system operational status on the central computer display. Provision shall be made for hard copy printout.

2.4.4 Logs

Detector data shall be processed by the central computer. Real-time logs shall be printed as received by the central computer while in the monitor mode. System detector logs shall be scheduled, formatted, and sent from the arterial master.

2.5 DATA BASE MANAGEMENT

2.5.1 Programming Displays

A data base management program shall exchange and update data with arterial master and intersection controller. Each arterial master and intersection controller shall have separate data base programming pages. These pages shall contain all the programming options unique to each controller type.

Once data base management is selected from the main menu, a sub-menu shall be presented listing the data base pages available for programming. It shall be possible for the user to scroll through the data

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pages of a sub-menu or enter and exit a data page without waiting for data to fill the page. For example, page up and page down functions shall permit the operator to go from page 1 to 30, within 5 seconds.

All programming entries shall primarily consist of numerical values, YES/NO or ON/OFF entries. During program entry, the new data shall over-write the old data. If the data is in error, changes shall not be permitted and the user shall be alerted by either an error message on the display or a warning tone.

2.5.2 Upload/Download

All devices shall use upload/download techniques for data base programming. The arterial master shall employ an additional data base programming method through direct data entry.

Upload/download shall transfer the entire programmable data base from/to the arterial master or any intersection controller via the arterial master, with the exception of intersection controller preemptor and overlap configuration.

All upload/download data shall use block transfer techniques, and shall be verified by block check-sum and word parity. Non-verified data shall cause termination of the upload/download with no data transfer taking place. It shall not be possible to load erroneous interval and configuration information to the controller.

Upload techniques shall not cause the system or intersection controller to go off-line. Traffic control operation shall remain intact in all respects.

The program shall compare the database of any arterial master or intersection controller to the database on file following an upload. The compare function shall be executed by simple keyboard technique and shall identify any differences between loaded and file data. The system operator shall be able to correct, use, or substitute data values, and proceed with further comparison.

2.5.3 Backup Data Base

Data from the backup files shall be read and verified for programming EEPROMs to be installed in intersection controllers and arterial masters.

2.5.4 Auto Print

Selection to automatically print any or all arterial master or intersection controller data bases that are stored in the central computer shall be provided.

Selection eliminating intersection controllers which are not in service when all intersection controllers are selected for printing shall be provided.

The system shall print only pages within a data base that contain data. Pages with no user-entered data shall be skipped. If a data base is selected for printing, but is not found on the central computer hard disk, it shall be noted on a separate sheet of the printout.

2.6 SECURITY

System security at the central computer shall be ensured through three levels of access. The levels shall be as follows:

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a. Supervisor
b. Data change
c. Viewer

The supervisor and data change levels shall have separate access codes that must be entered prior to making data base changes.

The supervisor level shall permit access code number assignments and data base changes. Data change level shall permit data base changes. If an incorrect code is entered, data base changes are denied. Viewer level shall not permit any data base changes.

2.7 DIRECTORIES

System and intersection directories shall include location of arterial masters and associated intersection controllers by name or number.

System directory text shall describe each of the systems. A system name may be entered and shall identify the system in menus, report titles, and arterial master data base pages.

Intersection directory text shall list intersection names and telephone numbers for each associated arterial master. An intersection name may be entered and shall identify the intersection in menus, intersection displays, and intersection data base pages.

The user shall assign names to the intersection controller alarm inputs. These names shall identify alarms in event reports. Each alarm name shall be twenty characters.

2.8 DATA BASE BACKUP AND RESTORE

The system shall include an option for making backup copies on diskettes of the data base files contained in the central computer. All files required to restore the system to operation without the need to re-enter data shall be included on the backup diskette.

The central computer's files containing records of event and buffeted data shall be saved on hard disk when received from the arterial master. Provision for transferring computer files to storage diskettes shall be included. After transfer to storage diskette, monitor files shall be removed from the hard disk by a user selected command. Storage diskette files shall allow for data analysis by the same report programs used for files on hard disk.

2.9 SOFTWARE MAINTENANCE AGREEMENTS

The software agreement for licensing to the Department shall be in force upon the acceptance by the vendor to supply equipment and software to the Department either by purchase order or construction project.

2.9.1 Performance

The vendor shall warrant that the software will perform according to the specifications.

2.9.2 CPU Limitations

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The vendor shall agree that it will be the Department's option to use the software on upgraded equipment at any time and use the software on backup equipment for a limited time. The limits of use shall be as previously stated.

2.9.3 Backup Provisions

The vendor shall agree that the Department will utilize off-site storage for the software and backup files. Copies of these files shall be made by the Department as needed within the operational guidelines previously stated.

2.9.4 Operational Restrictions

The vendor shall agree that the Department will utilize the software to monitor any system within the Department's responsibility.

2.9.5 Maintenance Standards

The vendor shall agree to supply the Department with updates to the software. If the updates require upgrading of the Department's equipment, the vendor will provide the source codes to the Department for the version of software provided to the Department.

2.9.6 Source Code

The vendor shall deliver the source code and documentation to the Department to be used in the event of failure to provide support to the software. A viable holding arrangement will be considered as an alternate method for source code to be delivered to the Department at no cost to the Department. This option shall be stated on the order, plans, or other purchase agreements for the controllers, otherwise will not be required.

3.0 SYSTEM COMMUNICATIONS

The controller unit shall communicate with a system master controller, central computer (for isolated intersections), or portable computer connected directly to the controller. Internal settings, including coordination, shall be accessible via an external Hayes compatible modem through the RS-232 interface. The controller unit shall receive system master commands and data transmissions. In addition, it shall transmit the controller unit status, database, and system detector information to the system master. All alarms provided shall be accessible through the RS-232 port by remote interrogation and by automatic dialing initiated by the controller unit.

3.1 SYSTEM COMMANDS

The communication shall allow the controller unit to receive, as a minimum, the following commands:

a. The coordination pattern (selects the Cycle, offset, and split)
b. Time of day and date
c. Special function commands (minimum of four)
d. Free and flash mode command patterns
e. Control of the local system on a specified master controller
f. Request for local status

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3.2 STATUS DATA

The status of each of the following functions shall be transmitted from each controller in response to a status request from any monitoring device:

a. Green and yellow status for all phases and overlaps
b. Walk and pedestrian clearance status for all phases
c. Vehicle and pedestrian detector status (8 pedestrian and 64 vehicle detectors)
d. Phase termination status
e. Local Cycle time
f. Coordination status
g. Conflict flash status
h. Local flash status
i. Preempt activity and calls
j. Volume and occupancy data from a minimum of 16 system detectors
k. Status of four user-defined alarms
l. Zone map display data

3.3 UPLOAD/DOWNLOAD

The communication shall provide the capability to upload/download the entire intersection data base to/from a monitoring personal computer. When desired, only a single screen of data can be sent and received from the intersection

3.4 OPERATION

Communication shall operate from communication ports on the front of the controller. The controller unit shall communicate with a system master/secondary controller, central computer, portable computer and/or the conflict monitor with RS-232 serial ports accessible through DB-25S connectors. The reserve connector pin assignments shall be as follows:

Pin #	Designation
1	Frame Ground
2	Transmit Data
3	Receive Data
4	Request to Send
5	Clear to Send
6	Data Set Ready
7	Signal Ground
8	Data Carrier Detect
20	Data Terminal Ready
22	Ring Indicator

The baud rate of each port shall be keyboard selectable for any one of the following rates: 600, 1200, 2400, 4800, 9600, 14.4K, 19.2K, 28.8K, 33K, and 57.6K. The port shall be configured for an eight (8) bit word, one (1) start, one (1) stop bit and no parity.

The communication path shall use a twisted pair of wires. These may be leased lines (Type 3002, voice grade, unconditioned), radio modem, or dedicated cable.

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Communication timers shall be programmable from 0 to 9.9 seconds.

The controller unit shall be programmable via keyboard with a user assigned, unique address identifying the master and intersection.

3.5 INTRA-SYSTEM COMMUNICATIONS

Intra-system communication shall be achieved through one of the four RS-232 serial ports defined herein and an external modem. The modem shall not be provided with order unless specified elsewhere.

3.6 RADIO SYSTEM COMMUNICATION (Inter-system) - (WHEN SPECIFIED)

The data radio modem system is for microprocessor based control equipment. The modem is external to any other equipment in the controller cabinet and at the terminus and shall be provided for data transmission and indicated on the plans. The modem shall provide half or full duplex communications. The modem shall connect directly to the controller in accordance with these standards for the auto dial modem stated above.

The Department will provide the necessary management to obtain a study for interference on the above mentioned radio frequencies, coordinate the frequency to be used, and apply for licensing to use the frequency. The equipment shall operate at the assigned frequency and the supplier/contractor shall make the necessary adjustments for correct operation.

3.6.1 Radio Modem

The modem shall meet the environmental requirements of NEMA TS-2 TYPE 2 and be a maximum dimension of four inches high by twelve inches wide by twelve inches deep. Indicators shall be provided on the front of the modem indicating carrier detect, transmit data, and receive data. The following shall be the operating characteristic of the modem:

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FUNCTION	CHARACTERISTIC
Frequency Range:	173 MHz or 940 MHz range (Capable of: 138-174 MHz, 406-430 MHz, 450-475 MHz, 928-960 MHz).
Temperature Range:	-30° to +60° C.
Operating Voltage:	120/240 VAC
Transmission Mode:	16F3, 16F9, 15F2
Modulation: (Receive and Transmit)	FSK, Frequencies, 2100 Hz - mark, 1300 Hz - space.
RF connector:	Type N Female
Data connector:	RS-232-C, 9-pin
Sensitivity:	-107 dbm (1.0μV) for BER_1x10^{-3} over the voltage and temperature range.
Decoder type:	PLL FSK Demodulator
Carrier Attack Time:	_ 10mS
Turn Around Time:	10mS Maximum
Power Output:	2 watts extendable to 20 watts, 100% duty cycle.
Frequency Stability:	±5 ppm on all frequencies.
Harmonic Distortion:	5 % Maximum
Compliances:	FCC Part 15, EIA RS-316B, and RS-232-C, as applicable.

TABLE 18A-2
RADIO MODEM CHARACTERISTICS

3.6.2 Antenna

The antenna shall be connected to the modem by transmission cable meeting the Department standards. The antenna shall be a directional Yagi with a minimum of 9 Db gain and five elements. The mounting shall adapt to a one and one-half or two inch mount.

3.6.3 Antenna Tower

The contractor (for projects) shall provide a tower for mounting the antenna at the site as shown on the plans. The height of the tower shall be determined from the frequency coordination study. The tower shall be erected in accordance with the AASHTO standards.

3.6.4 Central Office Radio Terminal

Additional labor shall be provided by the project contractor to install the antenna on the Department's tower, the cable from the antenna to the modem, and the necessary hardware to complete the installation as designated on the plans and in accordance with good engineering practices. The radio modem and auto-dial modem shall be installed in a single 19 inch rack mounting system or on a wall mountable shelf.

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Mounting equipment and hardware shall be provided by the contractor. The Department will supply one RJ-11C jack for the dial modem and the necessary 120 VAC outlet for the equipment adjacent to the installation as designated by the Department.

The installation shall include lightning protection on the incoming RF cable in accordance with good engineering practices.

3.6.5 Telephone Terminal Boards (For information purposes only)

The following equipment will be installed into the existing PBX equipment for telephone lines needed to implement the system communication. All other equipment specified shall work with this equipment to complete the system's communications. This equipment will be installed in and manufactured by Rolm Telecommunication Company.

TYPE EQUIPMENT	MODEL
16-channel coder	#8551E
16-channel decoder	#8552A
8 channel line interface	#85540A

TABLE 18A-3
TELEPHONE TERMINAL EQUIPMENT

This equipment will be installed by the Department and made ready for the completion of the system.

4.0 SYSTEM MASTER CAPABILITIES

4.1 DESIGN REQUIREMENTS

The system master shall be a microcomputer device that shall control and supervise a minimum system of twenty intersection controllers. It shall provide the communications link between the central computer and each of the intersection controllers within the system. The system master shall be assigned a unique identification number for communications on the same link with other system masters. An optional method for providing system master operation is to include the master operation as part of the software within the secondary controller. This option shall require the operation of the traffic signal control and system master without interference between them. Priority shall be given to the traffic signal control and operation as defined in this section.

Each master shall generate system commands to its associated intersection controllers, either in response to prevailing traffic conditions analyzed by system master using detectors information or by time-of-day scheduling, external command inputs, or manual inputs.

The central plans shall be constructed with the following minimum options:

a. 48 Patterns with a unique cycle length per pattern
b. From one to four offsets per pattern
c. Selection of one split per pattern from a table of 24 programmable splits
d. Selection of one sequence per pattern from a table of 16 programmable sequences.

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e. Pattern 254 (NTCIP) causes the intersection to operate in free.
f. Pattern 255 (NTCIP) causes the intersection to flash as programmed internally

The reference point for all cycles shall be programmable by the user. Normally it is initialized to midnight.

A minimum of forty-eight patterns will be provided. Each pattern can make all the selections as defined as in section of 3.5 of the NTCIP NEMA protocol.

The system master shall monitor the operation of all the associated intersection controllers, communication paths, local detectors, and system detectors. User programmable reporting alarms shall initiate failure reports to the designated terminals from a list of user identification numbers. A minimum of four terminals shall be assignable.

System master shall provide:

a. Traffic Plan Selection
b. Crossing Arterial Synchronization
c. Diagnostics
d. Events
e. Logs
f. Reports
g. Data Entry

Alternative crossing arterial synchronization shall be accomplished by using the master synchronization reference point. The operating cycles having the same cycle length will be referenced to the same point. An additional interface method shall be used to operate both arteries on the same cycle length. Associated system control shall also be included for mutual coordination.

4.2 TRAFFIC PLAN SELECTION

The traffic plan shall be selected on a priority basis. The priority order shall begin with the highest being:

a. Manual commands
b. Central System commands
c. Time-of-day/day-of-week/week-of-year scheduled commands
d. Traffic responsive commands.

4.2.1 Traffic Responsive Operation

Traffic plans shall be automatically selected in response to real-time system detector input data. These commands shall be transmitted to, received and implemented by the intersection controllers within the master's system.

A minimum of forty-eight system detector inputs shall be provided and each, if selected, shall be processed into scaled values used for volume, density, and occupancy data. The volume and occupancy scale factors shall be user-specified and programmable through the keyboard into the master for each detector; otherwise a default value of zero shall be entered. Each detector shall be user-programmable as one of two directions or crossing direction.

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Detector data shall be processed to provide a value representing traffic conditions for each function. The process shall include:

a. Data computations resulting in values accurately representing vehicle volume (vehicle/hour), occupancy (time detected), and density (vehicle/mile).

b. Comparison of computed values determining the relative volume and density for traffic conditions detected and assigned to directions as stated above.

c. Accumulation of detection values over a user programmable time interval, evenly divided into a minimum of ten sampling periods, shall provide smooth transitions into selected programs designed by the Department to progress traffic through the system. Functional requirement for this process is to select a cycle, offset, and split from user specified values of detector data.

d. User-specified adjustment factors for each function shall be used to make the detector data be within 50 to 100 percent of selected vehicle density characteristic.

Function values shall be compared to user-specified threshold values for traffic plan selection. Plan selections shall not oscillate between plans which have numerically close values. A method of hysteresis shall be used to prevent oscillation.

Ranges for six traffic volume and occupancy levels shall be programmable and used for comparing the master's computed volume and occupancy level from the overall detector data. Level one shall be associated with light traffic with no coordination and level six shall be associated with heavy traffic. Twelve programmable thresholds shall be provided for the master's comparison values to implement plan selection based upon its computed values.

Arterial directional preference shall be determined by computing directional detector data. The magnitude of the difference and directional preference shall be compared to user programmed threshold values to select and implement directional or average offsets.

Split selection shall be based on user assigned system or phase detector data. Programmable weighing of each detector data, as stated above, shall be used by the master for computing each detector adjusted data. The master shall implement the appropriate split by comparing the main street and cross street data. Programmable values shall be used for selecting four levels of increasing values and four levels of decreasing values. If an error condition is detected, the selection shall default to average or user specified value.

Based on the master's computed detector data levels, a user-specified traffic plan shall be selected as the traffic responsive plan. If computed level or computed offset cannot be determined because of detector failures, a default plan shall be implemented from TOD plan or from TBC.

Each traffic plan contains a programmed split command for that plan. Alternately, it shall be possible to select splits and special function commands for user-specified plans based on split demand function values. Four split/special function combinations shall be available.

4.2.2 Time-Of-Day/Day-Of-Week/Week-Of-Year Schedule

Time-of-day scheduling shall be controlled by an internal clock, accurate to the power line frequency. In the event of a power failure, the clock shall be maintained for a minimum of 72 hours. Leap year shall be automatically compensated for and daylight savings time shall be programmable for date of occurrence. A minimum of 24 user-defined programs shall operate on a daily, weekly, and yearly basis.

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TOD programming shall follow section 3.5 of the NEMA NTCIP specifications.

Programmable entries shall include:

a. Day-program assignment
b. Start time
c. Traffic pattern (cycle, offset, split, special functions, free, plan command)
d. Traffic responsive plan enable
e. Traffic responsive plan override of TOD
f. Sample period interval
g. Sample period log interval
h. Detector log interval

The arterial master shall update time and date in all intersection controllers in a system a minimum of once every hour.

The arterial master shall include a time comparison feature. This feature shall indicate the need to update the master clock after being compared with the reference clock in the central personal computer. It would be preferred to enable a clock reset from the central computer to update the master clock with the time from the central computer.

4.2.3 External Commands

External commands shall be received from a remote source such as another arterial master. These control signals shall be used to initiate an external plan. Alternatively, the external command inputs shall be used for crossing arterial synchronization. External commands shall override TOD and traffic responsive operation.

4.2.4 Manual Entry

Manual entry from the front panel keyboard or a remote source shall provide the highest priority of plan selection. It shall be the default program if traffic responsive operation fails and a TOD plan is not specified.

4.2.5 Pattern Mode Entry (Test Command)

Mode commands shall allow selection of any defined pattern. Intersection controllers may contain the same or different programs which shall allow sub-system coordination or independent operation under time-base control.

4.3 DIAGNOSTICS

Diagnostic tests shall be continuous checks performed on system detector data, communications, and communication connected devices. Detected faults shall produce event failures at the arterial master and the central computer.

Failures shall be displayed on the arterial master. A fault isolation routine, selected from the front panel keyboard, shall identify the failed device. The operator shall have the ability to display all fault conditions on command.

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4.3.1 Power Fail Restart

Following a power interruption, the arterial master shall update the clock and bring itself on-line automatically and gain control of the system.

4.3.2 Device Event Reports

If operating in a system, diagnostic failures shall be reported to the central computer as events. The following devices shall be monitored:

a. Communication
b. Local intersection controllers
c. System detectors
d. Local detectors

Report events shall verify system master and local intersection controller responses. Communication tests can be a specific test or results from normal evaluation during operation and shall be as follows:

a. System Master Test - A system master test failure shall occur when the master does not respond to central computer commands. If a response is received within three seconds following a failure, the failure condition shall automatically clear, restoring system master/computer service.

b. Local Intersection Controller Communication Test - A local intersection controller communication failure shall occur when valid data is not received by the master for five seconds. If data is received within five seconds following a local intersection controller communication failure, the failure condition shall automatically clear, restoring local intersection controller communications.

Local intersection controller events shall indicate CMU flash, local and commanded flash, cycle fail, coordination alarm, local and commanded free, coordination error, preempt, and user-designated events:

a. CMU flash - If intersection controller status indicates CMU flash for a period in excess of a user-programmable period of 0-30 seconds, the intersection controller shall fail and a CMU flash event shall be recorded.

b. Local Flash - If intersection controller status indicates CMU flash is OFF and flash is not commanded from the arterial master, the intersection controller shall be considered off-line and a local flash event shall be recorded.

c. Commanded Flash - If intersection controller status indicates flash, CMU flash is OFF, and flash is commanded from the arterial master, the intersection controller shall be considered off-line and a commanded flash event shall be recorded.

d. Cycle Fail - If intersection controller status remains in the same phase with opposing phase calls for two cycles during coordination or three minutes if the system is free, the intersection controller shall be failed and a cycle fail event shall be recorded.

e. Coordination Event - If intersection controller status indicates a coordination alarm condition, the intersection controller shall be failed and a coordination event condition shall be recorded.

f. Local Free - If intersection controller status indicates a free condition and free is not commanded from the arterial master, the intersection controller shall be considered off-line and a local free event shall be recorded.

g. Commanded Free - If intersection controller status indicates a free condition and free is commanded from the arterial master, the intersection controller shall be considered off-line and a commanded free event shall be recorded.

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h. Coordination Error - If intersection controller status indicates a coordination error condition, the intersection controller shall be considered off-line and a coordination error event shall be recorded.

i. Preempt - If intersection controller status indicates a preempt condition, the intersection controller shall be considered off-line and a preempt event shall be recorded.

j. Event 1/Event 2 - If intersection controller status indicates an event 1 or event 2 condition, the intersection controller shall feed back user-designated alarm information and an event 1 or event 2 shall be recorded.

4.3.3 Detector Diagnostics

System detector diagnostics shall check for maximum presence, minimum presence, excessive counts, and no activity. If a system detector is diagnosed as failed or in error, then data supplied by that device shall be automatically eliminated from system computations.

Local detectors shall be checked for maximum presence and no activity only.

Detector diagnostics shall be performed each minute. Diagnostic periods shall vary depending on the diagnostic test.

Maximum presence events shall be generated by a continuous detector call during a user-specified diagnostic period. The diagnostic period shall be user-selected from 0-30 minutes.

Excessive count events shall be generated if a detector volume count is greater than or equal to a user-specified excessive count threshold. The diagnostic period shall be user-selected from 0-30 minutes.

No activity events shall be generated if vehicle counts are not received during a user-specified diagnostic period. The diagnostic period shall be user-selected from 0-255 minutes.

Detectors shall be failed when its operation is not within the specified criteria. A detector that begins functioning within the specified limits shall be returned to a non-failed status and its input used by the controller.

4.4 MONITOR EVENTS

Status changes and operating failure events at any intersection controller or arterial master shall be recorded by the arterial master at the time of failure or event occurrence. Events shall be reported to the central computer on a priority basis.

Reporting priority shall be selected by event or failure. It shall be programmable as: immediate, report with higher priority, or not at all.

Two telephone number entries shall be programmable from the central computer for reporting events to central computer and for reporting device failures to another maintenance computer or terminal. Device failure reports shall be transmitted to the designated computer or terminal only when scheduled by a TOD entry.

If the central computer is busy or off-line, a reporting arterial master shall repeatedly attempt to call at a preset retry interval in the range of three to fifteen minutes.

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Reporting shall be selected for directing all events to a central computer and maintenance computer or terminal when this capability is selected. Printed events shall consist of the following categories:

a. Program and TOD changes
b. System events
c. Device diagnostics

4.4.1 Program and TOD Changes

Program and mode changes shall occur automatically as a result of traffic responsive plan computations, TOD scheduling, external, and manual commands. Program and mode event changes shall include the following:

a. In-effect program change
b. Traffic responsive program change
c. Special function change
d. Time-of-day interval change
e. Controller command TOD change

4.4.2 System Events

System events shall be arterial master self diagnostics. The diagnostic messages shall include:

a. Power-off (Comm-failure)
b. Power-on (Comm-failure)
c. Power interrupt
d. Clock error
e. Backup

Power-off event shall be stored in memory and reported when power is restored.

Power-on event shall report the time and date that power is restored. Time and date information shall be accurate if power is off less than 72 hours.

Power interrupt event shall report when power was off for less than one second.

Clock error event shall report when time and date information is different from the central computer reference. This event shall automatically occur whenever power was off greater than 72 hours. A clock error event shall inhibit TOD operation and scheduled reports until the clock has been reset and is functioning correctly.

Backup event shall indicate a data change in the arterial master memory. All memory shall be automatically re-initialized with a backup data base to allow continued operation.

4.4.3 Device Diagnostics

All device diagnostic failures shall be reported as events. Refer to Section 4.3 for diagnostic descriptions.

FOR INFORMATION ONLY

4.5 REAL-TIME DETECTOR LOGS

Real-time logs shall provide the operator with a permanent record of system detector data. Real-time logs shall consist of the following categories:

a. System detector log
b. Sample period log

4.5.1 System Detector Log

System detector logs shall show actual volume, and occupancy for user-specified system detectors. Volume shall be the number of vehicle counts accumulated, while occupancy shall be the actual percentage of time that vehicle presence was detected during a 15-minute log period.

Detector data intervals shall be user-specified by TOD scheduling. The user shall be capable of enabling and disabling the real-time log without affecting previous entries. At the end of the interval, the arterial master reports the log to the central computer for printing. The log shall not be stored on hard disk.

4.5.2 Sample Period Log

Sample period logs shall show computed parameters used in determining the traffic responsive plan selection. The sample period log interval shall be user-specified as a multiple from 1-6 sample periods by TOD scheduling.

If the default log period is programmed to be zero, the sample period log shall be reported when there is a change in the computed traffic responsive program. The user shall be capable of enabling and disabling sample period logs without affecting previous entries. The sample period log is reported to the central computer for printing. The log shall not be stored on hard disk. The sample period log shall consist of the following:

a. Scaled volume and occupancy for enabled system detectors
b. Scaled volume and occupancy for detector groups with assigned detectors
c. Current value of each program selection function
d. Smoothed value of each program selection function
e. Computed program selection values
f. Selected traffic responsive plan program
g. In-effect program and cycle length

Additionally, the printout shall identify groups that have not been assigned and parameters containing errors.

4.6 STATUS REPORTS

Manually commanded status reports shall be provided to allow the operator at the central computer an immediate record of system operations. Reports shall consist of the following categories:

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a. System status
b. Controller failure summary
c. System detector failure summary
d. Current 15-minute system detector log

4.6.1 System Status

System status report shall describe the system operating conditions. The report shall be a concise printout including the following:

a. Traffic responsive program (computed values)
b. Traffic responsive plan
c. Program-in-effect and source
d. Special function status
e. Communication status:
    1. System master communication failure
    2. Local intersection controller communication failure
f. Intersection controller status:
    1. On-line
    2. Off-line
    3. Failed
g. System detector status:
    1. On-line
    2. Failed
h. Local detector status:
    1. Failed

Local detectors shall be identified by intersection controller number and assigned phase. Intersection controller off-line shall indicate a disabled intersection controller or a non-coordinated intersection controller due to the following conditions: preemption, coordination error, local free, commanded flash, or local flash.

4.6.2 Intersection Controller Failure Summary

Intersection controller failure summary shall identify failed intersection controller(s) and probable cause(s). Probable failure causes shall be as follows:

a. Communication
b. Cycle failure
c. CMU flash
d. Coordination alarm

4.6.3 System Detector Failure Summary

System detector failure summary shall identify failed system detector(s) and probable cause(s). The possible failure causes shall be as follows:

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a. Communication
b. No activity
c. Maximum presence
d. Excessive counts

4.6.4 Current Detector Log

Current detector log shall show actual volume and occupancy recorded during the last log period. Volume shall be the number of vehicle counts accumulated while occupancy shall be the actual percentage of time a vehicle presence was detected. This data shall be indicated per detector.

4.6.5 Stored Events

Stored events shall be a report of the last events stored in the arterial master (up to 255). These events shall be printed in the order recorded. If the event storage memory becomes full, the newest event over-writes the oldest event.

5.0 COORDINATION/SYSTEM OPERATION COMMANDS

The controller unit shall provide coordination functions to control intersection cycle lengths, system offset relationships, and phase split timing. The coordinator shall perform these functions by internally manipulating the appropriate controller unit inputs. The controller unit shall be programmable for selecting these functions as output during all modes of coordination, controller unit designated as master, secondary or isolated.

Coordination functions shall be provided as a standard controller unit feature. These functions shall be included in the equipment and software provided. Hardwired inputs and outputs for coordination functions shall be through isolation relays, specified elsewhere, and shall be binaurally encoded on the respective cycle and split input lines. The voltage on the hardwired interconnect shall be 120VAC. The input lines shall have no active inputs for cycle one and split one. Cycle four and split four shall be activated by both the cycle two and three or splits two and three inputs being active respectively. Offsets one through three shall be only activated one at a time by the synchronization pulse being superimposed upon active line. The offset line shall operate by using a continuous high (120VAC) interrupted by a low for three seconds at the coordination point. Only one offset line shall be operated at a time. The remainder of the required system operations are not required to operate within a hardwired system.

Alternate methods to the cycle-split concept of coordination shall be evaluated based upon providing programmable time distribution to control vehicle movements within system parameters for traffic progression. A minimum of sixteen "programs" of the alternate method shall be provided and controlled by the inputs specified and shall meet the requirements for coordination.

5.1 TRANSITION CYCLES

The controller unit shall provide a smooth and orderly transition during operational changes in both free and coordinated operations. No skipping of thought movement phases shall be allowed when changing a sequence from a lead-lag to a lag-lead.

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5.1.1 Free to Coordinated Transition

During the free to coordinated transition, the controller unit shall complete a pick-up cycle before entering the coordinated mode. The pick-up cycle shall begin upon receipt of a sync pulse and a valid coordination command. During the pick-up cycle, the coordinator shall service all non-coordinated phase calls in normal sequence until entering the coordinated phase(s).

5.1.2 Coordination Command Transfer

The coordination command shall contain the system cycle, offset, and split. Command changes shall be implemented concurrent with a sync pulse. The cycle and split command shall take effect when the local zero point of the existing cycle is reached. Command transfers shall not stop the sequencing of the phases during the change except as noted elsewhere in this standard.

5.2 CYCLE

The coordinator shall provide five cycles. Each cycle shall have a minimum programmable cycle length from 10-255 seconds, in 1-second increments.

5.2.1 Synchronization

Coordination timing shall be synchronized to the leading edge of the system sync pulse (master zero). This point shall serve as the reference for all offset timing.

5.2.2 Sync Monitor

The coordinator shall check for the proper occurrence of the system sync pulse, once each cycle. If a sync pulse does not occur, then the coordinator shall self-sync and continue to operate with the last set of coordination commands.

Self-synchronization shall continue for a minimum of two cycles. If a sync pulse does not occur within the self sync period, the coordinator shall revert to the non-interconnected coordination mode.

5.2.3 Hardwired Interconnect

The controller shall provide for external inputs to be used for coordination. These inputs shall be connected to the wiring for the special connector described elsewhere in this standard. The functions shall meet the requirements as defined in this section.

5.3 OFFSET

The coordinator shall provide a minimum of one offset per pattern. Each offset shall be programmable within the cycle in 1-second increments from 30 to 254 seconds.

The offset shall be defined as seconds from the beginning of the master cycle counter to the beginning of the local cycle counter. When entering splits according to the NTCIP format, it shall be possible to select that the coordinated phase begins with the local zero point or ends with the local zero point. Time of day will be used to Sync the master cycle counter within the local controller. The master cycle count shall be seconds past the programmed reference, modulo of the current selected cycle length.

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5.3.1 Offset Correction

The coordinator shall provide offset correction through the following methods:

a. Shortway offset seeking
b. Dwell

5.3.2 Shortway Offset Seeking

Shortway seeking shall establish an offset within the shortest number of cycles by either lengthening or shortening the cycle length. The method provided by the manufacturer shall continue sequencing the phases until the programmed offset is established and shall be limited to a maximum of four cycle lengths. Any method that causes the controller to lose coordination or force to dwell and require the coordination to begin a second re-sync routine will not be acceptable.

Offset changes shall be accomplished by lengthening only if the reduction of the current cycle length is shorter than the sum of the controller unit's minimum vehicle interval lengths. In addition, all offset corrections shall be programmable to be lengthened only.

5.3.3 Dwell

The controller shall dwell in the coordinated phase if this method of offset seeking is selected. The sequence will begin in the first cycle after the offset is established and within the programmed permissive and force-off parameters for that cycle.

5.4 SPLIT

The controller unit shall provide three splits for each cycle. Each split shall provide a split interval for each phase of the controller unit. Each split interval shall be programmable in seconds within the cycle length timing in 1 second increments.

5.4.1 Split Intervals

Split interval settings shall determine the maximum time, including vehicle clearance (yellow and red) for a non-coordinated phase, or minimum time for a coordinated phase during the cycle. These times shall be controlled by establishing a force-off point for each phase within the cycle. Force-off points shall be determined from the phase timing values and split interval settings. Force-offs shall meet NEMA requirements and continue to be applied until the phase is terminated.

5.4.2 Coordinated Phase Split Extension

During coordination, an option shall be programmable to operate the coordinated phase(s) as actuated or non-actuated. If the coordinated phase is actuated, vehicle detections shall permit the coordinator to extend a phase beyond the normal yield point. Extended coordinated phase green shall be selected in seconds or terminated by a force-off setting for that phase. Selection of the CNA I and/or II operation per cycle will meet the non-actuated operation with the selected phase remaining green until the programmed force-off for that phase is reached.

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5.5 PERMISSIVE PERIODS

Permissive periods shall be timed in seconds within the cycle length and provided for each cycle or program to control the time period when the coordinated phase is released to service calls on the non-coordinated phases.

5.5.1 Yield Point

The yield point shall be defined as the point within the cycle when the hold input is released on the coordinated phase and the controller unit is allowed to service calls on non-coordinated phases. A force-off point shall be applied at the time the hold is released, unless a force-off has been programmed for this phase.

The yield point shall begin from the coordinated phase split interval and pedestrian clearance plus vehicle clearance time. The coordinated phase pedestrian clearance period shall always begin at the yield point regardless of calls on the non-coordinated phases.

5.5.2 Permissive Periods

All permissive period timing shall begin at the yield point. A minimum of three programmable permissive periods shall be provided. The vehicle portion of each permissive period shall be a programmable timed interval within the cycle length. An automatic pedestrian permissive period shall be allowed for phases following the coordinated phase(s). Each permissive period shall be programmable for selecting phases that would operate during this period. This function shall operate as follows:

a. During the first permissive period, the controller unit shall answer only vehicle or pedestrian calls on the phase(s) following the coordinated phase in the programmed sequence. If the controller unit yields to a call during this period and the all remaining phases are allowed during this period, then other permissive periods shall be inhibited. All remaining calls shall be served in programmed sequence.

b. The second and third permissive periods shall be programmable for beginning and ending after the yield point. During each permissive period the controller unit shall answer calls on each period's programmed phase(s).

c. An alternate method for the permissive period operation described above will be considered. The principle guidelines for controlling phase time shall be followed.

5.5.3 Single Permissive Period

Single permissive period shall become operational by eliminating the second and third permissive periods as described above. This single permissive period shall be similar to the first permissive period, except that the controller unit shall answer calls on any phase in order of the programmed sequence during the permissive period.

5.6 CYCLE PROGRAMMING

In addition to cycle length, offsets and splits, the following functions shall be programmable on a per cycle basis. Alternate methods of function selection shall be controlled by cycle, split, and offset inputs.

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5.6.1 Coordinated Phases

Coordinated phases shall be selected for each cycle. If the coordinated phase assignments are changed when transferring between cycles, the coordinator may operate in the free mode until completing a pick-up cycle.

The coordinated phases shall normally operate in the non-actuated mode during coordination. However, it shall be possible to select the coordinated phases to remain in the actuated mode (see paragraph 5.4.2).

5.6.2 Phase Sequence

The controller unit shall normally use a standard quad phase sequence. The controller shall be programmable to select the phase sequence by selecting cycle and split. The phase sequencing shall be selected from the sequences specified previously. The free mode phase sequence shall be programmable from the keyboard and not restricted to be one of the coordinated sequences.

5.6.3 Phase Omit

Phase omit(s) shall be selected during each cycle or program. Additionally, a phase shall be omitted if its split interval value, for the current split, is zero.

5.7 CROSSING ARTERY CONTROL

The coordinator shall be programmable for crossing artery synchronization by implementing dual coordinated phases at an intersection(s). The coordinator shall be programmable for two coordinated phases in a ring assignable to primary or secondary coordination. Phase(s) shall assigned to a secondary coordinator shall time the green of the phase until the force off occurs or shall be controlled by call to non-actuated operation.

In addition, the coordinator shall output a crossing artery sync pulse indicating the beginning of the crossing artery phase split interval. This signal shall be used to establish the master zero for the crossing artery system master.

Dual coordination shall also force a selected crossing artery split to be used. This feature shall optimize a particular split in each cycle for dual coordination.

See section 5.0 for alternate coordination methods and additional artery control.

5.8 FREE

The coordinator shall provide a free mode of operation. During this mode, all coordination control shall be removed from the controller unit.

Free mode shall be selected by coordination commands, external input, or keyboard entry. Additionally, the coordinator shall revert to free mode when active controller unit inputs, or functions, would interfere with coordination. These inputs or functions shall include the following:

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a. Manual Control Enable
b. Stop Time
c. Automatic Flash
d. Preemption

5.9 MANUAL CONTROL

The controller unit shall allow entry of manual override commands from the keyboard. Manual commands shall permit individual selection of any cycle, any offset, any split or selection of the complete coordination command. When a manual cycle is selected, the sync pulse shall be generated by the time based control section of the controller unit.

5.10 PROGRAM CONTROL

The alternate method of coordination shall provide manual control that shall select 1 of 16 programs (see section 6.2.3).

5.11 MODES OF INTERCONNECT

The coordinator shall be capable of operating with any of the following interconnect types:

a. Internal Time Based Coordination
b. Telemetry
c. Hardwired

The non-interconnected coordination mode shall also serve as a backup mode to communication or hardwired interconnect (see paragraph 5.1.2).

The coordinator shall be compatible with electromechanical pre-timed interconnect which provides the sync pulse superimposed on the offset lines.

5.12 MASTER COORDINATOR

The coordinator shall output the coordination commands, including sync. This feature shall permit the controller unit to be used as a time-of-day master in a hardwired electromechanical pre-timed interconnected system. This feature shall be included in all controllers and shall not have restricted use.

6.0 TIME-BASED CONTROL/NON-INTERCONNECTED COORDINATION

The controller unit shall include time-based control. This capability shall be a standard feature and shall include the additional modules and/or software.

6.1 CLOCK/CALENDAR

The controller unit shall provide a time-of-day (TOD)/99 year clock. The clock shall be programmed for current time (hour, minute, and second), date (month, day, and year), day of week, and week of year. This clock shall be used for all time based control functions.

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6.1.1 Clock Accuracy

The TOD clock shall use the power line frequency as a time base. When power is removed, the time shall be maintained by a crystal oscillator.

The oscillator shall maintain the time to within $\pm$ 0.005%, as compared to the Universal Mean Coordinated Time Standard. This accuracy shall be maintained over the NEMA Standard temperature range regardless of the number or rate of power failures.

The controller unit shall maintain the TOD clock during power outages for a minimum of forty-eight hours.

6.1.2 Time and Date Entry

Time and date information shall be entered in the controller unit through the following methods:

a. The controller unit keyboard
b. Computer via RS-232 port
c. Updated via system communications

6.1.3 Leap Year and Daylight Savings Time

The TOD clock shall automatically compensate for leap year changes. Daylight savings time changes shall be programmable to occur on a selected week or be omitted if not programmed.

6.2 TIME BASED CONTROL

6.2.1 Program Format

Time based control shall utilize a yearly program format. The program shall select from a minimum of sixty programs with cycle, offset, and split operations assignable to a day, days of the week, weekend or any one of, selection of more than one or all 52 weeks in the year.

6.2.2 Holidays

There shall be a minimum of 35 holiday or exception-day programs. Each holiday-program shall be assignable to occur on a specific month and day. Holiday-programs shall override the current day-program.

Each holiday-program shall be selected to repeat the following year.

6.2.3 Program Selection

Each program shall permit selection of the following functions:

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a. Day program assignment, (Month/Week/Day)
b. Start time, (Hour/Min/Sec)
c. Program, (Cycle/Offset/Split)
d. Control of a minimum of four Special Function outputs
e. Flash
f. Max 1 or 2
g. Free
h. Phase sequence

The cycle/offset/split/sequence or free commands, selected by a program step, shall serve as the coordination program only when the controller unit is operating as a TOD master or operating with time based coordination.

Remaining program step functions shall take effect immediately when the program step becomes active.

6.2.4 Manual Program Selection

It shall be possible to manually force any of the program steps to override the current program step. The forced step shall be entered from the keyboard and shall remain in effect until removed or until the next programmed step.

6.3 NON-INTERCONNECTED COORDINATION

6.3.1 Re-sync Time

When operating in the non-interconnected coordination mode, a programmable synchronization time shall be used as the beginning time for all cycles. All cycles shall be reset to zero, each day, at this time.

6.3.2 Synchronization Point

The synchronization point will be calculated as defined in the NTCIP standard. Computing this point was described in the coordination section. Computing the synchronization point based on event changes or similar methods will not be accepted.

7.0 CONTROLLER UNIT FEATURES

7.1 DESIGN REQUIREMENTS

This specifications set forth the minimum requirements for a shelf-mounted sixteen (16) phase full-actuated solid state controller unit with internal Time-Based Coordination (TBC), railroad / fire (emergency vehicle) preemption, diamond intersection operation, and closed loop master/secondary operation in a traffic signal controller assembly and cabinet assembly.

The controller unit shall meet the requirements of NEMA Standards Publication TS 2 1998 (TS 2), latest edition. Where a difference occurs, these requirements shall govern. The purchase document shall identify either a TS 2 Type 1 interface or TS 2 Type 2 interface.

The controller unit shall be microprocessor based with additional solid state electronics components for memory and data entry of all timing and traffic control functions described herein. The hardware

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provided shall meet the NEMA temperature requirements certified by an independent laboratory. A resident program shall start the controller operating when power is first applied, without a failure, providing the functionality described herein. The controller unit shall begin using each programmed data for the first occurrence of the event requiring the data and after data is loaded into memory. All units shall be capable of both master and secondary operations as described by these specifications.

The controller unit shall be shelf mountable enclosure containing electronics and hardware for processor/display, input/output interface, system communications, and power supply functions. The enclosure shall be constructed of sheet aluminum and a maximum of fifteen inches wide by ten and one-half inches high by ten inches deep. All exterior surfaces shall be finished with a durable protective coating or anodized. Model and serial number shall be permanently attached and/or displayed on the frame of the enclosure.

The controller unit shall provide electronic circuitry to monitor the operation of the microprocessor. Processor and circuitry faults shall be detected and shall set the voltage monitor output FALSE then indicate an error message on the front panel display.

The controller unit power supply shall provide for isolation and protection against power surges, generate all regulated voltages for internal and external use, and provide power monitoring control signals. The minimum power output shall be 24 watts @ 24 VDC. Additional protection shall be designed into the power supply for radio-frequency interference filtration including a differential and common mode noise filter. Fuse protection shall be provided for the 115 VAC input and 24 VDC power output. These fuses shall be mounted on or accessible from the front of the controller without removing the panel held by fasteners requiring tools for removal.

All timing shall be referenced to the 60 Hertz input power. This reference shall control all timing of the controller unit.

A power retaining component, "super cap", shall be provided for maintaining the time-of-day clock and temporary data storage during a primary power outage. The component shall provide sufficient voltage supply for a power interruption of forty-eight hours. Lead-acid and Ni-Cad batteries are not acceptable.

7.2 KEYBOARD

The programming of the controller shall be accomplished using a keyboard and shall include vehicle, pedestrian, and preemptor calls during test. The keyboard shall be located on the front panel of the controller unit. The keyboard shall be socket mounted for easy maintenance.

The keyboard contacts shall be constructed to be environmentally sealed, highly resistive to oil, dust, water, and most harsh environments and have a minimum rated lifetime of one million operations per key. All keys shall provide positive tactile feel and/or sound to the user.

All keys shall be clearly labeled indicating their function. Numerical keys shall be arranged in a standard telephone pattern. Keys used for YES/NO or ON/OFF entries shall be appropriately labeled. Additionally, data entry control and cursor keys shall clearly indicate their function.

Cursor keys shall provide directional movement of the cursor to any data entry position desired. The cursor keys shall auto-repeat if depressed for longer than one second, to facilitate locating a data entry.

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7.3 EEPROM DATA MODULE

User programmed settings and intersection configuration data shall be stored in an electrically erasable programmable read only memory (EEPROM). The device shall have the ability to be reprogrammed a minimum of 1500 times. Sectional programming of the EEPROM for each data entry shall be acceptable only if the Manufacture guarantees the life of the EEPROM under normal use for a period of 10 years and will be at the discretion of the Department. Designs using a battery to maintain user data entries shall not be acceptable. Additional requirements concerning data references are found in section 8.5.

7.3.1 Data Module

To facilitate data transfer from one controller unit to another, the EEPROM device shall be mounted on a sub-module (Data Module). The Data Module shall connect to the processor/display module via a DIN type printed circuit connector.

7.3.2 Firmware

The firmware shall be stored in a Flash ROM. The firmware (proprietary software) updates shall be accomplished by using upload/download unit connected to the controller's RS - 232 port (storage in Flash ROM). It shall not necessary to physically replace hardware components to update the firmware. Connecting the upload/download unit to a communications port on the controller and transferring the new firmware from files on the PC to the controller's PROM memory shall accomplish the update procedure. The components shall accept a minimum of one thousand (1000) firmware updates. The following components shall be supplied to accomplish the firmware update:

1. PC compatible software program to accomplish the transfer with a verification routine.
2. One (1) copy of instruction manual for the entire process.

The update process shall be accomplished at a transfer rate of ninety six hundred (9600) baud.

If the requirements of this section conflict with any provision of this specification (TCS 18A), the requirements of this section shall rule. No provision of this specification shall relieve the Vendor of supplying a controller that meets the requirements of section 7.3.2.

7.4 DISPLAY

A liquid crystal display (LCD) shall be provided on the front panel of the controller unit to display programming and operational status information. The display shall be clearly readable in bright sunlight or dim artificial light without shading the display. The contrast of the display shall be adjustable. If after the Department's evaluation that this requirement is not met then backlighting shall be provided. It shall contain a minimum of four lines with forty alphanumeric characters per line. The display shall have an expected continuous life cycle of ten years while operating in the NEMA temperature range.

7.5 OPERATING DISPLAYS

The display shall have two modes of operation, dynamic and programming. The dynamic mode shall display operational status information, while the programming mode shall display user-programmable information. The normal display shall be either blank or a dynamic display as stated below.

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7.5.1 Dynamic Displays

The dynamic displays shall provide a visual status of the real-time controller unit operations. Data entry shall be prevented without a display indicating the location for the data and the data that will be entered in this mode. Data entry during this display is acceptable only as an extra method, not as the primary data entry method.

The dynamic displays shall be accessible via the front panel keyboard. The following status displays shall be specific to each of the major functions of the controller unit.

7.5.2 Controller Timing Displays

The controller timing displays shall be a dynamic display that indicates ring, phase, and coordination status information. Ring status shall include phase timing, current interval and time remaining for both rings, simultaneously. Status messages shall include current vehicle and pedestrian intervals, reasons for phase termination, and Max timer in effect.

Phase status shall indicate the current phase(s) timing and which phase(s) is next to time, vehicle/pedestrian call/recall information and preemptor calls.

The coordinator status display shall indicate the command source, current cycle/offset/split, local/system cycle count, commanded/actual offset, and offset correction. This display shall provide co-ordination relationship to phase operation in real time and be a single display.

The preemptor status display shall indicate calls, preemptor active, and delay period timing. Also indicated shall be preemptor timing, the phase(s) timing while in preemption, interval, and time remaining on the interval.

The detector status display shall indicate activity for all detectors. The display shall indicate detector calls as they are processed by the controller unit.

7.5.3 Programming Displays

The programming displays shall aid the operator to enter data from the keyboard. These displays shall be arranged in a menu format. The main menu shall allow the user to select one of the major functions of the controller unit. A sub-menu is permissible to display selection of a specific area within that function. Cursor keys shall allow the user to move up, down, left, or right through the data of the menu. Multiple data entries shall be shown at the same time to facilitate programming. It shall be possible to return to the main menu or sub-menu by *a* maximum of two key strokes.

English language and traffic engineering terminology shall be used throughout the programming displays. Display organization and data entry method shall allow traffic engineers or technicians to program the controller unit without using reference cards or manuals. Mnemonic usage shall be minimized and limited to recognized traffic engineering terms.

All programming entries shall consist of numerical values, YES/NO, ON/OFF, TRUE/FALSE, logical 1's/0's entries. During program entry, the new data shall be displayed as it is entered from the keyboard. For quick entry of data, a repeating or copy function shall be provided. If the data is in error, then the user shall be alerted by an error message on the display. Previously programmed entries shall remain until valid data is entered.

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7.6 PROGRAMMING

The programming methods shall not affect normal operation of the controller unit.

Download flexibility shall permit individual transfer of each major programmable category or the entire data base at one time.

Controller unit programming shall be accomplished by the following methods:

a. Front panel keyboard through menu access.
b. Downloading data from a LA DOTD computer with Windows software system (including lap-top) running the appropriate software and using the controller unit terminal interface directly or via a dial-up modem.
c. Data module transfer from one controller unit to another as specified in section 7.3.

7.7 PROGRAMMING SECURITY

A four digit code shall be user selected, and stored in EEPROM, for one level of programming security. Display features shall be available without the need to employ the access code. The controller unit shall be supplied with the codes preset to all zeros (0000).

If the access code has not been entered and a data entry attempt is made, then a prompt, requesting the access code, shall appear. Once entering the code, the screen shall revert to the previous display and data entry shall be permitted. The code shall not appear on the screen at any time. No further access code entries shall be required.

When the access code is required for data entry, the controller unit shall automatically set the locked access mode following a period of keyboard inactivity for eight minutes.

The access code shall be changeable only if the previous access code has been entered. Additionally, it shall be possible to prevent changing the access code from the keyboard.

7.8 MEMORY CLEAR

A memory clear function from the keyboard shall not be permitted for the user to clear data entries. Default values shall be entered by the user to supersede previously programmed data.

7.9 INTERFACE CONNECTORS

All interface connectors shall be accessible on the front of the controller unit and rigidly secured to the controller by the shell of the connector. Three MS-type connectors (A, B, C), meeting the pin assignment and interface requirements of the NEMA Standard shall be provided. A fourth connector, identified as the D connector shall be provided for auxiliary inputs and outputs as specified within this standard.

Four (4) RS232 ports shall be provided for communications with the system software, portable download/upload unit, conflict monitor and intra-system communications. These four (4) ports shall be keyboard-assignable for any of the communications functions. All four (4) ports shall be RS-232 serial port accessible through DB-25, twenty-five pin, subminiature, dual-inline connectors. Additional ports required for closed loop secondary operation shall be supplied, if necessary to support the Vendor's

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standard closed-loop application software. Each unit shall support all necessary communication ports for both master and secondary operation.

One SDLC port shall be provided per unit in compliance with NEMA TS-2, 1998 specifications.

All connectors shall be mounted a minimum one and one-half inches apart providing hand working room for comfortable installing and removing of the mating connectors.

All inputs and outputs to the controller unit shall conform to the applicable interface and environmental requirements of the NEMA Standard.

7.10 PRINTED CIRCUIT BOARDS

All printed circuit boards shall meet, as a minimum, the requirements of the NEMA Standard. In addition, they shall also meet the following requirements:

a. All plated-through holes and circuit traces shall be plated with solder to protect exposed copper. Any wire jumpers included on circuit boards shall be placed in plated-through-holes that are specifically designed to contain them. Circuit track corrections by track cuts and jumpers that are tack soldered to circuit tracks are not acceptable.
b. Both sides of the printed circuit board shall be covered with a solder mask material.
c. The circuit reference designation for all components shall be clearly marked adjacent to the component. Pin 1 for all integrated circuit packages shall be designated on all printed circuit boards.
d. All electrical mating surfaces shall be gold-flashed.
e. All ICs 14 pin and up shall be installed in machine tooled grade sockets meeting these requirements. All sockets shall be AUGAT-8XX-AG11D or approved equal, meet UL specification 94V-0, be constructed with two-piece, machined contacts and close-ended to eliminate solder wicking. The outer sleeve shall be brass with tin or gold plating and tapered to allow easy IC insertion. The inner contact shall be beryllium copper sub-plated with nickel and plated with gold.

7.11 SERVICEABILITY

The controller unit design shall use printed circuit boards that plug into an internal harness array and/or connector plug within the unit. All circuit boards shall be mounted vertically. Transformers, capacitors, and transient suppressor components are exempt from the above requirement.

The controller unit design shall allow easy removal or replacement of a circuit board. All printed circuit boards shall be keyed to prevent improper installation.

The controller unit enclosure shall be constructed to allow complete disassembly using hand or standard screwdriver operated fasteners. The unit shall be designed for adequate accessibility to troubleshoot and test one side of any circuit board while the unit is still in operation. If testing cannot be accomplished with boards in their assigned position then extender boards or cables may be used. Only one board at a time shall be required to be moved during testing.

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7.12 SERVICE EQUIPMENT (to be provided when stated on order)

One set of cables and/or extender boards shall be provided with each order of ten controllers, two sets for twenty controllers, with a maximum of three sets of cable or extender boards.

One portable controller testing facility shall be provided with each order of ten controllers, two for twenty controllers, and a maximum of three for more than thirty controllers.

The testing facility shall provide switches for testing all NEMA inputs and LED's for all NEMA outputs. In addition, indicators and switches shall be provided for testing all the requirements within this standard except for the communication ports and/or RS-232 connectors.

The facility shall be contained within a weather proof enclosure, with quick release closure latches, and have a carrying handle. All harnesses shall be provided with the standard A, B, and C harnesses permanently wired within the enclosure. The additional harnesses shall be connected within the enclosure with a circular plastic connector meeting the requirements for type and pin assignment for the fourth connector installed in the cabinet. All standard NEMA functions shall be permanently labeled for each indication and switch. All additional inputs and outputs shall be identified with overlays which can be labeled identifying the function.

All servicing equipment shall be identified and documentation shall be provided which includes wiring diagrams and schematics.

8.0 ACTUATED CONTROL

The controller unit shall provide the actuated control functions and operations required by Sections 2, 13 and 14 of the NEMA Standard. In addition, it shall provide the features described in the following paragraphs.

8.1 PHASE SEQUENCE

The phase sequence of the controller unit shall be programmable in any combination of sixteen phases to achieve phase reversal individually or by pairs, one to four independent or concurrent timing rings, multiple rings allowing selection of four phase operated as a concurrent group, or coordination of two rings and one sequential ring divided by one barrier. Sequencing shall be selected by cycle program or timing plan. Selection of the required sequences shall be programmable from any of the following:

a. Full NEMA and NTCIP operation
b. Select a program number for an established phase sequence
c. Select one to four timing rings, with concurrent or sequential phase assignment
d. Select three or four phase diamond

Specific sequences required by the Department shall be selected from the above operation. Program for selecting phases shall include provisions to disable phases with each program, (phase on - off). Alternate sequences may be used to satisfy the above requirements however mutual coordination of the separate rings will be required. All controller units shall provide these sequences.

Diamond sequences shall include two operational sequences for interstate ramp interchanges. The operation of the controller unit as a 4 phase, and 3 phase diamond shall be keyboard selected and the standard timing function required by NEMA TS1 shall be provided for each phase. The configuration

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shall operate as two independent four phase rings. There shall be two mutually exclusive inputs as defined in Appendix (pins 12 and 13) that will force the controller unit into 3 phase or 4 phase operation. Additional circuits in this harness shall be for controller and cabinet interlock. Pin 35 listed in Appendix shall be a ground true controller interlock output. The controller shall assert this output when it is present and powered on. Pin 42 listed in Appendix shall be a ground true cabinet interlock input. This input shall be internally pulled up to 24VDC and the controller shall sense this input and operate only when it is present. Special clearance intervals shall be pre-timed programmable and shall be activated within the sequence shown. This shall be overridden while under computer control, TBC control, or by the inputs defined below. Figure 18A-3 illustrates the assignment of phase numbers to the traffic movements. The additional detector inputs shall be provided with these controllers as stated in the pin assignment for the connector.

8.1.1 Four Phase Diamond Operation

The normal sequence of operation shall be phase 2/5 → 4/5 → 1/6 → 1/8.

The point at which operation may be switched from 4 phase to 3 phase operation shall occur by forcing the sequence into concurrent left turns (inside clearance during ∅ 1 and ∅ 5).

The loop detector layout for 4 phase diamond operation shall be as defined in Figure 18A-4. Each detector input shall be to the phase shown and provide the normal phase timing required by NEMA TS1. The controller unit software shall provide the additional logic for Detector Circuit operation in the following description:

a. Detector Circuit #1 -
   1. Shall extend phase 1/6 if phase 1/8 is called.
   2. Shall call phase 2/5 if phase B overlap is not green and phase 4/5 is not called.
   3. Extend intervals inside left turn clearance interval.

b. Detector Circuit #2 -
   1. Shall extend phase 2/5 if phase 4/5 is called.
   2. Shall call phase 1/6 if phase A overlap is not green and phase 1/8 is not called.
   3. Extend intervals inside left turn clearance interval.

c. Detector Circuit #3 (45P) and #4 (45S) -
   During the phase 4/5 red condition the 45P detector shall always be active and the phase 45S detector shall always be inactive. A phase 4/5 green plus a phase 1/6 call plus a 0.2 second gap in 45P detection shall disable the 45P detector and enable the 45S detector until the phase 4/5 signal changes to yellow. The circuits then switch back to normal - 18P active and 18S inactive until the condition is repeated.

d. Detector Circuits #5 (18P) and #6 (18S) -
   During the phase 1/8 red condition the 18P detector shall always be active and the phase 18S detector shall always be inactive. A phase 1/8 green plus a phase 2/5 call plus a 0.2 second gap in 18P detection shall disable the 18P detector and enable the 18S detector until the phase 1/8 signal changes to yellow. The circuits then switch back to normal - 18P active and 18S inactive until the condition is repeated.

e. Detector Circuits #7 (25S) and #8 (16S) -
   The phase 2/5 detector circuit shall always be active during phase 2/5 red. A phase 25 green plus a 0.2 second gap in detector 25S shall disable this circuit until loss of phase 2/5 green.

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The phase 1/6 detector circuit shall always be active during phase 1/6 red. A phase 1/6 green plus a 0.2 second gap in detector 16S shall disable this circuit until loss of phase 1/6 green.

The 0.2 second gaps mentioned above shall be keyboard programmable from 0 to 3.0 seconds in 0.10 second increments or smaller.

The phase 45P detector shall always extend phase 4 during phase 4/6 interval.

The phase 45P detector shall always extend phase 8 during phase 8/2 interval.

An indication shall be provided for both the 45P detector circuit and the 18P detector circuit to indicate when they are active. When a circuit becomes inactive, the indication shall go out and stay out until it again becomes active.

f. Concurrent Timing Requirements -

Refer to Figures 18A-3 for the following descriptions.

The clearance interval phase 4/6 when sequencing from phase 4/5 to 1/6 shall time concurrently with phase 6, however phase 6 may not terminate green until phase 4 yellow interval has timed out.

The clearance interval phase 2/8 when sequencing from phase 1/8 to phase 2/5 shall time concurrently with phase 2, however phase 2 may not terminate green until phase 8 yellow interval has timed out.

All left to right internal clearance (Ø1/Ø5) times from phase 4/5 to phase 1/8 shall use the same timing settings for minimum green, extension, max green, yellow clearance, and red clearance.

All right to left internal clearance (Ø5/Ø1) times from phase 1/8 to phase 4/5 shall use the same timing settings for minimum green, extension, max green, yellow clearance, and red clearance.

Separate timing settings for minimum green, extension, max green, yellow clearance and red clearance shall be provided for each of the two external clearance intervals (Ø2/Ø8 and Ø4/Ø6 from Ø1/Ø8 to Ø2/Ø5 and Ø4/Ø5 to Ø1/Ø6).

8.1.2 Three Phase Diamond Operation

a. Sequence

The controller unit shall be keyboard selected for 3 phase diamond operation.

The normal sequence of operation shall be, except as modified below, 4/8 → 2/6 → 1/5.

The point at which operation may be switched from 3 phase to 4 phase operation shall be from phase 1/5 to 4 phase inside clearance interval phase 1/5.

The path from 4/8 to 2/6 shall be keyboard selected and selected by the TBC (on a time of day basis) for one of the five possible phase combinations of lead/lag left turn clearance movements. These possible phase combinations shall be permitted when individual phase gap time expires.

4/8 → 4/6 → 2/6
4/8 → 4/5 → 2/6
4/8 → 2/6
4/8 → 2/8 → 2/6
4/8 → 1/8 → 2/6

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The path from 2/6 to 1/5 shall be keyboard selected and selected by the TBC (on a time of day basis) for either 2/6 → 1/6 → 1/5 or 2/6 → 2/5 → 1/5.

The path from 2/6 to 4/8 shall always be through 1/5 and terminated simultaneously. The sequencing shall be flexible and phases shall be terminated bases on traffic actuation and gaps programmed for the phase.

b. Detector Operation

The loop detector layout for 3-phase diamond operation shall be as defined in Figure 18A-4.

The 1P detector shall function as a phase 2 calling detector during phase 4 and as a phase 1 extending detector during phase 2.

The 5P detector shall function as a phase 6 calling detector during phase 8 and as a phase 5 extending detector during phase 5.

8.2 TIMING INTERVALS - ALL SEQUENCES

The controller shall be programmable for the following timing parameters and any of the selected sequences. Each phase shall be timed independently and special clearance phasing described in the diamond sequence may be timed by group.

The following timed intervals shall be programmable in the minimum range for each interval

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INTERVAL	RANGE (SEC.)	INCREMENT (SEC.)
Vehicle passage	0-25.5	0.1
Yellow clearance	3-25.5	0.1
Red clearance	0-25.5	0.1
Added initial min. green	0-25.5	0.1
Red revert	0-25.5	0.1
Minimum gap	0-25.5	0.1
Delay/extend detector timing	0-25.5	0.1
Walk	0-255	1.0
Pedestrian clearance	0-255	1.0
Time before gap reduction	0-255	1
Time to reduce gap	0-255	1
Min initial green	0-255	1
Maximum added initial green	0-255	1
Overlap timing	0-25.5	.1
Maximum green I, II & III	0-255	1
Maximum green extension interval	0-255	1

TABLE 18A-4
TIMING INTERVALS

8.2.1 Guaranteed Interval

Guaranteed minimum time shall be provided for each phase, overlap, and preempt yellow. Minimum values shall not be changeable or overridden from the programming sources listed in this specification. Guaranteed minimum interval value shall be three seconds.

8.2.2 Maximum Green Intervals

The controller unit shall provide two maximum green intervals per phase, however three are preferable. Maximum intervals shall be selected by either time-of-day or external input.

8.2.3 Maximum Green Extension

The controller unit shall be capable of extending a phase maximum green time by continuous vehicle demand. If the phase terminates by expiration of the maximum time for one successive cycles, then its maximum green time in effect (Max 1 or Max 2) shall automatically be extended by a maximum green extension interval. The maximum green time shall be increased, until it equals Max 3, on each successive

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cycle that the phase green is terminated by the Max 1 or 2. If the phase gaps out for one successive cycles then the maximum green time shall return to the original Max 1 or 2 value.

An alternate method for providing active traffic responsive timing shall use the volume/occupancy system detectors capability assignment to the phase detector. A preprogrammed cycle plan shall be initiated for providing timing modification to meet the traffic demand.

8.2.4 Volume Density Intervals

Each phase shall have volume density intervals conforming to NEMA standards.

8.3 OVERLAPS

The controller unit shall provide sixteen internally generated overlaps: Each overlap may be programmable as standard or protected/permissive. The capability shall be provided for reassignments of a minimum of four phase outputs to overlap operation shall be in the software for implementing special sequencing requirements and shall not require rewiring the controller signal outputs on the back-panel.

8.3.1 Overlap Timing

Green, yellow and red timing intervals shall be provided for each overlap. These intervals shall permit the overlap to remain green after terminating the parent phase in addition to providing separate yellow and red clearance intervals for the overlap. A programmable feature shall provide a selection of sequencing that would hold all phases red or advance to the next serviceable phase green after the parent phase has terminated and the overlap timing is in effect. In either selection the next serviceable phase interval shall not begin timing until the overlap times have expired. Overlaps shall be controlled by the parent phase if the overlap timing intervals are not programmed. The overlap sequence shall never violate the conventional green, yellow, red sequence under any circumstance. This timing operation shall be provided during all operational requirement herein specified. Any conflicting operation with this timing requirement shall supersede the timing extensions.

Overlap programming flexibility shall permit the user to assign the timed overlap to follow any parent phase(s).

8.3.2 Multi-Overlap Operation

The controller unit shall be capable of eight overlaps including the standard four and assigning four phase outputs as overlaps. If a phase output is assigned as an overlap then it shall function as a standard overlap and programmed in the EEPROM. Changing these overlap assignments shall be programmed from the keyboard of the controller unit and provide warning of the impending sequence change.

8.4 RECALL FUNCTIONS

The controller unit shall provide the following programmable features for each phase.

a. Locking/Non-locking detector memory
b. Vehicle recall
c. Pedestrian recall
d. Maximum recall
e. Soft recall - Locking/Non-locking memory

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Soft recall shall return the controller unit to the programmed phases in the absence of all other calls.

8.5 INITIALIZATION

The controller unit shall permit power start and external start to be individually programmed by phase and interval. Start intervals shall be green, yellow, red, all red or flash. During a power start condition, the controller unit shall be programmable for a timed display of an all red or flash interval before the selected start phase(s) and intervals are displayed. Data reference shall be made to the data in the EEPROM. An error shall keep the controller non-operational until the error is corrected. Resets shall be initiated to correct data integrity and begin the controller operating.

8.6 ADDITIONAL FEATURES

8.6.1 Last Car Passage

The controller unit shall provide guaranteed passage operation on a per phase basis. When selected, this feature shall provide a full passage (vehicle extension) interval when a phase gaps out with a gap in effect less than the passage time. The phase shall terminate after the passage interval expires.

8.6.2 Dual Entry

The controller unit shall provide both single and dual entry operation. When selected, dual entry shall cause the controller unit to insure that one program selected phase is timing in each ring. If calls do not exist in a ring when a barrier is crossed, the controller shall select a programmed compatible phase and operate it concurrently with the phase or phases that have calls. When the selected controller sequence is non-NEMA, then an acceptable method of calling a compatible phase is the use of vehicle detector switching.

8.6.3 Conditional Service

The controller unit shall provide a programmable conditional service feature when the controller is operated in the standard NEMA sequence. When selected, the controller unit shall service only one odd numbered phase during a sequence, once normal service to that phase has been completed and enough time for additional service exists on the concurrent even phase. The odd phase (left turn) shall be serviced if the vehicle clearance time of the terminating even phase plus a conditional service minimum green is less than or equal to the time remaining on the maximum green timer of the even phase which is still timing.

A conditional service, minimum green time shall be programmable for each phase. This interval shall insure a minimum green if the phase is conditionally served.

The controller shall be programmable to re-service the even phase after conditionally serving an odd phase following the same guidelines stated above. Once an even phase has been conditionally re-serviced, the odd phase shall not be conditionally served again until returning to the concurrent group that is timing.

8.6.4 Pedestrian Functions

The controller unit shall provide the following additional pedestrian functions:

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a. Actuated phase rest in walk
b. Pedestrian clearance protection during manual control
c. Exclusive pedestrian occurring once at a programmable point within each of the previously required sequences.

8.6.5 Backup Protection

Programming shall be provided to inhibit re-service of odd phases within the same concurrent group. When programmed, backup protection shall take priority before conditional service.

8.6.6 Simultaneous Gap Termination

The controller unit shall provide a programmable simultaneous gap termination feature. When programmed, phases in both rings must gap out together in order to terminate the green interval and cross the barrier.

9.0 DETECTOR INPUT FUNCTIONS

9.1 DESIGN REQUIREMENTS

The controller unit shall provide a minimum of sixteen vehicle detector inputs. Each input shall be assignable to any single phase or group of phases and be programmable for type of function (detector switching).

Detectors 1 through 8 shall meet the NEMA standards for vehicle detector inputs into phases 1 through 8. Remaining detectors shall utilize inputs assigned to the auxiliary functions in the D connector as specified in the appendix.

9.2 DETECTOR INPUT PROGRAMMING

All vehicle detector input shall be user-programmable for vehicle calls to any or all of the eight phases in the controller. Each shall be selected for multiple applications identified in the following descriptions in addition to the vehicle call inputs. The controller shall include a minimum of three programming plans selected by TOD or cycle/split/offset for assignment of the programmable feature of each detector input.

9.2.1 Standard Detector Input

All inputs shall default to standard operation, providing one call per actuation and shall be assigned to each phase, (i.e. det 1 to phase 1, det 2 to phase 2, etc.).

9.2.2 Delay and Extend Detector Input Timing

A minimum of sixty-four detector inputs shall be programmable to delay a vehicle call to the assigned phase(s). The delay timer shall have a range from 0 to 25.5 seconds. The timing shall begin upon activation of the input to the controller. If the input remains when the time has expired then the input shall be directed to the phase(s). The timing shall be reset when the input is removed. The delay timing function shall be inhibited during the selected phase green interval.

A minimum of sixty-four detector inputs shall be programmable for extending the vehicle call to the assigned phase. The extend timer shall have a range from 0 to 25.5 seconds. The extending time shall

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begin upon removal of the input to the controller and will extend the call to the phase until the expiration of the programmed time.

9.2.3 Phase Extending Detector Input

All inputs shall be programmable to extend assigned phase or phases green interval timing and once programmed this input will not call the phase for service. All input shall be programmable to switch assigned phases during a programmed red interval and begin extending the assigned phase green interval.

9.2.4 Call Detector Programming

All inputs shall be programmable to call assigned phase or phases during its red interval and not extend the green time from any actuation.

10.0 PREEMPTION

The controller unit shall provide a minimum of five priority/non-priority preemption sequences. This capability shall be a standard controller unit feature and shall be provided within the modules and software. All required features specified above shall be available and programmable within the preemption operation.

10.1 PRIORITY/NON-PRIORITY PREEMPTOR DESIGN REQUIREMENTS

Each of the five priority/non-priority preemptor shall be capable of railroad, fire lane, or emergency vehicle preemption sequences. Any one of the following conditions shall be selected to occur during preemption.

a. Hold phase green
b. Limited phase service, following track clearance
c. All red
d. Flash

10.1.1 Preemptor Call Priority

Preemptor shall be selected as priority or non-priority. Lowest numbered priority preemptor shall have highest priority and will override a higher numbered priority preemptor calls. A minimum of two preemption phases shall be give equal priority and override higher numbered preempts. Additionally, priority preemptor calls shall override all non-priority preemptor calls. Non-priority preemptor calls shall be serviced in the order received.

10.1.2 Preemptor Call Memory

Each preemptor shall provide a programmable locking memory feature for preemptor calls. The preemptor in the non-locking mode shall not service a call when it is received and dropped during the delay time.

10.2 PRIORITY/NON-PRIORITY PREEMPTOR TIMING

The following preemptor timing features shall be provided for each of the priority/non-priority preemptor inputs.

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10.2.1 Preemptor Timing Intervals

All preemptor timing intervals shall be programmable from 0-60 minutes in 1 minute increments, 0-255 seconds in 1-second increments or 0-25.5 seconds in 0.1-second increments as indicated for each of the following.

10.2.2 Delay Time

The delay time interval shall inhibit the start of the preemption sequence for a specified duration. This interval shall begin timing immediately after receiving a preemption call. (0-255 sec., 1 sec increments)

10.2.3 Duration Time

Each preemptor shall provide a programmable minimum and maximum duration time that a preemptor shall be active, (Min: 0-255 sec., 1 sec. increments, Max: 0-60 mins, 1 min. increments).

10.2.4 Minimum Times

Phase timing at the beginning of a preemption sequence shall be controlled by the programmable minimum times before advancing to the next sequential interval. Preemptor minimum times shall be programmable for the following intervals:

a. Green/Pedestrian Clearance (0-255 sec., 1 sec. increments)
b. Yellow (3-25.5 sec, 0.1 sec. increments)
c. Red (0-25.5 sec. 0.1 sec. increments)

10.2.5 Pedestrian Timing

If a phase is timing a walk interval at the beginning of a preemption sequence, then the phase shall advance immediately to the preemption pedestrian clearance. A selectable timing interval shall be provided to time the minimum pedestrian clearance through the vehicular yellow interval, or alternately advance immediately to vehicular yellow.

During preemption, pedestrian indicators shall be user selected to be solid don't walk, blank, or operational during preemption.

10.2.6 Overlap Timing

Overlaps shall be programmed to operate with the phase(s) or to clear to red then remain red during preemption. Overlaps terminating or forced to terminate when a preemption sequence begins, shall be selectable to time the preemptor minimum yellow and red clearance times or to time programmed overlap timing specified in section 8.3.

10.2.7 Track Clearance

Each preemptor sequence shall provide user-programmable green, yellow and red track clearance intervals. Track clearance shall begin timing immediately after the preemptor minimum red interval, (section 10.2.4).

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A minimum of two phases shall be selected as track clearance phases. During the track clearance period, the selected phases shall time the track clearance green, yellow and red intervals once, and then advance to the next programmed interval (section 10.2.8).

If track clearance phases are not selected, the track clearance intervals shall be omitted from the preemption sequence.

10.2.8 Limited Sequence

The limited sequence program shall be user selected and begin immediately after track clearance. It shall remain in effect until preemptor duration time, phase minimum times has elapsed, or preemptor call has been removed.

10.2.9 Limited Sequence Phases

Any active phase, except a track clearance phase(s), shall be selected for operating during limited sequence operation. Those phases not selected shall remain red during preemption. The controller unit shall remain in all red interval during the limited sequence interval when no phases are selected for operation during limited sequence.

If flash is selected for the limited sequence interval, up to two permissive phases shall be selected to flash yellow. The remaining phases shall flash red. Overlaps associated with the phases flashing yellow shall also flash yellow unless they have been forced to terminate in which case they shall remain dark. Flashing shall occur by controlling the appropriate load switch driver outputs.

10.2.10 Limited Sequence Timing

During the limited sequence interval, the selected phase(s) shall operate normally (as outside of preemption). When preemption is exited, the current phase shall terminate after minimum green time is expired.

If any limited sequence intervals are programmed with zero timing, the equivalent interval time of the controller unit shall be used.

10.2.11 Exit Phases

Two permissive exit phases shall be selected to time after the preemption sequence has been completed. These phases shall serve as transition phases to return the controller unit to normal operation. Exit phases shall time their normal programmed interval times.

Additionally, it shall be possible to program exit calls on any of the phases used in normal operation. Phases programmed as exit phases shall be served first, while exit calls on the remaining phases shall be served in normal sequence.

10.3 PREEMPTOR ACTIVE OUTPUT

A preemptor active output shall be provided for the five priority/non-priority preemptor. The output shall be set to ON when the preemption sequence begins and shall remain ON for the duration of the sequence.

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10.4 POWER INTERRUPTION

If a preemptor call is active when power is restored to a controller unit, the voltage monitor output shall be set to FALSE, placing the intersection into the flashing mode of operation. Additionally, if external start is applied during a preemption sequence, the intersection shall be placed into the flashing mode of operation. The flashing mode of operation shall remain in effect until the preemptor call has been removed or the preemptor maximum duration time has elapsed. The controller shall begin operating as described by NEMA during power interruption.

10.5 PREEMPTOR STOP TIME

A stop time input shall stop the timing of the current active preemptor. The stop time input shall normally be controlled by the conflict monitor unit.

11.0 AUTOMATIC FLASH

The controller unit shall provide automatic flash selection per the requirements of the Manual on Uniform Traffic Control Devices. The flash phases shall be programmable through the keyboard and flashing shall be controlled by changing the controller outputs to the load cells from the normal sequencing of three outputs to a flashing output to one selected output. The controller shall be programmable for selecting the indication which will flash. Automatic flash shall be selected by external input, system command, or time-of-day from the internal time base clock. Two flashing controls shall be provided that alternate and shall be program selected for assignment as needed to each phase that will prevent a yellow/yellow conflict.

12.0 CONFLICT MONITOR

The conflict monitor shall conform to NEMA TS-1, SECTION 6, in addition to the requirements of this specification. A six or twelve channel monitor shall be provided with the controller as required on the order or plans.

Each conflict monitor shall utilize and be provided with a programming card specified in the above mentioned NEMA standards.

12.1 MECHANICAL DESIGN

The frame shall be completely enclosed within sheet aluminum housing with a durable protective finish. The housing shall be removable for service to the internal circuitry.

The programming card shall be inserted through the front panel of the conflict monitor. Card guides should be provided for aligning the edge connector of the card with the mating jack. The cards shall be removable without use of tools or disassembling of the housing.

All printed circuit boards shall meet, as a minimum, the requirements of the NEMA Standard. In addition, they shall also meet the following requirements:

a. All plated-through holes and circuit traces shall be plated with solder to protect exposed copper. Any wire jumpers included on circuit boards shall be placed in plated-through-holes that are specifically designed to contain them. Circuit track corrections by track cuts and jumpers that are tack soldered to circuit tracks are not acceptable.

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b. Both sides of the printed circuit board shall be covered with a solder mask material.
c. The circuit reference designation for all components shall be clearly marked adjacent to the component. Pin 1 for all integrated circuit packages shall be designated on all printed circuit boards.
d. All electrical mating surfaces shall be gold-flashed.
e. All ICs 14 pin and up shall be installed in machine tooled grade sockets meeting these requirements. All sockets shall be AUGAT-8XX-AG11D or approved equal, meet UL specification 94V-0, be constructed with two-piece, machined contacts and close-ended to eliminate solder wicking. The outer sleeve shall be brass with tin or gold plating and tapered to allow easy IC insertion. The inner contact shall be beryllium copper sub-plated with nickel and plated with gold.

12.2 ELECTRICAL DESIGN

Liquid crystal displays shall be provided for displaying load cell outputs during normal operation, operations selected from a menu, and fault sensed. When a fault is detected, the display shall present two displays, sequentially, one showing all load cell outputs at the time of the fault detection, and one showing the specific fault and date/time detected.

Circuitry shall be provided to detect sequential failure and indicate the channel on which the failure occurred. This feature shall be programmable to select either enable or disable for each channel. The following shall be failure indicated as sequential failures:

a. Yellow indication on for less than 2.5 seconds.
b. No yellow indication after green.
c. Simultaneous display of two or more indications within the same signal head, except as allowed by the MUTCD.
d. Combinations of any above.

All solid state components shall be mounted on printed circuit boards. The electronic components and printed circuit board(s) shall comply with the requirements outlined for the controller in section 7.10 of this standard.

The conflict monitor shall be capable of recording and holding in memory (logs) the last ten conflicts detected and the last ten power failures. The time and date shall be indicated for each conflict and power failure. The memory shall be non-volatile during power loss and meet the requirements for the controller in section 7.3, excluding Section 7.3.1. A log of the sequence of 20 events prior to a fault detection shall be retrievable prior to resetting the monitor and accessible through the communication port.

Each conflict monitor will be supplied with a 4-foot RS-232 cable with male connectors on each end. The monitor shall have a 9 pin communication port on the front of the monitor. The communication port shall be as defined herein, compatible with EIA-RS-232 standards for connection to a portable computer, printer, or other electronic devices. Communications shall be full or half duplex using FSK transmissions. The data transmission rate shall be selected baud. Control of the port shall be selected in menu form on the monitor display or request through the communication port. Data transfer to other electronic devices shall be provided with download commands from the device.

The monitor display shall present a selection menu for various data and programs available. This shall include, but not limited to, date and time set, review of programmed permissive phases, various logs, and other operational.

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12.3 COMMUNICATIONS

The conflict monitor shall generate a report to the controller each time a change in status occurs. The report shall include the following as a minimum:

a) The configuration of the programming card.
b) The channels which have the NEMA plus features enabled.
c) A listing of the phases which are monitored for short yellow times.

Additionally, the conflict monitor shall store and report at least five (5) failures containing the information listed above when interrogated directly via the portable download/upload unit.

The report shall list at least the last five (5) failures from the monitor which contain the following:

a) Time of the occurrence of the failure.
b) The channels (Green, Yellow, Red and Walk) that were active at the time of the failures.
c) The status of the CVM input and the +24 V 1 and 2 inputs.
d) The type of failure (conflict, switch failure, red failure, etc.)

The conflict monitor will be capable of transmitting (via RS-232 port) an ASCII report to the controller unit.

The conflict monitor shall provide three (3) reports for interrogation. The first is an ASCII record of all data entries and programming card configurations. The second is an ASCII formatted record of all failures and each power on/off cycle. The last ten of these failure records will be available in report form. The third report will be a sampling report and will contain the twenty (20) samples of all of the inputs to the conflict monitor. Each sample will be taken at 0.1 second intervals so that the last two (2) seconds of real-time outputs of the load switches can be viewed.

Each of the reports will have the appropriate headings and will consist of ASCII lines of not greater than eighty (80) characters so that a clear presentation of the data can be viewed from the screen of a notebook computer using the standard ASCII character codes.

The monitor port shall be programmed in the following format:

a) Standard EIA-232 convention
b) Each word shall be eleven (11) bits long: eight (8) data bits, one (1) start bit, one (1) stop bit, no parity.
c) 2400 to 9600 baud
d) The notebook or traffic controller unit will send a message of one byte to the monitor requesting each of the reports. After the one-byte message, the controller will issue an XON command to start the data flow. The data flow can be stopped with an XOFF command at any time.

   The data sent to the notebook or controller unit in response to the request message will be the ASCII report requested. The last byte sent by the monitor will be an EOT (End Of Text- 04H)

If the controller issues an XOFF during a reporting request, the monitor will stop the data flow. If an XON is not issued within 30 seconds, the monitor will time out and set its pointer to the beginning of the report. The next XON will then start at the beginning of the requested report. A report will also perform the XOFF function to the conflict monitor.

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Definitions of the requests are as follows:

Request report 1: 31H
Request report 2: 32H
Request report 3: 33H
XON (DC1) 11H
XOFF (DC3) 13H

13.0 SOLID STATE SIGNAL LOAD CELLS

The load cells shall follow those standards previously set forth. In addition to those, each load cell shall have indicators on the front showing the input state of operation with the indicators vertically aligned and the red input on top, yellow in the middle, and green below.

14.0 SIGNAL FLASH TRANSFER RELAY

The transfer relays shall be electro-mechanical and shall be energized during normal sequential operation of the traffic signals with the operational switch in the normal position. This relay shall be de-energized when the indications are to be flashing. The relay shall transfer the field signal circuits to the flashing circuits and energize the flasher.

14.1 PHYSICAL DESIGN

The relay shall be enclosed in a transparent case for protection against dust, dirt and other foreign objects. The case shall be a maximum of 2.671 inches high, 2.375 inches wide and 1.75 inches deep. The insulated base shall extend 0.625 inch from the case and shall be 1.990 inches wide and 1.120 inches deep. The contacts of the plug shall be flat blades arranged in two (2) parallel rows, 0.475 inch apart with the flat side of the blades in line with the row. The contacts of the plug shall be 0.250 inch wide, 0.060 inch thick, and extend past the insulated base 0.520 inch. Each row shall have four (4) contacts. The base shall be keyed with a pin that has a diameter of 0.156 inch and extend past the insulated base 0.685 inch. The pin shall be centered between the row of contacts and centered in line with contacts 5 and 6 of the plug. The contacts of the plug shall be numbered for wiring purposes, from 1 through 8. The top row shall be consecutively numbered from left to right using the odd numbers and the bottom row shall be consecutively numbered from left to right using even numbers.

14.2 ELECTRICAL DESIGN

The relay coil shall be rigidly supported by the insulated base. The contacts shall be 2 Form C, rated at 20 Amps, and shall be 3/8 inch diameter, silver cadmium-oxide. The relay's life shall be 5 million mechanical operations and 100,000 electrical operations. Each contact shall be rated for power bus control and 1 KW tungsten at 120 VAC. The coil shall be 110 VAC and shall pick up at 80% of nominal voltage. Maximum power requirement of the coil shall be 10 VA. The relay shall be wired and the socket pin assignments arranged according to the following table:

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PIN	FUNCTION	PIN	FUNCTION
1	Relay Coil	5	Common Circuit #1
2	Relay Coil	6	Common Circuit #2
3	NC Circuit #1	7	NO Circuit #1
4	NC Circuit #2	8	NO Circuit #2

TABLE 18A-5
TRANSFER RELAY WIRING

The base, relay, and enclosure shall have a minimum rating of 1500 volts.

15.0 SOLID STATE FLASHER

The flasher shall comply with NEMA TS-1, Section 8 and Section 7.2.3.2. The flasher shall be a two circuit flasher rated at 15 amps per circuit (Type 3).

16.0 VEHICLE AND PEDESTRIAN DETECTORS

Vehicle detectors shall be fully digital, microprocessor designed, auto-tune, card rack mounted and have four channels of detection per card, type 8. Unless otherwise noted the detectors shall be provided with the order for controller in type 3, 5, 6, and 7 cabinets. Detector units shall conform to applicable environmental, functional, dimensional, and design required in NEMA TS 1, Section 15. The amplifier shall not consume more than 385 ma of current at the rated voltage. Delay and extension timings shall meet this standard when the order or plans require the detector to have such timing. Each channel shall have an erasable, write-on surface for channel identification.

Pedestrian detectors shall be of an approved model accepted by the Department under the appropriate Traffic Control Standard. Each order or plans shall identify the type and quantity of detectors in each cabinet.

16.1 SENSITIVITY AND ACCURACY

Detector units shall conform to NEMA TS1, Section 15. Each detector shall be accurate for detecting all vehicles from motorcycles to tractor-trailer combinations which ordinarily travel public streets and highways and are comprised of sufficient conductive material, suitably located to permit recognition and response by the detector system. There shall be a minimum of sixteen selected sensitivity ranges located on the front of the unit for each channel. The range of sensitivity shall be, nominally, between 0.00 % - 1.250% change in total loop inductance.

16.2 OPERATING MODES

Each channel shall be self-tuning in accordance with the NEMA standards. Response time for compensation from extended detection, re-tuning to track the changing electrical characteristics of the loop and recovery from power interruption shall be accomplished within 50 milliseconds. Each channel shall have a on and off switch. Each detector card shall have a momentary push switch to reset all channels.

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16.3 FAIL SAFE

The detector shall operate when sensor loop shorted to ground or not in good condition. The unit shall generate a continuous call when re-tuning failed sensor loop or failed detector unit.

16.4 CONTROL VOLTAGE

All controls shall be DC voltage in accordance with the NEMA standards. The control circuit from the delay/extension feature shall follow this requirement.

16.5 CONTROL SWITCHES

All switches, connectors, and fuses shall be located on the front of the card. Each switch shall be permanently labeled to identify its function. Each position shall be labeled to identify its mode of operation. Each mode of operation shall be simple to program with one switch position assigned to one function.

16.6 PRINTED CIRCUIT BOARD DESIGN

The PC board shall be in accordance with NEMA TS1 Section 15. All pressure contracts shall be gold flashed. All components mounted and soldered to the PC board shall be easily removed and replaced without causing damage to the board or traces. Each individual PC board shall be identified by manufacturer and a serial number or part number clearly stamped or etched on the board. All PC boards shall be coated with an epoxy or approved equal type material to prevent erratic performance due to high humidity, condensation and growth of fungus and mildew. This coating will not cover the component on the board, but once the components are in place, they and the soldered joints shall be covered with a moisture and fungus proof, clear type of acrylic lacquer. This coating shall not be injurious to the board or components and shall not interfere with the repair of the circuitry or the replacement of components.

16.7 PEDESTRIAN DETECTOR ISOLATION

Two - two channel pedestrian isolation circuit boards shall be provided. There shall be two circuits using optical and transformer isolation designed and tested for a minimum of 2500 volts D.C. between the inputs and outputs. Each circuit shall recognize a minimum 5 millisecond switch closure between conductor pairs from the pedestrian push button operated on a maximum of 5 volts and 20 milliamps. Transient protection shall be on the input and shall withstand a 10 microfarad capacitor charged to 2,000 volts to be discharged between input pins or between input pin and chassis ground. When the input switch closure occurs, the circuitry shall close the pedestrian call circuit between the controller input and logic ground and remain closed for a minimum of 100 milliseconds or the time the pedestrian push button is closed, whichever is larger. Additional circuits shall be provided to maintain isolation, lock the pedestrian actuation, and reset when an input from the DC level from the controller activates the walk and raises the potential of the field circuit from five volts to 24 volts. Each board shall have a fused power supply. Output status indicators shall be located on the front panel for each channel. A three position switch shall be provided on the front of the unit for each input circuit and provide "on", "off", and momentary "on". Alternate designs will be reviewed at the time of bid for pedestrian actuation and annunciator located at the pedestrian push button.

The card shall fit into the vehicle detector card rack. The dimension characteristics shall follow the Type 7 card detectors standards Section 15 in NEMA TS1 1989.

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16.8 PEDESTRIAN ISOLATION CARD CONNECTOR

The isolation card shall be designed with an edge connector. The connector shall be 22 position, dual inline type connector with the following position assignments:

PIN	FUNCTION	PIN	FUNCTION
2A/1	SPARE/CH 1 ØWALK	N	AC(+) 120 V
B/2	SPARE/CH 2 ØWALK	P	SPARE
C	SPARE	R	SPARE
D	INPUT #1	S	SPARE
E	INPUT COMMON	T	SPARE
F	OUTPUT #1 (COLLECTOR)	U	SPARE
H	OUTPUT #1 (EMITTER)	V	SPARE
J	INPUT #2	W	OUTPUT #2 (COLLECTOR)
K	INPUT COMMON	X	OUTPUT #2 (EMITTER)
L	CHASSIS GROUND	Y	SPARE
M	AC (-) 120 V	Z	SPARE

TABLE 18A-6
PEDESTRIAN ISOLATION CARD CONNECTOR ASSIGNMENT

16.9 CARD RACK

Card racks shall be designed with top and bottom card guides for four-four channel detector cards mentioned above, two-two channel isolation cards, and a power supply installed in type 6 cabinets and two-four channel detector cards mention above, two-two channel isolation cards, and a power supply in type 3 and 5 cabinets.

The housing shall be constructed of 5052 aluminum alloy of a minimum thickness 0.062 inch with a protective coating (painted or anodized). Removable covers shall be provided on top, bottom, and back allowing access to the internal hardware and circuitry. Each cover shall be easily removable with the use of conventional hand tools.

The dimension of the rack in type 3 and 5 cabinets shall be approximately 10 inches wide, 6 inches high and 9 inches deep and in type 6 cabinets shall be approximately 14 inches wide, 6 inches high and 9 inches deep. The rack shall be mounted on the inside of the door of type 3 cabinets as shown in drawing 18-A and attached to the bottom shelf in type 5 and 6 cabinets, hinged to swing out to provide access to the rear assembly without removing the shelf(s).

The card rack for type 3 cabinet shall be as above except: the top shall be rain proof with a drip edge to prevent water from running across the lower side of the top and into the rack and shall have a power supply, two - four channel detector cards positions, and two - two channel isolation cards. These shall be wired as follows: first card detector to vehicle call input 1 through 4, second card detector to special

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detector inputs 1 through 4, first isolator card to pedestrian detector inputs phases 2 and 4, and second isolator to preemptions 1 and 2.

The power supply shall meet the dimensional requirement of a four channel card rack detector type 8, operate on 120 VAC, 60 Hz, and the AC+ into the power supply shall be fused. The fuse shall be located on the supply card, permanently labeled indicating the fuse and size. The supply shall meet NEMA specifications and provide 24 VDC, 385 ma, regulated as specified in NEMA TS-2-1989, Section 15.2.6.2. A power indicator and a fuse shall be provided on the front of the supply for each output. A pull handle shall be on the front of the unit. The power supply shall be located on the left side of the rack when viewed from the front. DC voltage from the power supply shall not be supplied to the isolator positions.

The rack shall be wired with a separate power cord and individual wires to each card position. The power cord shall have each wire identified with a sleeve marked, DR-AC+, DR-AC-, and DR-Gr, and terminated with a spade terminal connected to the terminal for the controller power. Each module slot shall be wired directly to the card edge connector with color coded harness. The harness shall meet the requirements for wiring elsewhere in this standard. Each detector lead in from the field wiring shall be a twisted pair. A sufficient amount of slack in the wiring harness shall allow the rack to be moved for visual inspection and mechanical repairs. The wiring shall be cabled together into a harness, attached to the back right side (viewed from the front) with an approved cable clamp, and routed to the back and detector panel.

The cards in the rack shall be numbered from left to right viewed from the front in order to identify the position function. For type 6 cabinets the first position will be the power supply; the second, a four channel detector for phases 1, 2, 3, and 4; the third, a four channel detector for phases 5, 6, 7, and 8; the fourth, a four channel detector for special detectors 1, 2, 3, and 4; the fifth, a four channel detector for special detectors 5, 6, 7, and 8 ; and the sixth and seventh, each a two channel isolation card for pedestrian detection to phase 2, 4, 6, and 8 respectively. For type 3 and 5 cabinets the first position will be the power supply; the second, a four channel detector for phases 1, 2, 3, and 4; the third position, a four channel detector for special detectors 1, 2, 3, and 4; the fourth and fifth position each a two channel isolation card for pedestrian detection to phase 2 and 4, and preemption input to 1 and 2.

Wiring from each detector and isolator output shall be directly to and terminated to the front of the back panel at their associated terminals of the controller. The control circuit wiring for each detector and isolator input shall be made directly from the associated terminals of the controller. The wiring for the field input to the card rack shall be terminated with the associated terminal on the detector panel. Each wire from the card rack to the back panel shall be terminated using a spade type compression terminal and an identification sleeve identifying each as follows: Detector position one, VD-1-1, VD-1-2, VD-1-3, and VD-1-4; the input to these card positions shall be identified as: VD-1-1G, VD-1-2G, VD-1-3G, and VD-1-4G. The remainder of the detector wiring shall be identified in a similar manner. The pedestrian detector isolator cards outputs shall be identified as: Isolator position nine: PD-1-1 and PD-1-2, the inputs: PD-1-1W and PD-1-2W. The other isolator shall be identified similarly using PD-2-,etc.

17.0 MECHANICAL CONSTRUCTION OF ENCLOSURES

The cabinet shall be constructed of sheet or cast aluminum alloy.

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17.1 SHEET ALUMINUM

The sheet aluminum alloy shall be ASTM No. 5052-H32 or equivalent, and shall have a minimum sheet material thickness of approximately 1/8 inch.

17.2 CAST ALUMINUM

The cast aluminum alloy shall be ASTM No. 356-75 or equivalent. Flat cast surfaces exceeding 12 inches in both directions shall be a minimum of 1/4 inch (0.25 inches) in thickness. Flat cast surfaces not exceeding 12 inches in both dimensions shall be a minimum 3/16 inch (0.1875 inches) in thickness.

17.3 OUTLINE DIMENSIONS

Outline dimensions shall be as shown in Table 18A-7. All dimensions are outside of cabinet and in inches exclusive of hinges, handles, overhang(s), vent housing and adapters. Cabinet heights are measured to the lowest point of the top surface of the cabinet. The combined overhangs of the top of the cabinet shall not exceed four inches. Type 4 cabinets will be a combination of an empty type 2 cabinet or a meter base cabinet on bottom and a type 2 or 3 cabinet on top.

CABINET TYPE	WIDTH	HEIGHT	DEPTH
2	22 (-0 + 15%)	***45 (-0 + 10%)***	15 (-0 + 15%)
3	22 (-0 + 15%)	***45 (-0 + 10%)***	15 (-0 + 15%)
4	22 (-0 + 15%)	60 (-0 + 20%)	15 (-0 + 15%)
5	30 (-0 + 10%)	46 (-0 + 18%)	16 (-0 + 15%)
6	38 (-0 + 10%)	52 (-0 + 15%)	24 (-0 + 15%)
7	38 (-0 + 10%)	72 (-0 + 15%)	24 (-0 + 15%)

TABLE 18A-7
CABINET DIMENSIONS

17.4 FINISH AND SURFACE PREPARATION

17.4.1 Painted Aluminum Cabinets (When specified)

The color shall be medium green, OAAA #144. The surfaces of the cabinet shall be suitably prepared prior to priming. Unpainted interior surfaces shall be permissible in aluminum cabinets. Exterior surfaces shall be primed and painted to provide a durable exterior finish. If the primed surfaces are scratched or damaged, the affected area shall be re-primed prior to painting.

17.4.2 Unpainted Aluminum Cabinets (Shall be provided unless otherwise noted).

Unpainted aluminum cabinets shall be fabricated from mill finished material and shall be cleaned with appropriate methods that will remove oil film, weld black, mill ink marks and render the surface clean, bright, smooth and non-sticky to the touch.

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17.5 SHELVES

Cabinets shall be provided with a minimum of one shelf in type 2 and 3, two shelves in type 5 and 6, and three shelves for type 7 to support control equipment. Type 2 and 3 cabinets shall have provisions for positioning the shelf between 10 inches from the bottom and within 8 inches from the top. Type 5, 6, and 7 cabinets shall have provisions for positioning shelves between 24 inches of the bottom of the cabinet and to within 8 inches of the top of the cabinet in increments of not more than 2 inches. The adjustment of the shelves shall be accomplished by using small hand tools. Rivets are not acceptable. All shelves shall have a raised back edge to stop equipment from passing the back edge of the shelf. This edge shall be a minimum of 1/2 inch from the rear wall of the cabinet and be constructed from one continuous piece of metal.

All cabinets shall have a 1 ½ inch drawer, mounted directly beneath the lowest shelf. This drawer shall have a hinged top cover and shall be capable of storing documents and miscellaneous equipment. The drawer shall open and close smoothly. Drawer dimensions shall make maximum use of the available depth offered by the cabinet and controller shelf, and shall have approximately the same width as the corresponding back panel. The bottom of the drawer shall have drain holes sufficient to drain any amount of accumulated water in the drawer.

17.6 TOP SURFACE CONSTRUCTION

Cabinets shall be manufactured to prevent the accumulation of water on its top surface and slope in a manner to drain water to the back side of the cabinet. The highest point of the top surface shall be limited to a maximum of six (6) inches added to the overall height of the cabinet.

17.7 DOORS

17.7.1 Main Cabinet Door

Cabinets shall have a single hinged main door which permits access to all equipment within the cabinet and visual inspection of all indicators and controls. Unless otherwise specified, the door shall be hinged on the right side of the cabinet as viewed from the outside facing the cabinet door opening. Type four (4) cabinets shall have two main doors equally dividing the height of the cabinet front with clearances at top, middle, and bottom.

17.7.2 Hinges

All cabinet doors shall incorporate suitable hinges utilizing stainless steel hinge pins. Hinges shall be protected to prevent being removed or dismantled when cabinet door is closed. Attachment to the cabinet shall produce a smooth finish, protruding fasteners are not acceptable.

17.7.3 Door Stop

Each cabinet shall be provided with a door stop which holds the door open at positions of 90° ± 10° and 170° ± 10°. A means shall be provided to minimize accidental release of the door stop. Type seven (7) cabinets shall have the door stop located at the bottom of the door and all other cabinets shall have the stop located at the top of the door.

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17.7.4 Locking Mechanism

All cabinets shall incorporate a main door lock constructed of nonferrous or stainless steel materials, which shall operate with a traffic industry conventional #2 key. A minimum of one key shall be included with each main cabinet door lock.

A three - point lock on the strike edge of the door shall be provided with all types of cabinets except when specified to be different on the order or plans. The three (3) points of the lock shall be located at the top, bottom, and middle of the strike edge of the door.

The lock shall prevent operation of the mechanism when in the locked position.

The door handle shall rotate inward from the locked position so that the handle does not extend beyond the perimeter of the door at any time. The operation of the handle shall not interfere with the key, police door or any other cabinet mechanism or projection. The handle shall have the mechanical strength to operate the mechanism and shall be made from non-corrosive material.

Cabinets with three point lock shall be provided with a means of externally padlocking the mechanism. A minimum 3/8 inch diameter lock shackle shall be accommodated. The lock shaft shall be 5/8 inches in diameter.

17.7.5 Door Opening

The main door opening of all cabinets shall open on and be centered within the front side having the width dimensions listed in the previous table and shall be at least 69% of the area of the side. Necessary clearances shall be provided allowing unrestricted movement of the door from closed position to open position. The door shall seal against a minimum of one inch wide neoprene sponge gasket with tight seams. The top gasket shall be the width of the door, the side gaskets shall begin below the top gasket and the bottom gasket shall be within the side gaskets. A gasket retaining ring shall be installed on the inside of the gasket.

17.7.6 Police Compartment

A hinged police compartment door shall be mounted on the outside of the main cabinet door. The door shall permit access to a police panel compartment for operation of switches defined elsewhere in these standards. The compartment shall be constructed to restrict access to exposed electrical terminals or other equipment within the cabinet. The door shall seal against a neoprene sponge gasket in the same manner as stated above for the main door.

Space shall be allowed for the switch controls and storing of the manual control cord in the police panel compartment with the door closed. The minimum internal dimensions shall be 3-1/2 inches high, 6-3/4 inches wide and 2 inches deep. Additionally, the volume shall be not less than seventy (70) cubic inches.

Police doors shall be equipped with a lock which can be operated by a police key, Corbin Type Blank 04266, or equivalent. A minimum of one key shall be included for the police compartment of each cabinet.

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The police compartment shall be located above the bottom of the main door as shown in the following table:

CABINET TYPE	LOCATION
2 and 3	2.5" ± 10% from bottom and left of center, see Drawing #18A
5	30" ± 10%
6 and 7	39" ± 10%

TABLE 18A-8
POLICE COMPARTMENT LOCATION

17.8 CABINET MOUNTING

17.8.1 Pole Mounted Cabinets Type 2 and 3

The cabinets shall be provided with provisions to attach a pole bracket to a reinforcement plate permanently mounted to the back, top, and center of the cabinet. The reinforcement to the cabinet shall be designed to support the weight of the cabinet and the equipment intended to be contained within and the structural loads referred to in this specification. The minimum width of the adapter shall be six (6) inches wide and three (3) inches high, tolerance of both -0 inch, +6 inches. Two 3/8 inch holes shall be drilled through the cabinet, within the reinforced area, two inches from center line of the width of the cabinet. Countersink each hole on the outside of the cabinet for flat head screws. Install two 5/16" flathead screws in the mounting holes with the top of the screw heads to be flush with the surface of the cabinet wall.

The cabinet shall be pre-drilled for two (2), 3" wire entrance holes, one in the top and one in the bottom, both at the back edge and centered on the width of the cabinet and one (1) 2" entrance hole adjacent to the three inch hole on the bottom as shown in the attached drawing. Three hubs shall be provided with type 2 and 3 cabinets. The hubs shall centered on the entrance holes and attached to the cabinet using four (4) 5/16 inch-18-tpi by 1-1/2 inch long hex head bolts, with lock washers and hex nuts. The hubs and cabinet shall be pre-drilled for mounting the hubs to the cabinet with the above mentioned bolts using a bolt pattern of 2-1/8 inches centered on a line perpendicular to the back of the cabinet, by 3-3/4 inches parallel to the back of the cabinet. The centers of the bolt pattern on the hub and the wire entrance hole shall coincide. The location of the hubs shall allow minimum clearance for box end wrenches to fit onto the nuts within the cabinet.

17.8.2 Pedestal mounted cabinets Type 2 or 3

When specified on the order or plans the requirement for a pedestal mounted cabinet shall meet the following requirements. The specified cabinet shall be provided and equipped with a reinforced bottom, 1/4" aluminum plate, and a slip fit adapter for attachment to a standard four inch inside diameter pipe. The bottom of the cabinet shall be provided with an access hole for cable (min. 4 inches) and mounting holes for the adapter located in the center of the bottom. The adapter shall be bolted to the cabinet with 5/8" bolts and fitted on a 6-1/2" bolt circle. The attachment to the standard four inch pipe shall be secured with four square headed set screws. The holes drilled for pole mounting hardware and wiring shall be covered with gaskets and blank hubs.

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17.8.3 Base mounted cabinet Type 4

The type 4 cabinet shall consist of two separate upper and lower cabinets. Both shall have doors specified above and shall be constructed without interference when opening or closing. A base adapter shall be provided for mounting the lower cabinet to the foundation specified in the signal plan detail sheets and within this standard. The order or plans will specify the type cabinet to be the top cabinet, type 2 or type 3. The drilled center hole specified for a pedestal mount shall be provided for wire-way between the cabinets. All other holes will be covered with a blank hub and gasket as specified above. A terminal panel shall be provided with the signal circuits, interconnect, communications, and power individually terminated and labeled. When a type 3 cabinet is required, additional terminals shall be provided for the loop and pedestrian lead-in terminations.

The base adapter shall separate the lower cabinet from the foundation a minimum of 4" and a maximum of 6". The cabinet shall be sized to provide the correct dimension of the completely assembled unit to meet the dimension requirements stated above. The adapter shall be constructed for mounting on the foundation shown in Figure 18A-1. The complete unit shall be securely connected with removable fasteners and meet the requirements for security in this standard.

The interior anchor brackets shall transverse the cabinet. Each bracket shall attach to one edge adjacent to the bracket. The strength of the bracket shall prevent the cabinet from being lifted from the concrete base with a load of fifty pounds acting at the top, front or back of the cabinet. An alternate method of cabinet support can be a 1/4" aluminum reinforcement plate meeting the requirements shown in Figure 18A-1.

17.8.4 Base mounted cabinets Types 5, 6, and 7 (Types as specified on order or plans)

The cabinet or its base adapter shall be so constructed that it can be mounted on the foundation shown in Figure 18A-2.

The interior anchor brackets shall transverse the cabinet. Each bracket shall attach to one edge adjacent to the bracket. The strength of the bracket shall prevent the cabinet from being lifted from the concrete base with a load of fifty pounds acting at the top, front or back of the cabinet.

17.8.5 Anchor bolts

Anchor bolts for base mounted cabinets shall be 3/4 inch diameter and 16 inches long. A 90° bend with a 2 inch leg on one end and a minimum of 3 inches with a UNC-10 thread shall be provided. Anchor bolts shall be steel with hot dipped galvanized finish. Each anchor bolt shall be furnished with one 3/4 inch UNC-10 HDG steel nut and one 3/4 inch HDG flat steel washer. Two anchor bolts shall be provided with each cabinet.

17.9 CABINET STRUCTURAL TESTS (mounting shall withstand the following:)

17.9.1 Hinges and Door

The hinge and door assembly shall be of sufficient strength to withstand a load of 30-pound-per-vertical-foot of door height. This load shall be applied vertically to the outer edge of the door when it is opened to the 90 degree position. There shall be no permanent deformation or impairment of the door, locking mechanism, or door seal function after the load is removed. A stiffener shall be installed the width and at mid height of the door. The door panel shall be flat after fabrication.

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17.9.2 Door Stop

Both the door and door stop mechanisms shall be of sufficient strength to withstand a simulated wind load of 5 pounds per square foot of door area applied independently to the inside and outside surfaces without failure, permanent deformation, or any major movement of the door positions. For test purposes, a test load shall be applied to the vertical midpoint of the outer edge of the door at a right angle to the plane of the door. The test load shall equal one half of the calculated wind load. The force shall be applied first on the inside edge, then on the outside edge. These tests shall be performed with the door at 90° and 170° positions.

17.9.3 Lock

The door handle and associated cabinet locking mechanism shall withstand a torque of 100-foot lbs. applied in a plane parallel with the door to the handle in the locked position. The door handle and the external padlock mechanism shall meet the same requirement without the internal locking mechanism securing the handle.

17.9.4 Shelves and Drawer

Shelves shall support a load equivalent to 2 pounds per inch of length without deforming more than 1%. The test load shall be applied at two points, 6 inches to each side of the shelf's center, with the shelf installed in the cabinet. The drawer shall support up to 50 pounds in weight when fully extended.

17.10 EQUIPMENT PROTECTION

Cabinets are intended to provide protection for the housed equipment. Prying open or dismantling the doors, walls, or tops, shall be prevented with the cabinet securely closed.

When completely and properly installed, cabinets shall have provision for rain water drainage. The cabinet shall not permit water to enter the equipment cavity above any live part, insulation, or wiring.

17.11 RAIN TEST

All cabinets shall be designed to meet the requirements of the following tests. To insure realistic testing, the enclosure and enclosed equipment shall be mounted as intended for use.

A continuous water spray, using as many nozzles as required, shall be applied against the entire top and all exposed sides of the enclosure for 10 minutes at a minimum rate of 18 inches per hour of equivalent rain at an operating pressure of 4 to 5 pounds per square inch. The distance of the nozzles to the cabinet shall be a minimum of 36 inches and a maximum of 48 inches and located above the top edge of the cabinet.

The enclosure is considered to have met the requirement of this test if there is no significant accumulation of water within the enclosure and no water is visible on the live parts, insulation materials, or mechanism parts.

A rain test which is performed in accordance with Underwriters Laboratories, Inc., "Rain Tests of Electrical Equipment, Bulletin of Research #23, September, 1941", is considered to be equivalent to this test.

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17.12 AUXILIARY EQUIPMENT

17.12.1 Fan and cooling system

All cabinets shall be equipped with a cooling system of sufficient capability to pass the test described in NEMA TS1-2.2.04. The fan shall be capable of operating continuously for a minimum of 6000 hours in a 122°F (50°C) environment without need for after-installation maintenance and deliver 100 CFM in free air. The fan shall be thermostatically controlled by switching the 120 VAC supply to the fan. The thermostat shall be field adjustable to switch on and off at any temperature between 70° and 160°F.

The exhaust shall be vented through the upper portion of the cabinet. All ventilation shall be rain-tight and shall prevent any water from dripping into the cabinet.

The cooling system shall be constructed to allow cleaning of the vents, screens and fan. Fasteners for removing panels to gain access to perform the above requirement of cleaning shall be removable with the use of simple hand tools, except as noted in Section 17.12.2.

An additional duplex receptacle (for use with communications modems) shall be mounted and wired in the upper left side of the cabinet assembly. This receptacle shall be wired on the load side of the 20 Amp circuit breaker.

17.12.2 Air Filter

The cabinet shall be equipped with a secured, replaceable filter for the incoming ventilation air. The air filter shall be removable without the use of tools. The filter size shall be: 7-1/2 inches high x 7 inches wide x 1 inch deep for the Type 2 and 3 cabinets, 10 inches high x 20 inches wide x 1 inch deep for the Type 5 cabinets, and 14 inches high x 25 inches wide x 1 inch deep for Type 6 and 7 cabinets. The filter shall have clearly indicated on it the size and direction of air flow. A metal grid shall be on both sides of the filter. The filter shall meet ASHRAE standard 52-76 for disposable, Type II, glass fiber air filters. The air resistance shall be 0.08 inch WC, measured on 24 inches x 24 inches sample at 300 FPM. The efficiency of the filter shall be a minimum of 75%.

17.12.3 Plan Holder (DELETED)

17.12.4 Cable Hanger (DELETED)

17.12.5 Cabinet Light

A fluorescent bulb and fixture shall be installed in cabinet types 2 and 3. The fixture shall be mounted against the cabinet top and the strike edge for the door. The fixture shall not extend beyond the strike edge at the top of the cabinet and shall not restrict the opening of the door. Mounting supports shall be on the front of the cabinet. The fixture shall have an on/off switch mounted on the side of the fixture. The fluorescent bulb shall be a ***F8T5WW***.

A fluorescent bulb and fixture shall be installed in cabinet Types 5, 6, and 7; and when specified in other cabinets. The fixture shall be within the upper 3 inches from the top and toward the door side of the cabinet. It shall illuminate the interior of the cabinet without hampering the vision of service personnel while inspecting the cabinet. The fluorescent bulb shall be a 15 watt, T-12, 18 inches in length. The fixture shall be of a sturdy construction to hold and operate the above mentioned bulb. For Types 5, 6,

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and 7, the cabinet light shall be turned on when the cabinet door is opened and turned off when the cabinet door is closed.

17.12.6 Cabinet Hubs

The hubs for the cabinets shall be cast aluminum, ASTM B-108 and those standard specifications referenced there in. The bolt pattern shall be as details in the drawings 18-A. The blank shall be a flat plate, 1/4 inch thick. All other hubs shall have a conduit threaded collar that shall be a minimum of 2 inches from the base of the hub. The threaded opening shall be centered within the 3-3/4 inches dimensions of the hub with outside edge of the threaded collar in line with the base of the hub. All hubs shall be provided with stainless steel bolts casted into the hub. The outside of the hub shall provide a smooth design that will shed water. On the hubs with larger threaded collar(s), the bolting pattern shall be maintained. The following table are the designations and type of hubs that will be specified on the order or plans.

TYPE	OPENING(S) SIZE	OPENING DESCRIPTION
Blank	-0-	no opening, flat plate, 1/4" minimum thickness
Single	3/4 in.	one opening, 3/4" conduit thread
Single	1 in.	one opening, 1" conduit thread
Single	1-1/2 in.	one opening, 1-1/2" conduit thread
Single	2 in.	one opening, 2" conduit thread
Single	2-1/2 in.	one opening, 2-1/2" conduit thread
Single	3 in.	one opening, 3" conduit thread
Double	3/4 in.	two openings, 3/4" each conduit thread
Double	1 in.	two openings, 1" each conduit thread

TABLE 18A-9
CABINET HUB DESCRIPTION

17.12.7 Clamp Pole Mounted Cabinet

A pole clamp shall be provided with the controller cabinet types number 2 and 3 for mounting the cabinet to the pole. The clamp shall be cast aluminum meeting the requirements for the cabinets and designed to hold the weight of the mentioned cabinets and the equipment contained within. The design shall provide four contact points with the pole and shall be adjustable for pole diameters from 10 inches to 12 inches. The clamp shall be divided into two parts, one half to be attached to the cabinet and the other half to be installed on the "back" side of the pole. The clamp shall have a slotted opening for coupling the clamp together using 5/8 inch galvanized all thread bolts and nuts. The clamp shall have a flat surface area, 4-1/2 inches x 2 inches minimum that attaches to the cabinet. Two 5/16 inch - 18 tpi, drilled and tapped holes spaced 4 inch center to center shall be centered within the flat area. The flat area shall space the back of the cabinet a minimum of two inches from the pole.

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17.12.8 Adapter Pole Mounted Cabinet

When specified, an adapter shall be provided, excluding lag bolts or steel bands. The adapter shall be conformable for mounting to round poles with a 4-1/2 inches or larger diameter. Material for the adapter shall be comparable with aluminum alloy 6061 and have the mechanical strength to hold the weight and loading requirements for the cabinet. The adapter shall accommodate lag bolts up to ½ inch and steel banding up to 1 inch wide. The adapter shall have the same mounting bolt pattern and wire way requirement as the hubs stated in 17.12.6. The adapter shall be mounted to the cabinet using the same mounting bolts as the hubs, and additional gaskets shall be used between the cabinet, hub, and adapter.

17.12.9 Adapter Slip-fit Four Inch Pipe

The adapter shall slip-fit to a standard four inch pipe and shall secure to the pipe with four square headed set screws. The adapter shall be made of cast aluminum or steel designed to hold the weight of the cabinet and the loading characteristics required for the cabinet. The length of the adapter shall be approximately eight inches long. The adapter shall be attached to the cabinet with 5/8" bolts and fitted on a 6-1/2" bolt circle.

18.0 CABINET INTERIOR PANELS

18.1 GENERAL REQUIREMENTS

All panels shall be made from structural grade sheet aluminum equal to 2024 or 5052 aluminum alloy. Approval from the Department is needed if different material than listed above is used for the panels. The panels shall be attached to the cabinet walls with bolts, nuts, and washers specified elsewhere in this standard. Each panel shall be completely removable or capable of folding down from the cabinet wall without the need to remove any other panel or shelf so that inspections and repairs may be made behind each panel. All panels shall be grounded to the cabinet using a braided copper conductor equaling #6 AWG. All panels shall be sized to fit within the minimum dimension of the cabinet it is specified for as listed in Table 18A-7.

18.2 GENERAL WIRING DESIGN REQUIREMENTS

The inspection and repair of any panel shall not require disconnecting or removing wires. When multiple panels are required in the cabinet then the cable shall follow a single route and shall be from the detector/auxiliary panel to back panel to power panel to police panel. Cabling shall conform to the previously stated requirements for servicing each panel. Cable(s) shall be secured to the panels at the point where it leaves and/or enters each panel. The cable shall be secured to the cabinet wall with a cable clamp at two (2) points equally spaced between the panels on the above stated route. Wiring requirements for ventilation, temperature monitoring, and cabinet lighting shall be from the power panel to each device and shall be neat and in accordance with good wiring practices. A separate, parallel cable route shall be used from the field terminal to the back panel solid state load relay outputs.

18.3 IDENTIFICATION OF COMPONENTS, TERMINALS, AND CONNECTORS

Each terminal position, sockets, switches, filters, relays, and fuses shall be permanently labeled by painting, printing or engraving directly onto the panel or terminal strip identifying the position number

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and/or function of the terminal or device (paper labels of any type will not be accepted). Each harness shall be permanently labeled to identify function or connector with only the following:

HARNESS	LABEL	HARNESS	LABEL
NEMA Connector A	"A"	Conflict Monitor	"CMA"
NEMA Connector B	"B"	Conflict Monitor	"CMB"
NEMA Connector C	"C"	All Harnesses	Labeled with function
Controller Connector D	"D"	Additional harnesses may be identified later.	

TABLE 18A-10
HARNESS LABELS

18.4 IMPLEMENTATION OF EQUIPMENT CAPABILITIES

The wiring between the panels shall connect the functional inputs and outputs needed to implement the operational capabilities of the equipment and requirements of this standard. Input circuits to the controller for external controls shall not be wired: i.e.; hold, omit, force off, CNA I&II, control status bids, phase next, phase on, phase check, red omit, pedestrian recycle, max I&II, max inh. There shall be no discrete circuit, components or active devices attached to any panel or cabinet wall except as specified. Printed circuit boards are not allowed on any panel.

18.5 BACK PANEL

The back panel shall be located on the lower half of the back cabinet wall. The controller and conflict monitor harnesses shall be terminated on the upper portion and shall be secured to the top left corner of this panel with non-chafing cable clamps as described elsewhere in this standard. All wires shall be installed for the D and E connector functions listed in the appendix, between terminal positions and a receptacle on the back panel. The receptacles shall be square flange, with sockets connector, permanently mounted on the back panel, D receptacle - AMP206438-1, E receptacle - AMP2064038-1. The D connector on the harness shall be an AMP 206437-1 or an exact equivalent. A E harness connected to the Emergency Vehicle Detection System shall be provided with the EVDS equipment. The E connector on the harness shall be an AMP 206039-1 or an exact equivalent. The pins and sockets shall be gold finished. (Engineering note: EVDS equipment is specified in a separate document. All cabinets provided to DOTD shall be equipment to receive the EVDS equipment and provide the required functions as stated elsewhere in this standards.)

The wires from the controller harnesses, panel mounted receptacle, and other required devices shall be grouped by associated functions and terminated individually at a position on a terminal strip, (example - all inputs, by cycle, offset ... etc.). The terminal blocks and cabling for each harness shall be separate and have no wires crossing others from a different harness. Each terminal position shall be permanently identified with the associated function in the connecting equipment. Wiring to this panel from other equipment specified elsewhere in this specification shall be given extra lengths to allow movement between controller terminal positions for field changes.

All harnesses shall be five feet long from the point that is held by the cable clamp to the connector on the free end. The connector on the free end of the harnesses shall be a designated connector by the

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manufacturer. Any additional connectors and harnesses necessary to implement the controller and system operations specified herein shall be supplied by the manufacture meeting this standard.

For type 2 and 3 cabinets the panels shall be constructed in accordance with LA DOTD drawings #18A-1. The harnesses for type 2 and 3 cabinets shall be three feet long from the point that is held by the cable clamp to the connector free end.

18.5.1 Connectors

Controller and monitor harnesses shall utilize Mil-C-26482 Series 1 and AMP CPC type series 2 connectors. The controller harness connectors shall be as described elsewhere in this standard. The monitor harness connectors shall be as follows:

MONITOR Number of Channels	CONNECTOR
6	MS 3116F-22-55SY
12 Connector A	MS 3116F-22-55SZ
12 Connector B	MS 3116F-16-26S

TABLE 18A-11
MONITOR CONNECTORS

18.5.2 Harness Wire Termination

The monitor's signal input channels and voltage monitoring circuits shall be terminated on the appropriate terminals. The following shall be terminated at one position in all cabinets: harness wiring listed in NEMA-TS-1 Section 13 except as noted above, each input and output of the load cells, input and output of the controller, and the output of the flash transfer relays. The terminal blocks shall be either single row feed-through or double row type (electrical requirements described elsewhere in this standard). Exceptions to the requirement for single position termination for each wire are AC-, chassis ground, logic ground and flashing outputs. Listed below are the minimum terminals required for each:

a. Logic Ground - Three (3) adjacent positions
b. AC- - a separate copper or brass multi-terminal bus bar shall be mounted near the lowest portion of the panel, adjacent to and horizontally aligned with the signal field terminals. It shall be insulated from the cabinet and connected to AC- on the power panel with a single #6 AWG insulated wire. The bus bar shall be sized to accept 5 - #14 AWG solid wires at each terminal and shall have a minimum of 12 positions. This bus shall be used to terminate all the neutral circuits from cable wired to the signal heads.
c. Flashing outputs - each circuit of the transfer relay shall have different flashing circuits.

All terminations shall be grouped by function as listed in NEMA TS-1 standards, Section 13, Tables 13-1 and 13-2. The signal load cell inputs shall be terminated below all other controller and monitor harness termination.

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Panels for cabinet types 2 and 3 shall only have terminations of all voltage, monitoring, and coordinator circuits of the controller. The controller load cell controls shall be wired to the load cell receptacle and other requirements shown in drawings #18A. A single harness shall contain the circuits for A and B connectors. The connectors shall be offset along the end of the harness by six inches. Load cells shall be provided as follows: eight cells, four phase, two overlaps, two pedestrians (Additional details shown on drawing #18A).

Panels for cabinet type 5 shall have the phase overlap outputs "A" and "B" shall be wired respectively to load cells 5 and 6. Pedestrian outputs for phase 2 and 4 shall be wired to load cells 7 and 8 respectively.

Type 6 cabinets shall have overlap outputs "A" through "D" wired respectively to load cells 9 through 12. Wiring shall be arranged on the back panel to facilitate connecting the pedestrian outputs to the load cell inputs by moving wires, without adding wire, connectors, or terminal blocks.

(Engineering Note: The only controller outputs and load cell inputs circuits that are to be terminated on terminal strips are those circuits used for overlap and pedestrian indications. In accordance with the specification these circuits shall be provided to change the inputs of these load cells from either overlap or pedestrian outputs. In addition this will allow the reset circuit for pedestrian isolator cards to be terminated with the correct controller output. This requirement shall be for both the type 5 and 6 cabinets. In reference to logic ground within the cabinets this notation shall apply to all circuits. All reference to logic ground shall be through connector "A" of the controller. In cases where specific controls are used in connector "D", then logic ground of this harness may be used. In all cases logic ground through any connector shall be the same reference within the controller.)

When specified on order or plans, overlaps shall be terminated at different positions than specified above.

18.5.3 Load Cells and Flash Transfer Relays

Signal load cells shall be provided, one for each phase and each overlap. When specified, additional positions and load cells shall be provided for four pedestrian signals in line with the load cells previously specified. All flash transfer relays shall be located on the back panel, adjacent to the load cells. A solid state flasher shall be provided and located as stated below.

The position of the load cells, flashers, and transfer relays shall be between the terminals for the load cell inputs and outputs. In type 2 and 3 cabinets the position of the load cells, flashers, and transfer relays shall be in accordance with drawings #18A. The area above the load cells and flasher shall be open to allow the ventilation to flow freely away from the load cells.

The AC+ for the signal load cells shall be terminated as previously specified and be capable of carrying 60 amps, equally distributed to each signal load switch from a terminal strip on the back panel.

The transfer relays shall be operated directly by the voltage to transfer the signal operation from sequential to flashing. No intermediate relay shall be used between the transfer relays and signal operate/flash circuit. The transfer relays shall be energized during normal operation to connect the signal load cells to the field terminals.

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18.5.4 Signal Field Circuits

The output from the load cells shall be located on the lowest terminal strip at the bottom of the back panel. Wiring from the signal heads shall be terminated separately for each indication and there shall be no internal cabinet wiring terminated on the same terminal. The inputs and outputs of the flash transfer relay shall be terminated above and adjacent to the load switch outputs. The arrangement of these terminal strips shall allow the selection of either red or yellow signal indications to flash without needing to un-solder or solder connections. The number of signal circuits which will be transferred to flashing circuits shall equal the maximum number of load switch positions specified. No wiring shall be installed on the terminal for the field wiring.

18.6 POWER PANEL

The power panel shall be mounted on the lower right inside of the cabinet. It shall receive a single phase, 120 VAC, 60 Hz electrical service and shall have three (3) separate terminals for terminating the wires from the service source. This panel shall provide the power required and necessary functions, including cabinet ground, to each panel. The service terminals shall be a mechanical compression type, sized to accept a wire range from #8 to #2 AWG, stranded wire. A ground bus bar shall be located on the lower portion of this panel and terminate all ground circuit within the cabinet. All ground circuits shall be designed for a single path to the ground bar and no ground loops shall be created. The ground bus bar shall be a separate copper or brass multi-terminal bus bar. It shall be mounted directly to the panel and connected to chassis ground input terminal with a single #6 AWG green insulated wire. The bus bar shall be sized to accept 5 - #14 AWG solid wires at each terminal and shall have a minimum of 12 positions. This bus shall be used to terminate all the ground circuits from cable wired to the signal heads. All internal ground wiring to this bar shall be on one end using a maximum of 4 positions.

The power panel components for type 2 and 3 cabinets shall be incorporated on the back panel. Both neutral and ground bus bars shall be located conveniently for installing field wiring. All other requirement mentioned above shall be adhered to. Switches shall be located for easy reach and away from energized parts. (Details shown on drawing #18A-1.)

18.6.1 Control Switches

The following switches shall be located on the power panel and shall perform the functions listed below and labeled as shown:

a. Cabinet light - ON/OFF - this switch shall control the AC+ to the cabinet light specified elsewhere in this standard. For type 2, 3, and 4 cabinets the switch shall be part of the fixture.
b. Test - FLASH/AUTO - The "flash position" of this switch shall allow the signal indications to flash and the control equipment to cycle in its normal manner. The "auto" position will not affect the normal operation of the equipment.

18.6.2 Breakers

Breakers shall be provided in each type of cabinet. The AC+ power shall have one input and shall be bussed to three (3) separate circuits. The breakers shall be a single pole, molded case, screw mounted on this panel with two #10 screws on a four and one/half inch pattern. Each breaker shall indicate visually that the breaker has been tripped. The following are the functions and labels for each breaker:

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a. Controller power - ON/OFF - this shall be rated for ten amps and control the AC+ power to the controller and conflict monitor. (filtered and suppressed)

b. Main Power - ON/OFF - this shall be rated for sixty amps and control the AC+ power into the cabinet for all equipment. The power for the auxiliary circuits shall not be controlled by this switch.

c. Detector Panel Power - ON/OFF - this shall be rated for ten amps and control the AC+ power to the detector panel used for interconnect relay outputs. This circuit shall not be used for detector card rack and shall not be connected to the suppressor on the power panel.

d. Auxiliary Power - ON/OFF - this shall be rated for twenty amps and control the AC+ power to the ventilation fan, cabinet light, and convenience outlet (filtered).

18.6.3 Surge Protection and Filtration

The power for the control equipment shall be protected by a RFI line filter and high voltage surge arresters. The line filter shall be rated at sixty amps on each AC+ and AC- line. Terminals on the filter shall be for suppression on the main power, neutral, and ground; and separate terminals for line in and out, neutral out supplying the controller and detector panel power to the breakers. The filter shall attenuate signals both from line to load and load to line. The attenuation in both directions shall be a minimum of 50 decibels over the frequency range of 200 KHz to 75 MHz. The impulse life of the protector shall be capable of operating 20 times at peak current. The clamp voltage shall be 340 volts at 20 Kamps and shall respond to over voltage conditions within 300 nanoseconds. The minimal capability of the protector shall be to discharge a single impulse with a wave shape of 8/20 and current to be 20 Kamps on each side to ground. The insulation resistance between line to ground shall be 100 megohms.

18.6.4 Signal Bus Operation

The signal bus power shall be switched individually by normally opened solid state relays rated a minimum of 60 amps, control voltage 120 VAC (Crydon series 1 - A2475 or equal). The solid state relay shall operate within the NEMA temperature range by derating the device and using necessary heat sinks. All switches are specified elsewhere and the circuit design shall limit the switched current to ten amps max.

18.6.5 Convenience Outlet

The receptacle shall be a feed through, ground fault interrupter type, 20 amps, duplex receptacle. The receptacle shall have three (3) wires from the device to the appropriate terminal on the power panel, (Ground, AC-, and AC+). The feed through shall supply power to the fan and light.

The convenience outlet installed in type 2 and 3 cabinets shall be mounted on the door. The electrical details shall meet the following requirements and details in drawing 18A-1. The convenience outlet in type 5 and above cabinets shall be mounted on the power panel.

18.6.6 Power Panel Isolation

A clear, non-breakable, 1/4" Lexan insulating cover shall be used to shield all open connections and not cover any switch, breaker levers, terminals blocks, bus bars, or convenience outlet. The cover shall be secured in place with screw fasteners and be removable by hand or simple hand tools.

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18.7 DETECTOR AND AUXILIARY CONTROL PANELS

A detector panel shall be provided in cabinet types 3, 5, 6, and 7, and located on the left inside wall of the cabinet, except as noted for type 3 cabinet in section 18.7.2. The terminals and wires for detector card inputs, controller vehicle detector input test switches, remote communications, and additional functional inputs/outputs specified shall be on this panel. The upper portion of this panel shall be used for mounting any required terminal blocks. The middle of the panel shall be for vehicle/pedestrian test button and control circuit and field wiring terminals. A six position terminal block with suppressor shall be positioned on the bottom of the panel for communications. There shall be no splices in the wiring.

A separate panel shall be provided for the auxiliary controls including relay bases for interconnection controls, isolating the field circuits and the controller inputs.

18.7.1 Auxiliary Control Function (supplied with all Type 2 cabinets and when specified with any other cabinet.)

This panel shall be located on the left lower inside wall of all cabinets, below the detector panel when present, and shall be separate from other panels. Relay bases shall be mounted at the top of this panel and the quantity of bases shall be supplied that will provide the functions required or as indicated on the order. The relays bases shall be wired isolating the field wiring and the controller inputs/outputs for hardwired interconnect. Field wiring will be terminated at fuse blocks, specified elsewhere in this standard. Additional wiring requirements are given below. The relay bases shall be for two-pole octal relays and have screw terminals for all relay pins. The required functions for hardwired interconnect are; resets, cycles, splits, free, flash, and remote common. Wiring from the interconnect terminations described above shall not be included with any wiring or harnesses on the detector panel.

A terminal block shall be provided below the relay bases where the following are to be terminated. Power for this panel shall be supplied by a separate breaker on the power panel. A minimum of three adjacent positions shall be provided for each AC+, AC-, and ground. This power shall be used for supplying master interconnect power and providing power to external equipment. This power shall not be used for equipment power within the cabinet. Logic common from the controller shall also be terminated on a terminal strip. Controller system operations for dials 2, 3, and 4, split 2, 3, and 4, and offset 1, 2, 3, and 4, shall be terminated on the back panel as stated within this standard. Each system operation terminal shall be wired to the front side of the terminal blocks on the back panel and terminated using a compression spade lug to the inputs of the controller. Each wire shall be identified with a sleeve marked, D-2, D-3, D-4, SP-2, SP-3, SP-4, O-1, O-2, O-3, and O-4 respectively. Two terminal positions shall be provided for free in and out, and two positions for flash in and out. Wiring shall be provided for each, one for free and one for flash, from these terminals to the terminals on the front of back panel, terminated using compression spade lugs. Each identified with a sleeve, free marked FR and flash marked FL. This panel shall conform to drawing 18A of this standard.

(Engineering Note: For railroad preemption inputs, we intended to use the pedestrian isolator cards between field and controller inputs. For hardwired interconnect controls, we will move the wiring on the back panel for master or secondary operation. Similar methods of moving wires will be used to implement other required functions as needed.)

18.7.2 Detector Panel for Type 3 and 5 Cabinets

The detector panel shall be located on the inside right wall of type 3 cabinets and the left wall of type 5 cabinets. The panel shall have terminal positions for the specified field input circuits. The wiring

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requirements stated above shall be followed. Terminals shall be provided for eight vehicle and four pedestrian detector input circuits.

The card rack shall follow the specified requirements elsewhere stated, however positions shall be provided for one power supply, two-four channel vehicle detector cards, and two pedestrian isolators cards. The wiring for the rack shall be formed to follow the hinge of the door without damage to the wiring.

18.7.3 Detector Panel Test Switches

Detector test switches shall be provided on all detector panels. These switches shall be positioned in between the terminal blocks for the field wiring and adjacent to the input of the channel that the switch is for. Access to the switches shall not be interfered with wires or suppressor. Each switch shall be a momentary push button, normally open switch. There shall be a switch for each detector channel supplied in the cabinet and for each pedestrian call circuit (2 for 4-phase, and 4 for 8-phase), as per this specification, order, plans, or any addendum. Each switch shall be permanently labeled with the nomenclature of the function it provides (∅ # or ∅ ##). The function of the switches shall be to place a logic ground on the controller vehicle, pedestrian, and system detector inputs. The wiring shall be terminated on the front of the back panel at the associated controller input terminal. A compression type spade lug shall be use and each wire marked with a identification sleeve as follows: VB-∅1, VB-∅2, . . . VB-∅8, PB-∅2, PB-∅4, etc.

18.7.4 Field Wiring - Detector and Auxiliary Panels

The loop lead-in, pedestrian field push button shall be terminated on the sides of the detector panel, the communications shall be terminated on the bottom of the detector panel, and the interconnect and field inputs/outputs shall be terminated on the bottom of the auxiliary panel. Each channel, vehicle and pedestrian, shall be terminated at two adjacent positions for inputs. On the auxiliary panel six NON type fuse holders and one remote common terminal shall be positioned on the bottom of the panel for hardwired interconnect.

The specified lightning protection shall be connected to the designated field terminals.

18.7.5 Communication Harnesses

All additional harnesses required for connecting the modem, line drivers, controller, master, and system hardware in addition to the specified connectors shall be provided and terminated in a fashion required by the manufacturer. Additional harnesses shall not negate any harness specific by this standard. Approval of these harnesses shall be obtained from the Department.

18.7.6 Lightning Protection

All detector and data field wiring shall be terminated on the required terminal block. Minimum voltage clamping shall be 30 volts for both differential and common mode. Current carrying capabilities shall be 400 amps in differential mode and 1000 amps in common mode. Response time for detector protection shall be 40ns and for data lines shall be 1 to 5 ns. The devices shall be mounted to the panel and the leads terminated on each field terminal.

All 120 volt field circuits shall be protected on the equipment side of the fuse by a surge protector. Operating line voltage shall be 120VAC, peak surge trip point for 600 volts/microsecond impulse shall be less than 890 volts. Response time shall be less the 200 nanosecond at 10KV/microsecond. Surge

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handling ability shall be 20 Kamps. The device shall be mounted on the grounding stud adjacent to the protected terminal.

18.8 POLICE PANEL

The police panel shall be located in the police compartment previously specified and provide switches which are accessible when the police compartment door is opened. The following list of switches shall be located on this panel and be wired to their appropriate circuits to provide the functions identified below:

a. Flash Control Switch - Flash/Normal - this switch shall control the signal output from the controller to cause them to flash in the "Flash" position and to initialize the controller to the start-up phase unless the conflict monitor has detected a conflict. If the monitor has placed the equipment on flash, then this switch shall be inactive. The "Normal" position of the switch shall cause no effect to the signal circuits and shall allow the control equipment to function in its prescribed manner.

b. Signal Shut-Down - On/Off - the "On" position of this switch shall allow the signals to operate in normal manner. The "Off" position of the switch shall cause the signal indications to become dark, regardless of whether the signals were flashing or operating normally and to initialize the controller to the start up phase unless the conflict monitor has detected a conflict.

c. Manual Control - Auto/Manual - All necessary wiring, (manual control enable, interval advance, logic ground) shall be routed to the panel and terminated. A switch shall be provided only when specified and switch the function of the controller from normal operation in the "Auto" position to a manual advance operation in the "Manual" position by a manual push button to advance the controller in accordance with the NEMA standards. In addition to the switch, a manual control shall be provided. The cord shall be terminated on a terminal strip attached to the back of the police panel. The cord shall be weatherproof and coiled, having a maximum retracted length of eight inches and a minimum extended length of five feet. The cord shall be attached to the panel with a cable clamp, and fitted with strain relief bushing at the point it is routed through a five-eighths inch hole in the panel. The manual control shall be on the free end of the cord. The manual control and the connection to the cord shall be weatherproof. A hand grip shall be constructed for normal use by being held in one hand and a momentary contact switch can be activated with the thumb. This control shall be operable between the above mentioned lengths.

d. Emergency Vehicle Detection System Enable - On/Off - All necessary wiring shall be routed to the panel and terminated. A switch shall be provided to activate the EVDS when it is in the on position and the EVDS equipment is installed in the cabinet. In the off position the EVDS equipment shall be disabled and all functions connected to the Traffic Control System Equipment shall be disable allowing the control equipment to operate as programmed. When the EVDS equipment is not installed in the cabinet then this switch shall not effect the operation of the Traffic Control System Equipment.

The back of the panel shall have an aluminum shield to prevent personnel from accidentally coming in contact with the terminals of the switches or terminal strip. With the cover in place, it shall provide visual inspection of the back of the panel and shall not interfere with any equipment when the main door is closed.

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19.0 CABINET WIRES AND WIRING

The wiring in the cabinet shall withstand the environmental temperature range as stated in NEMA TS-1. The insulation shall remain flexible over the temperature range and will not begin melting, causing the insulation to reduce in thickness. The insulation shall meet Specification MIL-W-16878D, 105 degrees, 600V, (MIL), heat resistant, polyvinylchloride or approved equal. The wire shall be 600 volts and color coded according to the following list:

HARNESS	COLOR
Controller harness and wiring	Blue
Conflict monitor Harness and wiring	Red
Detector, preemptor, and interconnect wiring	Yellow
All AC+	Black
All AC-	White
All Controller Logic Ground	White/Black Stripe or White/Green Stripe
All Chassis Ground	Green

TABLE 18A-12
WIRING COLOR CODE

The wire shall be stranded copper and sized to carry 125% of the design current and a minimum #22AWG. All signal circuit wiring shall meet the above stated size and be a minimum of #16AWG. All circuits shall be wired using a single conductor; therefore, parallel wiring is not an acceptable method of meeting wire size requirements as stated above. The wires shall be terminated individually by a solder less compression type spade lug appropriately sized or by soldering. All wiring shall be installed having a zero tension after installation.

Wire bundles shall be held in cable form by lacing tape, spiral wrap, or plastic sheathing. The lacing tape shall be flat, braided nylon and 0.090 inch wide, equal to ICO-Rally type LTN-2. The spiral wrap shall be correctly sized to fit the wire bundle and be a weather-resistant polyethylene equal to Panduit spiral wrapping. The insulating tubing shall be clear colored and sized to fit the wire bundle, equal to Alpha PVC-105 plastic tubing. Cable ties are restricted from use on cable bundles between panels and equipment harnesses. Cable ties may be used to bundle wire on panels only. Cable ties shall be self-locking and have properly applied tension according to the manufacturer's specifications. The ties shall be weather resistant nylon equal to T & B ties (MX series).

20.0 CABINET MECHANICAL AND ELECTRICAL HARDWARE

All hardware shall meet the environmental requirements of the controller. All fastening devices, (bolts, washers, screws, etc.), shall not rust when exposed to weather. These shall be hot dipped galvanized, stainless steel or brass. All electrical hardware shall be sealed and electrical contacts protected against moisture and corrosion.

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20.1 TERMINAL BLOCKS

Terminal blocks shall be multiple terminal, one piece, rated at a minimum of 300 VDC for all 24 VDC control circuit terminations and a minimum of 600 VDC for all 120 VAC circuits. All field terminal blocks shall be multiple terminal, one piece, rated a 600 VDC and 20 amps. Exceptions to the above requirement for 600 VDC terminal blocks used with the 120 VAC terminations are the 120 VAC terminations of the controller, monitor, and detectors, which are permitted to be terminated on a 300 VDC terminal block. Another exception is where intermixing terminal blocks would result from the above requirement then the block to be used shall be determined by the voltage of the largest number of terminations on that block. The minimum current rating of all terminal blocks shall be 15 amps unless otherwise specified. The minimum amperage for the 120 VAC termination on the power panel shall be 60 amps. Any contradiction between circuit description and hardware restriction shall be resolved by using the larger requirement specified.

In addition to the above requirements for voltage terminations a minimum size screw shall be used. The terminal blocks shall have a minimum screw of #6 for low voltage circuits for the electronic equipment and #8 for all field termination. The power terminal shall be a barrel type screw tightened lug.

20.2 WIRING TERMINALS

All compression terminals shall be constructed with a base material of fine grade high conductive copper per QQ-C-576 and tin plated per MIL-T-10727 plating process for durable corrosion resistance against salt spray and most chemical fumes. The insulation shall be made of vinyl. The terminal shall be installed with tooling recommended by the manufacturer to meet the performance requirements of MIL-T-7928. The use of ring or spade terminals are not being precluded by the above requirement. Each terminal shall be correctly sized to fit the wire and terminal screw.

All soldered connections shall be made using the designed temperature for the solder being used and the location of the connection. The connection shall be made preventing a cold solder joint and excessive winking of the solder into the wire. The insulation of the wire shall not be damaged by excessive overheating at any point on the wire.

20.3 MULTIPLE PIN CONNECTORS

All multiple pin connectors shall be wired in accordance with the connector manufacturer's recommendations or applicable MIL specifications. The type of connector shall be in accordance with this standard, NEMA TS-2 TYPE 2, and as listed below.

Unused sockets and pins shall not be installed in the D connector. A cable clamp designed for each connector shall be installed securely to prevent excessive strain on the wires from being transmitted to the contacts inside the connector housing.

20.4 SWITCHES

All switches, except the detector push button test switches, shall be heavy duty toggle switches and meet the MIL-MS-35059 Series Standards, rated at 20 Amps/125 VAC. The level shall have a seal for sand, dust, and fifteen foot water submersion. The terminals shall be threaded for screws and have a tinned finish. Mounting shall be by two hex nuts and two internal-tooth, lock washers on a ½ inch shank through which the toggle lever is mounted. The number of poles and lever positions shall be determined by the applications previously stated.

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20.5 LOAD CELL AND RELAY BASES

The load cell and the flash transfer relay sockets shall be rigidly mounted on the back panel. The insulating ridge on the front of the socket shall be reinforced with a metal mounting ring designed by the manufacturer of the socket. This ring shall be secured to the socket with a minimum of two screws and the ring fastened to the panel. Both sockets shall a minimum current rating of 15 amps, individual contacts, voltage rating of 1750 volts rms, pre-grounded, or grounding pin connected to chassis ground.

All relay bases used for special circuits specified previously, and not otherwise specified, shall be rated a 300 VDC and 10 Amps. Bases shall be front-panel mounted and shall have a closed back for insulation from the panel. The socket shall be octal and wired to barrier type terminals permanently numbered. Terminal screws shall be tinplated, #6-32 with captive nuts, and shall accept #20 to #12 AWG wire.

20.6 CABLE CLAMPS

All cable clamps shall have a metal loop and cushion made with a general purpose neoprene. The metal shall be aluminum 20204-T4 or stainless steel per Specification MIL-S-6721, annealed (321 or 347). The neoprene shall meet AMS Specification 3209. The clamp shall be sized to grip the cable it is being used on without damaging any insulation.

20.7 FUSES AND HOLDERS

All fuses located on the all removable electronic equipment shall be a 1/4 inch by 1-1/4 inch glass tube fuse rated at a minimum of 125 VAC. All panel mounted fuses shall be U.L. Class "H" fuses rated at 250 VAC, fast acting. Fuses shall be provided and equal to Type NON 0-30 Amps.

The fuse holder shall be constructed of a general purpose phenolic material U.L. listed for 250 VAC. The fuse holders shall have barriers on each side of the fuse and shall have a screw type terminal.

20.8 RELAY AND MOTOR SUPPRESSOR

A suppressor shall be installed on all AC relay coils and motor inputs. The suppressor shall be a series resistor-capacitor, 100 ohms-0.1 microfarad, and rated for 600 volts.

20.9 IDENTIFICATION SLEEVES

Identification sleeves shall be supplied on specified wires. The sleeve shall have the required identification printed or typed with a minimum size of pica-pitch 10. The sleeve shall be installed on the sire providing a self-laminating protective shield over the legend. Acceptable material shall be transparent 3.5 mil. vinyl film with acrylic pressure sensitive adhesive. The operating temperature range shall be -40° C to 80° C. The size of the label shall provide sufficient area for the printed identification.

Application of the sleeve onto the wire shall be neat and smooth completely protecting the identification label.

21.0 TESTING

A test(s) shall be performed on the cabinet containing the completely assembled equipment and control equipment by the manufacturer prior to shipment. Malfunctions or defects shall be corrected and

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the equipment retested. The complete log beginning with the first test, showing the results of the all tests, shall be delivered with the equipment. The manufacturer shall furnish certification with the documentation required in section 24, stating that the results of the test are true and accurate and stating the name and title of the person conducting the test. The test shall require the operation of the equipment with each signal circuit connected to an incandescent load of at least six-hundred watts. The equipment shall operate sequentially and continuously for at least forty-eight hours, as stated above, in an environment having a minimum temperature of one-hundred-forty degrees Fahrenheit.

The complete system, including all local controllers, cabinets, on-street master controller, and modems shall be assembled and interconnected at the point of manufacture.

The system shall be completely performance tested and a written test report submitted in the documentation required in Section 24. The Engineer reserves the right to an on-site system inspection at the point of manufacture to witness the system operation and the performance test of the system.

After installation and debugging of all central control equipment, local controllers, detectors, communications, and other system hardware and software elements, the system shall be required to complete a 30 day period of acceptable operation. The system test shall fully and successfully demonstrate all system functions using live detector data and controlling all system-controlled intersections.

22.0 TRAINING

Formal classroom training and "hands-on" operations training shall be provided for personnel designated by this agency. The engineering, operations and maintenance training shall take place at locations within the state of Louisiana designated by this agency. The technician training shall take place at the manufacturer's facility. Classroom training shall be given for the engineering, operations and maintenance sessions.

Five training sessions are required during the contract period. Three maintenance sessions, one engineering session and one technician session shall be given. The engineering session shall provide for a maximum of twenty-five people. Each maintenance session shall provide for a maximum of fifteen people. The technician session shall provide for a maximum of four people. Copies of course materials shall be supplied to and retained by each attendant. Training shall occur after delivery of initial order, but before one year after date of final acceptance of initial order. The Manufacturer shall submit for each type of session, syllabuses to the Traffic Signal Engineer for approval before classes are scheduled.

22.1 OPERATIONAL TRAINING

Training for the operation of the system shall include analyzing system performance and revision of system operating parameters based on the analysis. The session shall be a minimum of two days and presented at an engineering level.

The training topics shall include as a minimum:

a. How to enter commands (, System software, utilities, and disk management)
b. Operation of all devices
c. Generation and editing of arterial master and intersection controller databases
d. Uploading/downloading of arterial master and intersection controller databases

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e. Procedure for enabling dynamic displays
f. Explanation of the communication system

22.2 MAINTENANCE TRAINING

Training for maintenance personnel shall include detailed, field level troubleshooting and basic interrogation of the controller unit. The training shall consist of three sessions. Two sessions shall be remedial and one session shall cover more advanced material. Each session shall be three days in length. Course content shall emphasize information required to successfully pass the below specified tests.

Maintenance personnel shall be tested by the Vendor as to their ability to repair and/or diagnose simulated failures, and to gather basic information about a particular controller unit (i.e., min time, conflicting and non-conflicting phases, etc.). There shall be at least ten (10) controller/cabinet configurations per session type. Cabinets, controllers and miscellaneous materials shall be supplied by the Department. Wiring and programming necessary to conduct the tests shall be performed by the Vendor. The Vendor shall recommend at least ten (10) simulated failures, timing schemes and other configurations to be used for each type of test. The Department shall supply the Vendor with the final, approved test configurations, however, the Vendor shall not be required to perform more than six (6) hours of wiring or programming in development of the test configurations.

Final test questions shall be supplied by the Department. A Department representative will be present at all time to assist the Vendor in administering the test.

22.3 TECHNICIAN TRAINING

The manufacturer shall provide a minimum of two, four-day sessions at their facility for a maximum of three Department employees per session. The manufacturer shall be responsible for all costs associated with such training except for the cost of travel.

Training sessions shall be highly technical and include as a minimum the following topics:

a. Architecture of controller unit.
b. Controller troubleshooting to component level.
c. Cabinet wiring and troubleshooting
d. Advanced controller programming including diamond sequencing.

22.3 ENGINEERING TRAINING

Training for engineering personnel shall focus on implementing traffic engineering data with the controller. The manufacturer shall provide one two-day session for a maximum of 25 participants.

The first day of the session shall emphasize basic operation and interrogation of the controller. The second day of the session shall emphasize implementing traffic engineering data and include, at a minimum the following:

a. Programming an actuated, coordinated controller based on intersections provided by the Department.
b. Theory and operation of volume density operation and associated programming methods.
c. Theory and operation of three- and four-phase diamond sequencing and associated programming methods.

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23.0 WARRANTY

The system equipment shall be warranted for a minimum of one year. All warranty periods shall begin at the date of acceptance by the Department.

24.0 DOCUMENTATION

Detailed technical information on material being offered shall be supplied with the bids for equipment directly shipped to the Department and with the material submittal for equipment being installed on projects. Information shall be for all items required by this specification and on the order or in the plans.

Manuals shall be supplied for all equipment and components of the system. The manuals supplied for software, peripherals, and modems shall be from the original source. The manual shall be comprehensive, easy to use and understand, and completely descriptive of the product.

24.1 CLOSED LOOP SYSTEM OPERATION MANUAL

a. Step-by-step system installation procedures
b. Operating instructions
c. System set-up procedures
d. Explanations and descriptions of data entry procedures
e. Menu item descriptions

24.2 EQUIPMENT MANUALS

a. Technical descriptions
b. Operating instructions
c. Theory of operation
d. Detailed schematic diagrams
e. Assembly drawings
f. Wiring diagram
g. Troubleshooting procedures to assist the maintenance staff in the identification and isolation of malfunctions
h. Parts list

24.3 CABINET WIRING

Complete wiring details shall be shown on the drawings. The drawings shall use the same nomenclature to identify the various components as referred to in this standard. If no name was mentioned in this standard then a reasonable nomenclature shall be used. A legend shall be provided on all drawings identifying acronyms and symbols. Two drawings shall be provided with each cabinet. The DOTD specification shall be followed when supplying documentation for projects.

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FIGURES

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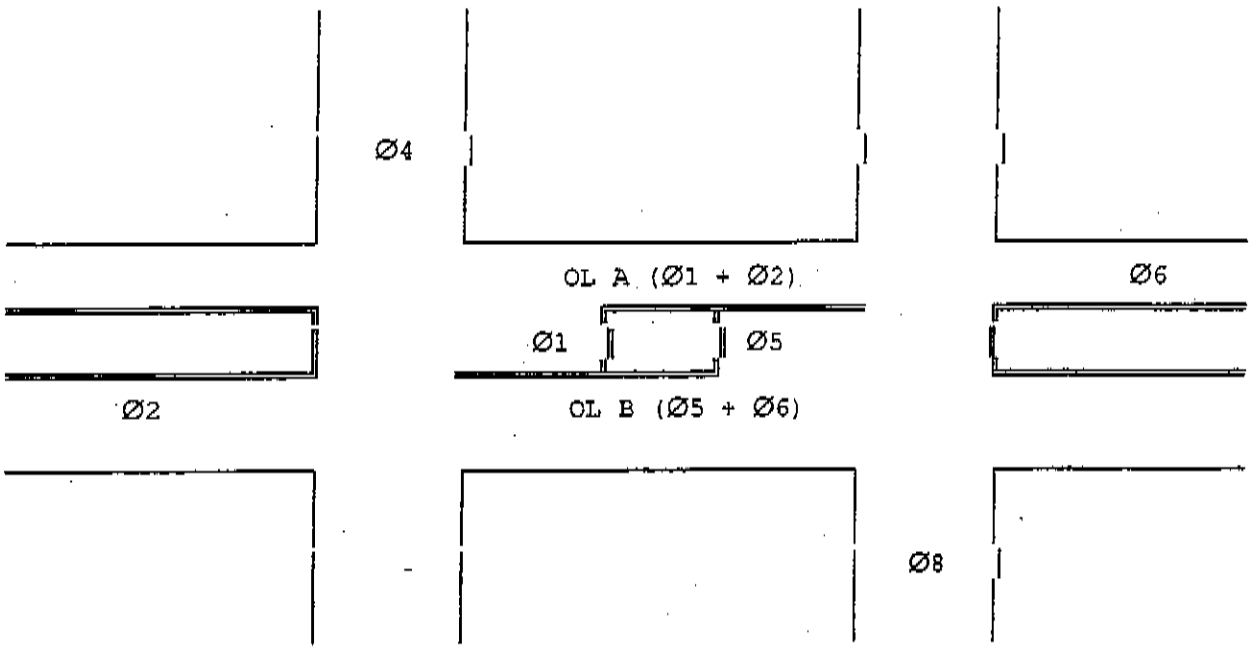


FIGURE 18A-3
DIAMOND INTERSECTION PHASE ASSIGNMENT

FOR INFORMATION ONLY

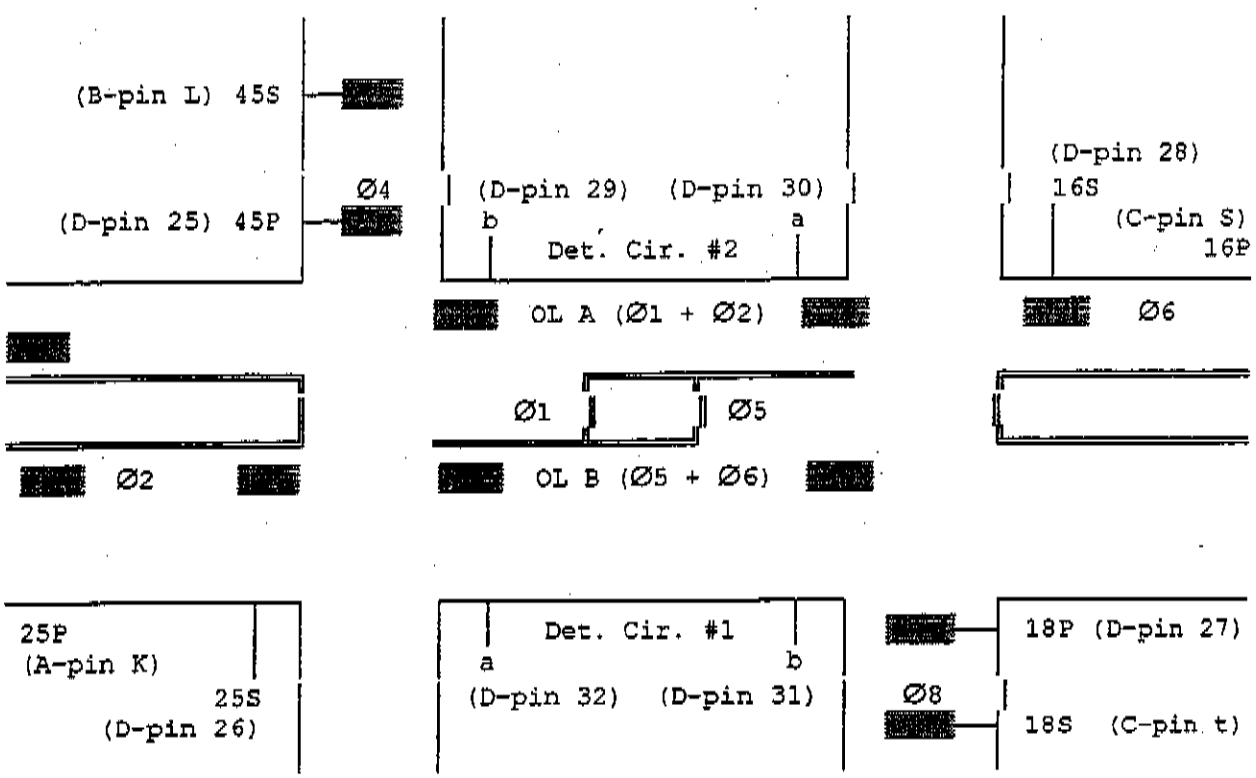


FIGURE 18A-4
VEHICLE DETECTOR ASSIGNMENT - 4 PHASE DIAMOND

FOR INFORMATION ONLY

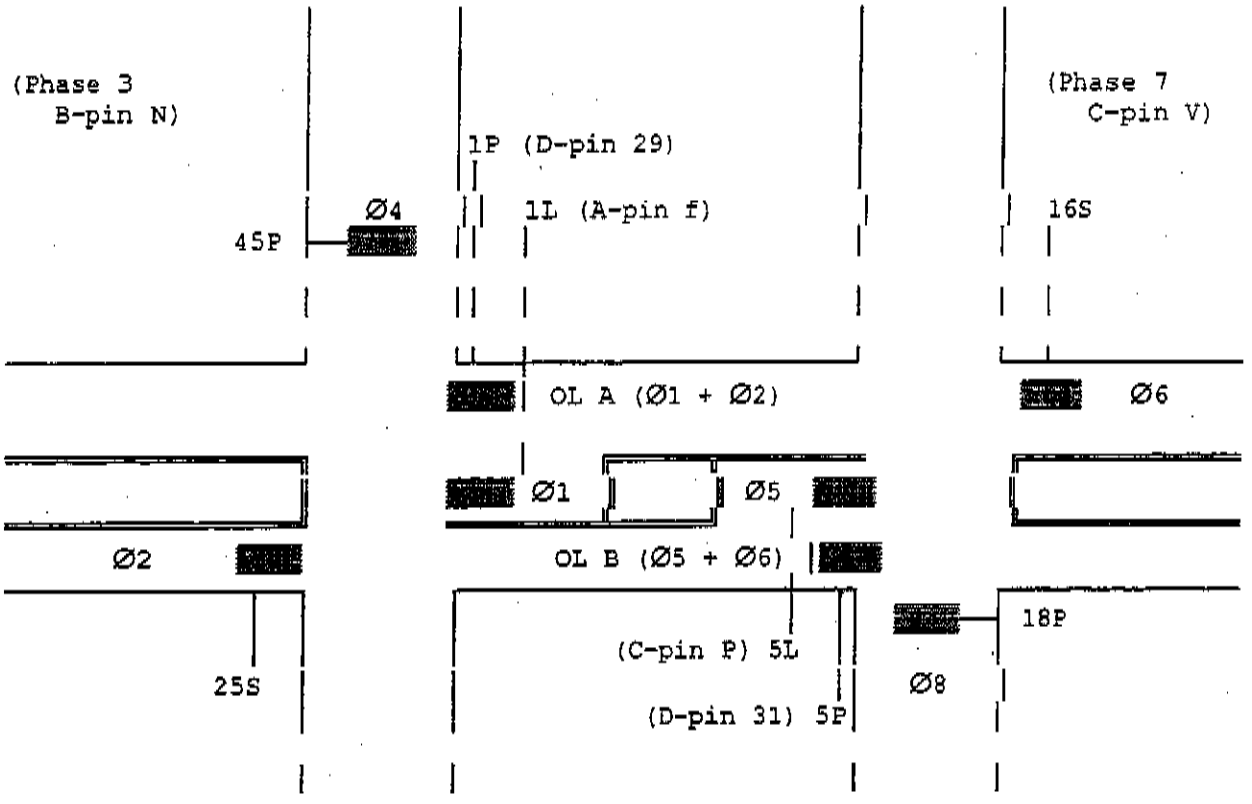


FIGURE 18A-5
VEHICLE DETECTOR ASSIGNMENT - 3 PHASE DIAMOND

FOR INFORMATION ONLY

APPENDIX

PIN/SOCKET ASSIGNMENTS FOR D CONNECTOR ON BACK PANEL

PIN	FUNCTION
1	OFFSET 1 IN
2	CYCLE 2 IN
3	CYCLE 3 IN
4	FLASH IN
5	OFFSET 2 IN
6	OFFSET 3 IN
7	INTERCONNECT FREE
8	SPLIT 2 IN
9	SPLIT 3 IN
10	SPL FUNCTION 2 OUT (TBC)
11	COMPUTER ON-LINE
12	THREE PHASE DIAMOND SELECT
13	FOUR PHASE DIAMOND SELECT
14	RESERVED
15	RESERVED
16	EXT RESYNC INPUT
17	MASTER SELECT
18	SYNC INPUT
19	PREEMPT 1 IN
20	PREEMPT 2 IN
21	PREEMPT 3 IN
22	PREEMPT 4 IN
23	PREEMPT 5 IN
24	PREEMPT INTERLOCK
25	SYSTEM DET. 1/DETECTOR 45P INPUT
26	SYSTEM DET. 2/DETECTOR 25S INPUT
27	SYSTEM DET. 3/DETECTOR 18P INPUT
28	SYSTEM DET. 4/DETECTOR 16S INPUT
29	SYSTEM DET. 5/DET. #2b-1P INPUT
30	SYSTEM DET. 6/DET. #2a INPUT
31	SYSTEM DET. 7/DET. #1b-5P INPUT
32	SYSTEM DET. 8/DET. #1a INPUT
33-34	SPARE
35	CONTROLLER INTERLOCK DIAMOND
36	COMP. SEL 1
37	COMP. SEL 2
38	COMP. SEL 3
39-41	SPARE (DO NOT USE)
42	CABINET INTERLOCK DIAMOND
43	SPL FUNCTION 1 OUT (TBC)
44	SPLIT 3 OUT
45	SPLIT 2 OUT
46	INTERCONNECT FREE OUT
47	OFFSET 3 OUT
48	OFFSET 2 OUT
49	FLASH OUT
50	CYCLE 3 OUT
51	CYCLE 2 OUT
52	OFFSET 1 OUT
53	+24 VDC
54	LOGIC GROUND
55	CHASSIS GND
56	RESERVED
57	RESERVED

PIN/SOCKET ASSIGNMENTS FOR E CONNECTOR ON BACK PANEL

PIN	FUNCTION
1	AC +
2	AC-
3	CHASSIS GROUND
9	PREEMPT 1
10	PREEMPT 2
11	PREEMPT 3
12	PREEMPT 4
13	PREEMPT 5
15	LOGIC GROUND

FOR INFORMATION ONLY

18A DRAWINGS

FOR INFORMATION ONLY

STATE PROJECT NOS. 005-10-0037, 006-01-0021, 006-02-0064, 006-25-0001, 006-30-0041, 063-03-0051, AND 063-04-04-0035
HUEY P. LONG BRIDGE WIDENING
(WESTBANK AND EASTBANK APPROACHES AND MAIN BRIDGE DECK WIDENING)
ROUTE US 90
JEFFERSON PARISH

FOR INFORMATION ONLY

kgc
Environmental Services Inc.

1009 Janette Ct.
Slidell, LA 70461
Phone 985-643-4745
Fax 985-643-8727
Web www. kgces.com
Email kgces@aol.com

October 14, 2002

Mr. Mike Beitzel, SET
Modjeski and Masters Inc.
1055 St. Charles Avenue
New Orleans, LA 70130

Re: **HUEY P. LONG BRIDGE**
LADOTD WIDENING PROJECT
PAINT ANALYSIS FOR LEAD, CADMIUM AND CHROMIUM

Dear Mr. Beitzel:

We have completed the sampling & analysis of twenty (20) paint chip samples taken at the above captioned project site. Below is a report detailing our findings.

INTRODUCTION

KGC Environmental Services Inc. was retained by Modjeski and Masters to characterize the existing coating system at various locations across the Huey P. Long Bridge for the presence of lead, cadmium and chromium. On 10-1-02, twenty (20) paint chip samples were removed by the writer. Mr. Darrel Hoffman of Modjeski & Masters assisted in the sampling.

REMOVAL METHODOLOGY [PAINT CHIPS]

The paint chips were removed using **ASTM D 5702-95 - *Standard Practice for Field Sampling of Coating Films for Analysis for Heavy Metals*** as a standardized guide. This method was selected from the American Industrial Hygiene Association's Ad Hoc Committee on Sampling for Environmental Lead. In short, all twenty (20) paint samples were scraped or shaved from the substrate. The area of the paint surface from which the samples were taken was approximately 2 square inches per sample.

Each sample was placed into an individual bag and labeled with a unique identification number. Samples were sent to Environmental Hazards Services in Richmond, Virginia, an AIHA and A2LA accredited lab.

COATING EVALUATION

Before removing each of the samples, dry film thickness readings were taken by the writer. Five locations per sample were measured and averaged to arrive at the final reading in mils. The dry film thickness readings were determined by a pre-calibrated PosiTector 6000 fixed probe dry film thickness gage

FOR INFORMATION ONLY

RESULTS

See Table 1

DISCUSSION

Lead and chromium were found in the paint. Exposure to these metals in excess of their respective exposure limits could cause adverse health effects.

The Federal Occupational Safety and Health Administration's (OSHA) Lead Exposure in Construction; Interim Final Rule- Inspection and Compliance Procedures **CPL 2-2.58** states the interim final lead standard for the construction industry applies to all occupational exposures to lead in all construction work in which lead, in any amount, is present in an occupationally related context.

Exposure to lead can happen from breathing workplace air or dust, eating contaminated foods, or drinking contaminated water. Lead can damage the nervous system, kidneys, and reproductive system.

The Occupational Safety and Health Administration (OSHA) has set limits of 500 µg water soluble chromium(III) compounds per cubic meter of workplace air (500 $\mu g/m^3$), 1,000 $\mu g/m^3$ for metallic chromium(0) and insoluble chromium compounds, and 52 $\mu g/m^3$ for chromium(VI) compounds for 8-hour work shifts and 40-hour work weeks.

Exposure to chromium occurs from ingesting contaminated food or drinking water or breathing contaminated workplace air. Chromium(VI) at high levels can damage the nose and can cause cancer.

CONCLUSIONS

It appears after multiple, representative sampling that there is lead and chromium present in the existing coating on the Huey P. Long Bridge. When lead or other heavy metals are present on a substrate, the removal or disturbance of such paint must be conducted in accordance with all applicable federal, state and local occupational health, safety and environmental regulations.

Should you have any questions, please call me.

Sincerely,

KGC Environmental Services Inc.

Kevin Guth, MSPH

Enclosure: Analytical Results & Site photographs

FOR INFORMATION ONLY

Table 1

Paint Analysis for Lead, Cadmium and Chromium
Huey P. Long Bridge
Widening Project

Date Sampled: **10/1/2002** Removal Method: **ASTM D6702-95**
Client: **Modjeski and Masters** Analytical Method: **NIOSH 7300 M**

Sample ID	Average DFT	Cadmium PPM	Chromium PPM	Lead PPM	Sample Location
P-01-100102	14	<37	32000	120000	Highway Bracket (Tension Strap) , PP A-1 , Upstream
P-02-100102	7	<51	18000	1900	Upper Chord (Top Lateral Connection), PP A-1, Downstream
P-03-100102	14	<52	13000	11000	Lower Chord, PP A-7, Downstream
P-04-100102	11	<43	27000	2000	Highway Bracket (Tension Strap) , Pier I , Upstream
P-05-100102	9	<47	14000	4700	Highway Bracket (Tension Strap) , PP I-4 , Upstream
P-06-100102	10	<60	10000	2800	Lower Chord, PP I-15, Downstream
P-07-100102	10	<67	<67	340000	Highway Bracket (Floor Beam Web) , II-3, Upstream
P-08-100102	50	<50	11000	200000	Highway Bracket (Tension Strap), II-6, Upstream
P-09-100102	32	<55	9100	280000	Highway Bracket (Tension Strap), II-8 , Upstream
P-10-100102	25	<80	13000	150000	Highway Bracket (Tension Strap) , II-10 , Upstream
P-11-100102	29	<110	13000	120000	Highway Bracket (Tension Strap) , II-12 , Upstream
P-12-100102	6	<180	17000	2100	Upper Chord (Top Cover), II-6, Upstream
P-13-100102	5	<180	31000	2400	Upper Chord (Out Board Gusset), II-12, Upstream
P-14-100102	18	<89	14000	990	Lower Chord (Top Cover) , III-1 , Upstream
P-15-100102	9	<350	25000	1400	Upper Chord (Top Cover) , III-1, Downstream
P-16-100102	5	<250	51000	1600	Upper Chord (Top Cover), III-13, Upstream
P-17-100102	15	<69	7100	860	Lower Chord (Top Cover) , III-13 , Downstream
P-18-100102	27	<38	64	310000	Highway Bracket @ Pier C, Upstream
P-19-100102	27	<50	11000	230000	Tower 25 E Highway Bracket , Upstream
P-20-100102	6	<630	<630	1900	Tower 49 W Highway Bracket, Upstream

DFT = Dry Film Thickness in mils - Average Reading PPM= Parts Per Million

Note:
1) Sample results denoted with a "less than" (<) sign contains less than the above stated reporting limit for each particular metal, based on a 100 ml sample volume.
2) All samples were analyzed by EHS - Richmond, Virginia
3) A2LA accredited for the analysis of environmental lead samples under the ELLAP.
4) AIHA accredited for the analysis of metals.

ENVIRONMENTAL HAZARDS SERVICES, L.L.C.
7469 WHITE PINE ROAD - RICHMOND, VA 23237
804-275-4788 FAX 804-275-4907

PAINT METALS ANALYSIS SUMMARY

CLIENT: KGC Environmental Services
1009 Janette Ct.
Slidell, LA 70461

DATE OF SAMPLING: 01 OCT 2002
DATE OF RECEIPT: 03 OCT 2002
DATE OF ANALYSIS: 04 OCT 2002
DATE OF REPORT: 04 OCT 2002

CLIENT NUMBER: 19-2355 A
EHS PROJECT #: 10-02-0515
PROJECT: Modjeski & Masters/Huey P. Long Widening Project

EHS SAMPLE #: 10-02-0515-01
CLIENT SAMPLE #: P-01-100102
SAMPLE WEIGHT (g): 0.274

ANALYTE	CONCENTRATION PPM (mg/kg)	METHOD	REPORT LIMIT (ug)	MDL (ug)
CADMIUM (Cd)	<37	NIOSH 7300M	10.0	0.410
CHROMIUM (Cr)	32000	NIOSH 7300M	10.0	0.470
LEAD (Pb)	120000	NIOSH 7300M	10.0	0.750

EHS SAMPLE #: 10-02-0515-02
CLIENT SAMPLE #: P-02-100102
SAMPLE WEIGHT (g): 0.199

ANALYTE	CONCENTRATION PPM (mg/kg)	METHOD	REPORT LIMIT (ug)	MDL (ug)
CADMIUM (Cd)	<51	NIOSH 7300M	10.0	0.410
CHROMIUM (Cr)	18000	NIOSH 7300M	10.0	0.470
LEAD (Pb)	1900	NIOSH 7300M	10.0	0.750

EHS SAMPLE #: 10-02-0515-03
CLIENT SAMPLE #: P-03-100102
SAMPLE WEIGHT (g): 0.196

ANALYTE	CONCENTRATION PPM (mg/kg)	METHOD	REPORT LIMIT (ug)	MDL (ug)
CADMIUM (Cd)	<52	NIOSH 7300M	10.0	0.410
CHROMIUM (Cr)	13000	NIOSH 7300M	10.0	0.470
LEAD (Pb)	11000	NIOSH 7300M	10.0	0.750

FOR INFORMATION ONLY

ENVIRONMENTAL HAZARDS SERVICES, L.L.C.

CLIENT NUMBER: 19-2355 A
EHS PROJECT #: 10-02-0515
PROJECT: Modjeski & Masters/Huey P. Long Widening Project

EHS SAMPLE #: 10-02-0515-04
CLIENT SAMPLE #: P-04-100102
SAMPLE WEIGHT (g): 0.233

ANALYTE	CONCENTRATION PPM (mg/kg)	METHOD	REPORT LIMIT (ug)	MDL (ug)
CADMIUM (Cd)	<43	NIOSH 7300M	10.0	0.410
CHROMIUM (Cr)	27000	NIOSH 7300M	10.0	0.470
LEAD (Pb)	2000	NIOSH 7300M	10.0	0.750

EHS SAMPLE #: 10-02-0515-05
CLIENT SAMPLE #: P-05-100102
SAMPLE WEIGHT (g): 0.214

ANALYTE	CONCENTRATION PPM (mg/kg)	METHOD	REPORT LIMIT (ug)	MDL (ug)
CADMIUM (Cd)	<47	NIOSH 7300M	10.0	0.410
CHROMIUM (Cr)	14000	NIOSH 7300M	10.0	0.470
LEAD (Pb)	4700	NIOSH 7300M	10.0	0.750

EHS SAMPLE #: 10-02-0515-06
CLIENT SAMPLE #: P-06-100102
SAMPLE WEIGHT (g): 0.169

ANALYTE	CONCENTRATION PPM (mg/kg)	METHOD	REPORT LIMIT (ug)	MDL (ug)
CADMIUM (Cd)	<60	NIOSH 7300M	10.0	0.410
CHROMIUM (Cr)	10000	NIOSH 7300M	10.0	0.470
LEAD (Pb)	2900	NIOSH 7300M	10.0	0.750

EHS SAMPLE #: 10-02-0515-07
CLIENT SAMPLE #: P-07-100102
SAMPLE WEIGHT (g): 0.150

ANALYTE	CONCENTRATION PPM (mg/kg)	METHOD	REPORT LIMIT (ug)	MDL (ug)
CADMIUM (Cd)	<67	NIOSH 7300M	10.0	0.410
CHROMIUM (Cr)	<67	NIOSH 7300M	10.0	0.470
LEAD (Pb)	340000	NIOSH 7300M	10.0	0.750

FOR INFORMATION ONLY

ENVIRONMENTAL HAZARDS SERVICES, L.L.C.

CLIENT NUMBER: 19-2355 A
EHS PROJECT #: 10-02-0515
PROJECT: Modjeski & Masters/Huey P. Long Widening Project

EHS SAMPLE #: 10-02-0515-08
CLIENT SAMPLE #: P-08-100102
SAMPLE WEIGHT (g): 0.200

ANALYTE	CONCENTRATION PPM (mg/kg)	METHOD	REPORT LIMIT (ug)	MDL (ug)
CADMIUM (Cd)	<50	NIOSH 7300M	10.0	0.410
CHROMIUM (Cr)	11000	NIOSH 7300M	10.0	0.470
LEAD (Pb)	200000	NIOSH 7300M	10.0	0.750

EHS SAMPLE #: 10-02-0515-09
CLIENT SAMPLE #: P-09-100102
SAMPLE WEIGHT (g): 0.183

ANALYTE	CONCENTRATION PPM (mg/kg)	METHOD	REPORT LIMIT (ug)	MDL (ug)
CADMIUM (Cd)	<65	NIOSH 7300M	10.0	0.410
CHROMIUM (Cr)	9100	NIOSH 7300M	10.0	0.470
LEAD (Pb)	280000	NIOSH 7300M	10.0	0.750

EHS SAMPLE #: 10-02-0515-10
CLIENT SAMPLE #: P-10-100102
SAMPLE WEIGHT (g): 0.125

ANALYTE	CONCENTRATION PPM (mg/kg)	METHOD	REPORT LIMIT (ug)	MDL (ug)
CADMIUM (Cd)	<80	NIOSH 7300M	10.0	0.410
CHROMIUM (Cr)	13000	NIOSH 7300M	10.0	0.470
LEAD (Pb)	150000	NIOSH 7300M	10.0	0.750

EHS SAMPLE #: 10-02-0515-11
CLIENT SAMPLE #: P-11-100102
SAMPLE WEIGHT (g): 0.098

ANALYTE	CONCENTRATION PPM (mg/kg)	METHOD	REPORT LIMIT (ug)	MDL (ug)
CADMIUM (Cd)	<110	NIOSH 7300M	10.0	0.410
CHROMIUM (Cr)	13000	NIOSH 7300M	10.0	0.470
LEAD (Pb)	120000	NIOSH 7300M	10.0	0.750

FOR INFORMATION ONLY

ENVIRONMENTAL HAZARDS SERVICES, L.L.C.

CLIENT NUMBER: 10-2355 A
EHS PROJECT #: 10-02-0515
PROJECT: Modjeski & Masters/Huey P. Long Widening Project

EHS SAMPLE #: 10-02-0515-12
CLIENT SAMPLE #: P-12-100102
SAMPLE WEIGHT (g): 0.058

ANALYTE	CONCENTRATION PPM (mg/kg)	METHOD	REPORT LIMIT (ug)	MDL (ug)
CADMIUM (Cd)	<180	NIOSH 7300M	10.0	0.410
CHROMIUM (Cr)	17000	NIOSH 7300M	10.0	0.470
LEAD (Pb)	2100	NIOSH 7300M	10.0	0.750

EHS SAMPLE #: 10-02-0515-13
CLIENT SAMPLE #: P-13-100102
SAMPLE WEIGHT (g): 0.055

ANALYTE	CONCENTRATION PPM (mg/kg)	METHOD	REPORT LIMIT (ug)	MDL (ug)
CADMIUM (Cd)	<190	NIOSH 7300M	10.0	0.410
CHROMIUM (Cr)	31000	NIOSH 7300M	10.0	0.470
LEAD (Pb)	2400	NIOSH 7300M	10.0	0.750

EHS SAMPLE #: 10-02-0515-14
CLIENT SAMPLE #: P-14-100102
SAMPLE WEIGHT (g): 0.102

ANALYTE	CONCENTRATION PPM (mg/kg)	METHOD	REPORT LIMIT (ug)	MDL (ug)
CADMIUM (Cd)	<99	NIOSH 7300M	10.0	0.410
CHROMIUM (Cr)	14000	NIOSH 7300M	10.0	0.470
LEAD (Pb)	990	NIOSH 7300M	10.0	0.750

EHS SAMPLE #: 10-02-0515-15
CLIENT SAMPLE #: P-15-100102
SAMPLE WEIGHT (g): 0.029

ANALYTE	CONCENTRATION PPM (mg/kg)	METHOD	REPORT LIMIT (ug)	MDL (ug)
CADMIUM (Cd)	<350	NIOSH 7300M	10.0	0.410
CHROMIUM (Cr)	25000	NIOSH 7300M	10.0	0.470
LEAD (Pb)	1400	NIOSH 7300M	10.0	0.750

FOR INFORMATION ONLY

ENVIRONMENTAL HAZARDS SERVICES, L.L.C.

CLIENT NUMBER: 19-2355 A
EHS PROJECT #: 10-02-0515
PROJECT: Modjeski & Masters/Huey P. Long Widening Project

EHS SAMPLE #: 10-02-0515-16
CLIENT SAMPLE #: P-16-100102
SAMPLE WEIGHT (g): 0.041

ANALYTE	CONCENTRATION PPM (mg/kg)	METHOD	REPORT LIMIT (ug)	MDL (ug)
CADMIUM (Cd)	<250	NIOSH 7300M	10.0	0.410
CHROMIUM (Cr)	61000	NIOSH 7300M	10.0	0.470
LEAD (Pb)	1600	NIOSH 7300M	10.0	0.750

EHS SAMPLE #: 10-02-0515-17
CLIENT SAMPLE #: P-17-100102
SAMPLE WEIGHT (g): 0.147

ANALYTE	CONCENTRATION PPM (mg/kg)	METHOD	REPORT LIMIT (ug)	MDL (ug)
CADMIUM (Cd)	<69	NIOSH 7300M	10.0	0.410
CHROMIUM (Cr)	7100	NIOSH 7300M	10.0	0.470
LEAD (Pb)	860	NIOSH 7300M	10.0	0.750

EHS SAMPLE #: 10-02-0515-18
CLIENT SAMPLE #: P-18-100102
SAMPLE WEIGHT (g): 0.266

ANALYTE	CONCENTRATION PPM (mg/kg)	METHOD	REPORT LIMIT (ug)	MDL (ug)
CADMIUM (Cd)	<38	NIOSH 7300M	10.0	0.410
CHROMIUM (Cr)	64	NIOSH 7300M	10.0	0.470
LEAD (Pb)	310000	NIOSH 7300M	10.0	0.750

EHS SAMPLE #: 10-02-0515-19
CLIENT SAMPLE #: P-19-100102
SAMPLE WEIGHT (g): 0.203

ANALYTE	CONCENTRATION PPM (mg/kg)	METHOD	REPORT LIMIT (ug)	MDL (ug)
CADMIUM (Cd)	<50	NIOSH 7300M	10.0	0.410
CHROMIUM (Cr)	11000	NIOSH 7300M	10.0	0.470
LEAD (Pb)	230000	NIOSH 7300M	10.0	0.750

FOR INFORMATION ONLY

ENVIRONMENTAL HAZARDS SERVICES, L.L.C.

CLIENT NUMBER: 19-2355 A
EHS PROJECT #: 10-02-0515
PROJECT: Modjeski & Masters/Huey P. Long Widening Project

EHS SAMPLE #: 10-02-0515-20
CLIENT SAMPLE #: P-20-100102
SAMPLE WEIGHT (g): 0.016

ANALYTE	CONCENTRATION PPM (mg/kg)	METHOD	REPORT LIMIT (ug)	MDL (ug)
CADMIUM (Cd)	<630	NIOSH 7300M	10.0	0.410
CHROMIUM (Cr)	<630	NIOSH 7300M	10.0	0.470
LEAD (Pb)	1900	NIOSH 7300M	10.0	0.750

ANALYST: Bayard Vandegrift

Reviewed By Authorized Signatory:
Howard Varner, Laboratory Director
Irma Faszewski, Quality Assurance Coordinator
David Ku, MS, Senior Chemist
Feng Jiang, MS, Senior Geologist
Michael A. Mueller, Quality Assurance Manager

This method has been validated for sample weights of 0.020g or greater. When samples with a weight of less than that are analyzed those results fall outside of the scope of accreditations.

Sample Results denoted with a "less than" (<) sign contains less than the above stated reporting limit for each particular metal, based on a 100ml sample volume.

Results represent the analysis of samples submitted by the client. Sample location, description, area, volume etc., was provided by the client. This report shall not be reproduced, except in full, without the written consent of Environmental Hazards Services, L.L.C. California Certification #2319 NY ELAP #11714

LEGEND	g = gram	ug = microgram	ppm = parts per million
	ml = milliliter	mg/kg = milligrams per kilogram	MDL = method detection limit

palnmt3.dot/ICPVISTA/07AUG2002/ MR

FOR INFORMATION ONLY

EHS 10-02-0515

20Pb CdCr paint

SAMPLE CONDITION
Accepted: ____
Unacceptable: ____

kgc Environmental Services Inc.

CHAIN OF CUSTODY

CUSTOMER/ SITE: Modjeski & Masters / Huey P. Long Widening Project	SAMPLER'S NAME: Kevin Guth
TYPE OF SAMPLE(Matrix): Paint Chip	NUMBER OF SAMPLES: 20
TURNAROUND TIME: Rush	DATE/TIME SAMPLED: 10/1/2002

SAMPLE ID	ANALYSIS REQUESTED	MATRIX	MISC	LAB ID
P-01-100102 1	Lead, Cadmium & Chromium	Paint Chip		
P-02-100102 2	Lead, Cadmium & Chromium	Paint Chip		
P-03-100102 3	Lead, Cadmium & Chromium	Paint Chip		
P-04-100102 4	Lead, Cadmium & Chromium	Paint Chip		
P-05-100102 5	Lead, Cadmium & Chromium	Paint Chip		
P-06-100102 6	Lead, Cadmium & Chromium	Paint Chip		
P-07-100102 7	Lead, Cadmium & Chromium	Paint Chip		
P-08-100102 8	Lead, Cadmium & Chromium	Paint Chip		
P-09-100102 9	Lead, Cadmium & Chromium	Paint Chip		
P-10-100102 10	Lead, Cadmium & Chromium	Paint Chip		
P-11-100102 11	Lead, Cadmium & Chromium	Paint Chip		
P-12-100102 12	Lead, Cadmium & Chromium	Paint Chip		
P-13-100102 13	Lead, Cadmium & Chromium	Paint Chip		
P-14-100102 14	Lead, Cadmium & Chromium	Paint Chip		
P-15-100102 15	Lead, Cadmium & Chromium	Paint Chip		
P-16-100102 16	Lead, Cadmium & Chromium	Paint Chip		
P-17-100102 17	Lead, Cadmium & Chromium	Paint Chip		
P-18-100102 18	Lead, Cadmium & Chromium	Paint Chip		
P-19-100102 19	Lead, Cadmium & Chromium	Paint Chip		
P-20-100102 20	Lead, Cadmium & Chromium	Paint Chip		
10/7/02				

Send Results To: Attn: Kevin Guth
KGC Environmental Services, Inc.
1009 Janette Ct.
Slidell, LA 70461

Phone: 985-643-4745
Fax: 985-643-8727
email:kgces@aol.com

Relinquished By: Kevin Guth Date/Time: 10-1-02

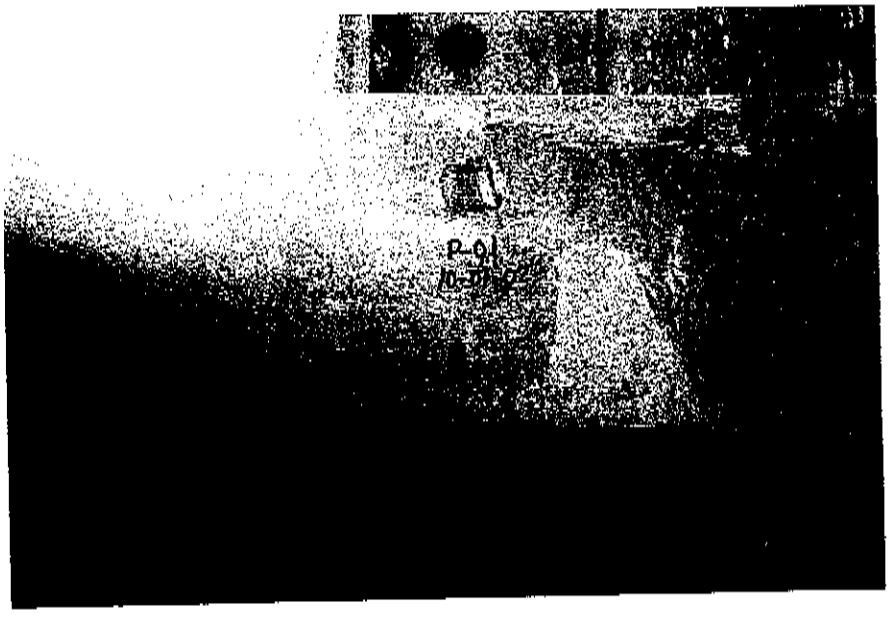
(Lab) Received by: [signature] Date/Time: 10-3-02

Page 1 of 1

TOTAL P.07

FOR INFORMATION ONLY

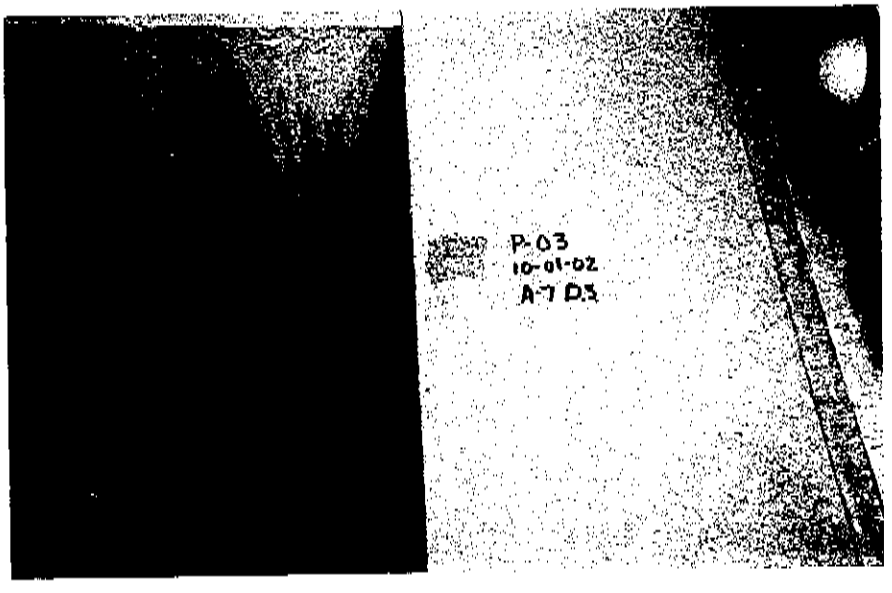
Sample ID: P-01-100102



Sample ID: P-02-100102

FOR INFORMATION ONLY

Sample ID: P-03-100102



Sample ID: P-04-100102

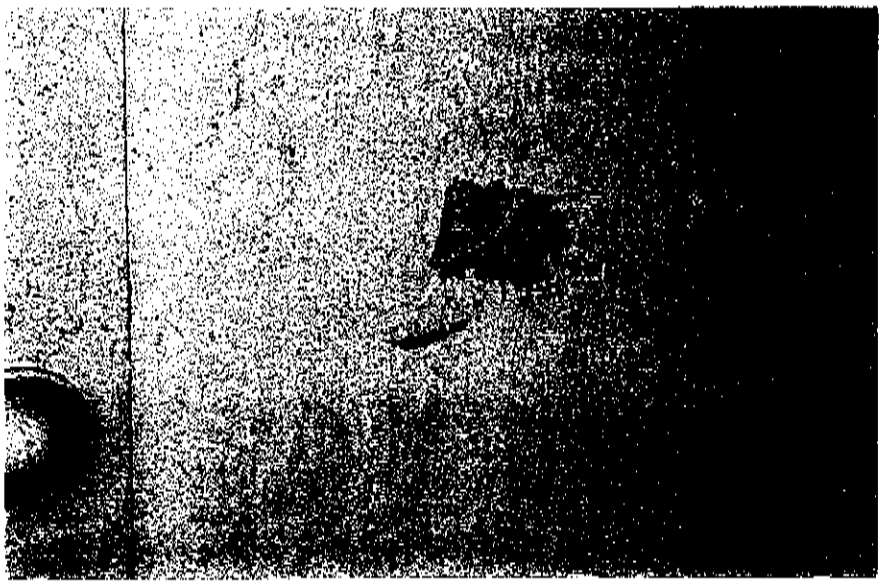
FOR INFORMATION ONLY

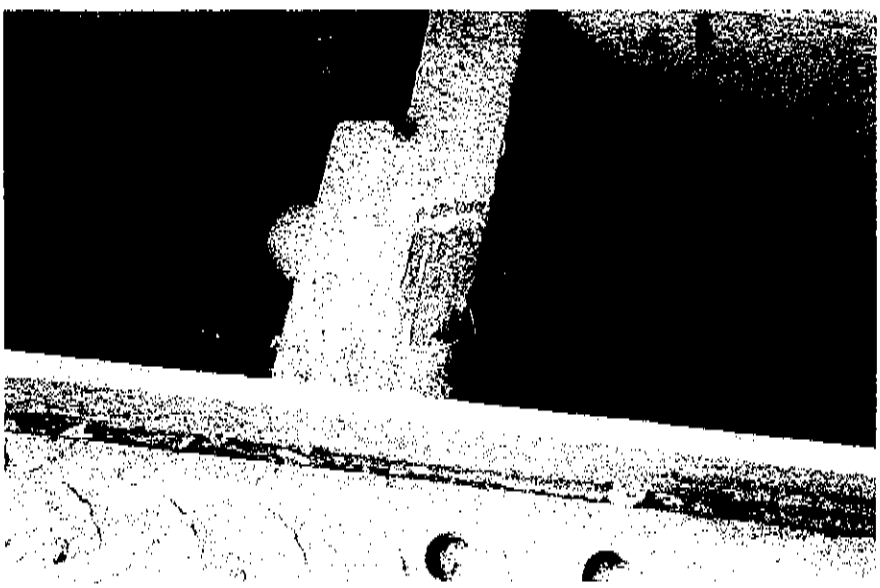
Sample ID: P-05-100102

Sample ID: P-06-100102

FOR INFORMATION ONLY

Sample ID: P-07-100102





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FOR INFORMATION ONLY

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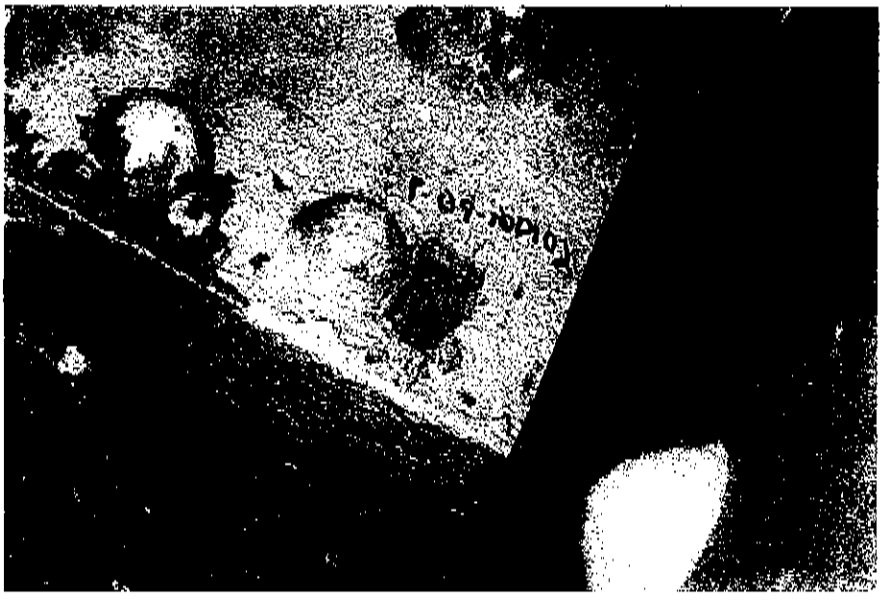

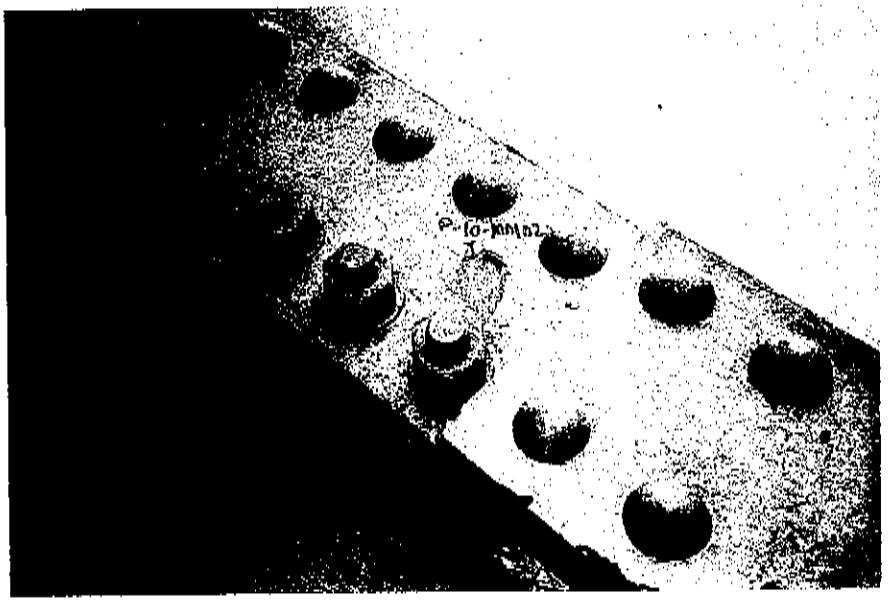

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FOR INFORMATION ONLY

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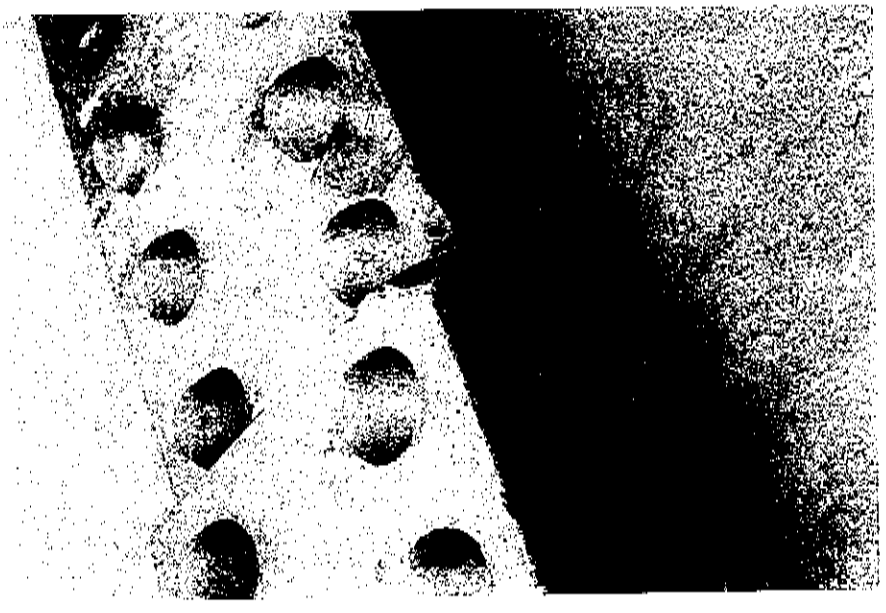

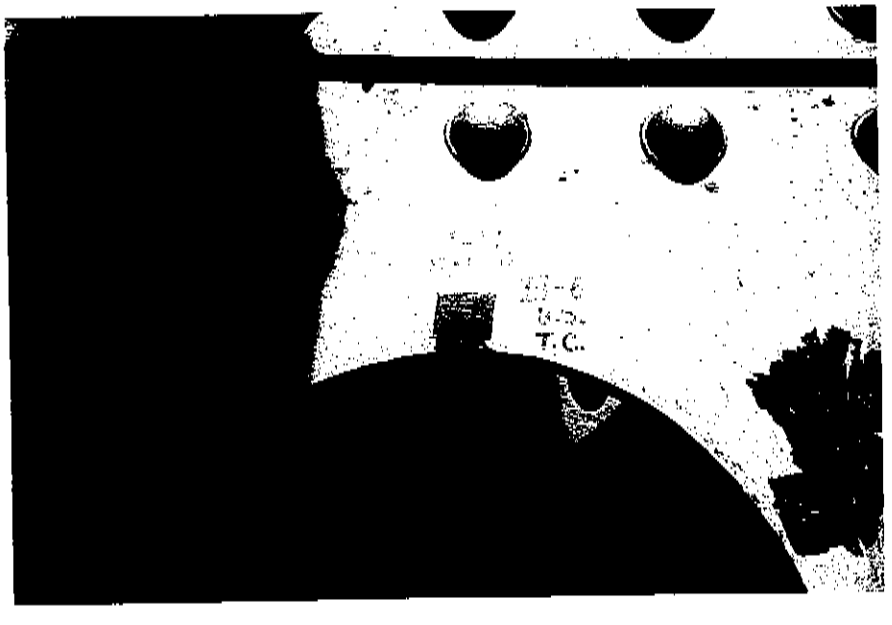

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FOR INFORMATION ONLY

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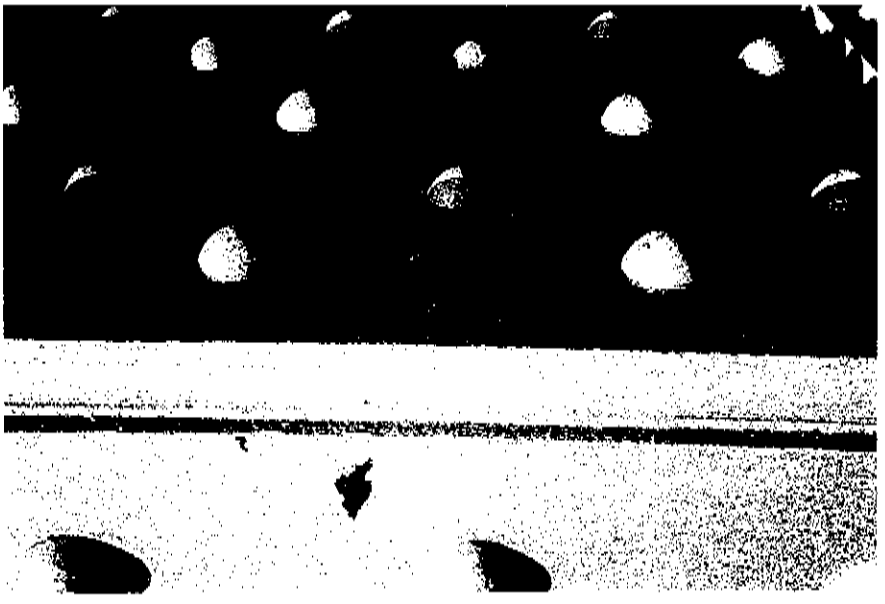

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FOR INFORMATION ONLY

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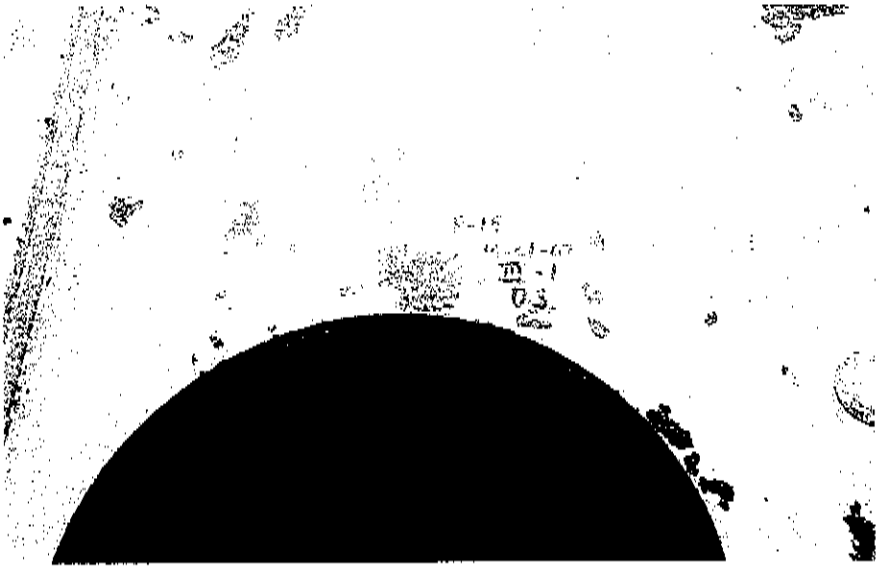

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FOR INFORMATION ONLY

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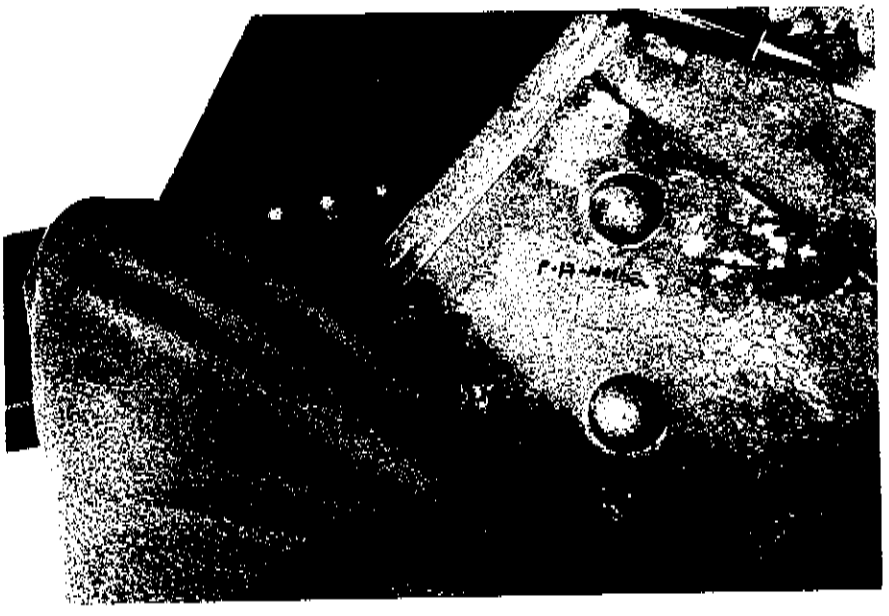

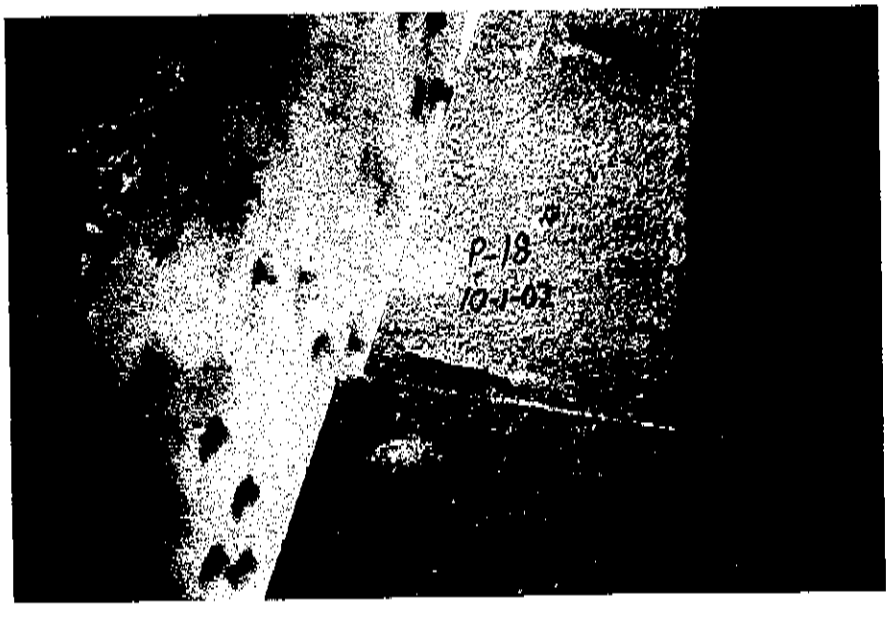

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FOR INFORMATION ONLY

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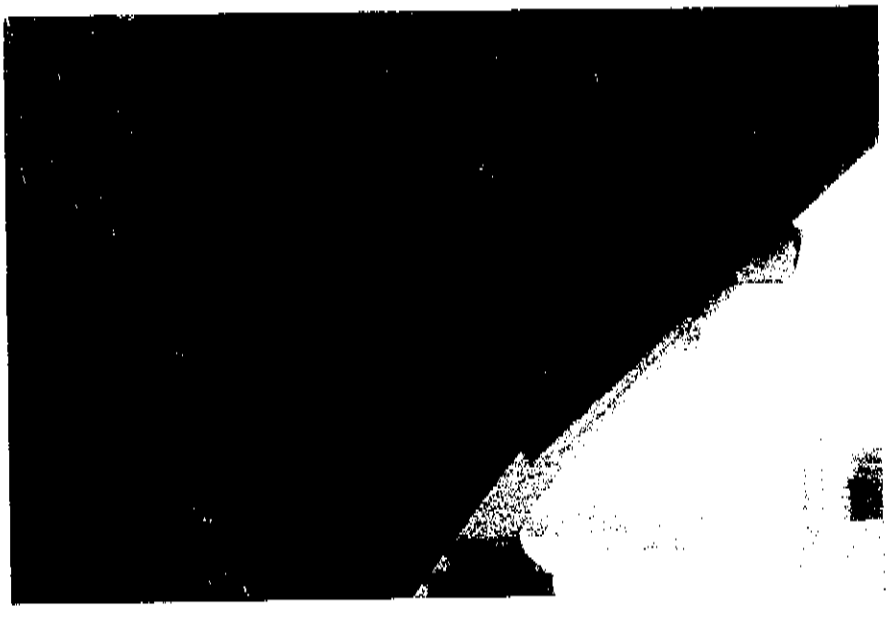

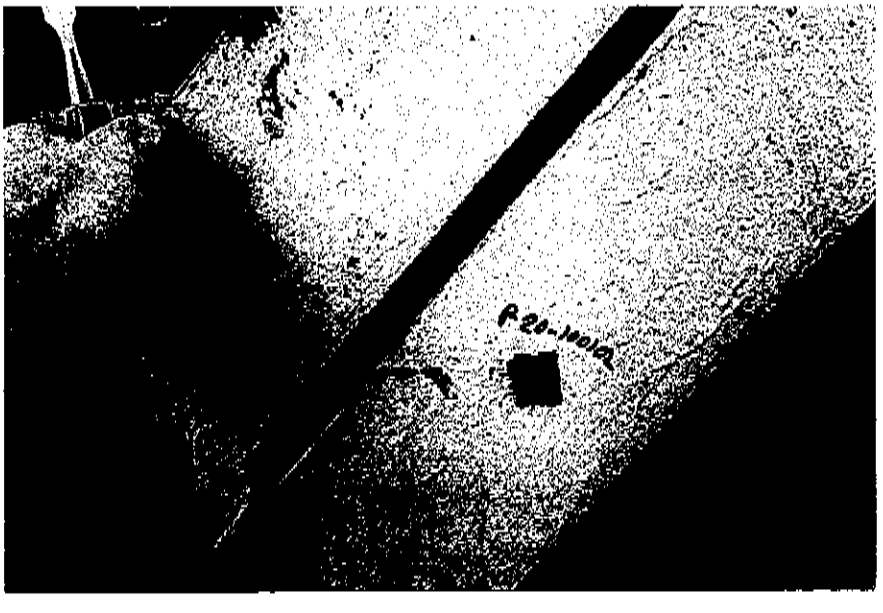

Sample ID: P-20-100102

FOR INFORMATION ONLY

STATE PROJECT NOS. 005-10-0037, 006-01-0021, 006-02-0064, 006-25-0001, 006-30-0041, 063-03-0051, AND 063-04-0035
HUEY P. LONG BRIDGE WIDENING
(WESTBANK AND EASTBANK APPROACHES AND MAIN BRIDGE DECK WIDENING)
ROUTE US 90
JEFFERSON PARISH

FOR INFORMATION ONLY

NEW ORLEANS PUBLIC BELT RAILROAD REQUIREMENTS

Subsection 107.08 of the 2000 Standard Specifications is amended to include the following Requirements of the New Orleans Public Belt Railroad:

The Huey P. Long Bridge is owned and its title is held by the City of New Orleans through the New Orleans Public Belt Railroad (NOPBRR). The state of Louisiana through the Louisiana Department of Transportation and Development, has ownership and certain rights to the highway portion of the crossing. The parties have a pre-existing agreement that neither will perform work on the crossing that will adversely affect the other. As the owner of the bridge, the New Orleans Public Belt Railroad will be actively involved with this project, will be routinely kept informed about the project through the Project Engineer, and will be routinely monitoring the project in order to insure that no adverse effects occur that will impact the railroad and its tenant lines.

The main bridge will be open to use for railroad traffic during the construction. The bridge generally carries 24 trains per day. New Orleans Public Belt Railroad personnel will be on the main bridge and in the construction area performing normal or necessary work tasks to maintain railroad operations. If any coordination of these personnel with the contractor and his activities on the bridge is necessary, it shall be coordinated by the Project Engineer with the Railroad's Bridge Supervisor.

During the various phases of construction, engineering personnel from the New Orleans Public Belt Railroad will be on site to monitor and observe the work being performed in order to insure that the work methods being used do not represent an adverse risk to the railroad and its property. These personnel shall check in with the contractor and Project Engineer so they are aware that they are on the construction site. The contractor is not permitted to perform any trackwork on the existing structure.

The Project Engineer shall copy the Chief Engineer of the New Orleans Public Belt Railroad on all project correspondence.

The Chief Engineer of the New Orleans Public Belt Railroad shall be informed on a weekly basis by the contractor through the Project Engineer as to the work that is expected to be performed during the next four (4) weeks.

COORDINATION WITH RAILROAD

Subsection 107.08(b) of the 2000 Standard Specifications is amended to include the following:

The contractor is not permitted to interfere or adversely affect the operations or scheduled work of the New Orleans Public Belt Railroad or their tenant lines. The contractor is not permitted to use the tracks, block the tracks, or store equipment, material, etc. within the Railroad right-of-way on or under the structure without the New Orleans Public Belt Railroad's permission. The contractor shall coordinate his work with the New Orleans Public Belt Railroad through the Project Engineer.

RAILROAD RIGHT-OF-WAY

Subsection 107.08(c) of the 2000 Standard Specifications is amended to include the following:

Property directly under or adjacent to the project site is owned by the New Orleans Public Belt Railroad or by the State of Louisiana. The contractor must request and receive permission from the New Orleans Public Belt Railroad or the State of Louisiana to occupy any property owned by the New Orleans Public Belt Railroad or the State of Louisiana, respectively.

FOULING OF RAILROAD TRACK

Fouling a track shall be defined as the placement of an individual or an item of equipment in such proximity to a track that the individual or equipment could be struck by a moving train or on-track equipment, or in any case is within four feet radial in all directions of an active rail on the main bridge.

The contractor shall avoid fouling the track. There may be times when the contractor or its subcontractors will need to foul the track and the contractor shall notify the New Orleans Public Belt Railroad at least three (3) days in advance of any anticipated or scheduled work which may result in fouling of the tracks. If sufficient notice has not been given to the Railroad, the contractor shall not foul the track.

WORKER SAFETY

Subsection 107.08(g) of the 2000 Standard Specifications is amended to include the following:

The New Orleans Public Belt Railroad requires that any person that could foul its tracks shall receive Federal Railroad Administration mandated Roadway Worker Protection Training. This training shall be provided to the contractor's or its subcontractor's employees that could foul the track, at no cost to the contractor. This training shall be provided either (1) entirely by the New Orleans Public Belt Railroad or (2) by the contractor once designated personnel have received the training from the New Orleans Public Belt Railroad. The anticipated training time of any Roadway Protection Training required by those who could foul a track will be about two to four hours in duration.

1) Training entirely provided by the New Orleans Public Belt Railroad shall be to all of the contractor's and its subcontractor's employees that could foul the tracks. Training shall be done in as large of groups as possible in order to minimize the frequency of the training. The contractor shall coordinate all Roadway Worker Protection Training with the New Orleans Public Belt Railroad through the Project Engineer and shall provide written documentation for all personnel who have completed the training prior to performance of any work that will result in the contractor's or its subcontractor's employees fouling the tracks. Workers who have received and successfully passed the Roadway Protection Training shall wear ID's affixed to their hardhats. ID's shall be required when workers are in the project work area and will be provided by the New Orleans Public Belt Railroad. The contractor shall notify the New Orleans Public Belt Railroad at least three (3) days advance notice for scheduling the Roadway Worker Protection Training.

FOR INFORMATION ONLY

2) Training provided by the contractor shall be performed by personnel trained by the New Orleans Public Belt Railroad. The contractor's trainers shall then provide the safety training to all of the contractor's or its subcontractor's employees that could foul the tracks. The contractor shall coordinate all Roadway Worker Protection Training for the contractor's trainers with the New Orleans Public Belt Railroad through the Project Engineer and shall provide written documentation for all personnel who have completed the training prior to performance of any work that will result in the contractor's or subcontractor's employees fouling the tracks. Workers who have received and successfully passed the Roadway Protection Training shall wear ID's affixed to their hardhats. ID's shall be required when workers are in the project work area and will be provided by the New Orleans Public Belt Railroad. The contractor shall notify the New Orleans Public Belt Railroad at least three (3) days advance notice for scheduling the Roadway Worker Protection Training for the contractor's trainers.

RAILROAD FLAGMEN

Subsection 107.08(g) of the 2000 Standard Specifications is amended to include the following:

The use of railroad flagmen is necessary any time the contractor is performing work that could affect the railroad or has personnel and/or equipment inside the truss envelope (on Main Bridge structure) or whenever personnel or equipment are within 25 feet of the tracks (all other locations outside Main Bridge structure). The truss envelope is defined for this purpose as the volume of space between the outside of the upstream existing truss to the outside of the downstream existing truss and from the bottom of the bottom chord to the top of the top chord.

The contractor shall erect a temporary barrier to prevent a crane boom and/or other equipment from penetrating the truss envelope in the work area unless a flagman is being used for the work.

The contractor shall notify the New Orleans Public Belt Railroad in writing at least three (3) days in advance of when a flagman or other services are required.

Railroad flagmen will be provided by the New Orleans Public Belt Railroad. The cost of railroad flagmen will be paid in accordance with subsection 107.08 of the 2000 Standard Specifications.

REIMBURSEMENT FOR RAILROAD SERVICES

Subsection 107.08(h) of the 2000 Standard Specifications is amended as follows:

The first paragraph is deleted and the following substituted.

The contractor will be required to reimburse the New Orleans Public Belt Railroad for the cost of all services performed by the New Orleans Public Belt Railroad for the contractor within thirty (30) days of receipt of the Railroad's invoice. The contractor will furnish the Department satisfactory evidence that the New Orleans Public Belt Railroad has acknowledged receipt of payment before final acceptance.

FOR INFORMATION ONLY

RAILROAD APPROVAL

Subsection 107.08(j) of the 2000 Standard Specifications is amended to include the following:

The contractor shall provide to the Chief Engineer of the New Orleans Public Belt Railroad through the Project Engineer, his proposed methods of construction for any work that affects the main bridge, railroad related items, and any work that is performed on a structural component that carries railroad live load. The approved methods shall bear the seal of a registered Civil Engineer and shall be provided to the Railroad for review four (4) weeks in advance of performing the proposed work.

MINIMUM RAILROAD CLEARANCES

Subsection 107.08(l) of the 2000 Standard Specifications is amended as follows:

The first paragraph is deleted and the following substituted.

The following temporary clearances are the minimum which shall be maintained during construction operations:

For Main Bridge Structure:
- Vertical: Bottom of bottom chord to top of top chord.
- Horizontal: Outside of upstream existing truss to outside of downstream existing truss.

All other locations:
- Vertical: 25 feet above top of highest rail.
- Horizontal: 25 feet from centerline of the nearest track measured at right angles thereto.

STAGING OF EQUIPMENT

Subsection 107.08(m) of the 2000 Standard Specifications is amended to include the following:

The bridge roadways and the railroad deck shall not be used for the staging of equipment or supplies.

INSURANCE

Subsection 107.08(n) of the Standard Specifications is amended to include the following:

The New Orleans Public Belt Railroad intends to keep all current policies covering the Huey P. Long Bridge in force during the project. The contractor shall carry first-party construction insurance to cover the replacement cost of the main bridge superstructure, main bridge piers, and any other railroad live load supporting structure that can be impacted by the contractor's work. Acceptable policy types which may fulfill this requirement include commercial, property

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any other railroad live load supporting structure that can be impacted by the contractor's work. Acceptable policy types which may fulfill this requirement include commercial, property damage, liability umbrella, "builder's risk," or "all risk" policy types. The minimum replacement value shall be $167,000,000.00 as follows:

(a) Minimum "Replacement Value" including debris removal, design, and construction of new structure shall be $116,000,000.
(b) Minimum "Interruption to Operations" including additional rerouting, fuel, crew, and demurrage charges shall be $51,000,000.

The intent of this specification is to involve the New Orleans Public Belt Railroad as the bridge owner of the existing structure. Any material change in the insurance policy shall be considered to be any change in coverage and/or limits of coverage other than those specified in the initial coverage requirements.

The contractor shall include New Orleans Public Belt Railroad and the following tenant lines of the New Orleans Public Belt Railroad under its Public Liability and Property Damage Insurance:

Burlington Northern Santa Fe (BNSF)
Union Pacific Railroad (UP)
National Railroad Passengers Corporation (AMTRAK)
State of Louisiana

Subsection 107.08(n)(3) of the 2000 Standard Specifications is amended as follows:

NORMAL COVERAGE (other than AMTRAK) and AMTRAK COVERAGE are deleted and the following coverage substituted.

NORMAL COVERAGE (including AMTRAK)

(1), (2), and (3)

Combined Single Limit for Bodily Injury Liability, Property Damage Liability and Physical Damage to:
Property - $6,000,000.00 per occurrence
Aggregate Limit - $12,000,000.00 for the term of the policy

The contractor shall include the New Orleans Public Belt Railroad and the following tenant lines of the New Orleans Public Belt Railroad under its Protective Liability Insurance: Burlington Northern Santa Fe (BNSF), Union Pacific Railroad (UP), the National Railroad Passengers Corporation (AMTRAK), and the State of Louisiana.

Subsection 107.08(o) of the 2000 Standard Specifications is amended to include the following:

The contractor shall indemnify the New Orleans Public Belt Railroad and the tenant lines of the New Orleans Public Belt Railroad from all suits, actions or claims brought because of injuries or damages sustained by any person or property due to operations of the contractor; due to negligence in safeguarding the work; or the use of unacceptable materials in constructing the work; or any negligent act, omission or misconduct of the contractor; or claims or amounts recovered from infringements of patent, trademark or copyright.

FOR INFORMATION ONLY

NOPBRR CONTACT INFORMATION

All correspondence to the New Orleans Public Belt Railroad shall be sent to:

New Orleans Public Belt Railroad
Attn: Chief Engineer
4822 Tchoupitoulas Street
New Orleans, LA 70115

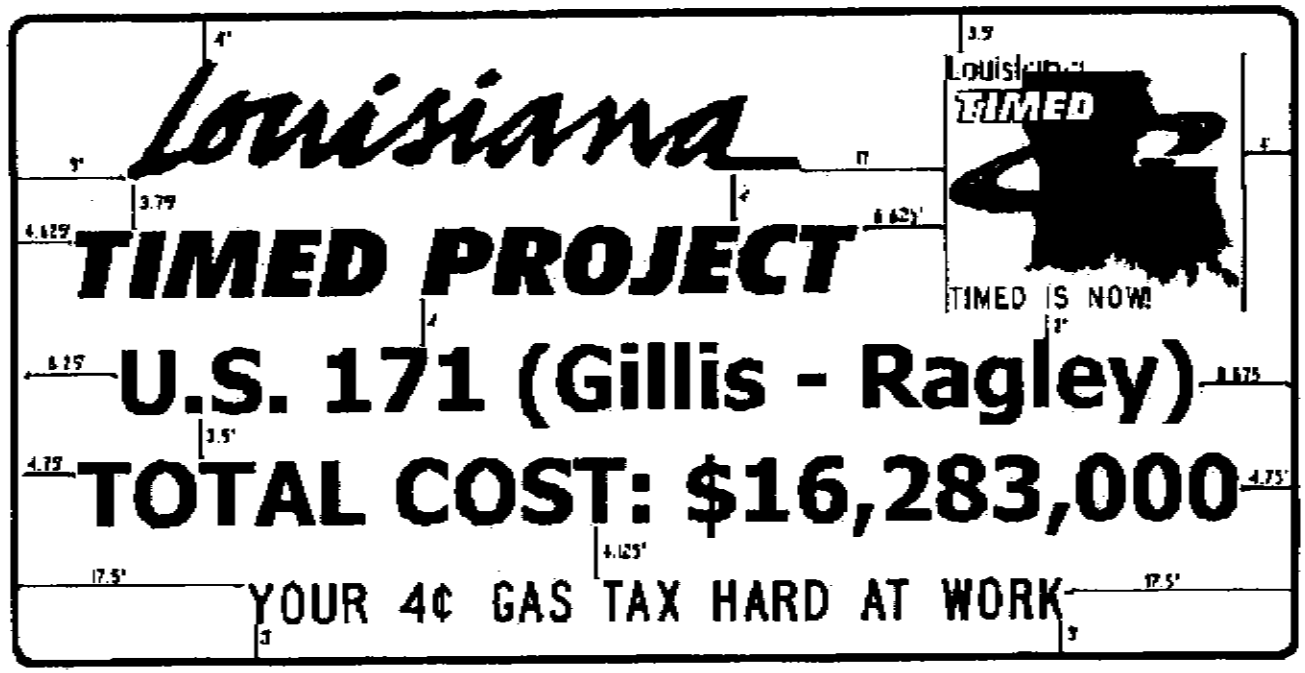
FOR INFORMATION ONLY

48" X 96"
BACKGROUND BLUE
BORDER SILVER

LOUISIANA
9" YELLOW

4 3/4" Tahoma Bold
SILVER

3" Highway C
SILVER



LOUISIANA
1.75 Tahoma Bold
BLACK

TIMED
2.5 Future Extra
Black Italic Bt
ORANGE WITH
BLACK AROUND

Program
1.75 ABD-BOC
BLACK

TIME IS NOW
1.5' D Compacta
BLACK

La Shield
High 15 3/8
Wide 15 13/16
GREEN

TIMED
ORANGE
5" FUTURE EXTRA BLACK
CONDENSED ITALIC

SILVER SQUARE
22"X19"

ARROW
H 7.423
W 20.678

FOR INFORMATION ONLY

STATE OF LOUISIANA
DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT

CONSTRUCTION PROPOSAL RETURNABLES FOR

STATE PROJECT NOS. 005-10-0037, 006-01-0021, 006-02-0064, 006-25-0001, 006-30-0041, 063-03-0051 AND 063-04-0035
HUEY P. LONG BRIDGE WIDENING
(WESTBANK AND EASTBANK APPROACHES AND MAIN BRIDGE DECK WIDENING)

FOR INFORMATION ONLY

BID BOND

A Proposal/Bid Guaranty is only required when the bidder's total bid amount as calculated by the Department in accordance with Subsection 103.01 is greater than $250,000. *(See Section 102 of the Project Specifications.)*

_____, as Principal
(Bidder) and
_____, as Surety,
are bound unto the State of Louisiana, Department of Transportation and Development, (hereinafter called the Department) in the sum of five percent (5%) of the bidder's total bid amount as calculated by the Department for payment, of which the Principal and Surety bind themselves, their heirs, executors, administrators, successors and assigns, as solidary obligors.

Signed and sealed this _____ day of _____, 20_____.

The condition of this obligation is such that, whereas the Principal has submitted a bid to the Department on a contract for the construction of **STATE PROJECT NOS. 005-10-0037, 006-01-0021, 006-02-0064, 006-25-0001, 006-30-0041, 063-03-0051 AND 063-04-0035, HUEY P. LONG BRIDGE WIDENING (WESTBANK AND EASTBANK APPROACHES AND MAIN BRIDGE DECK WIDENING, located in JEFFERSON PARISH, ROUTE US 90,** if the bid is accepted and the Principal, within the specified time, enters into the contract in writing and gives bond with Surety acceptable to the Department for payment and performance of said contract, this obligation shall be void; otherwise to remain in effect.

_____	_____
Principal (Bidder or First Partner to Joint Venture)	If a Joint Venture, Second Partner
By _____	By _____
Authorized Officer-Owner-Partner	Authorized Officer-Owner-Partner
_____	_____
Typed or Printed Name	Typed or Printed Name

_____
Surety
By _____ (Seal)
Agent or Attorney-in-Fact

_____
Typed or Printed Name

To receive a copy of the contract and subsequent correspondence / communication from LA DOTD, with respect to the bid bonds, the following information must be provided:

_____	_____
Bonding Agency or Company Name	Address
_____	_____
Agent or Representative	Phone Number / Fax Number

05/02
Form CS-2A

FOR INFORMATION ONLY

LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT
SCHEDULE OF ITEMS

LEAD PROJECT: 005-10-0037
OTHER PROJECTS: 006-01-0021, 006-02-0064

DATE: 11/01/07 10:50 PAGE: 1

ITEM NUMBER	APPROXIMATE QUANTITY	UNIT OF MEASURE	PAY ITEM UNIT PRICE (IN WORDS, INK OR TYPED)
201-01	LUMP	LUMP SUM	CLEARING & GRUBBING _____ DOLLARS _____ CENTS
202-02-B-01	1	EACH	REMOVAL OF CONCRETE BOX CULVERTS (WBB 1076+77; 36" x 30" x 35') _____ DOLLARS _____ CENTS
202-02-B-02	1	EACH	REMOVAL OF CONCRETE BOX CULVERTS (EBB 1078+07; 36" x 30" x 42') _____ DOLLARS _____ CENTS
202-02-C	39,387	SQUARE YARD	REMOVAL OF PORTLAND CEMENT CONCRETE PAVEMENT _____ DOLLARS _____ CENTS
202-02-D	4,464	SQUARE YARD	REMOVAL OF CONCRETE WALKS & DRIVES _____ DOLLARS _____ CENTS
202-02-E	11,846.2	LINEAR FOOT	REMOVAL OF CONCRETE CURBS _____ DOLLARS _____ CENTS

FOR INFORMATION ONLY

LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT
SCHEDULE OF ITEMS

LEAD PROJECT: 005-10-0037
OTHER PROJECTS: 006-01-0021, 006-02-0064

DATE: 11/01/07 10:50 PAGE: 2

ITEM NUMBER	APPROXIMATE QUANTITY	UNIT OF MEASURE	PAY ITEM UNIT PRICE (IN WORDS, INK OR TYPED)
202-02-H	3,261	LINEAR FOOT	REMOVAL OF GUARD RAIL _____ DOLLARS _____ CENTS
202-02-I	LUMP	LUMP SUM	REMOVAL OF TRAFFIC SIGNAL EQUIPMENT - WESTBANK _____ DOLLARS _____ CENTS
202-02-J	LUMP	LUMP SUM	REMOVAL OF TRAFFIC SIGNAL EQUIPMENT - EASTBANK _____ DOLLARS _____ CENTS
202-02-K	LUMP	LUMP SUM	REMOVAL OF EXISTING SIGNS AND SUPPORTS - WESTBANK _____ DOLLARS _____ CENTS
202-02-L	LUMP	LUMP SUM	REMOVAL OF EXISTING SIGNS AND SUPPORTS - EASTBANK _____ DOLLARS _____ CENTS
202-02-M	2	EACH	REMOVAL OF EXISTING OVERHEAD SIGN AND SUPPORT _____ DOLLARS _____ CENTS

FOR INFORMATION ONLY

LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT
SCHEDULE OF ITEMS

LEAD PROJECT: 005-10-0037
OTHER PROJECTS: 006-01-0021, 006-02-0064

ITEM NUMBER	APPROXIMATE QUANTITY	UNIT OF MEASURE	PAY ITEM UNIT PRICE (IN WORDS, INK OR TYPED)
202-03-A	1	EACH	RELOCATION OF BUS STOP SHELTER (UTAH BEACH ROAD) _____ DOLLARS _____ CENTS
202-03-B	22	EACH	RELOCATION OF EXISTING SIGNS AND SUPPORTS _____ DOLLARS _____ CENTS
203-01	70,388	CUBIC YARD	GENERAL EXCAVATION _____ DOLLARS _____ CENTS
203-02	3,957	CUBIC YARD	DRAINAGE EXCAVATION _____ DOLLARS _____ CENTS
203-03	3,443	CUBIC YARD	MUCK EXCAVATION _____ DOLLARS _____ CENTS
203-04	40,667	CUBIC YARD	EMBANKMENT _____ DOLLARS _____ CENTS

FOR INFORMATION ONLY

ITEM NUMBER	APPROXIMATE QUANTITY	UNIT OF MEASURE	PAY ITEM UNIT PRICE (IN WORDS, INK OR TYPED)
203-09	138,281	SQUARE YARD	GEOTEXTILE FABRIC _____ DOLLARS _____ CENTS
204-02	157	EACH	TEMPORARY HAY OR STRAW BALES _____ DOLLARS _____ CENTS
204-06	14,028	LINEAR FOOT	TEMPORARY SILT FENCING _____ DOLLARS _____ CENTS
302-02-A	9,470.5	SQUARE YARD	CLASS II BASE COURSE (6" THICK) _____ DOLLARS _____ CENTS
302-02-C	33,413.4	SQUARE YARD	CLASS II BASE COURSE (10" THICK) _____ DOLLARS _____ CENTS
302-02-D	90,892.8	SQUARE YARD	CLASS II BASE COURSE (12" THICK) _____ DOLLARS _____ CENTS

FOR INFORMATION ONLY

ITEM NUMBER	APPROXIMATE QUANTITY	UNIT OF MEASURE	PAY ITEM UNIT PRICE (IN WORDS, INK OR TYPED)
401-01	1,052.3	CUBIC YARD	AGGREGATE SURFACE COURSE ((NET SECTION) _____ DOLLARS _____ CENTS
402-01	200.0	CUBIC YARD	TRAFFIC MAINTENANCE AGGREGATE (VEHICULAR MEASUREMENT) _____ DOLLARS _____ CENTS
502-01	23,470.9	TON	SUPERPAVE ASPHALTIC CONCRETE _____ DOLLARS _____ CENTS
502-01-A	1,763.1	TON	SUPERPAVE ASPHALTIC CONCRETE, DRIVES, TURNOUTS AND MISCELLANEOUS _____ DOLLARS _____ CENTS
509-01	28,490	SQUARE YARD	COLD PLANING ASPHALTIC PAVEMENT _____ DOLLARS _____ CENTS
509-02	-3,100	CUBIC YARD	CONTRACTOR RETAINED RECLAIMED ASPHALTIC PAVEMENT _____ DOLLARS _____ CENTS

FOR INFORMATION ONLY

ITEM NUMBER	APPROXIMATE QUANTITY	UNIT OF MEASURE	PAY ITEM UNIT PRICE (IN WORDS, INK OR TYPED)
601-01-G	13,455.5	SQUARE YARD	PORTLAND CEMENT CONCRETE PAVEMENT (8" THICK) _____ DOLLARS _____ CENTS
601-01-K	40,937.7	SQUARE YARD	PORTLAND CEMENT CONCRETE PAVEMENT (10" THICK) _____ DOLLARS _____ CENTS
601-02-G	5,773.8	SQUARE YARD	PORTLAND CEMENT CONCRETE PAVEMENT (8" THICK) (CROSSOVERS & TURNOUTS) _____ DOLLARS _____ CENTS
601-02-K	5,999.7	SQUARE YARD	PORTLAND CEMENT CONCRETE PAVEMENT (10" THICK) (CROSSOVERS & TURNOUTS) _____ DOLLARS _____ CENTS
601-03-G	2,780.3	SQUARE YARD	PORTLAND CEMENT CONCRETE SHOULDER (8" THICK) _____ DOLLARS _____ CENTS
601-03-K	10,130.3	SQUARE YARD	PORTLAND CEMENT CONCRETE SHOULDER (10" THICK) _____ DOLLARS _____ CENTS

FOR INFORMATION ONLY

ITEM NUMBER	APPROXIMATE QUANTITY	UNIT OF MEASURE	PAY ITEM UNIT PRICE (IN WORDS, INK OR TYPED)
601-04	98	EACH	PORTLAND CEMENT CONCRETE PAVEMENT CORING _____ DOLLARS _____ CENTS
602-08	123.3	SQUARE YARD	GRINDING CONCRETE PAVEMENT _____ DOLLARS _____ CENTS
701-02-D	95	LINEAR FOOT	CROSS DRAIN PIPE ARCH (24" EQUIV. RCPA) _____ DOLLARS _____ CENTS
701-02-E	415	LINEAR FOOT	CROSS DRAIN PIPE ARCH (30" EQUIV. RCPA) _____ DOLLARS _____ CENTS
701-02-F	217	LINEAR FOOT	CROSS DRAIN PIPE ARCH (36" EQUIV. RCPA) _____ DOLLARS _____ CENTS
701-03-F	4,419	LINEAR FOOT	STORM DRAIN PIPE (15" RCP/PCP) _____ DOLLARS _____ CENTS

FOR INFORMATION ONLY

ITEM NUMBER	APPROXIMATE QUANTITY	UNIT OF MEASURE	PAY ITEM UNIT PRICE (IN WORDS, INK OR TYPED)
701-03-F-01	473	LINEAR FOOT	STORM DRAIN PIPE (15" RCP/PCP) (OUTFALL) _____ DOLLARS _____ CENTS
701-03-G	1,810	LINEAR FOOT	STORM DRAIN PIPE (18" RCP/PCP) _____ DOLLARS _____ CENTS
701-03-G-01	92	LINEAR FOOT	STORM DRAIN PIPE (18" RCP/PCP) (OUTFALL) _____ DOLLARS _____ CENTS
701-03-I	4,788	LINEAR FOOT	STORM DRAIN PIPE (24" RCP/PCP) _____ DOLLARS _____ CENTS
701-03-K	2,124	LINEAR FOOT	STORM DRAIN PIPE (30" RCP/PCP) _____ DOLLARS _____ CENTS
701-03-K-01	16	LINEAR FOOT	STORM DRAIN PIPE (30" RCP/PCP) (OUTFALL) _____ DOLLARS _____ CENTS

FOR INFORMATION ONLY

ITEM NUMBER	APPROXIMATE QUANTITY	UNIT OF MEASURE	PAY ITEM UNIT PRICE (IN WORDS, INK OR TYPED)
701-03-M	1,473	LINEAR FOOT	STORM DRAIN PIPE (36" RCP/PCP) _____ DOLLARS _____ CENTS
701-04-A	262	LINEAR FOOT	STORM DRAIN PIPE ARCH (15" EQUIV. RCPA) _____ DOLLARS _____ CENTS
701-04-B	358	LINEAR FOOT	STORM DRAIN PIPE ARCH (18" EQUIV. RCPA) _____ DOLLARS _____ CENTS
701-04-D	1,205	LINEAR FOOT	STORM DRAIN PIPE ARCH (24" EQUIV. RCPA) _____ DOLLARS _____ CENTS
701-04-E	624	LINEAR FOOT	STORM DRAIN PIPE ARCH (30" EQUIV. RCPA) _____ DOLLARS _____ CENTS
701-04-F	739	LINEAR FOOT	STORM DRAIN PIPE ARCH (36" EQUIV. RCPA) _____ DOLLARS _____ CENTS

FOR INFORMATION ONLY

ITEM NUMBER	APPROXIMATE QUANTITY	UNIT OF MEASURE	PAY ITEM UNIT PRICE (IN WORDS, INK OR TYPED)
701-04-G	365	LINEAR FOOT	STORM DRAIN PIPE ARCH (42" EQUIV. RCPA) _____ DOLLARS _____ CENTS
701-04-H	727	LINEAR FOOT	STORM DRAIN PIPE ARCH (48" EQUIV. RCPA) _____ DOLLARS _____ CENTS
701-10-I	20	LINEAR FOOT	REINFORCED CONCRETE PIPE (EXTENSION)(24") _____ DOLLARS _____ CENTS
701-10-K	6	LINEAR FOOT	REINFORCED CONCRETE PIPE (EXTENSION)(30") _____ DOLLARS _____ CENTS
701-13-G	6	LINEAR FOOT	CORRUGATED METAL PIPE ARCH (EXTENSION)(42" EQUIV.) _____ DOLLARS _____ CENTS
701-15	1	EACH	CONCRETE COLLAR _____ DOLLARS _____ CENTS

FOR INFORMATION ONLY

ITEM NUMBER	APPROXIMATE QUANTITY	UNIT OF MEASURE	PAY ITEM UNIT PRICE (IN WORDS, INK OR TYPED)
702-02-B	29	EACH	MANHOLES (R-CB-11) _____ DOLLARS _____ CENTS
702-02-C	3	EACH	MANHOLES (R-CB-11 MOD) _____ DOLLARS _____ CENTS
702-03-A	32	EACH	CATCH BASINS (CB-01) _____ DOLLARS _____ CENTS
702-03-B	7	EACH	CATCH BASINS (CB-02) _____ DOLLARS _____ CENTS
702-03-C	95	EACH	CATCH BASINS (CB-06) _____ DOLLARS _____ CENTS
702-03-D	21	EACH	CATCH BASINS (CB-07) _____ DOLLARS _____ CENTS

FOR INFORMATION ONLY

ITEM NUMBER	APPROXIMATE QUANTITY	UNIT OF MEASURE	PAY ITEM UNIT PRICE (IN WORDS, INK OR TYPED)
702-03-F	54	EACH	CATCH BASINS (CB-08) _____ DOLLARS _____ CENTS
702-03-G	1	EACH	CATCH BASINS (CB-09) _____ DOLLARS _____ CENTS
702-03-I	1	EACH	CATCH BASINS (CB-04) _____ DOLLARS _____ CENTS
702-04-A	9	EACH	ADJUSTING MANHOLES _____ DOLLARS _____ CENTS
702-04-B	12	EACH	ADJUSTING CATCH BASINS _____ DOLLARS _____ CENTS
704-01-A	31.3	LINEAR FOOT	GUARD RAIL (SINGLE THRIE BEAM)(3'-1 1/2" POST SPACING) _____ DOLLARS _____ CENTS

FOR INFORMATION ONLY

ITEM NUMBER	APPROXIMATE QUANTITY	UNIT OF MEASURE	PAY ITEM UNIT PRICE (IN WORDS, INK OR TYPED)
704-01-B	362.5	LINEAR FOOT	GUARD RAIL (SINGLE THRIE BEAM)(6'-3" POST SPACING) _____ DOLLARS _____ CENTS
704-01-C	342.9	LINEAR FOOT	GUARD RAIL (DOUBLE THRIE BEAM)(3'-1 1/2" POST SPACING) _____ DOLLARS _____ CENTS
704-03	2,568.9	LINEAR FOOT	BLOCKED OUT GUARD RAIL _____ DOLLARS _____ CENTS
704-06	43.8	LINEAR FOOT	GUARD RAIL ANCHOR SECTIONS (TRAILING END) _____ DOLLARS _____ CENTS
704-06-A	31.4	LINEAR FOOT	GUARD RAIL ANCHOR SECTIONS (TRAILING END)(SINGLE THRIE BEAM) _____ DOLLARS _____ CENTS
704-07-A	12.5	LINEAR FOOT	GUARD RAIL BRIDGE ATTACHMENTS (SINGLE THRIE BEAM) _____ DOLLARS _____ CENTS

FOR INFORMATION ONLY

ITEM NUMBER	APPROXIMATE QUANTITY	UNIT OF MEASURE	PAY ITEM UNIT PRICE (IN WORDS, INK OR TYPED)
704-08-B	200.0	LINEAR FOOT	GUARD RAIL TRANSITIONS (DOUBLE THRIE BEAM) _____ DOLLARS _____ CENTS
704-11-A	13	EACH	GUARD RAIL END TREATMENT (FLARED) _____ DOLLARS _____ CENTS
705-06-B	6,407	LINEAR FOOT	CHAIN LINK FENCE (5-FOOT HEIGHT) _____ DOLLARS _____ CENTS
705-06-D	1,019	LINEAR FOOT	CHAIN LINK FENCE (7-FOOT HEIGHT) _____ DOLLARS _____ CENTS
705-08-D	2	DOUBLE GATE	26-FOOT DOUBLE GATES FOR CHAIN LINK FENCE (7-FOOT HEIGHT) _____ DOLLARS _____ CENTS
706-01-A	1,105.3	SQUARE YARD	CONCRETE WALK (4" THICK) _____ DOLLARS _____ CENTS

FOR INFORMATION ONLY

ITEM NUMBER	APPROXIMATE QUANTITY	UNIT OF MEASURE	PAY ITEM UNIT PRICE (IN WORDS, INK OR TYPED)
706-02-C	1,431.0	SQUARE YARD	CONCRETE DRIVE (6" THICK) _____ DOLLARS _____ CENTS
706-03-A	4,370.6	SQUARE YARD	INCIDENTAL CONCRETE PAVING (4" THICK) _____ DOLLARS _____ CENTS
706-03-C	1,403.7	SQUARE YARD	INCIDENTAL CONCRETE PAVING (6" THICK) _____ DOLLARS _____ CENTS
707-01	14,893.9	LINEAR FOOT	CONCRETE CURB _____ DOLLARS _____ CENTS
707-03	15,340.0	LINEAR FOOT	COMBINATION CONCRETE CURB & GUTTER _____ DOLLARS _____ CENTS
707-04	8.0	LINEAR FOOT	ASPHALTIC CURB _____ DOLLARS _____ CENTS

FOR INFORMATION ONLY

ITEM NUMBER	APPROXIMATE QUANTITY	UNIT OF MEASURE	PAY ITEM UNIT PRICE (IN WORDS, INK OR TYPED)
708-01	235	EACH	RIGHT-OF-WAY MONUMENT _____ DOLLARS _____ CENTS
708-02	171	EACH	RIGHT-OF-WAY MONUMENT WITNESS POST _____ DOLLARS _____ CENTS
711-02-C	1,743	CUBIC YARD	RIPRAP (30 LB) _____ DOLLARS _____ CENTS
711-04	3,488	SQUARE YARD	GEOTEXTILE FABRIC _____ DOLLARS _____ CENTS
713-01	LUMP	LUMP SUM	TEMPORARY SIGNS & BARRICADES _____ DOLLARS _____ CENTS
713-03-A	25,801	LINEAR FOOT	TEMPORARY PAVEMENT MARKINGS (4" WIDTH) _____ DOLLARS _____ CENTS

FOR INFORMATION ONLY

ITEM NUMBER	APPROXIMATE QUANTITY	UNIT OF MEASURE	PAY ITEM UNIT PRICE (IN WORDS, INK OR TYPED)
713-03-C	9,749	LINEAR FOOT	TEMPORARY PAVEMENT MARKINGS (8" WIDTH) _____ DOLLARS _____ CENTS
713-03-E	1,569	LINEAR FOOT	TEMPORARY PAVEMENT MARKINGS (24" WIDTH) _____ DOLLARS _____ CENTS
713-04-B	8.444	MILE	TEMPORARY PAVEMENT MARKINGS (BROKEN LINE)(4" WIDTH)(10' LENGTH) _____ DOLLARS _____ CENTS
713-06-A	53	EACH	TEMPORARY PAVEMENT LEGENDS AND SYMBOLS (ARROW) _____ DOLLARS _____ CENTS
713-06-B	13	EACH	TEMPORARY PAVEMENT LEGENDS AND SYMBOLS (DOUBLE ARROW) _____ DOLLARS _____ CENTS
713-07	433	EACH	TEMPORARY REFLECTORIZED RAISED PAVEMENT MARKERS _____ DOLLARS _____ CENTS

FOR INFORMATION ONLY

ITEM NUMBER	APPROXIMATE QUANTITY	UNIT OF MEASURE	PAY ITEM UNIT PRICE (IN WORDS, INK OR TYPED)
713-08	34	EACH	TEMPORARY PRECAST CONCRETE BARRIER (CONTRACTOR FURNISHED) _____ DOLLARS _____ CENTS
714-01	72	SQUARE YARD	SLAB SODDING _____ DOLLARS _____ CENTS
716-01-A	66.49	ACRE	MULCH (VEGETATIVE) _____ DOLLARS _____ CENTS
717-01	3,990	POUND	SEEDING _____ DOLLARS _____ CENTS
718-01	132,958	POUND	FERTILIZER _____ DOLLARS _____ CENTS
720-01-A	24,900	SQUARE YARD	EROSION CONTROL SYSTEM, SLOPE PROTECTION (TYPE A) _____ DOLLARS _____ CENTS

FOR INFORMATION ONLY

ITEM NUMBER	APPROXIMATE QUANTITY	UNIT OF MEASURE	PAY ITEM UNIT PRICE (IN WORDS, INK OR TYPED)
722-02	2	EACH	PROJECT SITE LABORATORY (EQUIPPED) _____ DOLLARS _____ CENTS
724-01	100	SQUARE YARD	PAVEMENT PATCHING _____ DOLLARS _____ CENTS
725-02-A	3,315.0	SQUARE YARD	TEMPORARY DETOUR ROADS (TYPE A) _____ DOLLARS _____ CENTS
725-02-B	2,450.0	SQUARE YARD	TEMPORARY DETOUR ROADS (TYPE B) _____ DOLLARS _____ CENTS
725-02-C	1,765.0	SQUARE YARD	TEMPORARY DETOUR ROADS (TYPE C) _____ DOLLARS _____ CENTS
725-02-D	1,145.0	SQUARE YARD	TEMPORARY DETOUR ROADS (TYPE D) _____ DOLLARS _____ CENTS

FOR INFORMATION ONLY

ITEM NUMBER	APPROXIMATE QUANTITY	UNIT OF MEASURE	PAY ITEM UNIT PRICE (IN WORDS, INK OR TYPED)
726-01	10,639.2	CUBIC YARD	BEDDING MATERIAL _____ DOLLARS _____ CENTS
727-01	LUMP	LUMP SUM	MOBILIZATION _____ DOLLARS _____ CENTS
728-01-A	50.0	LINEAR FOOT	JACKED OR BORED PIPE (24" RCP, CLASS III) _____ DOLLARS _____ CENTS
728-01-B	65.0	LINEAR FOOT	JACKED OR BORED PIPE (30" RCP, CLASS III) _____ DOLLARS _____ CENTS
729-01	1,452.9	SQUARE FOOT	SIGN (TYPE A) _____ DOLLARS _____ CENTS
729-02	674.2	SQUARE FOOT	SIGN (TYPE B) _____ DOLLARS _____ CENTS

FOR INFORMATION ONLY

ITEM NUMBER	APPROXIMATE QUANTITY	UNIT OF MEASURE	PAY ITEM UNIT PRICE (IN WORDS, INK OR TYPED)
729-04	1,204.5	SQUARE FOOT	SIGN (TYPE D) _____ DOLLARS _____ CENTS
729-06	1,054.2	SQUARE FOOT	SIGN (OVERHEAD MOUNTED) _____ DOLLARS _____ CENTS
729-08-A	247	EACH	MOUNTING (2 1/2" POST) _____ DOLLARS _____ CENTS
729-08-B	70	EACH	MOUNTING (3 1/2" POST) _____ DOLLARS _____ CENTS
729-08-C	4	EACH	MOUNTING (5" POST) _____ DOLLARS _____ CENTS
729-08-G	2	EACH	MOUNTING (W8 X 18) _____ DOLLARS _____ CENTS

FOR INFORMATION ONLY

ITEM NUMBER	APPROXIMATE QUANTITY	UNIT OF MEASURE	PAY ITEM UNIT PRICE (IN WORDS, INK OR TYPED)
729-10	4	EACH	MOUNTING (OVERHEAD TRUSS)(STRUCTURE MOUNTED) _____ DOLLARS _____ CENTS
729-16-B	25	EACH	OBJECT MARKER ASSEMBLY (TYPE 2) _____ DOLLARS _____ CENTS
729-16-C	1	EACH	OBJECT MARKER ASSEMBLY (TYPE 3) _____ DOLLARS _____ CENTS
729-17	21	EACH	MILEPOST ASSEMBLY (GROUND MOUNTED) _____ DOLLARS _____ CENTS
729-21	21	EACH	U-CHANNEL POST _____ DOLLARS _____ CENTS
731-01	4,218	EACH	NONREFLECTORIZED RAISED PAVEMENT MARKERS _____ DOLLARS _____ CENTS

FOR INFORMATION ONLY

ITEM NUMBER	APPROXIMATE QUANTITY	UNIT OF MEASURE	PAY ITEM UNIT PRICE (IN WORDS, INK OR TYPED)
731-02	9,798	EACH	REFLECTORIZED RAISED PAVEMENT MARKERS _____ DOLLARS _____ CENTS
732-01-C-03	25,294	LINEAR FOOT	PLASTIC PAVEMENT STRIPING (8" WIDTH) HOT APPL THERMO (40 MIL THICKNESS) _____ DOLLARS _____ CENTS
732-01-E-03	4,755	LINEAR FOOT	PLASTIC PAVEMENT STRIPING (24" WIDTH) HOT APPL THERMO (40 MIL THICKNESS) _____ DOLLARS _____ CENTS
732-02-A-03	21.952	MILE	PLAST PVMT STRIPING(SOLID LINE)(4" WIDTH)HOT APPL THERMO (40MIL THICKNESS) _____ DOLLARS _____ CENTS
732-03-A-03	15.889	MILE	PLASTIC PVMT STRIPING(BROKEN LINE)(4" WIDTH) HOT APPL THERMO (40 MIL THICK _____ DOLLARS _____ CENTS
732-04-A	82	EACH	PLASTIC PAVEMENT LEGENDS & SYMBOLS (ARROW) _____ DOLLARS _____ CENTS

FOR INFORMATION ONLY

ITEM NUMBER	APPROXIMATE QUANTITY	UNIT OF MEASURE	PAY ITEM UNIT PRICE (IN WORDS, INK OR TYPED)
732-04-B	13	EACH	PLASTIC PAVEMENT LEGENDS & SYMBOLS (DOUBLE ARROW) _____ DOLLARS _____ CENTS
732-04-D	7	EACH	PLASTIC PAVEMENT LEGENDS & SYMBOLS (RR CROSSING) _____ DOLLARS _____ CENTS
732-05	0.499	MILE	REMOVAL OF EXISTING MARKINGS _____ DOLLARS _____ CENTS
733-01-A	445.3	LINEAR FOOT	CONCRETE ROADWAY BARRIER (32" HEIGHT) _____ DOLLARS _____ CENTS
733-01-B	395.8	LINEAR FOOT	CONCRETE ROADWAY BARRIER (54" HEIGHT) _____ DOLLARS _____ CENTS
736-01	4,011	LINEAR FOOT	TRENCHING AND BACKFILLING _____ DOLLARS _____ CENTS

FOR INFORMATION ONLY

ITEM NUMBER	APPROXIMATE QUANTITY	UNIT OF MEASURE	PAY ITEM UNIT PRICE (IN WORDS, INK OR TYPED)
736-03-A	1,177	LINEAR FOOT	JACKED OR BORED CONDUIT (2" P.E.C., SCHEDULE 80) _____ DOLLARS _____ CENTS
736-03-B	2,041	LINEAR FOOT	JACKED OR BORED CONDUIT (3" P.E.C., SCHEDULE 80) _____ DOLLARS _____ CENTS
736-03-C	5,750	LINEAR FOOT	JACKED OR BORED CONDUIT (4" MULTIDUCT WITH 3 - 1 1/2" CONDUITS, P.E.C., SCHEDULE 80) _____ DOLLARS _____ CENTS
736-04-A	5	EACH	SIGNAL SUPPORT (MAST ARM POLE, DUAL ARMS, 25' AND 50') _____ DOLLARS _____ CENTS
736-04-B	1	EACH	SIGNAL SUPPORT (MAST ARM POLE, DUAL ARMS, 30' AND 55') _____ DOLLARS _____ CENTS
736-04-C	1	EACH	SIGNAL SUPPORT (MAST ARM POLE, DUAL ARMS, 35' AND 50') _____ DOLLARS _____ CENTS

FOR INFORMATION ONLY

ITEM NUMBER	APPROXIMATE QUANTITY	UNIT OF MEASURE	PAY ITEM UNIT PRICE (IN WORDS, INK OR TYPED)
736-04-D	1	EACH	SIGNAL SUPPORT (MAST ARM POLE, DUAL ARMS, 35' AND 55') _____ DOLLARS _____ CENTS
736-04-E	1	EACH	SIGNAL SUPPORT (MAST ARM POLE, DUAL ARMS, 40' AND 55') _____ DOLLARS _____ CENTS
736-04-F	3	EACH	SIGNAL SUPPORT (MAST ARM POLE, DUAL ARMS, 45' AND 50') _____ DOLLARS _____ CENTS
736-04-G	3	EACH	SIGNAL SUPPORT (MAST ARM POLE, DUAL ARMS, 50' AND 55') _____ DOLLARS _____ CENTS
736-04-H	1	EACH	SIGNAL SUPPORT (MAST ARM POLE, DUAL ARMS, 55' AND 55') _____ DOLLARS _____ CENTS
736-04-I	1	EACH	SIGNAL SUPPORT (MAST ARM POLE, 15' ARM) _____ DOLLARS _____ CENTS

FOR INFORMATION ONLY

ITEM NUMBER	APPROXIMATE QUANTITY	UNIT OF MEASURE	PAY ITEM UNIT PRICE (IN WORDS, INK OR TYPED)
736-04-J	1	EACH	SIGNAL SUPPORT (MAST ARM POLE, 45' ARM) _____ DOLLARS _____ CENTS
736-04-K	1	EACH	SIGNAL SUPPORT (MAST ARM POLE, 50' ARM) _____ DOLLARS _____ CENTS
736-04-L	1	EACH	SIGNAL SUPPORT (MAST ARM POLE, 55' ARM) _____ DOLLARS _____ CENTS
736-04-M	3	EACH	SIGNAL SUPPORT (MAST ARM POLE, 60' ARM) _____ DOLLARS _____ CENTS
736-04-N	2	EACH	SIGNAL SUPPORT (PEDESTAL POLE, 10') _____ DOLLARS _____ CENTS
736-04-O	17	EACH	SIGNAL SUPPORT (STRAIN POLE) _____ DOLLARS _____ CENTS

FOR INFORMATION ONLY

ITEM NUMBER	APPROXIMATE QUANTITY	UNIT OF MEASURE	PAY ITEM UNIT PRICE (IN WORDS, INK OR TYPED)
736-05-A	84	EACH	SIGNAL HEADS (3-SECTION , 12" LED LENS, R, Y, C) _____ DOLLARS _____ CENTS
736-05-B	30	EACH	SIGNAL HEADS (3-SECTION , 12" LED LENS, R, LT. Y, LT. G) _____ DOLLARS _____ CENTS
736-05-C	2	EACH	SIGNAL HEADS (3-SECTION , 12" LED LENS, R, RT. Y, RT. G) _____ DOLLARS _____ CENTS
736-05-D	7	EACH	SIGNAL HEADS (3-SECTION , 12" LENS, R, Y, G, OPTICALLY PROGRAMMED) _____ DOLLARS _____ CENTS
736-05-E	6	EACH	SIGNAL HEADS (3-SECTION , 12" LENS, R, LT.Y LT. G, OPTICALLY PROGRAMMED) _____ DOLLARS _____ CENTS
736-06	8	EACH	SIGNAL SERVICE (POST MOUNTED) _____ DOLLARS _____ CENTS

FOR INFORMATION ONLY

ITEM NUMBER	APPROXIMATE QUANTITY	UNIT OF MEASURE	PAY ITEM UNIT PRICE (IN WORDS, INK OR TYPED)
736-08	8	EACH	SIGNAL CONTROLLER (NEWA TS2, TYPE 2, 8-PHASE, TYPE 6 BASE MOUNTED CABINET) _____ DOLLARS _____ CENTS
736-09	4,375	LINEAR FOOT	LOOP DETECTOR (SAWCUT, LOOP WIRE, SEALANT) _____ DOLLARS _____ CENTS
736-10-A	9	EACH	UNDERGROUND JUNCTION BOX (TYPE D) _____ DOLLARS _____ CENTS
736-10-B	15	EACH	UNDERGROUND JUNCTION BOX (TYPE E) _____ DOLLARS _____ CENTS
736-10-C	35	EACH	UNDERGROUND JUNCTION BOX (TYPE F) _____ DOLLARS _____ CENTS
736-10-D	5	EACH	UNDERGROUND JUNCTION BOX (TYPE H) _____ DOLLARS _____ CENTS

FOR INFORMATION ONLY

ITEM NUMBER	APPROXIMATE QUANTITY	UNIT OF MEASURE	PAY ITEM UNIT PRICE (IN WORDS, INK OR TYPED)
736-11-A	2,471	LINEAR FOOT	CONDUIT (1/2" P.E.C., SCHEDULE 80) _____ DOLLARS _____ CENTS
736-11-B	1,695	LINEAR FOOT	CONDUIT (2" P.E.C., SCHEDULE 80) _____ DOLLARS _____ CENTS
736-11-C	1,422	LINEAR FOOT	CONDUIT (3" P.E.C., SCHEDULE 80) _____ DOLLARS _____ CENTS
736-12-A	2,471	LINEAR FOOT	CONDUCTOR (2C, LOOP LEAD-IN/#14 awg STRANDED AND SHELDED) _____ DOLLARS _____ CENTS
736-12-B	9,947	LINEAR FOOT	CONDUCTOR (2C, #14 AWG STRANDED) _____ DOLLARS _____ CENTS
736-12-C	695	LINEAR FOOT	CONDUCTOR (3C, POWER, 6 GAUGE /#6 AWG) _____ DOLLARS _____ CENTS

FOR INFORMATION ONLY

ITEM NUMBER	APPROXIMATE QUANTITY	UNIT OF MEASURE	PAY ITEM UNIT PRICE (IN WORDS, INK OR TYPED)
736-12-D	3,043	LINEAR FOOT	CONDUCTOR (6C, SIGNAL /#14 AWG) _____ DOLLARS _____ CENTS
736-12-E	11,872	LINEAR FOOT	CONDUCTOR (10C, SIGNAL /#14 AWG) _____ DOLLARS _____ CENTS
740-01	LUMP	LUMP SUM	CONSTRUCTION LAYOUT _____ DOLLARS _____ CENTS
744-01	LUMP	LUMP SUM	TRAFFIC CONTROL MANAGEMENT _____ DOLLARS _____ CENTS
802-01	23,790.9	CUBIC YARD	STRUCTURAL EXCAVATION _____ DOLLARS _____ CENTS
802-03	572.3	CUBIC YARD	STRUCTURAL EXCAVATION FOR PIERS (DRY) _____ DOLLARS _____ CENTS

FOR INFORMATION ONLY

ITEM NUMBER	APPROXIMATE QUANTITY	UNIT OF MEASURE	PAY ITEM UNIT PRICE (IN WORDS, INK OR TYPED)
802-04	11,028.5	CUBIC YARD	STRUCTURAL EXCAVATION FOR PIERS (WET) _____ DOLLARS _____ CENTS
802-05	LUMP	LUMP SUM	COFFERDAMS _____ DOLLARS _____ CENTS
804-01-C	98,715	LINEAR FOOT	PRECAST CONCRETE PILES (16") _____ DOLLARS _____ CENTS
804-03-F	132,048	LINEAR FOOT	STEEL PILES (HP 14X73) _____ DOLLARS _____ CENTS
804-03-G	194,828	LINEAR FOOT	STEEL PILES (HP 14X89) _____ DOLLARS _____ CENTS
804-03-I	36,650	LINEAR FOOT	STEEL PILES (HP 14X117) _____ DOLLARS _____ CENTS

FOR INFORMATION ONLY

ITEM NUMBER	APPROXIMATE QUANTITY	UNIT OF MEASURE	PAY ITEM UNIT PRICE (IN WORDS, INK OR TYPED)
804-05	4	EACH	PRECAST CONCRETE TEST PILES _____ DOLLARS _____ CENTS
804-07	21	EACH	STEEL TEST PILES _____ DOLLARS _____ CENTS
804-09	21	EACH	LOADING TEST PILES _____ DOLLARS _____ CENTS
804-10	1	EACH	RELOADING TEST PILES _____ DOLLARS _____ CENTS
804-11	1	EACH	REDRIVING TEST PILES _____ DOLLARS _____ CENTS
804-12	1	EACH	LOADING PERMANENT PILES _____ DOLLARS _____ CENTS

FOR INFORMATION ONLY

ITEM NUMBER	APPROXIMATE QUANTITY	UNIT OF MEASURE	PAY ITEM UNIT PRICE (IN WORDS, INK OR TYPED)
804-17	1	EACH	DYNAMIC MONITORING _____ DOLLARS _____ CENTS
805-01	1,148.53	CUBIC YARD	CLASS A CONCRETE _____ DOLLARS _____ CENTS
805-01-A	37.89	CUBIC YARD	CLASS A CONCRETE (PIPE HEADWALLS) _____ DOLLARS _____ CENTS
805-01-B	99.31	CUBIC YARD	CLASS A CONCRETE (BOX CULVERT HEADWALLS) _____ DOLLARS _____ CENTS
805-01-D	17,969.19	CUBIC YARD	CLASS A CONCRETE (FOOTINGS) _____ DOLLARS _____ CENTS
805-01-E	7,712.75	CUBIC YARD	CLASS A CONCRETE (PIERS) _____ DOLLARS _____ CENTS

FOR INFORMATION ONLY

ITEM NUMBER	APPROXIMATE QUANTITY	UNIT OF MEASURE	PAY ITEM UNIT PRICE (IN WORDS, INK OR TYPED)
805-01-F	29,356.72	CUBIC YARD	CLASS A CONCRETE (BENTS) _____ DOLLARS _____ CENTS
805-03	31,776.13	CUBIC YARD	CLASS AA CONCRETE _____ DOLLARS _____ CENTS
805-04	4,604.10	CUBIC YARD	CLASS AA(M) CONCRETE _____ DOLLARS _____ CENTS
805-08-C	56,550.6	LINEAR FOOT	PRECAST-PRESTRESSED CONCRETE GIRDERS (TYPE III) _____ DOLLARS _____ CENTS
805-08-D	4,591.9	LINEAR FOOT	PRECAST-PRESTRESSED CONCRETE GIRDERS (TYPE IV) _____ DOLLARS _____ CENTS
805-08-I	32,699.8	LINEAR FOOT	PRECAST-PRESTRESSED CONCRETE GIRDERS (TYPE BT-78) _____ DOLLARS _____ CENTS

FOR INFORMATION ONLY

ITEM NUMBER	APPROXIMATE QUANTITY	UNIT OF MEASURE	PAY ITEM UNIT PRICE (IN WORDS, INK OR TYPED)
805-11	4,270.08	LINEAR FOOT	STRIP SEAL JOINTS _____ DOLLARS _____ CENTS
805-12-F	596.0	LINEAR FOOT	REINFORCED CONCRETE BOX CULVERTS (5'X 4') _____ DOLLARS _____ CENTS
805-12-J	3,750.0	LINEAR FOOT	REINFORCED CONCRETE BOX CULVERTS (6'X 5') _____ DOLLARS _____ CENTS
805-12-K	4,494.0	LINEAR FOOT	REINFORCED CONCRETE BOX CULVERTS (7'X 5') _____ DOLLARS _____ CENTS
806-01	23,230,096	POUND	DEFORMED REINFORCING STEEL _____ DOLLARS _____ CENTS
807-06	LUMP	LUMP SUM	STRUCTURAL METALWORK _____ DOLLARS _____ CENTS

FOR INFORMATION ONLY

ITEM NUMBER	APPROXIMATE QUANTITY	UNIT OF MEASURE	PAY ITEM UNIT PRICE (IN WORDS, INK OR TYPED)
810-01-A	32,010.80	LINEAR FOOT	CONCRETE RAILING (PL-2) _____ DOLLARS _____ CENTS
810-01-B	17,872.92	LINEAR FOOT	CONCRETE RAILING (PL-3) _____ DOLLARS _____ CENTS
810-03	24,974.19	LINEAR FOOT	PIPE RAILING _____ DOLLARS _____ CENTS
813-02	4,552.51	SQUARE YARD	CONCRETE APPROACH SLABS (PILE SUPPORTED) _____ DOLLARS _____ CENTS
814-01-J	1,840.0	LINEAR FOOT	DRILLED SHAFT (9-FT DIAMETER) _____ DOLLARS _____ CENTS
814-02-J	184.0	LINEAR FOOT	TEST HOLE (9-FT DIAMETER) _____ DOLLARS _____ CENTS

FOR INFORMATION ONLY

ITEM NUMBER	APPROXIMATE QUANTITY	UNIT OF MEASURE	PAY ITEM UNIT PRICE (IN WORDS, INK OR TYPED)
814-03	650.1	LINEAR FOOT	PERMANENT CASING _____ DOLLARS _____ CENTS
814-04-J	13	EACH	CROSSHOLE SONIC LOGGING (9-FT DIAMETER) _____ DOLLARS _____ CENTS
S-001	6	EACH	SPECIAL CATCH BASIN (S-1) _____ DOLLARS _____ CENTS
S-002	3	EACH	JEFFERSON PARISH CATCH BASIN (TYPE 4) _____ DOLLARS _____ CENTS
S-003	LUMP	LUMP SUM	TEMPORARY DRIVEWAY (SEWAGE TREATMENT PLANT) _____ DOLLARS _____ CENTS
S-004	LUMP	LUMP SUM	CONCRETE DRAINAGE CHUTE AND INLET (WBB 1110+71) _____ DOLLARS _____ CENTS

FOR INFORMATION ONLY

ITEM NUMBER	APPROXIMATE QUANTITY	UNIT OF MEASURE	PAY ITEM UNIT PRICE (IN WORDS, INK OR TYPED)
S-005	7	EACH	SPECIAL GUARD RAIL ANCHOR SECTION (6'-3") _____ DOLLARS _____ CENTS
S-006	16	EACH	CONCRETE ROADWAY BARRIER TRANSITION (54" TO 32") _____ DOLLARS _____ CENTS
S-007	11	EACH	CONCRETE ROADWAY BARRIER TRANSITION (32" TO BARRIER OR MOUNTABLE CURB) (20' TO 10' TRANSITION) _____ DOLLARS _____ CENTS
S-008	2	EACH	CONCRETE ROADWAY BARRIER END TRANSITION TO GUARD RAIL _____ DOLLARS _____ CENTS
S-009	1	EACH	IMPACT ATTENUATOR (KINETIC)(EBB 1091+60) _____ DOLLARS _____ CENTS
S-010	1	EACH	IMPACT ATTENUATOR (KINETIC)(L18W 650+28) _____ DOLLARS _____ CENTS

FOR INFORMATION ONLY

ITEM NUMBER	APPROXIMATE QUANTITY	UNIT OF MEASURE	PAY ITEM UNIT PRICE (IN WORDS, INK OR TYPED)
S-011	1	EACH	IMPACT ATTENUATOR (KINETIC)(L18E 852+01) _____ DOLLARS _____ CENTS
S-012	1	EACH	IMPACT ATTENUATOR (KINETIC)(WBB 964+25) _____ DOLLARS _____ CENTS
S-013	LUMP	LUMP SUM	JUNCTION BOX (BCW 253+40) _____ DOLLARS _____ CENTS
S-014	2	EACH	CONCRETE ROADWAY BARRIER TRANSITION (32" TO BARRIER CURB)(40' TRANSITION) _____ DOLLARS _____ CENTS
S-015	8	EACH	VIDEO DETECTION DEVICE AND CONNECTION _____ DOLLARS _____ CENTS
S-016	3	EACH	VIDEO DETECTION SYSTEM _____ DOLLARS _____ CENTS

FOR INFORMATION ONLY

ITEM NUMBER	APPROXIMATE QUANTITY	UNIT OF MEASURE	PAY ITEM UNIT PRICE (IN WORDS, INK OR TYPED)
S-017	3	EACH	PEDESTRIAN PUSHBUTTONS _____ DOLLARS _____ CENTS
S-018	3	EACH	LED PEDESTRIAN SIGNAL HEAD _____ DOLLARS _____ CENTS
S-019	1	EACH	COMMUNICATION TOWER _____ DOLLARS _____ CENTS
S-020	1	EACH	ANTENNA _____ DOLLARS _____ CENTS
S-021	1	EACH	RADIO COMMUNICATION SYSTEM _____ DOLLARS _____ CENTS
S-022	200	LINEAR FOOT	FIBER OPTIC DROP CABLE, (12 FIBER, SINGLE MODE) _____ DOLLARS _____ CENTS

FOR INFORMATION ONLY

ITEM NUMBER	APPROXIMATE QUANTITY	UNIT OF MEASURE	PAY ITEM UNIT PRICE (IN WORDS, INK OR TYPED)
S-023	6,950	LINEAR FOOT	FIBER OPTIC TRUNK CABLE (48 FIBER, SINGLE MODE) _____ DOLLARS _____ CENTS
S-024	9	EACH	FIBER OPTIC SPLICE CLOSURE (TYPE M) _____ DOLLARS _____ CENTS
S-025	6	EACH	PRETERMINATED PATCH PANEL (12F, SC DUPLEX SM) _____ DOLLARS _____ CENTS
S-026	9	EACH	FUSION SPLICE _____ DOLLARS _____ CENTS
S-027	6	EACH	PATCH CORD (SINGLE MODE 2F, SC-LC 1 METER) _____ DOLLARS _____ CENTS
S-028	6	EACH	ETHERNET SWITCH _____ DOLLARS _____ CENTS

FOR INFORMATION ONLY

ITEM NUMBER	APPROXIMATE QUANTITY	UNIT OF MEASURE	PAY ITEM UNIT PRICE (IN WORDS, INK OR TYPED)
S-029	LUMP	LUMP SUM	TESTING _____ DOLLARS _____ CENTS
S-030	4	EACH	PULL BOX (TYPE GG, 24" x 36" X 36") _____ DOLLARS _____ CENTS
S-031	5	EACH	PULL BOX (TYPE HH, 30" x 48" X 36") _____ DOLLARS _____ CENTS
S-032	37	EACH	ADJUST SIGNAL HEAD (3 SECTION, 12" LED LENS, RYG) _____ DOLLARS _____ CENTS
S-033	12	EACH	ADJUST SIGNAL HEAD (3 SECTION, 12" LED LENS, R LT. Y LT. G) _____ DOLLARS _____ CENTS
S-034	151.0	LINEAR FOOT	HANDRAIL _____ DOLLARS _____ CENTS

FOR INFORMATION ONLY

ITEM NUMBER	APPROXIMATE QUANTITY	UNIT OF MEASURE	PAY ITEM UNIT PRICE (IN WORDS, INK OR TYPED)
S-035	LUMP	LUMP SUM	EASTBANK RAILROAD SPUR AND STUB TRACKWORK _____ DOLLARS _____ CENTS
S-036	1,861	CUBIC YARD	RAILROAD SUB-BALLAST _____ DOLLARS _____ CENTS
S-037	1,415	CUBIC YARD	RAILROAD GRANITE BALLAST _____ DOLLARS _____ CENTS
S-038	LUMP	LUMP SUM	SELF-SUPPORTING ROADWAY BARRIER (JEFFERSON HIGHWAY/CLEARVIEW PARKWAY INTERSECTION) _____ DOLLARS _____ CENTS
S-039	5,645.3	LINEAR FOOT	SAW-CUTTING (PORTLAND CEMENT CONCRETE PAVEMENT) _____ DOLLARS _____ CENTS
S-040	11,635.6	LINEAR FOOT	SAW-CUTTING (ASPHALTIC CONCRETE PAVEMENT) _____ DOLLARS _____ CENTS

FOR INFORMATION ONLY

ITEM NUMBER	APPROXIMATE QUANTITY	UNIT OF MEASURE	PAY ITEM UNIT PRICE (IN WORDS, INK OR TYPED)
S-041	1,944.3	LINEAR FOOT	CONCRETE CURB (DOWELED) _____ DOLLARS _____ CENTS
S-042	LUMP	LUMP SUM	CONCRETE BARRIER (DOWELED) _____ DOLLARS _____ CENTS
S-043	LUMP	LUMP SUM	HIGHWAY CROSSING SIGNALS _____ DOLLARS _____ CENTS
S-044	LUMP	LUMP SUM	REMOVAL OF STRUCTURES AND OBSTRUCTIONS _____ DOLLARS _____ CENTS
S-045	LUMP	LUMP SUM	REMOVAL OF MAIN BRIDGE EXISTING ROADWAY DECK AND FLOOR SYSTEM _____ DOLLARS _____ CENTS
S-046	LUMP	LUMP SUM	REMOVAL OF EASTBANK EXISTING HIGHWAY SUPERSTRUCTURE _____ DOLLARS _____ CENTS

FOR INFORMATION ONLY

ITEM NUMBER	APPROXIMATE QUANTITY	UNIT OF MEASURE	PAY ITEM UNIT PRICE (IN WORDS, INK OR TYPED)
S-047	LUMP	LUMP SUM	REMOVAL OF WESTBANK EXISTING HIGHWAY SUPERSTRUCTURE _____ DOLLARS _____ CENTS
S-048	LUMP	LUMP SUM	REMOVAL OF JEFFERSON HIGHWAY OVERPASSES _____ DOLLARS _____ CENTS
S-049	LUMP	LUMP SUM	REMOVAL OF EXISTING RAILROAD TOWER FOUNDATION _____ DOLLARS _____ CENTS
S-101	LUMP	LUMP SUM	CLEANING, PAINTING AND WASTE DISPOSAL/RECYCLING OF EXISTING BRIDGE METALWORK FAYING SURFACES _____ DOLLARS _____ CENTS
S-102	LUMP	LUMP SUM	DECK DRAINAGE SYSTEM _____ DOLLARS _____ CENTS
S-103	803	EACH	MODIFIED STANDARD TEMPORARY PRECAST BARRIER (15' UNIT) _____ DOLLARS _____ CENTS

FOR INFORMATION ONLY

ITEM NUMBER	APPROXIMATE QUANTITY	UNIT OF MEASURE	PAY ITEM UNIT PRICE (IN WORDS, INK OR TYPED)
S-104	18	EACH	VARIABLE MESSAGE SIGN UNIT _____ DOLLARS _____ CENTS
S-105	27	EACH	BARRIER MOUNTED SIGN POST _____ DOLLARS _____ CENTS
S-106	8,427.8	LINEAR FOOT	PRECAST-PRESTRESSED HIGH PERFORMANCE CONCRETE (HPC) GIRDERS (TYPE BT-78) _____ DOLLARS _____ CENTS
S-107	LUMP	LUMP SUM	TRUSS MONITORING _____ DOLLARS _____ CENTS
S-108	9,498.46	LINEAR FOOT	STEEL BARRIER RAILING _____ DOLLARS _____ CENTS
S-109	2	EACH	IMPACT ATTENUATOR (KINETIC) _____ DOLLARS _____ CENTS

FOR INFORMATION ONLY

ITEM NUMBER	APPROXIMATE QUANTITY	UNIT OF MEASURE	PAY ITEM UNIT PRICE (IN WORDS, INK OR TYPED)
S-110	LUMP	LUMP SUM	MAINTENANCE OF TRAFFIC _____ DOLLARS _____ CENTS
S-111	LUMP	LUMP SUM	TRAFFIC ASSISTANCE _____ DOLLARS _____ CENTS
S-112	LUMP	LUMP SUM	CONSTRUCTION SCREENING _____ DOLLARS _____ CENTS
S-113	4	EACH	WEB-ENABLED CAMERA SYSTEM _____ DOLLARS _____ CENTS
S-114	LUMP	LUMP SUM	VIBRATION MONITORING _____ DOLLARS _____ CENTS
S-115	LUMP	LUMP SUM	CONSTRUCTION SITE SURVEY _____ DOLLARS _____ CENTS

FOR INFORMATION ONLY

ITEM NUMBER	APPROXIMATE QUANTITY	UNIT OF MEASURE	PAY ITEM UNIT PRICE (IN WORDS, INK OR TYPED)
S-116	2	EACH	TEST DRILLED SHAFT (9-FT DIAMETER) _____ DOLLARS _____ CENTS
S-117	2	EACH	LOAD TESTING DRILLED SHAFT (9-FT DIAMETER) _____ DOLLARS _____ CENTS
S-118	11	EACH	POST GROUTING DRILLED SHAFT (9-FT DIAMETER) _____ DOLLARS _____ CENTS
S-119	LUMP	LUMP SUM	GROUNDWATER MONITORING _____ DOLLARS _____ CENTS
S-120	3	EACH	BACKWALL MOUNTED SIGN POST _____ DOLLARS _____ CENTS
S-121	8	EACH	TOP OF BARRIER SIGN MOUNT _____ DOLLARS _____ CENTS

FOR INFORMATION ONLY

ITEM NUMBER	APPROXIMATE QUANTITY	UNIT OF MEASURE	PAY ITEM UNIT PRICE (IN WORDS, INK OR TYPED)
S-122	LUMP	LUMP SUM	PIER REVETMENT SYSTEMS _____ DOLLARS _____ CENTS
S-123	LUMP	LUMP SUM	STRUCTURAL METALWORK (ERECT) _____ DOLLARS _____ CENTS
S-124	LUMP	LUMP SUM	DRY STANDPIPE FOR FIRE PROTECTION _____ DOLLARS _____ CENTS
S-125	LUMP	LUMP SUM	SOIL BORINGS _____ DOLLARS _____ CENTS
S-126	LUMP	LUMP SUM	REMOVAL OF TRUSS MONITORING SYSTEM _____ DOLLARS _____ CENTS
S-201	435	LIN. FOOT	SEWER FORCE MAIN (10" HDPE) _____ DOLLARS _____ CENTS

FOR INFORMATION ONLY

ITEM NUMBER	APPROXIMATE QUANTITY	UNIT OF MEASURE	PAY ITEM UNIT PRICE (IN WORDS, INK OR TYPED)
S-202	1,575	LIN. FOOT	SEWER FORCE MAIN (16" HDPE) _____ DOLLARS _____ CENTS
S-203	6	EACH	SEWER MANHOLE (DIA. 4')(DEPTH: UNDER 10'-1") _____ DOLLARS _____ CENTS
S-204	13	EACH	SEWER MANHOLE (DIA. 4')(DEPTH: 10'-1" TO 12'-0") _____ DOLLARS _____ CENTS
S-205	8	EACH	SEWER MANHOLE (DIA. 4')(DEPTH: OVER 12'-0") _____ DOLLARS _____ CENTS
S-206	4	EACH	SEWER MANHOLE TO BE RAISED _____ DOLLARS _____ CENTS
S-207	26	EACH	REMOVAL OF SEWER MANHOLES _____ DOLLARS _____ CENTS

FOR INFORMATION ONLY

ITEM NUMBER	APPROXIMATE QUANTITY	UNIT OF MEASURE	PAY ITEM UNIT PRICE (IN WORDS, INK OR TYPED)
S-208	1	EACH	AIR RELEASE VALVE AND FRP MANHOLE _____ DOLLARS _____ CENTS
S-209	LUMP	LUMP SUM	NEW SEWER LIFT STATION _____ DOLLARS _____ CENTS
S-210	LUMP	LUMP SUM	REMOVAL OF OLD LIFT STATION _____ DOLLARS _____ CENTS
S-211	1,000	SQUARE YARD	REMOVE AND REPLACE CONCRETE ROADWAY, SIDEWALK AND DRIVEWAY _____ DOLLARS _____ CENTS
S-212	LUMP	LUMP SUM	VERIFICATION OF EXISTING UTILITIES _____ DOLLARS _____ CENTS
S-213	1	EACH	SEWER FORCE MAIN TIE-IN (16" HDPE) _____ DOLLARS _____ CENTS

FOR INFORMATION ONLY

ITEM NUMBER	APPROXIMATE QUANTITY	UNIT OF MEASURE	PAY ITEM UNIT PRICE (IN WORDS, INK OR TYPED)
S-214	1	EACH	SEWER FORCE MAIN TIE-IN (10" HDPE) _____ DOLLARS _____ CENTS
S-215	LUMP	LUMP SUM	CONCRETE CONFLICT BOX _____ DOLLARS _____ CENTS
S-301	17.8	TON	PIPE FITTINGS (DUCTILE IRON BENDS, TEES, WYES, ETC) _____ DOLLARS _____ CENTS
S-302	15,129	LINEAR FOOT	REMOVAL OF WATER LINE WITH FITTINGS _____ DOLLARS _____ CENTS
S-303-A	6	EACH	JOINT RESTRAINERS (4" DUCTILE IRON) _____ DOLLARS _____ CENTS
S-303-B	78	EACH	JOINT RESTRAINERS (8" DUCTILE IRON) _____ DOLLARS _____ CENTS

FOR INFORMATION ONLY

ITEM NUMBER	APPROXIMATE QUANTITY	UNIT OF MEASURE	PAY ITEM UNIT PRICE (IN WORDS, INK OR TYPED)
S-303-C	6	EACH	JOINT RESTRAINERS (10" DUCTILE IRON) _____ DOLLARS _____ CENTS
S-303-D	401	EACH	JOINT RESTRAINERS (12" DUCTILE IRON) _____ DOLLARS _____ CENTS
S-303-E	134	EACH	JOINT RESTRAINERS (14" DUCTILE IRON) _____ DOLLARS _____ CENTS
S-304-A	100	LINEAR FOOT	FIRE SERVICE LINE (6" C-900) _____ DOLLARS _____ CENTS
S-304-B	170	LINEAR FOOT	FIRE SERVICE LINE (8" C-900) _____ DOLLARS _____ CENTS
S-305-A	3	EACH	FIRE SERVICE TAP (6" C-900) _____ DOLLARS _____ CENTS

FOR INFORMATION ONLY

ITEM NUMBER	APPROXIMATE QUANTITY	UNIT OF MEASURE	PAY ITEM UNIT PRICE (IN WORDS, INK OR TYPED)
S-305-B	6	EACH	FIRE SERVICE TAP (8" C-900) _____ DOLLARS _____ CENTS
S-306-A	2	EACH	MECHANICAL JOINT ADAPTOR (4") _____ DOLLARS _____ CENTS
S-306-B	2	EACH	MECHANICAL JOINT ADAPTOR (6") _____ DOLLARS _____ CENTS
S-306-C	23	EACH	MECHANICAL JOINT ADAPTOR (8") _____ DOLLARS _____ CENTS
S-306-D	2	EACH	MECHANICAL JOINT ADAPTOR (10") _____ DOLLARS _____ CENTS
S-306-E	44	EACH	MECHANICAL JOINT ADAPTOR (12") _____ DOLLARS _____ CENTS

FOR INFORMATION ONLY

ITEM NUMBER	APPROXIMATE QUANTITY	UNIT OF MEASURE	PAY ITEM UNIT PRICE (IN WORDS, INK OR TYPED)
S-306-F	8	EACH	MECHANICAL JOINT ADAPTOR (14") _____ DOLLARS _____ CENTS
S-307	8	EACH	BOLLARDS _____ DOLLARS _____ CENTS
S-741-01-A	761	LINEAR FOOT	WATER LINE (8" HDPE) _____ DOLLARS _____ CENTS
S-741-01-B	1,025	LINEAR FOOT	WATER LINE (12" HDPE) _____ DOLLARS _____ CENTS
S-741-01-C	934	LINEAR FOOT	WATER LINE (14" HDPE) _____ DOLLARS _____ CENTS
S-741-01-D	870	LINEAR FOOT	WATER LINE (12" DUCTILE IRON) _____ DOLLARS _____ CENTS

FOR INFORMATION ONLY

ITEM NUMBER	APPROXIMATE QUANTITY	UNIT OF MEASURE	PAY ITEM UNIT PRICE (IN WORDS, INK OR TYPED)
S-741-01-E	80	LINEAR FOOT	WATER LINE (4" C-900) _____ DOLLARS _____ CENTS
S-741-01-F	90	LINEAR FOOT	WATER LINE (6" C-900) _____ DOLLARS _____ CENTS
S-741-01-G	3,028	LINEAR FOOT	WATER LINE (8" C-900) _____ DOLLARS _____ CENTS
S-741-01-H	60	LINEAR FOOT	WATER LINE (10" C-900) _____ DOLLARS _____ CENTS
S-741-01-I	8,629	LINEAR FOOT	WATER LINE (12" C-900) _____ DOLLARS _____ CENTS
S-741-01-J	1,107	LINEAR FOOT	WATER LINE (14" C-900) _____ DOLLARS _____ CENTS

FOR INFORMATION ONLY

ITEM NUMBER	APPROXIMATE QUANTITY	UNIT OF MEASURE	PAY ITEM UNIT PRICE (IN WORDS, INK OR TYPED)
S-741-02-A	1	EACH	GATE VALVE (4" W/COVER) _____ DOLLARS _____ CENTS
S-741-02-B	1	EACH	GATE VALVE (6" W/COVER) _____ DOLLARS _____ CENTS
S-741-02-C	25	EACH	GATE VALVE (8" W/COVER) _____ DOLLARS _____ CENTS
S-741-02-D	1	EACH	GATE VALVE (10" W/COVER) _____ DOLLARS _____ CENTS
S-741-02-E	51	EACH	GATE VALVE (12" W/COVER) _____ DOLLARS _____ CENTS
S-741-03-A	7	EACH	TAPPING SLEEVE AND VALVE ASSEMBLY (UP TO 4") _____ DOLLARS _____ CENTS

FOR INFORMATION ONLY

ITEM NUMBER	APPROXIMATE QUANTITY	UNIT OF MEASURE	PAY ITEM UNIT PRICE (IN WORDS, INK OR TYPED)
S-741-03-B	10	EACH	TAPPING SLEEVE AND VALVE ASSEMBLY (6") _____ DOLLARS _____ CENTS
S-741-03-C	24	EACH	TAPPING SLEEVE AND VALVE ASSEMBLY (8") _____ DOLLARS _____ CENTS
S-741-04	44	EACH	FIRE HYDRANT _____ DOLLARS _____ CENTS
S-741-05-A	210	LINEAR FOOT	WATER SERVICE LINE (UP TO 4" HDPE) _____ DOLLARS _____ CENTS
S-741-05-B	300	LINEAR FOOT	WATER SERVICE LINE (6" HDPE) _____ DOLLARS _____ CENTS
S-741-05-C	120	LINEAR FOOT	WATER SERVICE LINE (8" HDPE) _____ DOLLARS _____ CENTS

FOR INFORMATION ONLY

ITEM NUMBER	APPROXIMATE QUANTITY	UNIT OF MEASURE	PAY ITEM UNIT PRICE (IN WORDS, INK OR TYPED)
S-741-13	33	EACH	REMOVING FIRE HYDRANT _____ DOLLARS _____ CENTS
S-741-15-A	30	LINEAR FOOT	CASING (24" STEEL, BORED) _____ DOLLARS _____ CENTS
S-741-15-B	30	LINEAR FOOT	CASING (30" STEEL, BORED) _____ DOLLARS _____ CENTS
S-742-01-A	981	LINEAR FOOT	SANITARY SEWER PIPE (8" PVC)(DEPTH: UNDER 10'-1") _____ DOLLARS _____ CENTS
S-742-01-B	203	LINEAR FOOT	SANITARY SEWER PIPE (10" PVC)(DEPTH: 10'-1" TO 12'-0") _____ DOLLARS _____ CENTS
S-742-01-C	223	LINEAR FOOT	SANITARY SEWER PIPE (12" PVC)(DEPTH: OVER 12'-0") _____ DOLLARS _____ CENTS

FOR INFORMATION ONLY

ITEM NUMBER	APPROXIMATE QUANTITY	UNIT OF MEASURE	PAY ITEM UNIT PRICE (IN WORDS, INK OR TYPED)
S-742-01-D	649	LINEAR FOOT	SANITARY SEWER PIPE (15" PVC)(DEPTH: 10'-1" TO 12'-0") _____ DOLLARS _____ CENTS
S-742-01-E	753	LINEAR FOOT	SANITARY SEWER PIPE (18" PVC)(DEPTH: 10'-1" TO 12'-0") _____ DOLLARS _____ CENTS
S-742-01-F	645	LINEAR FOOT	SANITARY SEWER PIPE (18" PVC)(DEPTH: OVER 12'-0") _____ DOLLARS _____ CENTS
S-742-01-G	22	LINEAR FOOT	SANITARY SEWER PIPE (24" PVC)(DEPTH: 12'-0") _____ DOLLARS _____ CENTS
S-742-02	19	EACH	ADJUSTING SANITARY SEWER HOUSE CONNECTIONS _____ DOLLARS _____ CENTS
S-742-03	475	LIN. FOOT	ADJUSTING SANITARY SERVICE LINES _____ DOLLARS _____ CENTS

FOR INFORMATION ONLY

ITEM NUMBER	APPROXIMATE QUANTITY	UNIT OF MEASURE	PAY ITEM UNIT PRICE (IN WORDS, INK OR TYPED)
S-742-04-A	331	LIN. FOOT	CASING (24" STEEL) _____ DOLLARS _____ CENTS
S-742-04-B	331	LIN. FOOT	CASING (36" STEEL) _____ DOLLARS _____ CENTS

FOR INFORMATION ONLY

CONSTRUCTION PROPOSAL SIGNATURE AND EXECUTION FORM

THIS FORM, THE SCHEDULE OF ITEMS, AND THE PROPOSAL GUARANTY MUST BE COMPLETED AS INDICATED AND SUBMITTED TO THE LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT (DOTD) TO CONSTITUTE A VALID BID

STATE PROJECT NOS.	**005-10-0037, 006-01-0021, 006-02-0064, 006-25-0001, 006-30-0041, 063-03-0051, and 063-04-0035**
FEDERAL AID PROJECT NO(S).	**N/A**
NAME OF PROJECT	**HEUY P. LONG BRIDGE WIDENING (WESTBANK AND EASTBANK APPROACHES AND MAIN BRIDGE DECK WIDENING**

I (WE) HEREBY CERTIFY THAT I (WE) HAVE CAREFULLY EXAMINED THE PROPOSAL, PLANS AND SPECIFICATIONS, INCLUDING ANY AND ALL ADDENDA, AND THE SITE OF THE ABOVE PROJECT AND AM (ARE) FULLY COGNIZANT OF ALL PROPOSAL DOCUMENTS, THE MASTER COPY OF WHICH IS ON FILE AT DOTD HEADQUARTERS IN BATON ROUGE, LA., AND ALL WORK, MATERIALS AND LABOR REQUIRED THEREIN, AND AGREE TO PERFORM ALL WORK, AND SUPPLY ALL NECESSARY MATERIALS AND LABOR REQUIRED FOR SUCCESSFUL AND TIMELY COMPLETION OF THE ABOVE PROJECT AND TO ACCEPT THE SUMMATION OF THE PRODUCTS OF THE UNIT PRICES BID ON THE SCHEDULE OF ITEMS ATTACHED HERETO AND MADE A PART HEREOF MULTIPLIED BY THE ACTUAL QUANTITY OF UNIT OF MEASURE PERFORMED FOR EACH ITEM, AS AUDITED BY DOTD, AS FULL AND FINAL PAYMENT FOR ALL WORK, LABOR AND MATERIALS NECESSARY TO COMPLETE THE ABOVE PROJECT, SUBJECT TO INCREASE ONLY FOR PLAN CHANGES (CHANGE ORDERS) APPROVED BY THE DOTD CHIEF ENGINEER OR HIS DESIGNEE. THIS BID IS SUBMITTED IN ACCORDANCE WITH THE GENERAL BIDDING REQUIREMENTS IN THE CONSTRUCTION PROPOSAL AND ALL SPECIAL PROVISIONS, PLANS, SUPPLEMENTAL SPECIFICATIONS, AND THE LOUISIANA STANDARD SPECIFICATIONS FOR ROADS AND BRIDGES (2000 EDITION). I (WE) UNDERSTAND THAT THE SUMMATION OF THE PRODUCTS OF THE UNIT PRICES BID ON THE SCHEDULE OF ITEMS MULTIPLIED BY THE ESTIMATED QUANTITY OF UNIT OF MEASURE FOR EACH ITEM, ALONG WITH ANY OTHER FACTORS SPECIFIED TO BE APPLICABLE SUCH AS CONSTRUCTION TIME AND/OR LANE RENTAL, SHALL BE THE BASIS FOR THE COMPARISON OF BIDS. I (WE) UNDERSTAND THAT THE SCHEDULE OF ITEMS MUST CONTAIN UNIT PRICES WRITTEN OUT IN WORDS AND THAT THE SCHEDULE OF ITEMS SUBMITTED AS PART OF THIS BID IS ON THE FORM SUPPLIED BY DOTD IN THE BID PROPOSAL. MY (OUR) PROPOSAL GUARANTY IN THE AMOUNT SPECIFIED FOR THE PROJECT IS ATTACHED HERETO AS EVIDENCE OF MY (OUR) GOOD FAITH TO BE FORFEITED IF THIS BID IS ACCEPTED BY DOTD AND I (WE) FAIL TO COMPLY WITH ANY REQUIREMENT NECESSARY FOR AWARD AND EXECUTION OF THE CONTRACT, AS WELL AS, SIGN AND DELIVER THE CONTRACT AND PAYMENT/PERFORMANCE/RETAINAGE BOND AS REQUIRED IN THE SPECIFICATIONS.

NONCOLLUSION DECLARATION (APPLICABLE TO FEDERAL-AID PROJECTS)

I (WE) DECLARE UNDER PENALTY OF PERJURY UNDER THE LAWS OF THE UNITED STATES AND THE STATE OF LOUISIANA THAT I (WE) HAVE NOT DIRECTLY OR INDIRECTLY, ENTERED INTO ANY AGREEMENT, PARTICIPATED IN ANY COLLUSION, OR OTHERWISE TAKEN ANY ACTION IN RESTRAINT OF FREE COMPETITIVE BIDDING IN CONNECTION WITH THE CONTRACT FOR THIS PROJECT NOR VIOLATED LA. R.S. 48:254.

BIDDER'S DBE GOAL STATEMENT (APPLICABLE TO DBE GOAL PROJECTS)

IF THIS PROJECT IS DESIGNATED BY SPECIAL PROVISION AS A DISADVANTAGED BUSINESS ENTERPRISE (DBE) GOAL PROJECT IN ACCORDANCE WITH THE DBE PROVISIONS OF THIS CONTRACT, THE BIDDER ASSURES DOTD THAT HE/SHE WILL MEET OR EXCEED THE DBE CONTRACT GOAL, OR IF THE BIDDER CANNOT MEET THE REQUIRED DBE GOAL, THE BIDDER ASSURES DOTD THAT HE/SHE HAS MADE AND CAN DOCUMENT GOOD FAITH EFFORTS MADE TOWARDS MEETING THE GOAL REQUIREMENT IN ACCORDANCE WITH THE CONTRACT AND DBE PROGRAM MANUAL INCORPORATED HEREIN BY REFERENCE.

THE APPARENT LOW BIDDER SHALL COMPLETE AND SUBMIT TO THE DOTD COMPLIANCE PROGRAMS OFFICE, FORM CS-6AAA AND ATTACHMENT(S) AND, IF NECESSARY, DOCUMENTATION OF GOOD FAITH EFFORTS MADE BY THE BIDDER TOWARD MEETING THE GOAL, WITHIN TEN BUSINESS DAYS AFTER THE OPENING OF BIDS FOR THIS PROJECT. RESPONSIVENESS OF INFORMATION SUPPLIED IN THIS SECTION OF THIS CONSTRUCTION PROPOSAL SIGNATURE AND EXECUTION FORM IS GOVERNED BY THE DBE REQUIREMENTS INCLUDED WITHIN THE SPECIFICATIONS AND DBE PROGRAM MANUAL.

CERTIFICATION OF EMPLOYMENT OF LOUISIANA RESIDENTS TRANSPORTATION INFRASTRUCTURE MODEL FOR ECONOMIC DEVELOPMENT (TIME) PROJECTS (APPLICABLE TO TIME PROJECTS)

IF THIS PROJECT IS DESIGNATED BY SPECIAL PROVISION AS A TRANSPORTATION INFRASTRUCTURE MODEL FOR ECONOMIC DEVELOPMENT (TIME) PROJECT AS DEFINED IN ACT NO. 16 OF THE 1989 FIRST EXTRAORDINARY SESSION OF THE LEGISLATURE WHICH ENACTED PART V OF CHAPTER 7 OF SUBTITLE II OF TITLE 47 OF THE LOUISIANA REVISED STATUTES OF 1950, COMPRISED OF R.S. 47:820.1 THROUGH 820.6.

THE BIDDER CERTIFIES THAT AT LEAST 80 PERCENT OF THE EMPLOYEES EMPLOYED ON THIS TIME PROJECT WILL BE LOUISIANA RESIDENTS IN ACCORDANCE WITH LOUISIANA R.S. 47:820.3.

NON PARTICIPATION IN PAYMENT ADJUSTMENT (ASPHALT CEMENT AND FUELS) STATEMENT

IF THIS PROJECT IS DESIGNATED BY SPECIAL PROVISION AS BEING SUBJECT TO PAYMENT ADJUSTMENT FOR ASPHALT CEMENT AND/OR FUELS, THE BIDDER HAS THE OPTION OF REQUESTING EXCLUSION FROM SAID PAYMENT ADJUSTMENT PROVISIONS THAT ARE ESTABLISHED BY SPECIAL PROVISION ELSEWHERE HEREIN.

IF THE BIDDER DESIRES TO BE EXCLUDED FROM THESE PAYMENT ADJUSTMENT PROVISIONS,

THE BIDDER IS REQUIRED TO MARK HERE ☐

FAILURE TO MARK THIS BOX PRIOR TO BID OPENING WILL CONSTITUTE FORFEITURE OF THE BIDDER'S OPTION TO REQUEST EXCLUSION.

FOR INFORMATION ONLY

STATE PROJECT NO. **006-01-0018**

BIDDER SIGNATURE REQUIREMENTS (APPLICABLE TO ALL PROJECTS)

THIS BID FOR THE CAPTIONED PROJECT IS SUBMITTED BY:

Name of Principal (Individual, Firm, Corporation, or Joint Venture)

If Joint Venture, Name of First Partner

(Louisiana Contractor's License Number of Bidder or First Partner to Joint Venture)

(Business Street Address)

(Business Mailing Address, if different)

(Area Code and Telephone Number of Business)

(Telephone Number and Name of Contact Person)

(Telecopier Number, if any)

If Joint Venture, Name of Second Partner

(Louisiana Contractor's License Number of Second Partner to Joint Venture)

(Business Street Address)

(Business Mailing Address, if different)

(Area Code and Telephone Number of Business)

(Telephone Number and Name of Contact Person)

(Telecopier Number, if any)

ACTING ON BEHALF OF THE BIDDER, THIS IS TO ATTEST THAT THE UNDERSIGNED DULY AUTHORIZED REPRESENTATIVE OF THE ABOVE CAPTIONED FIRM, CORPORATION OR BUSINESS, BY SUBMISSION OF THIS BID, AGREES AND CERTIFIES THE TRUTH AND ACCURACY OF ALL PROVISIONS OF THIS PROPOSAL, INCLUSIVE OF THE REQUIREMENTS, STATEMENTS, DECLARATIONS AND CERTIFICATIONS ABOVE AND IN THE SCHEDULE OF ITEMS AND PROPOSAL GUARANTY. EXECUTION AND SIGNATURE OF THIS FORM AND SUBMISSION OF THE SCHEDULE OF ITEMS AND PROPOSAL GUARANTY SHALL CONSTITUTE AN IRREVOCABLE AND LEGALLY BINDING OFFER BY THE BIDDER.

(Signature)

(Printed Name)

(Title)

(Date of Signature)

(Signature)

(Printed Name)

(Title)

(Date of Signature)

CONTRACTOR'S TOTAL BASE BID $ _____

IT IS AGREED THAT THIS TOTAL, DETERMINED BY THE BIDDER, IS FOR PURPOSES OF OPENING AND READING BIDS ONLY, AND THAT THE LOW BID FOR THIS PROJECT WILL BE DETERMINED FROM THE EXTENSION AND TOTAL OF THE BID ITEMS BY DOTD.

CS-14AA
04/01

FOR INFORMATION ONLY