100% ISSUED FOR BID

City of Shreveport, Louisiana
Public Works Department
Engineering Division

PAVEMENT IMPROVEMENTS, VOLUME 1B
Project No.: C24001

PROJECT MANUAL AND TECHNICAL SPECIFICATIONS

January 19, 2026

Prepared by:

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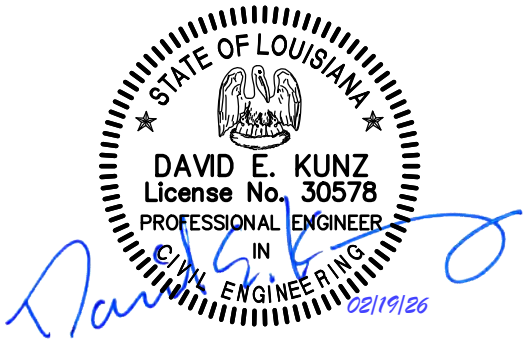
SEALS AND CERTIFICATIONS

ENGINEER'S CERTIFICATION:

I hereby certify that the General Requirements, Sections from Division 5, and the Special Provisions of these Supplemental Specifications were prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Louisiana.

Engineering Firm:	Balar Associates, Inc.
Engineer's Name:	David E. Kunz, P.E.
Engineer's License No.:	LA 30578
Date:	January 19, 2026



ENGINEER'S CERTIFICATION:

I hereby certify that the General Requirements, Sections from Division 5, and the Special Provisions of these Supplemental Specifications were prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Louisiana.

Engineering Firm:	Owen Engineering, LLC
Engineer's Name:	Mark E. Owen, P.E.
Engineer's License No.:	LA 28092
Date:	January 19, 2026

END OF SECTION

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PART I GENERAL PROVISIONS

SECTION 100

DEFINITIONS AND ABBREVIATIONS

100.1 TERMS. Unless otherwise stated, the words "direct," "required," "permitted," "ordered," "instructed," "designated," "considered," "necessary," "prescribed," "approved," "acceptable," "satisfactory," or words of like import, refer to actions, expressions and prerogatives of the Engineer.

100.2 DEFINITIONS.

Addenda. Written or graphic instruments issued prior to the opening of Bids which clarify correct, or change the Bidding Documents.

Advertisement. A public announcement inviting bids containing the location and description of the work, time and place of opening bids.

Asbestos. Any material that contains more than one percent asbestos or is friable or is releasing asbestos fibers into the air above current action levels established by the Unites States Occupational Safety and Health Administration.

As-Built Drawings. Annotated Drawings, which have been revised to reflect any changes during construction including unforeseen site conditions.

Bid. The offer of a responsible and responsive Bidder that was submitted to the Department on the Bid Forms, in accordance with the Bidding Documents. The bid shall be binding after expiration of the 48 hour waiting period.

Bidder. The individual or entity who submits a Bid directly to City.

Bidding Documents. The Invitation For Bid (IFB), Special Conditions for Streets/Drainage and Water/Sewer, the Bid Forms with any supplements, Standard Specifications for Infrastructure Improvements, Standard Plans, Drawings, Technical Specifications, and the proposed Contract Documents (including all Addenda).

Bid Forms. Louisiana Uniform Public Works Bid Forms and Bid Bond Form as developed by the Office of Facility Planning and Control.

Change Order. Any contract modification that includes an alteration, deviation, addition, or omission to the Contract, which authorizes an adjustment in the Contract Amount, Contract Time, or an addition, deletion, or revision of the Work.

City. The City of Shreveport, Louisiana for whom the work is being performed.

City Engineer. The Department Head of the Department of Engineering and Environmental Services.

Claim. A demand or assertion by City or Contractor seeking an adjustment of Contract Amount or Contract Time, or both, or other relief with respect to the terms of the Contract.

Closed Specification. A product specified to the exclusion of all other products of apparent equal quality and utility

Conformed Documents. An assembly of Contract Documents with the Contractor's completed Bid Forms, Bonds, Certificates of Insurance, and other forms furnished with the Bidding Documents; executed Contract; addenda and revised drawings and specifications incorporating changes made by addenda.

Contract. The entire and integrated written agreement between the City and the Contractor concerning the Work. The Contract supersedes prior negotiations, representations, or Contracts whether written or oral.

Contract Bond. The approved form of security, executed by the Contractor and its surety of sureties, guaranteeing complete execution of the contract and all supplemental Contracts pertaining thereto and the payment of all legal debts pertaining to the construction of the project.

Contract Documents. Those items so designated in the Contract. Only printed or hard copies of the items listed in the Contract are Contract Documents. Approved Shop Drawings, other Contractor submittals, and the reports and drawings of subsurface and physical conditions are not Contract Documents.

Contract Item (Pay Item). A specific unit of work for which a price is provided in the Contract.

Contract Amount. The moneys payable by City to Contactor for completion of the Work in accordance with the Contract Documents as stated in the Contract subject to the provisions of Section 101 in the case of Unit Price Work.

Contract Time. The number of days or dates stated in the Contract to achieve Milestones, if any, and complete the Work so that it meets the requirements of completion as evidenced by written recommendation of the Engineer.

Contractor. The individual or entity with whom City has entered into the Contract.

Controlling Item of Work. An item of work that should be in progress at the time, essential to the orderly completion of the work within the time limit specified, in accordance with the Contractor's approved progress schedule.

Department. The term shall mean" Department of Public Works," "Department of Water and Sewerage," "Department of Engineering and Environments Services (EES)" or its authorized representative.

Drawings. The part of the Contract Documents prepared or approved by the Engineer which shows the scope, extent, and character of the Work to be performed by Contractor. Shop Drawings and other Contractor submittals are not Drawings as so defined.

Effective Date of the Contract. The date indicated in the Contract on which it becomes effective, but if no such date is indicated, it means the date on which the Contract is signed and delivered by the last of the two parties to sign and deliver.

Engineer. The City Engineer of the Department of Engineering and Environmental Services (EES) or their authorized representative.

Equipment. All machinery, equipment, tools and apparatus necessary for acceptable completion of the work.

Extra Work. An item of Work not provided for in the Contract as awarded but found essential to the satisfactory completion of the Contract within its intended scope.

Field Order. A written order issued by the Engineer and signed by the Contractor which requires minor changes in the Work but which does not involve a change in the Contract Amount or the Contract Time.

Final Acceptance. After receipt of a clear lien certificate, Final Acceptance will be approved by the City and a letter of Final Acceptance will be issued to the Contractor and retainage will be paid.

Final Completion. A letter of Final Completion will be issued by the City to the Contractor when all contract work has been completed, the final inspection has been performed and no incomplete or unsatisfactory work is outstanding. Accrual of Contract Time ends and time for the maintenance bond begins when Final Completion has been achieved.

Final Inspection. Contractor will notify the City in writing that the work is ready for final inspection. The Contractor's notice will be signed by the Engineer at least 10 days prior to the final inspection. The final inspection uncovers any work that is incomplete or unsatisfactory, The Engineer will give the Contractor written instruction for correction.

General Requirements. Technical Specifications for certain administrative requirements and procedural matters.

Hazardous Environmental Condition. The presence at the Site of Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto.

Hazardous Waste. The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.

Holiday or Legal Holiday. Any calendar day observed or authorized by the City as a non-working holiday.

Incidental Work. Work required by the contract for which no direct payment is provided.

Inspector. An individual authorized to inspect all Work and materials.

Intent to Award. The written notice by City to the Successful Bidder stating that upon timely compliance by the Successful Bidder with the conditions precedent listed therein, City will sign and deliver the Contract.

Laboratory. A testing laboratory approved by the City.

Laws and Regulations. Any and all applicable laws, rules, regulations, ordinances, codes, and other of any and all governmental bodies, agencies, authorizes, and courts having jurisdiction.

Liens. Changes, security interests, or encumbrances upon Project funds, real property, or personal property.

Load Bearing Area. Any area that supports vehicular traffic or high bearing loads; whether the area is paved, unpaved, gravel, green space, sidewalk, street, driveway, highway, etc. This area extends to a minimum of three feet from the edge of said load bearing area.

Manual of Uniform Traffic Control Devices (MUTCD). **The** manual adopted by the City for a uniform system of traffic control devices used on public roadways.

Materials. Any substances used in the Work.

Milestones. A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Final Completion all the Work.

Notice to Proceed. A written notice given by City to Contractor fixing the date on which the Contract Time will commence to run and on which Contractor shall start to perform the Work under the Contract Documents.

Open Specification. A product specified by a particular brand, make, or manufacturer only to convey the general style, type, character, and quality of the product desired.

PCBs. Polychlorinated biphenyls.

Parish. Parish of Caddo, Louisiana.

Pay Estimate. Documentation prepared by the Engineer from daily reports listing quantities of Contract Items and percentages of work items in the schedule of values completed during each working day.

Petroleum. Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste.

Plans. Drawings.

Profile Grade. The trace of a vertical plane intercepting the top surface of the original or proposed surface grade usually along the centerline of the roadbed, pipeline or channel.

Progress Schedule. A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor's plan to accomplish the Work within the Contract Time.

Project. The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part.

Project Engineer. An authorized representative of the Engineer who is in charge of the project.

Proposal. The written offer of the Bidder to perform the contemplated Work and furnish the necessary materials, when made out and submitted on the prescribed Bid Forms, properly signed and guaranteed.

Proposal Guaranty. Certified check, cashier's check, money order, or Bidder's surety bond executed by a bona fide surety company, accompanying the Bid as a guaranty that the Bidder, if awarded the Contract, will enter into a Contract with the City for the performance of the Work.

Qualified Products List. Lists maintained by the Department's materials and testing section for products which do not lend themselves to the preparation of meaningful specifications, or for which repetitive full testing is too time consuming or expensive to be practical for routine project control.

Quality Control/Quality Assurance (QC/QA). The program used jointly by the Contractor and the Department to monitor Material Selections and production and Project construction to ensure that the product continuously and uniformly conforms to the Plans and

Specifications. Quality Assurance is the process used by the Department to inspect, sample and test, and accept the Contractor's work.

Radioactive Material. Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.

Reference Specifications. Bulletins, standards, rules, methods of analysis or test, codes and specifications of other agencies, engineering societies, or industrial associations referred to in those specifications. All such references specified herein, refer to the latest edition thereof, unless otherwise specified, including any amendments thereto which are in effect and published at the time of advertising for bids.

Resident Project Representative. The authorized representative of Engineer who may be assigned to the Site or any part thereof.

Louisiana R.S. Louisiana Revised Statutes

Roadbed. The graded portion of a street or highway within top and side slopes, prepared as a foundation for pavement structure and shoulders.

Roadside. A general term denoting the area adjoining the outer edge of the Roadbed within the right of way. Extensive areas between the Roadways of a divided street or highway may also be considered roadside.

Roadway. That portion of the right of way included between the outside lines or slopes, gutters, or side ditches, including also the appurtenant structures, and all slopes, ditches, channels, waterways, etc., necessary to proper drainage and protection.

Samples. Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which established that standards by which such portion of the Work will be judged.

Schedule of Submittals. A schedule, prepared and maintained by Contractor, of required submittals and the time requirements to support scheduled performance of related construction activities.

Schedule of Values. A schedule, prepared and maintained by Contractor, allocating portions of the Contract Amount to various portions of the Work and used as the basis for reviewing Contractor's Pay Estimate.

Sewer. Any conduit intended for the reception and carrying of domestic sewage and industrial waste.

Shop Drawings. All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work.

Site. Lands or areas indicated in the Contract Documents as being furnished by City upon which the Work is to be performed, including right-of-way and servitudes for access thereto, and such other lands furnished by City which are designated for the use of Contractor.

Special Provisions. Specific clauses setting forth conditions or requirements peculiar to the Work, and that modify or supplement the standard and reference specifications.

Specialty Item. An item indicated in the Contract Documents which is not normally associated with the primary type of construction included in the Contract Documents and

requires highly specialized knowledge, abilities or equipment not ordinarily available in the type of contracting organizations qualified and expected to bid on the Contract.

Technical Specifications. That part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable thereto.

Specifications. This term includes the standard specifications and specifications included herein by reference.

Standard Plans. A set of details developed by the City as a guide to fabricating or constructing various structures.

Standard Drawings. Drawings of structures or devices referred to on the Plans or in Specifications by title and/or an index number.

Standard Work Week. The standard work week for contract time on a calendar day basis is Monday through Friday, excluding Holidays, and the standard working hours are between 7:00 am and 4:30 pm. The standard work week for contract time on a working day basis is Monday through Friday, excluding Holidays, and the standard working hours are between 7:30 am and 4:30 pm.

State. The State of Louisiana.

Stockpiled Materials. Materials used for constructing City projects that are located on or near the Project Site or other approved location.

Storm Drain. Any conduit intended for the reception and carrying of storm water and surface water, street wash and other wash waters, or drainage, but excludes sewage and industrial waste; also called "storm sewer". Also may include open channel type of stormdrain.

Street. Any road, highway, parkway, freeway, alley, walk, or way, including all area within the right-of-way.

Structures. Bridges, culverts, catch basins, junction boxes, retaining walls, cribbing, manholes, endwalls, buildings, sewers, water mains, service pipes, underdrains, foundation drains and other similar features encountered in the Work.

Subcontractor. Any individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work at the Site. Any individual, partnership, corporation, limited liability company, or any other legal entity shall not be considered to be a subcontractor if it is a subsidiary which is wholly owned or majority owned by the Contractor, or an affiliate of the Contractor or affiliated or otherwise controlled by the Contractor or the principals of the Contractor such that a true and independent subcontractor-contractor relationship reached by bidding or arms-length negotiation does not result therefrom.

Subgrade. The top surface of a Roadbed upon which the pavement Structure and shoulders are constructed.

Substantial Completion. When Work (or a specified part thereof) has progressed to the point where, in the opinion of the City as evidenced by the City's definitive certificate of Substantial Completion, it is sufficiently complete, in accordance with the Contract Documents, so that the Work (or specified part) can be utilized for the purposes for which it is intended. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion thereof.

Substructure. The portion of the Structure below the bearings of simple and continuous spans,

skew backs or arches and tops of footings of rigid frames, including back walls, and wing walls.

Successful Bidder. The Bidder submitting a responsive and responsible Bid to whom City makes an award.

Superintendent. The agent of the Contractor on the Work at all times, with capability and authority as required by the Contract Documents.

Supplier. A manufacturer, fabricator, supplier, distributor, material man, or vendor having direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or Subcontractor.

Surety. The bondsman, party or parties who may guarantee the fulfillment of the Contract by bond.

Underground Facilities. All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, stream, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other controls systems.

Unit Price Work. Work to be paid for on the basis of unit prices.

Utility. Tracks, overhead or underground wires, pipelines, conduits, ducts, or structures, owned, operated, or maintained in or across a public right-of-way or private easement. The word "utility" used herein, shall mean either the owner of the utility or the utility itself, whichever is applicable.

Work. The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.

Working Day. A calendar day during which construction operations could proceed for a major part of a shift, normally excluding Saturday, Sunday and City observed Holidays.

Work Change Directive. A Change Order authorizing an addition, deletion, or revision of the Work, but not an adjustment in Contract Amount or Contract Time A Work Change Directive is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequent Change Order following negotiations by the parties as to its effect, if any, on the Contract Amount or Contract Time.

100.3 TERMINOLOGY.

The words and terms discussed herein are not defined but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.

a. **Intent of Certain Terms or Adjectives**: The Contract Documents include the terms "as allowed," "as approved," "as ordered," "as directed" or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives "reasonable," "suitable," "acceptable," "proper," "satisfactory," or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating

otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to any provision of the Contract Documents.

b. **Day:** The word "day" means a calendar day of 24 hours measured from midnight to the next midnight.

c. **Defective:** The word "defective," when modifying the word "Work," refers to Work that is unsatisfactory, faulty, or deficient in that it:

1. does not conform to the Contract Documents; or
2. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or
3. has been damaged prior to Engineer's recommendation of final payment (unless responsibility for the protection thereof has been assumed by City at Substantial Completion).

d. **Furnish, Install, Perform, Provide**:

1. The word "furnish," when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.
2. The word "install," when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.
3. The words "perform" or "provide," when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.
4. When "furnish," "install," "perform," or "provide" is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of Contractor, "provide" is implied.

e. Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

100.4 ABBREVIATIONS.

AAN	American Association of Nurserymen
AASHTO	American Association of State Highway and Transportation Officials
ABS	Acrylonitrile - butadiene - styrene
ACI	American Concrete Institute
AGC	Associated General Contractors of America
AIA	American Institute of Architects
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
ANSI	American National Standards Institute
APWA	American Public Works Association
AREA	American Railway Engineering Association
ASCE	American Society of Civil Engineers
ASTM	American Society for Testing and Materials
AWG	American Wire Gauge
AWPA	American Wood Preservers Association
AWS	American Welding Society

AWWA	American Water Works Association
C	Degree on Celsius temperature scale
CC	Center to Center
CF	Cubic Foot
CM	Centimeter
CMP	Corrugated Metal Pipe
COE	Corps of Engineers
CRSI	Concrete Reinforcing Steel Institute
Cu.	Cubic
CWT	Hundred Weight
Deg	Degree or degrees
DEQ	Louisiana Department of Environmental Quality
Dia	Diameter
DOS	Department of Operational Services
DOTD	Louisiana Department of Transportation and Development, Office of Highway
E	East
EPA	Environmental Protection Agency
F	Degree on Fahrenheit Temperature Scale
FAA	Federal Aviation Association
Fed. Spec.	Federal Specification
Ft.	Foot or feet
Ga.	Gallon
Galv	Galvanized
ICC	Interstate Commerce Commission
IMSA	International Municipal Signal Association
IPCEA	International Power Cable Engineers Association
ITE	Institute of Traffic Engineers
Kg.	Kilogram
L	Liter
L.S.	Lump Sum
T	Thousand
Max.	Maximum
Min.	Minimum
Ml.	Milliliter
Mm	Millimeter
MUTCD	Manual of Uniform Traffic Control Devices
N	North or Newton
NA	Not Applicable
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
OD	Outside diameter
OSHA	Occupational Safety and Health Administration
Pa	Pascal
psi	Pounds per square inch
PVC	Polyvinyl chloride
RCP	Reinforced Concrete Pipe
RMA	Rubber Manufacturers Association
S	South
SDR	Standard thermoplastic pipe dimension ratio (ratio of pipe O.D. to minimum wall thickness)
Sq.	Square
SSPC	Steel Structures Painting Council
T	Ton
UL	Underwriters Laboratories, Inc.

USDA	United States Department of
Agriculture W	West
XCU	Explosion, collapse, underground obstacles
Yd.	Yard(s)

END OF SECTION 100

SECTION 101

BIDDING REQUIREMENTS

101.1 SITE CONDITIONS. Logs of test holes, ground water levels, and any accompanying soil, geological, or seismic reports as furnished by the Engineer are furnished for general information only. The field conditions so set forth shall not constitute a representation or warranty, expressed, or implied that such conditions existent. Bidders shall make their own investigations and form their own estimates of the site conditions, both above and below ground.

101.2 QUANTITIES AND UNIT PRICES. The quantities for which unit prices are indicated in the proposal do not constitute a warranty nor guarantee by the Engineer that the quantities so indicated are the actual quantities required for the work under the contract. The Engineer reserves the right to increase or decrease the quantities of work and materials under unit price pay items as outlined in Section 105 hereof, provided that said increase or decrease does not materially change the intent of the basic contract.

101.2.1 Approximate Quantities. The quantities appearing in the bid schedule are approximate only and will be used for the purpose of comparison of bids and the summation of the prices bid will determine the required amount of the proposal guaranty and the contract bond.

101.2.2 Changes in Estimated Quantities. Scheduled quantities of work to be done and materials to be furnished may each be increased, diminished, or omitted as herein provided, without in any way invalidating the prices bid.

101.2.3 Actual Quantities. Payment to the Contractor will be made only for the actual quantities of work performed and accepted, or materials furnished in accordance with the contract.

101.2.4 Unit Prices or Lump Sum Pay Items. Work will be paid for in accordance with the unit prices or lump sum pay items appearing in the proposal and contract. In the event no unit price nor lump sum pay item is provided for any specific item or work, material or equipment required under the contract, it will be considered as having been included by the Contractor in the prices bid for the pay items appearing in the proposal and contract. Unit Prices or Lump Sum Prices shall include all costs for labor, material, supplies, transportation, appurtenances, incidentals and equipment whether owned, leased or rented that is required to complete the work in accordance with the Contract Documents.

Estimated quantities, if listed on drawings for any structure or item of work, are for the convenience of the Contractor. Such estimated quantities shall not be construed as pay items and the Engineer assumes no responsibility for their accuracy.

101.2.5 Special Limitations. Bid prices submitted will be limited to one hundredth of a cent or more. If prices are submitted, carried to amounts less than one hundredth of a cent, the amount will be truncated and only that portion of the amount one hundredth of a cent or greater will be used. Quantities will be measured only to the nearest one hundredth of a unit. Extension amount calculations will be rounded off to the whole cent.

101.3 MATERIAL GUARANTY. The successful bidder may be required to furnish a complete statement of the origin, composition and manufacture of any or all materials to be used in the construction of the work together with samples, which samples may be subjected to the tests provided for in these specifications to determine their quality and fitness for the work.

END OF SECTION 101

SECTION 102

AWARD AND EXECUTION OF CONTRACT

102.1 CONSIDERATION OF PROPOSALS. After the Bids are opened and read, they will be compared on the basis of the sum of the base bid and any alternates accepted. The results of such comparisons will be available to the public.

The right is reserved to reject any or all Bids, or to advertise for new Bids if, in the judgment of the awarding authority, the best interests of the City will be promoted thereby.

102.2 AWARD OF CONTRACT. The award of a contract, if it will be awarded, will be made within 45 calendar days after the opening of Bids to the lowest responsible and responsive Bidder. The Successful Bidder will be notified of the Intent to Award.

102.2.1 Ordinance No. 114 or 1990. In accordance with this ordinance, the following applies:

1. On every contract to which the City is a party and for which written specifications are prepared, the specification shall include the requirement that before the contract is awarded, the Contractor shall pay all taxes, licenses, fees, and other charge which are outstanding and due to the City.

2. No contract to which the City is a party shall be awarded to any person who has not paid all taxes, licenses, fees and other charges which are outstanding and due the City.

102.2.2 Submittal of Additional Information. The apparent low Bidder shall submit additional information to the City within 10 days after the bid opening. This information shall include, but is not limited to, a complete list of proposed Subcontractors, with the dollar amount and percentage of labor to be performed by each Subcontractor. List shall include the dollar amount and percentage of labor to be performed by Contractor. Total of all percentages must equal 100 percent.

102.3 CANCELLATION OF AWARD. The City reserves the right to cancel the award of any contract at any time before the execution of said contract by all parties without any liability against the City.

102.4 RETURN OF PROPOSAL GUARANTY. All proposal guaranties of unsuccessful bidders will be returned to them within 15 days after the opening of the bids. The retained proposal guaranty of the successful bidder will be returned after a satisfactory bond has been furnished and the contract has been executed.

102.5 CONTRACT BOND. Prior to the execution of the contract, the Contractor shall file with the City, a surety bond, on a form provided or approved by the City, in the amount and for the purposes noted below, duly executed by a responsible corporate surety authorized to issue such bonds in the State of Louisiana. The Contractor shall pay all premiums and costs thereof and incidental thereto. The bond must be signed by both the Contractor and surety, and the bond shall be in the sum of not less than 100% of the contract price to assure the claims of material men supplying materials to him, and of mechanics and laborers employed by him on the work required under these specifications and to assure the faithful performance of the contract.

The bond shall be so conditioned as to assure the faithful performance by the Contractor of all work under said contract within the time limit prescribed in a manner that is satisfactory and acceptable to the City; that all materials and workmanship supplied by him will be free from original or developed defects; and that should original or developed defects or failures appear prior to the date of acceptance of the work by the City, the Contractor shall at his own expense make good such defects and failures and make

all replacements and adjustments required, within a reasonable time after being notified by the Department to do so, and to the approval of the City. This bond shall be maintained by the Contractor in full force and effect during the performance of the work of the Contractor, and until the date of acceptance of the work by the City, and until all claims for materials and labor are paid, subject to local ordinances and lien laws of the State of Louisiana.

Should any surety of sureties upon said bond or any of them become insufficient, the Contractor shall renew said bond with good and sufficient sureties within ten days after receiving notice from the City.

102.6 EXECUTION AND APPROVAL OF CONTRACT. The Contract shall be signed by the Successful Bidder and returned, together with the contract bond, within 15 days after the contract has been sent to the Successful Bidder. If the contract is not executed by the City within 60 days after Intent to, the Successful Bidder shall have the right to withdraw its bid without penalty. No contract shall be considered as effective until it has been fully executed by all of the parties thereto.

102.7 FAILURE TO EXECUTE CONTRACT. Failure to execute the contract and return acceptable bond within fifteen 15 days after the Contract has been sent to the Successful Bidder may be cause for cancellation of the Intent to Award and forfeiture of the proposal guaranty which shall become the property of the City, not as a penalty, but in liquidation of damages sustained. Award may then be made to the next lowest responsible and responsive Bidder or the Project may be re-advertised and constructed under Contract, as the City may decide.

102.8 FAILURE TO ISSUE NOTICE TO PROCEED. Should the Notice to Proceed not be issued within 30 days after the execution of the Contract, the Contractor may at any time thereafter demand cancellation of the Contract prior to issuance of Notice to Proceed.

102.9 PRELIMINARY MATTERS.

102.9.1 Evidence of Insurance: Before any Work is started, Contractor shall deliver to the City, with copies to each additional insured identified in the Contract Documents, certifications of insurance (and other evidence of insurance which the City or any additional insured may reasonably request) which Contractor is required to purchase and maintain.

102.9.2 Commencement of Contract Time; Notice to Proceed: The Contract Time will commence to run on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after execution of the Contract. In no event will the Contract Time commence to run later than the sixtieth day after the day of Bid opening or the thirtieth day after execution of the Contract, whichever date is earlier.

102.9.3 Starting the Work: Contractor shall start to perform the Work on the date when the Contract Time commences to run.

102.9.4 Preliminary Schedules: Within 10 days after the Effective Date of the Contract (unless otherwise specified in the General Requirements), Contractor shall submit to City for timely review:

1. a Baseline Construction Schedule and Narrative Report as specified in Technical Specification Section 4310 Construction Scheduling;

2. a preliminary Schedule of Submittals; and

3. a preliminary Schedule of Values for all of the Work which includes unit and lump sum items, quantities and prices of items which, when added together, equal the Contract Amount; and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

102.9.5 Preconstruction Conference: When scheduled by the City a conference attended by City, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the preliminary schedules, procedures for handling Shop Drawings and other submittals, processing Pay Estimates, and maintaining required records.

At this conference City and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit instructions, receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

102.9.6 Initial Acceptance of Schedules: At least 10 days before submission of the first Pay Estimate a conference attended by Contractor, Engineer, and others as appropriate will be held to review for acceptability to Engineer as provided below the schedules submitted in accordance with Technical Specification Section 4310 Construction Scheduling and Technical Specification Section 4370 Schedule of Values. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.

1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Time. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.

2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.

Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Amount to component parts of the Work.

END OF SECTION 102

SECTION 103

SCOPE OF WORK

103.1 INTENT OF CONTRACT. The intent of the contract is to provide for performance and completion of the work described. The Contractor shall furnish all labor, materials, equipment, tools, transportation and supplies required to complete the Work in accordance with the plans, project specifications and terms of the contract. When an item in the contract contains a choice to be made by the Contractor, the Contractor shall indicate the choice to the Engineer in writing. When the project specifications reference or require the use of "manufacturer's recommendations or specifications," the Contractor shall provide the Engineer with a current copy of these recommendations or specifications.

103.2 ALTERATION OF THE CONTRACT. Without invalidating the Contract, City may, at any time or from time to time, order addition, deletion, or revision of Work by a Change Order or a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided). Pay Items affected by such additions, deletions, or revisions shall be performed in accordance with the requirements of the Contract Documents, and payment will be made at the same unit prices as other parts of the Work, except as provided in Section 105.

When the City orders deletion of Work because of untimely or unsatisfactory performance by the Contractor, the City may perform the Work and back charge the actual cost of performing the Work. The Contractor shall cooperate with the City or its contractors during performance of the Work.

City may order addition, deletion, or revision of Work and authorize adjustments to the Contract Amount and/or Contract Time in a formal Change Order. Engineer may order addition, deletion, or revision of Work, but may not authorize adjustments to the Contract Amount or Contract Time, in a Work Change Directive. A Work Change Directive is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequent Change Order following negotiations by the parties as to its effect, if any, on the Contract Amount or Contract Time.

Engineer may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract or the Contract Time and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Engineer may order changes in details, including changes in materials, processes, and sequences.

These minor variations and changes in details may be accomplished by a Field Order and will be binding on City and also on Contractor, who shall perform the Work involved promptly. If City or Contractor believes that a Field Order justifies an adjustment in the Contract Amount or Contract Time, or both, and the parties are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Section 105.

The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, by one or more of the following ways:

a. Field Order

b. Engineer's approval of a Shop Drawing or Sample (subject to provisions of Section 104)

c. Engineer's written interpretation or clarification

Alterations to the contract as provided for by this section shall not invalidate the contract nor release the surety, and the Contractor agrees to accept the Work as altered, as if it had been part of the original contract. The Contractor shall notify the surety of any alterations to the contract. Alterations of the

contract shall not involve work beyond the termini of the proposed work except as necessary to satisfactorily complete the project. Approval of all plan changes is subject to the approval and concurrence from the appropriate funding source. No plan change will be assumed to be approved until the signed and approved plan change is returned to the originator.

103.3 MAINTENANCE OF TRAFFIC. Contractor shall furnish, erect, and maintain traffic control in accordance with the plans and MUTCD. This includes furnishing, erecting, and maintaining barricades, warning signs and delineators, and providing flaggers, pilot cars and other traffic control. The Contractor shall keep the portion of the project being used by public traffic, whether through or local traffic, in such condition that traffic (including mail delivery) will be adequately accommodated. The Contractor shall also provide and maintain in a safe condition all temporary approaches or crossings, intersections with roads, streets, businesses, parking lots, residences, garages and farms. Traffic control will be paid for at the unit price and lump sum items included in the contract. Payment will include all labor, materials, equipment, supplies, and incidentals required to complete the work per Section 1306. If no pay items for traffic control exist, costs for traffic control will be included in other unit and lump sum pay items.

103.4 FINAL CLEANING UP. Before final completion, the right-of-way, borrow and local material sources, and areas occupied by the Contractor in connection with the work shall be cleaned of rubbish, excess materials, temporary structures, haul roads and equipment. All parts of the work, including property adjacent to the right-of-way, which have been damaged or rendered unsightly during the work shall be left in satisfactory condition and when required, the right-of-way shall be mowed in accordance with City maintenance standards, all at no direct pay.

103.5 GUARANTEES. The Contractor guarantees, by signing the contract, mechanical and electrical equipment, apparatus, materials and workmanship provided under the contract for a period of two years after substantial completion on projects not involving federal funds and six months after final completion on 28 Federal-Aid Projects. Instruction sheets that are required to be furnished by the manufacturer for materials, supplies, and operation shall be delivered by the Contractor to the Engineer prior to final completion of the project, with the following written warranties and guarantees:

1. The manufacturer's standard warranty for each piece of mechanical and electrical equipment or apparatus furnished under the contract.

2. The Contractor's guarantee that, during the guarantee period, necessary repair or replacement of the warranted equipment or apparatus will be made by the Contractor at no direct pay.

3. The Contractor's guarantee for satisfactory operation of the mechanical and electrical systems furnished and constructed under the contract for the guarantee period.

4. The Contractor’s guarantee per Specification Section 4700.

103.6 DIFFERING SITE CONDITIONS, SUSPENSIONS OF WORK, AND SIGNIFICANT CHANGES IN THE CHARACTER OF THE WORK.

A. Differing Site Conditions:

1. During the progress of the work, if subsurface or latent physical conditions are encountered at the site differing materially from those indicated in the contract or if unknown physical conditions of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in the work provided for in the contract, are encountered at the site, the party discovering such conditions shall promptly notify the other party in writing of the specific differing conditions before they are disturbed and before the affected work is performed.

2. Upon written notification, the Engineer will investigate the conditions and if he determines that the conditions materially differ and cause an increase or decrease in the cost or time required for the performance of any work under the contract, an adjustment, excluding loss of anticipated profits, will be made and the contract modified in writing accordingly. The Engineer will notify the Contractor of his determination whether or not an adjustment of the contract is warranted.
3. No contract adjustment which results in a benefit to the Contractor will be allowed unless the Contractor has provided the required written notice.
4. The presence of ground water does not constitute differing site conditions. The Contractor should expect to encounter ground water during normal excavation operations.

B. Suspensions of Work Ordered by the Engineer.

1. If the performance of all or any portion of the work is suspended or delayed by the Engineer in writing for an unreasonable period of time (not originally anticipated, customary or inherent to the construction industry) and the Contractor believes that additional compensation and/or contract time is due as a result of such suspension or delay, the Contractor shall submit to the Engineer in writing a request for adjustment within 7 calendar days of receipt of the notice to resume work. The request shall set forth the reasons and support for such adjustment.
2. Upon receipt, the Engineer will evaluate the Contractor's request. If the Engineer agrees that the cost and/or time required for the performance of the contract has increased as a result of such suspension and the suspension was caused by conditions beyond the control of and not the fault of the Contractor, its suppliers, or subcontractors, and not caused by weather, the Engineer will make an adjustment (excluding profit) and modify the contract in writing accordingly. The Engineer will notify the Contractor of his determination whether or not an adjustment of the contract is warranted.
3. No contract adjustment will be allowed unless the Contractor has submitted the request for adjustment within the time prescribed.
4. No contract adjustment will be allowed under this clause to the extent that performance would have been suspended or delayed by any other cause, or for which an adjustment is provided for or excluded under any other term or condition of this contract.

C. Significant Changes in the Character of Work.

1. The Engineer reserves the right to make, in writing, at any time during the work, such changes in quantities and such alterations in the work as are necessary to satisfactorily complete the project. Such changes in quantities and alterations shall not invalidate the contract nor release the surety, and the Contractor agrees to perform the work as altered.
2. If the alterations or changes in quantities significantly change the character of the work under the contract, whether or not changed by any such different quantities or alterations, an adjustment, excluding loss of anticipated profits, will be made to the contract. The basis for the adjustment shall be agreed upon prior to the performance of the work. If a basis cannot be agreed upon, then an adjustment will be made either for or against the Contractor in such amount as the Engineer may determine to be fair and equitable.

3. If the alterations or changes in quantities do not significantly change the character of the work to be performed under the contract, the altered work will be paid for as provided elsewhere in the contract.

4. The term "significant change" shall be construed to apply only to the following circumstances:

   a. When the character of the work as altered differs materially in kind or nature from that involved or included in the original proposed construction or;

   b. When a major item of work, as defined elsewhere in the contract, is increased, or decreased, in excess of 25 percent of the contract quantity as awarded. Any adjustment in unit price will be made on only that portion of the major item exceeding the 25 percent increase, or, in the case of a decrease of the item by 25 percent or more, the remaining portion will be adjusted.

   c. Where conflicts exist between these requirements and other sections of the specifications, these requirements will govern.

103.7 REPORTS. The following reports of explorations and tests of subsurface conditions at or adjacent to the site are available to the contractor for review.

Not applicable

Contractor may utilize the technical data contained in boring logs, recorded measurements of subsurface water levels, laboratory test results, and other factual, objective information regarding conditions at the Site that are set forth in any geotechnical or environmental report prepared for the Project and made available to Contractor, but such reports are not Contract Documents. , Contractor may not make any claim against the City or the Engineer with respect to:

a. The completeness of such reports for the Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by the Contractor, and safety precautions and programs incident thereto; or

b. Other data, interpretations, opinions, and information contained in such reports; or

c. Any Contractor interpretation of or conclusion drawn from any technical data or any such other data, interpretations, opinions, or information.

END OF SECTION 103

SECTION 104

CONTROL OF WORK

104.1 AUTHORITY OF THE ENGINEER. The Engineer will decide the following: all questions which arise as to the quality and acceptability of materials furnished and work performed and as to the rate of progress of the work; all questions which arise as to the interpretation of the plans and specifications; and all questions as to the acceptable fulfillment of the contract on the part of the Contractor. The Engineer will have the authority to suspend the work wholly or in part due to failure to carry out provisions of the contract; failure to carry out orders; for such periods as deemed necessary due to unsuitable weather; for conditions considered unsuitable for the prosecution of the work or for any other condition or reason deemed to be in the public interest.

All orders to suspend the work shall be in writing and shall include the specific reasons for the suspension. The order to resume work shall also be in writing

Engineer will not supervise, direct, control or have authority over or be responsible for Contractor's means, methods, techniques, sequences or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws or Regulations applicable to the furnishing or performance of the Work. Engineer will not be responsible for Contractor's failure to perform or furnish the Work in accordance with the contract documents.

104.2 PLANS AND SPECIFICATIONS.

104.2.1 General. The Contractor will be supplied without charge five (5) sets of contract documents. The Contractor shall keep at the work site a copy of the plans and specifications and shop drawings to which the Engineer shall have access at all times.

If the Engineer finds the materials furnished, work performed, or the finished product not within reasonably close conformity with the plans and specifications but that reasonably acceptable work has been produced, he shall make a determination if the work will be accepted and remain in place. In this event, the Engineer will document the basis of acceptance by contract modification which will provide for an appropriate adjustment in the contract price for such work or materials as the Engineer deems necessary.

If the Engineer finds the materials furnished, work performed, or the finished product is not in reasonably close conformity with the plans and specifications and has resulted in an inferior or unsatisfactory product, the work or materials shall be removed and replaced or otherwise corrected by, and at the expense of, the Contractor.

While it is believed that much of the information pertaining to conditions which may affect the cost of the proposed work will be shown on the plans or indicated in the specifications, the City does not warrant the completeness or accuracy of such information. It is the Contractor's responsibility to ascertain the existence of any conditions affecting the cost of the work which would have been disclosed by reasonable examination of the site.

Existing improvements visible at the job site, for which no specific disposition is made on the plans, but which could reasonably be assumed to interfere with the satisfactory completion of the improvements contemplated by the plans, shall be removed and disposed of by the Contractor upon written approval of the Engineer.

Before undertaking each part of the Work, Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy which Contractor discovers, or has actual knowledge of, and shall obtain a written interpretation or clarification from Engineer

before proceeding with any Work affected thereby.

If, during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) any standard, specification, manual, or code, or (c) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in Section 105.

Contractor shall not be liable to City for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof.

104.2.2 Resolving Discrepancies.

Except as may be otherwise specifically stated in the Contract Documents, the provisions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Contract Documents and:

a. the provisions of any standard, specification, manual, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference in the Contract Documents); or

b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

Any conflict, error, ambiguity, or discrepancy within the Contract Documents shall be resolved with the following order of precedence, with the first document having the highest order. The document higher in order of precedence shall govern.

1. Change Orders
2. Work Change Directives
3. Field Orders
4. Technical Specifications
5. Drawings
6. Special Provisions
7. General Requirements
8. Standard Specifications
9. Reference Specifications

104.2.3 Shop Drawings and Samples.

Contractor shall submit Shop Drawings and Samples to Engineer for review and acceptance in accordance with the accepted Schedule of Submittals. Each submittal will be identified as specified in the General Requirements. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and acceptance of the pertinent submittal will be at the sole expense and responsibility of Contractor.

104.2.3.1 Shop Drawings.

a. Submit electronic copy as specified in Technical Specification Section 4300 Submittals.

b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions,

specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide and to enable Engineer to review the information for the purposes as intended in the Contract Documents.

104.2.3.2 Samples.

a. Submit number of Samples specified in Technical Specification Section 4300 Submittals or as required by the engineer.

b. Clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which it is intended and other data as Engineer may require to enable Engineer to review the submittal for the purposes as intended in the Contract Documents.

104.2.3.3 Submittal Requirements.

Before submitting each Shop Drawing or Sample, Contractor shall have:

a. reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;

b. determined and verified all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;

c. determined and verified the suitability of all materials offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and

d. determined and verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.

Each submittal shall bear a stamp or specific written certification and comply with Technical Specification Section 4300 Submittals.

With each submittal, Contractor shall give Engineer specific written notice of any variations that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be both a written communication separate from the Shop Drawings or Sample submittal; and, in addition, by a specific notation made on each Shop Drawing or Sample submitted to Engineer for review and approval of each such variation.

104.2.3.4 Engineer's Review.

Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals. Engineer's review and approval will be only to determine if theitems covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.

Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

Engineer's review and approval shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of

Subsection 104.2.3.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer's review and approval shall not relieve Contractor from responsibility for complying with the Submittal Procedures.

104.2.3.5 Resubmittal Procedures.

Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals.

104.3 COOPERATION BY CONTRACTOR. The Contractor shall give the work the constant attention necessary to facilitate the progress thereof, and shall cooperate with the Engineer, his inspectors and other Contractors to successfully complete the Work.

The Contractor shall have on the work at all times, as his agent, a competent superintendent capable of reading and understanding the plans and specifications and experienced in the type of work being performed, who shall receive instructions from the Engineer or his authorized representatives. The superintendent 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. Such superintendence shall be furnished regardless of the amount of work sublet. The Superintendent shall furnish telephone contact information and be available by telephone 24 hours each day for response to the City Engineer in emergency situations within a two (2) hour time frame. Failure to respond to an emergency situation within a reasonable time will result in the City correcting the situation and withholding the cost of equipment, material and labor required to remedy the emergency situation from the Contractor's monthly payment.

The Contractor shall certify to the Engineer, by written notice, the names of persons authorized to sign for the company in all matters pertaining to the changing of plans, force account or extra work, contract time charges and other fiscal documents. No work shall commence on the project until the Contractor has complied with this requirement. Such written notice shall also be furnished whenever a person so designated is removed and replaced on the project. Work shall not proceed until the name and information of the person replacing the person removed or replaced has been submitted, by written notice, to the Engineer.

104.4 COOPERATION BETWEEN CONTRACTORS. The City reserves the right at any time to contract for and perform additional work on or near the work covered by the contract. When separate contracts are let within the limits of one project or multiple projects whose limits overlap, each Contractor shall conduct his work so as not to hinder the progress of the work being performed by other Contractors. Contractors working on the same project shall cooperate and coordinate with each other.

Each Contractor shall assume all liability, financial or otherwise, in connection with his contract and shall indemnify the City from all damages or claims that may arise because of inconvenience, delay or loss experienced by him because of the presence and operations of other Contractors working within the limits of the same project or multiple projects whose limits overlap. The Contractor shall arrange his work and shall place and dispose of the materials being used so as not to interfere with the operations of the other Contractors within the limits of the same project or multiple projects whose limits overlap. He shall join his work with that of the others in an acceptable manner and shall perform it in proper sequence to that of the others.

104.5 CONSTRUCTION LAYOUT.

104.5.1 General. Contractor shall provide field engineering services as specified in Technical Specification Section 4050 Survey Controls.

104.5.2 Reference Points. City shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior

written approval of City. Contractor shall report to Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

104.5.3 **Highways and Bridges**. The provisions of this subsection are in addition to those specified in the General Requirements and apply to Work for roadway and bridge construction. Contractor shall employ sufficient qualified surveying or engineering personnel experienced in layout and construction of highways and bridges to correctly establish and keep complete and comprehensive notebook records of all lines and grades necessary from initial layout to final acceptance. The Contractor will be liable for the accuracy of the initial layout and all subsequent alignment and elevations and shall, at his own expense, rebuild, repair or make good any portion of the Work found to be incorrectly positioned either horizontally or vertically at any time before final acceptance. The Contractor shall compute and provide template grades to the Engineer as soon as possible in order to obtain pipe lengths in an orderly manner. This Work shall include, but is not limited to, staking for the relocation of utilities, all staking for the complete construction of the Project and any miscellaneous information required by the project Engineer. Numbered notebooks or electronic submittals of survey data in a format acceptable to the City for recording of all lines and grades will be provided by the City and shall be properly indexed and cross referenced by the Contractor before return to the Engineer for submittal with the final estimate.

104.6 **DUTIES OF THE INSPECTOR**. Inspectors employed by the City will be authorized to inspect all work done and materials furnished. Such inspection may extend to all or any part of the work and to the preparation, fabrication or manufacture of the materials to be used. The inspector will not be authorized to alter or waive the provisions of the contract. The inspector will not be authorized to issue instructions contrary to the plans and specifications or to act as foreman for the Contractor; however, the inspector shall have the authority to reject work or materials until any question at issue can be referred to and decided by the Engineer.

104.7 **INSPECTION OF WORK.** All material and each part or detail of the work shall be subject to inspection by the Engineer. The Engineer shall be allowed access to all parts of the work and shall be furnished with such information and assistance by the Contractor as is required to make a complete and detailed inspection. If the Engineer requests it, the Contractor, at any time before acceptance of the work, shall remove or uncover such portions of the finished work as directed. After examination, the Contractor shall restore said portions of the work to the standard required by the specifications. Should the work thus exposed or examined prove acceptable, the uncovering, or removing, and the replacing of the covering or making good of the parts removed will be paid for as extra work; however, should the work so exposed or examined prove unacceptable, the uncovering, or removing, and the replacing of the covering or making good of the parts removed, will be at the Contractor's expense. Any work done or materials used without supervision or inspection by an authorized City representative may be ordered removed and replaced at the Contractor's expense.

When any unit of government or political subdivision or any railroad corporation is to pay a portion of the cost of the work covered by the contract, its respective representatives shall have the right to inspect the work. Such inspection shall in no sense make any unit of government or political subdivision or any railroad corporation a party to the contract and shall in no way interfere with the rights of either party thereunder. The City is responsible for the agreement fees associated with said unit of government or railroad corporation.

104.8 **REMOVAL OF UNACCEPTABLE AND UNAUTHORIZED WORK.** All work which does not conform to the requirements of the contract will be considered as unacceptable, unless otherwise determined acceptable under the provisions in Subsection 104.2. Unacceptable work, whether the result of poor workmanship, use of defective materials, damage through carelessness or any other cause, found to exist prior to substantial completion of the work shall be removed and replaced in an acceptable manner.

No work shall be done without lines and grades having been given by the Engineer. Work done contrary to the Contract Documents, work done beyond the lines shown on the plans, or as given except as herein specified or any extra work done without authority will be considered as unauthorized and will not be paid

for under the provisions of the contract. Work so done may be ordered removed and/or replaced at the Contractor's expense.

Upon failure of the Contractor to comply forthwith with any order of the Engineer made under the provisions of this Subsection, the Engineer will have authority to cause unacceptable work to be remedied or removed and replaced and unauthorized work to be removed and to deduct the costs from payments due or to become due the Contractor.

104.9 LOAD RESTRICTIONS. The Contractor and his subcontractors and suppliers shall comply with all legal load restrictions in the hauling of materials or equipment and on completed bridge structures, bases and pavements within the limits of the project. A permit or special permit will not relieve the Contractor of liability for damage resulting from moving of material or equipment. In no case shall the legal load limits be exceeded unless permitted in writing by the recognized legal authority having jurisdiction over the completed bridge structures, bases and pavements.

The operation of equipment on the project of such weight or height or so loaded as to cause damage or overstress to structures or the roadway or to any other type of construction will not be permitted. Hauling of materials over the base course or surface course under construction shall be limited as directed. The Contractor shall be responsible for all damage done by his hauling equipment.

104.10 MAINTENANCE DURING CONSTRUCTION. The Contractor shall maintain the work during construction and until the project is accepted. This maintenance shall constitute continuous and effective work prosecuted daily with adequate equipment and forces to keep the roadway or structures in satisfactory condition at all times. In the case of a contract for the placing of a course on a previously constructed course or subgrade, the Contractor shall maintain the previous course or subgrade during all construction operations.

104.11 FAILURE TO MAINTAIN ROADWAY OR STRUCTURE. If the Contractor fails to comply with Subsection 104.10, 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 Engineer may immediately remedy the condition, 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 may immediately remedy the condition and the costs thereof will be deducted from payments for the work.

Except as provided elsewhere in these specifications, all cost of maintenance work during construction and before the project is accepted shall be included in the unit prices bid on the various pay items and the Contractor will not be paid an additional amount for such work.

104.12 PROJECT MEETING. Contractor shall arrange for all appropriate representatives of Contractor, Subcontractors, and Suppliers to prepare for and attend meetings specified in Technical Specification Section 4200 Project Meetings. Contractor shall provide documents and information as appropriate to the agenda.

END OF SECTION 104

SECTION 105

CHANGES IN WORK

105.1 CHANGES REQUESTED BY THE CONTRACTOR.

105.1.1 General. Changes in specified methods of construction may be made at the Contractor's request when approved in writing by the Engineer.

Changes in the plans and specifications, requested in writing by the Contractor, which do not materially affect the work and which are not detrimental to the work or to the interests of the City, may be granted by the Department to facilitate the work, when approved in writing by the Engineer.

105.1.2 Change Requested by the Contractor. If such changes are granted, they shall be made at a reduction in cost or at no additional cost to the City. Nothing herein shall be construed as granting a right to the Contractor to demand acceptance of such changes.

105.2 CHANGES INITIATED BY THE CITY.

105.2.1 General. The City may change the plans, specifications, character of the work, or quantity of work provided the total arithmetic dollar value of all such changes, both additive and deductive, does not exceed 25 percent of the total contract price. Should it become necessary to exceed this limitation, the change shall be by written supplemental agreement between the Contractor and the City.

Change orders shall be in writing and state the dollar value of the change or establish method of payment, any adjustment in contract time, and, when negotiated prices are involved, shall provide for the Contractor's signature indicating acceptance.

105.2.2 Payment for Changes Initiated by the City

105.2.2.1 Contract Unit Prices. If a change is ordered in an item of work covered by a contract unit price, and such change does not involve a substantial change in the character of the work from that shown on the plans or included in the specifications, an adjustment in payment will be made based upon the increase or decrease in quantity and the contract unit price. In the case of such an increase or decrease in a major bid item, the use of this basis for the adjustment of payment will be limited to that portion of the change which, together with all previous changes to that item, is not in excess of 25 percent of the total cost of such item based on the original quantity and contract unit price.

If a change is ordered in an item of work covered by a contract unit price and such change does involve a substantial change in the character of the work from that shown on the plans or included in the specifications, an adjustment in payment will be made in accordance with Subsection 105.2.2.3.

Should any contract item be deleted in its entirety, payment will be made only for actual costs incurred prior to notification of such deletion.

105.2.2.2 Stipulated Unit Prices. Stipulated unit prices are those established by the City in the contract documents, as distinguished from contract unit prices submitted by the Contractor. Stipulated unit prices may be used for the adjustment of contract changes.

105.2.2.3 Agreed Prices. Adjustments in payments for changes other than those set forth in Subsection 105.2.2.1 and 105.2.2.2 will be determined by agreement between the Contractor and the City. If unable to reach an agreement, the City may direct the Contractor to proceed on the basis of Extra Work in accordance with Subsection 105.3.

105.3 EXTRA WORK.

105.3.1 General. New or unforeseen work will be classed as "extra work" when the Engineer determines that it is not covered by contract unit prices or stipulated unit prices.

105.3.2 Payment.

105.3.2.1 General. When the price for the extra work cannot be agreed upon, the City will pay for the extra work based on the accumulation of costs as provided in Subsection 105.4.

105.3.2.2 Daily Reports by Contractor.

a. General. At the close of each working day, the Contractor shall submit a daily report to the Engineer, on forms approved by the City, together with applicable delivery tickets, listing all labor, materials, and equipment involved for that day, and for other services and expenditures when authorized. An attempt shall be made to reconcile the report daily, and it shall be signed by the Engineer and the Contractor. In the event of disagreement, pertinent notes shall be entered by each party to explain points which cannot be resolved immediately. Each party shall retain a signed copy of the report. Reports by subcontractors or others shall be submitted through the prime Contractor.

b. Labor. The report shall show names of workers, classification, and hours worked.

c. Material. The report shall describe and list quantities of materials used.

d. Equipment. The report shall show type of equipment, size, identification number, and hours of operation including loading and transportation, if applicable.

e. Other Services and Expenditures. Other services and expenditures shall be described in such detail as the City may require.

105.3.2.3 Basis for Establishing Costs.

a. Labor. The costs of labor will be the actual cost for wages prevailing locally for each craft or type of workers at the time the extra work is done, plus employer payments of payroll taxes and insurance, health and welfare, pension, vacation, apprenticeship funds, and other direct costs resulting from Federal, State or local laws, as well as assessments or benefits required by lawful collective bargaining agreements. The use of a labor classification which would increase the extra work cost will not be permitted unless the Contractor establishes the necessity for such additional costs. Labor costs for equipment operators and helpers shall be reported only when such costs are not included in the invoice for equipment rental.

b. Materials. The cost of materials reported shall be at invoice or lowest current price at which such materials are locally available and delivered to the job site in the quantities involved plus sales tax, freight and delivery.

The City reserves the right to approve materials and sources of supply, or to supply materials to the Contractor if necessary for the progress of the work. No markup shall be applied to any material provided by the City.

c. Tool and Equipment Rental. No payment will be made for the use of tools which no specific allowance is herein provided.

Regardless of ownership, the rates to be used in determining equipment rental costs shall not exceed listed rates prevailing locally at equipment rental agencies, or distributors at the time the work is performed. The rental rates paid shall include the cost of fuel, oil, lubrication, supplies, small tools, necessary attachments, repairs and maintenance of any kind, depreciation, storage, insurance, and all incidentals.

Necessary loading and transportation costs for equipment used on the extra work shall be included. If equipment is used intermittently and, when not in use, could be returned to its rental source at less expense to the City than holding it at the work site, it shall be returned, unless the Contractor elects to keep it at the work site at no expense to the City.

d. Invoices. Vendors' invoices for material, equipment rental, and other expenditures, shall be submitted with the request for payment. If the request for payment is not substantiated by invoices or other documentation, the City may establish the cost of the item invoiced at the lowest price which was current at the time of the report.

105.3.2.3 Markup.

a. Work by Prime Contractor. The following percentage shall be added to the Contractor's costs and shall constitute the markup for all overhead and profits.

Labor	20
Materials	15
*Equipment Rental	15
Other Items and Expenditures	15

Rental rates must be agreed on prior to any work.

To the sum of the costs and markups provided for in this Subsection, 6 percent shall be added as compensation for bond and liability insurance and tax. No allowance for general superintendents and small tools shall be made.

b. Work by Subcontractor. When all or any part of the extra work is performed by any of the Contractor's subcontractors, the markups established in paragraph (a) above shall be applied to the subcontractor's actual cost of such work, to which a markup of 10 percent on less than $50,000 and 5 percent on more than $50,000 on the subcontracted portion of the extra work may be added by the prime Contractor.

When the labor markup percentage of "burden", which is submitted on change orders, exceeds 35% (thirty-five percent), the Contractor is required to document in full as to the actual cost of the burden.

105.4 CHANGED CONDITIONS. Contractor shall notify the Engineer in writing of the following work site conditions, hereinafter called changed conditions, immediately upon their discovery and before they are disturbed:

a. Subsurface or latent physical conditions differing materially from those represented in the contract; and

b. Unknown physical conditions of an unusual nature differing materially from those ordinarily encountered and generally recognized as inherent in work of the character being performed.

The Engineer will promptly investigate conditions when notified or any conditions discovered by him/her which appear to be changed conditions. If the Engineer determines that the conditions are changed conditions and that they will materially increase or decrease the costs of any portion of the work, a

change order will be issued adjusting the compensation for such portion of the work in accordance with Subsection 105.2.2. If the Engineer determines that conditions of which he/she has been notified by the Contractor do not justify an adjustment in compensation, the Contractor will be so advised in writing. Should the Contractor disagree with such determination, he may submit a notice of potential claim to the Engineer, as provided in Subsection 105.5.

If the Engineer determines that the conditions are changed conditions and that they will materially affect the performance time, the Contractor, upon submitting a written request, may be granted an extension of time subject to the provisions of Subsection 110.7.

The Contractor's failure to give notice of changed conditions promptly upon their discovery and before they are disturbed shall constitute a waiver of all claims in connection therewith.

105.5 DISPUTE RESOLUTION. If unable to reach an agreement on changes in Work, the City may direct the Contractor to proceed with the disputed Work. Direction to proceed with the disputed Work shall not to be construed as proceeding under extra work provisions, the Contractor shall keep and furnish records of disputed Work in accordance with Subsection 105.3.

All Claims shall be referred to the Engineer for decision. A decision by Engineer shall be required as a condition precedent to any exercise by City or Contractor of any rights or remedies either may otherwise have under the Contract Documents or by Laws and Regulations in respect of such Claims.

Written notice stating the general nature of each Claim shall be delivered by the claimant to Engineer promptly (but in no event later than 15 days) after the start of the event giving rise thereto. The responsibility to substantiate a Claim shall rest with the claimant. Notice of the amount or extent of the Claim, with supporting data shall be delivered to the Engineer by the Contractor within 30 days after the start of such event (unless Engineer allows additional time for claimant to submit additional or more accurate data in support of such Claim). A Claim for an adjustment in Contract Amount or Contract Time shall be prepared in accordance with the provisions of Section 105.5. Each Claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to Engineer and the claimant within 30 days after receipt of the claimant's last submittal (unless Engineer allows additional time).

Engineer will review each Claim and, within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any, take one of the following actions in writing:

1. deny the Claim in whole or in part;
2. approve the Claim; or
3. notify that the Engineer is unable to resolve the Claim if, in the Engineer's sole discretion, it would be inappropriate for the Engineer to do so. For purposes of further resolution of the Claim, such notice shall be deemed a denial.

In the event that Engineer does not take action on a Claim within said 30 days, the Claim shall be deemed denied. Engineer's written action or denial pursuant to this subsection will be final and binding upon City and Contractor, unless within 30 days of such action or denial City or Contractor:

1. agrees to submit the Claim to another dispute resolution process; or
2. gives written notice of the intent to submit the Claim to a court of competent jurisdiction.

No Claim for an adjustment in Contract Amount or Contract Time will be valid if not submitted in accordance with this subsection.

105.6 VALUE ENGINEERING PROPOSALS. This provision is to share with the Contractor only the cost savings generated on this contract as a result of a Value Engineering (VE) Proposal(s) offered by the Contractor and approved by the City. Any time savings resulting from a VE Proposal will be considered at the completion of the project as an incentive to the Contractor, provided the contract contains an incentive clause for early completion of the work and the Contractor has not met the incentive limit in the contract. A time only reduction will not be considered as a VE Proposal. The purpose of the VE Proposal is to encourage the use of the Contractor's ingenuity and experience in arriving at alternative construction methods which will reduce the overall construction cost. After award of the contract, the successful bidder will be permitted to submit to the Engineer, written VE Proposals, for modifying the plans, specifications, or other requirements of the contract for the purpose of reducing the total cost of construction.

The VE Proposal shall not impair, in any manner, the essential functions and characteristics of the project, including but not limited to safety, service life, reliability, economy of operation, ease of maintenance, desired appearance, traffic flow during construction, or necessary standardized features. The VE Proposal shall be specifically identified by the Contractor as a cost reduction proposal. VE Proposals will be considered by the City in the same manner as plan changes.

The Contractor has the option of submitting a conceptual VE Proposal to the City for review prior to making formal submission. However, the Contractor may submit the formal VE Proposal directly. The conceptual VE Proposal shall provide the following minimum information:

1. A description of the proposal.

2. A listing of work items affected by the proposed change, including any change in contract time and/or traffic maintenance.

3. An initial estimate of the net cost savings which the change is expected to generate. The Contractor may proceed to the formal VE Proposal upon the City's approval of the conceptual VE Proposal. The City is not obligated to approve the Contractor's formal VE Proposal, even if the conceptual VE Proposal is initially considered acceptable. As a minimum, the following information shall be submitted by the Contractor with the formal VE Proposal:

    a. A statement that the proposal is submitted as a VE Proposal.

    b. A description of the difference between the existing contract requirements and the proposed change(s), and the comparative advantages and disadvantages of each, including effects on service life, economy of operations, ease of maintenance, desired appearance, necessary standardized features, reliability, traffic flow during construction, safety, and contract time.

    c. Complete plans, specifications, and calculations showing proposed revisions relative to the original contract features and requirements. All plans and Engineering calculations shall bear the signature and seal of a professional Engineer licensed to practice in the State of Louisiana.

    d. Detailed estimates of the cost to the City for performing the work under the existing contract and under the VE Proposal, including a listing of contract items affected by the proposal, and quantity variations attributable thereto with the related costs.

    e. An assessment of any effects that adoption of the VE Proposal could have on other costs to the City, including future maintenance and operation.

    f. A statement of the latest time or date that any agreement adopting the VE Proposal must be executed in order to obtain the maximum cost reduction during the

remainder of the contract and the reasoning for this time schedule. This date must allow the City time for review and processing of a plan change. Should the City find insufficient time is available for review and processing, it may reject the VE Proposal on such basis. If the City fails to respond to the VE Proposal by the date or time specified, the Contractor shall consider the proposal rejected and shall have no claim againstthe City.

g. A statement of the effect that adoption of the VE Proposal will have on the time for completion of the contract.

h. A description of any previous use or testing of the final VE Proposal on another City project or elsewhere and the conditions and results therewith. If the final VE Proposal was previously submitted on another City project, indicate the date, the project, and the action taken by the City.

The provisions of this Subsection shall not be construed to require the City to consider any VE Proposal which may be submitted. The City reserves the right to reject any and all VE Proposals. The bidders are cautioned not to base any bid prices on the anticipated approval of a VE Proposal and to recognize that the proposal may be rejected. In the event of rejection, the Contractor will be required to complete the contract at the contract bid prices. Proposed changes in basic configuration and design of a bridge, hydraulic capacity of drainage facilities, 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. If the City is already considering certain revisions to the contract or has approved certain changes in the contract for general use which are subsequently incorporated in a VE Proposal, the City will reject the Contractor's proposal and may proceed without obligation to the Contractor.

The City will not be liable to the Contractor for failure to act upon or accept any VE Proposal nor for any delays to the work attributable to any such proposal. The Contractor may withdraw, in whole or in part, any VE Proposal not accepted by the City within the period specified in the proposal. The decision of the City as to the acceptance or rejection of VE Proposals shall be final and shall not be subject to claim for additional compensation.

The Contractor will be notified in writing of the City's decision to accept or reject each VE Proposal submitted under these provisions. If a VE Proposal is accepted, the necessary contract modifications will be implemented by execution of a plan change, which will provide for equitable price adjustments giving the Contractor and the City equal shares in the resulting net savings. Until a VE Proposal is effected by such contract modification, the Contractor shall perform the work in accordance with the terms of the existing contract. The net cost savings to be shared shall be determined as the difference in costs between the original contract costs for the involved work items and the actual final costs to the City occurring as a result of the proposed change. Only those work items directly affected by the plan change will be considered in making the final determination of net cost savings.

Subsequent plan changes affecting the modified work items but not related to the VE Proposal, will be excluded from such determination. In reviewing the VE Proposal, the City reserves the right to reject the proposal if, in its judgment, the proposed net cost savings do not represent a reasonable measure of the value of the work to be performed or deleted. All costs incurred by the Contractor in developing the VE Proposal shall be borne by the Contractor. The plan change implementing the necessary contract modifications shall include a pay item for and a lump sum estimate of the approximate net cost savings anticipated as a result of the VE Proposal, and a proportionate amount thereof shall be included in partial payment estimates as the work on the modified contract items is performed. The Contractor's 50 percent share of the net cost savings shall constitute full compensation for implementing all changes pursuant to the agreement. Any time savings for early completion of the project resulting from the VE Proposal will be considered upon completion of the project as an incentive to the Contractor provided the contract contains an incentive clause for early completion of the work and the Contractor has not met the incentive limit in the contract

The City reserves the right to include in the agreement any conditions it deems appropriate for consideration, approval, and implementation of the VE Proposal. The City also reserves the right to require the Contractor to share in the City's costs of investigating a VE Proposal submitted by the Contractor as a condition of considering such proposal. The City will have the option to perform the investigation in-house or by consultants. When such a condition is imposed, the Contractor shall indicate his acceptance in writing, and such acceptance shall constitute full authority for the City to deduct amounts payable to the City from any monies due or that may become due to the Contractor under the contract.

The City reserves the right to adopt a VE Proposal for general use when it determines that said proposal is suitable for application to other contracts. When an accepted VE Proposal is adopted for general use, only the Contractor who first submitted such proposal will be eligible for compensation pursuant to this Subsection, and in that case, only as to those contracts awarded to him prior to submission of the accepted proposal. VE Proposals identical or similar to previously submitted proposals will be eligible for consideration and compensation under these provisions if the identical or similar previously submitted proposals were not adopted for general application to other City contracts. Subject to the provisions contained herein, the State or any other public agency shall have the right to use all or any part of any submitted VE Proposal without obligation or compensation of any kind to the Contractor.

Any changed conditions arising as a result of the acceptance of a VE Proposal will not be considered as the basis for any claim for additional compensation.

END OF SECTION 105

SECTION 106

CONTROL OF MATERIALS

106.1 SOURCE OF SUPPLY AND QUALITY. The materials used on the work shall meet all quality requirements of the contract. In order to expedite the inspection and testing of materials, the Contractor shall notify the Engineer of the proposed sources of materials prior to delivery. At the option of the Engineer, materials may be approved at the source of supply before delivery is started. If it is found after trial that sources of supply for previously approved materials do not produce specified products, the Contractor shall furnish materials from other sources or make necessary changes to provide acceptable materials.

106.2 FURNISHING OF MATERIALS. The Contractor shall furnish all materials required to complete the work, except those specified to be furnished by the City.

Material furnished by the City will be delivered or made available to the Contractor at the points specified in the Special Provisions.

The cost of handling and placing all materials after they are delivered to the Contractor shall be considered as included in the contract price for the item in connection with which they are used.

The Contractor will be held responsible for all material delivered to the Contractor, and deductions will be made from any monies due the Contractor to make good any shortages and deficiencies, from any cause whatsoever, and for any damage which may occur after such delivery and for any demurrage charges.

106.3 SUBSTITUTES AND "OR-EQUIVALENTS".

Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a certain brand, make, or manufacturer, or by using a definite specification, these are used only to describe the general style, type, character, and quality of the product desired. The Contractor is not restricted to the specific brand, make, manufacturer, or specification named, and equivalent products may be acceptable. Unless the specification or description contains or is followed by words reading that "no like item, no equivalent item, no or-equal item, or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be submitted to Engineer for review under the circumstances described below.

106.3.1 "Or-Equivalent" Items. If in the sole discretion of Engineer an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by Engineer as an "or-equivalent" item, in which case review and approval of the proposed item may be accomplished without compliance with some or all of the requirements for approval of proposed substitute items in Section 106.3.2. For the purposes of this Subsection, a proposed item of material or equipment will be considered functionally equivalent to an item so named if:

A. in the exercise of reasonable judgment Engineer determines that:

1. it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;

2. it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole;

3. it is equal in spare parts availability, ease of maintenance, and other considerations;

B. Contractor certifies that, if approved and incorporated into the Work:

1. there will be no increase in cost to the City or increase in Contract Time; and

2. it will conform substantially to the detailed requirements of the item named in the Contract Documents.

3. it has a proven record of performance and availability of responsive service.

106.3.2 Substitute Items. If in the sole discretion of Engineer an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item under Subsection 106.3.1, it will be considered a proposed substitute item. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor. Requests for review of proposed substitute items of material or equipment will not be accepted by Engineer from anyone other than Contractor. The requirements for review by Engineer will be as set forth in Subsection 106.3.1 as supplemented by the General Requirements, and as Engineer may decide is appropriate under the circumstances.

Contractor shall make written application to Engineer for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application:

1. shall certify that the proposed substitute item will:

   a. perform adequately the functions and achieve the results called for by the general design,

   b. be similar in substance to that specified, and

   c. be suited to the same use as that specified;

2. will state:

   a. the extent, if any, to which the use of the proposed substitute item will prejudice Contractor's achievement of Substantial Completion and Final Completion on time,

   b. whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with City for other work on the Project) to adapt the design to the proposed substitute item, and

   c. whether incorporation or use of the proposed substitute item in connection with the Work is sub1ject to payment of any license fee or royalty;

3. will identify:

   a. all variations of the proposed substitute item from that specified, and

   b. available engineering, sales, maintenance, repair, and replacement services; and

4. shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change.

106.3.3 Substitute Construction Methods or Procedures. If a specific means, method, technique, sequence, or procedure of construction is expressly required by the Contract Documents, Contractor may furnish or utilize a substitute means, method, technique, sequence, or procedure of

construction approved by Engineer. Contractor shall submit sufficient information to allow Engineer, in Engineer's sole discretion, to determine that the substitute method or procedure proposed is an acceptable substitute to that expressly called for by the Contract Documents. The requirements for review by Engineer will be similar to those provided in Subsection 106.3.2.

106.3.4 Engineer's Evaluation. Engineer will be allowed fourteen (14) calendar days to evaluate each proposal or submittal made pursuant to Subsections 106.3.2 and 106.3.3. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No "or-equal" or substitute will be ordered, installed or utilized until Engineer's review is complete, which will be evidenced by a Change Order in the case of a substitute and an approved Shop Drawing for an "or equal." Engineer will advise Contractor in writing of any negative determination.

106.3.5 Special Guarantee. City may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.

106.3.6 Engineer's Cost Reimbursement. Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor pursuant to Subsections 106.3.1, 106.3.2 and 106.3.3. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse City for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse City for the reasonable charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with City) resulting from the acceptance of each proposed substitute.

106.3.7 Contractor's Expense. Contractor shall provide all data in support of any proposed substitute or "or-equal" at Contractor's expense.

106.4 MATERIALS AND WORKMANSHIP. All materials, parts and equipment furnished by the Contractor shall be new, high grade, and free from defects and imperfections unless otherwise hereinafter specified or written approval is given under Article 106.5. Workmanship shall be in accord with the best standard practices. Both materials and workmanship shall be subject to the approval of the Engineer.

All materials and workmanship not conforming to the requirements of the Contract Documents shall be considered as defective and will be rejected. Defective material whether in place or not, shall be removed immediately from the site of the work by the Contractor at the Contractor's expense when so directed by the Engineer. No rejected material, the defects of which have been subsequently corrected, shall be used until approval in writing has been given by the Engineer.

In the event any defect in material or workmanship is of a minor nature and the Engineer determines that it is not of such consequence as to result in a dangerous or undesirable condition, or that the removal of such work would create a dangerous or undesirable condition, the Engineer shall have the right to retain such work and make such deductions in the payment therefore as it determines reasonable and in the public interest. Such determination by the Engineer shall be final.

106.5 USE OF MATERIALS FOUND ON THE WORK. NOT APPLICABLE

106.6 TESTS OF MATERIALS. Except as may otherwise be provided in specific instances, all testing that may be required by the City to determine the quality, fitness and suitability of such materials shall be performed at the direction and upon the order of the Engineer, and at no expense to the Contractor, except as provided in Subsection 106.3. Where tests prove that such materials do not meet the specified requirements, and retests are required for this reason, the cost for such retests shall be borne by the Contractor. Samples of materials may be secured and tested whenever considered necessary by the Engineer. In certain cases where the Contractor is required to provide and bear the expense of such testing, the specifications or drawings will be definitely so stated.

The Contractor, at the Contractor's own expense, shall deliver the materials for testing at the time and to the place designated by the Engineer.

106.7 INSPECTION AT SOURCE. If the volume of work, construction progress, and other considerations warrant, the Engineer may undertake the inspection of material or plant equipment at the source, but it is understood that no obligation is assumed to inspect materials in this manner. Such inspection will be undertaken solely as a matter of convenience to the Contractor and producers. Further, the following conditions must be met:

1. The cooperation and assistance of the Contractor and the producer with whom the Contractor has contracted for materials or plant equipment is assured;

2. The representative of the Engineer shall have free entry at all times to such parts of the plant as may concern the manufacture or production of the materials or equipment ordered;

3. The cost of tests or inspections made at plants or sources located outside the territorial limits of Caddo Parish shall be borne by the Contractor orproducer.

106.8 LIST OF MATERIALS AND EQUIPMENT. If required by the Engineer, within thirty days after signing the contract, the Contractor shall submit to the Engineer a list of all materials and equipment ordered for the project, the manufacturers or agents from whom ordered, catalog and type number, quantity ordered and promised delivery date on each item. Any subsequent changes in the list of equipment and materials, manufacturer's type, quantity or delivery dates shall be promptly brought to the attention of the Engineer. Shipping notices shall be furnished to the Engineer in adequate time prior to delivery so that provisions for inspection on receipt can be made.

106.9 STORAGE OF MATERIALS. All materials shall be stored and protected as specified in Technical Specification Section 4600 Delivery, Storage, and Handling. Materials shall be so stored as to assure the preservation of their quality and fitness for the work. Stored materials, even though approved before storage, may again be inspected prior to their use in the Work. Stored materials shall be located so as to facilitate their prompt inspection. Approved portions of the Site may be used for storage purposes and for the placing of the Contractor's plant and equipment, but any additional space required therefore must be provided by the Contractor at no additional cost to the City. Private property shall not be used for storage purposes without written permission of the owner and lessee., copies of such written permission shall be furnished to the Engineer. All storage sites shall be restored to their original condition or to the satisfaction of the property owner or lessee by the Contractor at no additional cost to the City. This shall not apply to the stripping and storing of topsoil or to other material salvaged from thework.

106.10 HANDLING MATERIALS. All materials shall be transported and handled as specified in Technical Specification Section 4600 Delivery, Storage, and Handling. All materials shall be handled in such a manner as to preserve their quality and fitness for the work. Aggregate materials shall be transported from the storage site to the work site in tight vehicles so constructed as to prevent loss or segregation of

materials after loading and measuring in order that there be no inconsistencies in the quantities of materials intended for incorporation in the Work as loaded and the quantities as actually received at the place of operations.

106.11 UNACCEPTABLE MATERIALS. All materials not conforming to the requirements of the Contract Documents shall be considered as unacceptable and all such materials will be rejected and shall be removed immediately from the site of the work unless otherwise instructed by the Engineer. No rejected material, the defects of which have been corrected, shall be used until approval has been given.

END OF SECTION 106

SECTION 107

GOVERNMENTAL REGULATIONS

107.1 GENERAL. It is the Contractor's responsibility to be fully apprised of all Federal, State and local laws, ordinances and regulations, and all orders and decrees of bodies of tribunals having any jurisdiction or authority, which affect those engaged or employed on the work or which affect the conduct of the work. The Contractor shall at all times observe and comply with all such laws, bylaws, ordinances, codes, regulations, orders and decrees. The Contractor shall indemnify the state and its representatives against any claim or liability arising from the violation of any such law, bylaw, ordinances code, regulation, order or decree, whether by the Contractor or the Contractor's employees.

107.1.1 Plant Quarantine Regulations. Soil and any soil-moving equipment operating in regulated areas will be subject to plant quarantine regulations. In general, these regulations provide for the cleaning of soil from equipment before it is moved from regulated areas to prevent the spread of harmful agricultural pests from areas quarantined by the State or U.S. Department of Agriculture. Complete information may be secured by contacting the appropriate district office of the USDA Plant Protection Division.

107.2 LAWS AND REGULATIONS. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, Engineer shall not be responsible for monitoring Contractor's compliance with any Laws or Regulations.

If Contractor performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work. However, it shall not be Contractor's responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve Contractor of their obligations regarding reporting and resolving discrepancies.

Changes in Laws or Regulations not known at the time of opening of Bids having an effect on the cost or time of performance of the Work shall be the subject of an adjustment in Contract Price or Contract Time. If City and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Section 105, Changes in Work.

END OF SECTION 107

SECTION 108

CONTRACTOR'S RESPONSIBILITIES

108.1 PROJECT SITE MAINTENANCE.

108.1.1 Cleanup and Dust Control. Perform cleanup and dust control as specified in Technical Specification Section 4562 Dust Control and Technical Specification Section 4710 Cleaning.

108.1.2 Air Pollution Control. The Contractor shall not discharge smoke, dust, or any other air contaminants into the atmosphere in such quantity that will violate the regulations of any legally constituted authority.

108.2 TEMPORARY FACILITIES.

108.2.1 Temporary Light, Power, and Water. The Contractor shall at its own expense furnish, install, maintain, and remove all temporary light, power, and water, including piping, wiring, lamps, and other equipment, necessary for the work. The Contractor shall not draw water from any fire hydrant, except to extinguish a fire, without first obtaining permission from the water agency concerned.

108.2.2 Sanitation. The Contractor shall provide and maintain enclosed toilets for the use of employees engaged in the work. These accommodations shall be maintained in a neat and sanitary condition. They shall also comply with all applicable laws, ordinances, and regulations pertaining to the public health and sanitation of dwellings and camps.

Sewage flows shall not be interrupted. Should the Contractor disrupt existing sewer facilities, sewage shall be conveyed in closed conduits and disposed of in a sanitary sewer system. Sewage shall not be permitted to flow in trenches or be covered by backfill.

108.2.3 Field Office. The Contractor shall provide and maintain field office(s) as specified in Technical Specification Section 4500, Temporary Facilities.

108.3 PUBLIC CONVENIENCE AND SAFETY

108.3.1 Traffic and Access. The Contractor shall be familiar with the Shreveport Ordinances concerning Traffic Control and the current MUTCD.

The Contractor's operations shall cause no unnecessary inconvenience. The access rights of the public shall be considered at all times. Unless otherwise authorized, traffic shall be permitted to pass through the work, or an approved detour shall be provided.

The Contractor shall provide and maintain safe and adequate pedestrian and vehicular access to fire hydrants, commercial and industrial establishments, churches, schools, parking lots, service stations, motels, fire and police stations, hospitals, and establishments of a similar nature. Access to these facilities shall be continuous and unobstructed unless otherwise approved by the Engineer. The Contractor shall also maintain safe and adequate pedestrian zones and public transportation stops, as well as pedestrian crossings of the work at intervals not exceeding 300 feet, unless otherwise approved by the Engineer.

The Contractor shall maintain vehicular access to residential driveways to the property line (or servitude line), except during active construction activities. Vehicular access shall be reinstated prior to the Contractor leaving the work site at the end of the day. If backfill has been completed to such extent that safe access may be provided and the street is opened to local traffic, the Contractor shall immediately clear the street and driveways and provide and maintain access at no additional pay.

The Contractor shall cooperate with the various parties involved in the delivery of mail, water meter reading, and the collection and removal of trash and garbage to maintain existing schedules for these

services.

Grading operations, roadway excavation and fill construction shall be conducted by the Contractor in a manner to provide a reasonably satisfactory surface for traffic. When rough grading is completed, the roadbed surface shall be brought to a smooth, even condition that is satisfactory for traffic.

Unless otherwise authorized, work shall be performed in only one-half of the roadway at one time. One-half shall be kept open and unobstructed until the opposite side is ready for use. If only one-half of a street is being improved, the other half shall be conditioned and maintained as a detour.

The Contractor shall provide temporary fencing or reinstate existing fencing at the end of each work day.

The Contractor shall include in his bid all costs for the above requirements.

108.3.2 Storage of Equipment and Materials in Public Streets. Construction materials may not be stored in streets, roads, or highways for more than 5 days after unloading. All materials or equipment not installed or used in the construction within 5 days after unloading shall be stored elsewhere by the Contractor at its expense unless the Contractor is authorized additional storage time.

Construction equipment shall neither be stored at the work site before its actual use on the work, nor for more than 5 days after it is no longer needed on the work. Time necessary for repair or assembly of equipment may be authorized by the Engineer. Excavated material, except that which is to be used as backfill in the adjacent trench, may not be stored in public streets, roads, or highways unless otherwise permitted. After placing backfill, all excess material shall be removed immediately from the site.

108.3.3 Street Closures, Detours, Barricades. The contractor shall be familiar with the MUTCD. Work of this project shall be in accordance with all applicable city ordinances. The Contractor shall comply with all applicable State, Parish and City requirements for closure of streets. The Contractor shall provide barriers, guards, lights, signs, temporary bridges, flagpersons and watchpersons, advising the public of detours and construction hazards. The Contractor shall also be responsible for compliance with additional public safety requirements which may arise during construction. The Contractor shall furnish and install, and upon completion of the work, promptly remove all signs and warning devices.

A Maintenance of Traffic Plan consisting of a Barricade Plan and/or Traffic Control Plan is required for temporary closure of any street, alley or other public thoroughfare. A Barricade Plan applies to a specific application such as a temporary lane closure, and may be utilized for situations with a duration of less than one week. Whenever Standard Plans are utilized for Barricade Plans, submit a Maintenance of Traffic Plan which identifies the specific Standard Plan proposed for each location and the duration of the Barricade Plan at each location. A Traffic Control Plan is required for all detours and all other situations with a duration of one week or more. Traffic Control Plans included in the Drawings are intended for use with an anticipated sequence of Work and shall be used as a guideline. Submit a Maintenance of Traffic Plan which identifies proposed adjustments to the Traffic Control Plan and durations of temporary signs and barricades at each location.

Proper maintenance of traffic is critical to the safety of any worksite. Work shall not begin in a project area until traffic control has been installed in accordance with the Maintenance of Traffic Plan or Traffic Control Plan and has been accepted by the Engineer. Contractor shall maintain traffic control and make adjustments as work progresses in accordance with the plans, Shreveport Ordinance and MUTCD until roadways and pedestrian access are reopened for the same use as prior to the start of work.

The Contractor shall notify at least 48 hours in advance of closing, or partially closing, or of reopening, any street, alley, or other public thoroughfare, the Police, Fire, Traffic and Engineering, Sportran, Caddo Parish School Board, and Departments of jurisdictional agencies involved and comply with their requirements. Deviations must first be approved in writing by the Engineer.

The Contractor will be held responsible for all damage to the work due to the failure of barricades, signs, lights and watchmen to protect it, and whenever evidence is found of any such damage, the Engineer may order the damaged portion immediately removed and replaced by the Contractor at his own expense.

The Contractor's responsibility for the maintenance of barricades, signs, and lights and for providing watchmen shall not cease until the work of the contract has been completed and accepted.

Should the Contractor provide inadequate traffic control or fail to maintain traffic control; Engineer can stop work and direct a third party to install traffic control. Contractor will not be granted any time extension for delays caused by not installing proper traffic control. Costs incurred by the City for the installation and maintenance of adequate traffic control including engineering, traffic control devices and third-party support will be back charged to the Contractor that failed to provide or maintain adequate traffic control.

108.3.4 Truck Bed Covers. Trucks or other conveyances hauling loose materials, including hot-mix bituminous materials, on public streets, highways, or detours shall be of an approved type, and if required by the Engineer, shall be covered in such manner as to prevent such materials from dropping, lifting, leaking, or otherwise escaping therefrom. Covering for trucks or other conveyances hauling loose materials as herein provided shall be securely fastened so as to prevent said covering or load from becoming loose, detached, or in any manner a hazard to public traffic. No vehicle in violation of this provision will be permitted to operate. When required by the Engineer, truck bed covers of an approved type shall be used on all trucks hauling hot-mix bituminous materials to prevent heat loss or moisture infiltration.

108.3.5 Use of Explosives. Explosives may be used only when authorized in writing by the Engineer, or otherwise stated in the Special Provisions. Explosives shall be handled, used, and stored in accordance with all applicable regulations.

The Engineer's approval of the use of explosives shall not relieve the Contractor from liability for claims arising from blasting operations.

108.3.6 Loading Structures. Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

108.3.7 Emergencies. In emergencies affecting the safety or protection of the public or persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent threatened damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If Engineer determines that a change in the Contract Documents is required because of the action taken by the Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

108.4 PATENT FEES OR ROYALTIES. Contractor shall pay all license fees and royalties and assume all costs incidental to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if, to the actual knowledge of City, its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by the City in the Contract Documents.

To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless City and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

108.5 ADVERTISING. The names of contractors, subcontractors, architects, or engineers, with their addresses and the designation of their particular specialties, may be displayed on removable signs. The size and location of such signs shall be subject to the Engineer's approval. Commercial advertising matter

shall not be attached to or painted on the surfaces of buildings, fences, canopies, or barricades.

108.6 USE OF LANDS.

108.6.1 General. For the performance of the contract, the Contractor will be permitted to occupy such portions of streets, alleys, or public places or other rights of way or servitude as provided by local ordinances, as shown on the plans, or as permitted. A reasonable amount of tools, materials, and equipment for construction purposes may be stored in such spaces. The storage of such materials shall not inconvenience occupants of adjoining property. Other contractors performing work for the City may, for all purposes required by their contracts, enter upon the work and premises used by the Contractor, and the Contractor shall give them all reasonable facilities and assistance for the completion of adjoining work. Any additional grounds desired by the Contractor for his use shall be provided by him at his own expense. Contractor shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the Site and other areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and other areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof, or of any adjacent land or areas resulting from the performance of the Work.

Should any claim be made by any such owner or occupant because of the performance of the Work, Contractor shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law.

To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless City and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against City, Engineer, or any other party indemnified hereunder to the extent caused by or based upon Contractor's performance of the Work

108.6.2 Work in State Highway Right-of-Ways. When the Work intersects or encroaches upon State Highway rights-of-way, Contractor shall obtain permission from Louisiana Department of Transportation and Development (LADOTD) with regard to methods of construction, materials, and safeguards. LADOTD may provide special details of construction and detailed specifications for Contractor's use in performance of the Work within State Highway rights-of-way.

108.6.3 Work in Servitude Over Private Property. Where the work passes over or through private property the City will provide such right-of-way by servitude agreements. The servitude agreements will provide for the temporary use of immediately adjacent property for construction purposes. The Contractor shall notify the owner of the adjacent property not less than 48 hours in advance of any work on said property and shall arrange for access and entry. Where fences must be removed either for construction purposes or for access, they shall immediately be reconstructed or replaced. The Contractor shall provide adequate gates as necessary to contain or restrict domestic farm animals within their proper areas during the life of this contract and shall provide reasonably safe and convenient means of access where and when required. Unless designated for removal in the Contract Documents, the Contractor shall not injure, cut or remove trees or shrubs without the written approval of the properauthority.

108.6.4 Preservation and Restoration of Property. The Contractor shall protect all public and private property insofar as it may be endangered by his operations and he shall take every reasonable precaution to avoid damage to such property.

Public or private improvements or facilities within the right-of-way not designated for removal, but visibly evident or correctly shown on the plans, which are damaged or injured, directly or indirectly, by or on account of any act, omission, or neglect of the Contractor in the execution of the work, shall be restored by the Contractor at its expense to a condition substantially equivalent to that existing before such damage or injury occurred, by repairing, rebuilding, or otherwise affecting restoration thereof. However, if restoration is not feasible, a reasonable settlement shall be reached with the owner of the damaged property.

The Contractor shall not trespass on public or private property without permission to do so and shall at all times take proper precautions to protect public and private property from damage.

Where paving and landscaping are removed in order to complete the Work, and when Contract Items for replacement of paving and landscaping are included in the Bid Forms, payment for restoration of those features will be made as specified.

Other Contract Items not included in the Bid Forms are considered to be included in the unit or lump sum prices for other pay items for the Work. The Contractor shall restore any public, private, or City-owned property disturbed or damaged as a direct or indirect result of construction operations to a condition equivalent to the pre-existing condition at no additional cost to the City.

Restoration shall be completed within time limits specified in Section 4560 Restoration of Property.

108.6.5 **Availability of Lands.** City shall furnish the Site. City shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work. City will obtain in a timely manner and pay for servitudes for permanent structures or permanent changes in existing facilities. Upon reasonable written request, City shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which the Work is to be performed and City's interest therein as necessary for giving notice of or filing a construction lien against such lands in accordance with applicable Laws and Regulations. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

108.7 **RAILWAY-HIGHWAY PROVISIONS.** All work performed by the contractor in a railway right-of-way shall be in accordance with the requirements of the appropriate Railway authority.

1. The Contractor shall coordinate with the Railway duly designated representative as required for work on the Railway's premises.

2. During the progress of work on or about the Railway's tracks or premises, the Contractor shall maintain contact and liaison with the Railway's officers or representatives for purposes of ascertaining the time of passage of trains at the work in order to clear the Railway's tracks and facilities of people, equipment and obstructions in order to allow free flow of railway traffic. The Contractor shall perform work on the Railway's premises without materially interfering with the Railway's tracks, structures and facilities or operations, or the operations of the Railway's tenants or licensees. Also, the Contractor shall not materially interfere with communication and signal lines upon said premises, except under arrangement effected between the Contractor and the Railway. The Contractor shall protect the Railway's property and avoid accidents. The Contractor shall keep the Railway's track and roadbed free of earth, rock, construction materials, debris and obstructions. The Contractor shall immobilize equipment parked near the Railway's track, when such equipment is unattended, to prevent its movement by unauthorized persons.

3. The Contractor shall, before entering upon the Railway's right-of-way for performance of any construction work, or work preparatory thereto, secure permission from the Railway's representative for the occupancy and use of the Railway's right-of-way outside the limits of the highway servitude area and shall confer with the Railway relative to requirements for railway clearances, operation and general safety regulations.

4. The Railway's representative will at all times have jurisdiction over the safety of railway operations. The decision of the Railway's representative as to procedures which may affect the safety of railway operations shall be final. The Contractor shall be governed by such decision.

5. Should any damage occur to railway property, as a result of the Contractor's unauthorized or negligent operations, and the Railway deems it necessary to repair such damage or perform work for the protection of its property, the required materials, labor and

equipment shall be furnished by the Railway. The Contractor shall reimburse the Railway for any costs incurred.

6. If the Contractor requires access across the Railway's right-of-way and tracks at any location which is not an existing permanent type of open public railway-highway crossing in or incident to the construction of the project, the Contractor shall contact the Railway and request access across said right-of-way and tracks and execute a license agreement with the Railway. The Contractor shall reimburse the Railway for the cost of providing and removing any temporary at-grade and grade-separated structure access crossing, including warning devices, watchmen expense or other costs which the Railway deems necessary for protection of Railway property and operations. The type of temporary crossing required shall be determined by the Railway. The Contractor shall not cross the Railway's right-of-way and tracks with vehicles or equipment except at existing open public road crossings or at such crossings established pursuant to this paragraph. The foregoing requirements include new grade crossings which will become part of the finished highway being constructed under the contract. The Contractor shall comply with the requirements for insurance contained under Heading (n) hereinafter during operations hereunder. The Contractor shall cooperate with the Railway during all phases of the work including providing sufficient advance notice for project completion in order for the Railway to remove the temporary grade crossing and perform final grade crossing improvements under the agreement with the City prior to final acceptance.

7. Any engineering, inspection, training, flagging and watcher service required by the Railway for the safety of Railway operations because of work being performed by the Contractor or in connection therewith, shall be provided by the Railway and the cost thereof shall be reimbursed to the Railway, by the Contractor, on the basis of the Railway's bills, to be rendered monthly. The Contractor will be reimbursed, by the City, for the actual incurred cost for such services. The Contractor shall furnish documentation of railway invoices and evidence of payment before reimbursement. When it is determined that railroad services and/or crossings are no longer in the best interest of the City, the Contractor will be issued written notification that no further reimbursement will be made by the City for railroad services. Work done or services provided for the Contractor's convenience will not be reimbursed by the City. The Contractor shall notify the Railway when Railway services are required. Notification shall be in a manner acceptable to the Railway with sufficient time for the Railway to provide services without impacting project schedule.

8. The Contractor will be required to reimburse the Railway monthly for the cost of all services performed by the Railway for the Contractor and furnish the City satisfactory evidence that the Railway has acknowledged receipt of payment before final acceptance.

9. During construction of piers or other supports or structures adjacent to any track, or of drainage pipe, underground utility or structure under or adjacent to any track of the Railway, the Contractor shall make adequate provisions against sliding, shifting, sinking or in any way disturbing the railway embankment and track adjacent to said piers, supports, structures, drainage pipe, underground utilities or structures due to construction operations by driving temporary sheeting or by other means satisfactory to the City and Railway.

10. Before commencing work on any pier or structure adjacent to any track, or on any structure and parts thereof which carry Railway facilities, the Contractor shall coordinate with the Railway and Engineer to develop a submittal including sheeting, shoring, bracing and false work details for protection of the Railway's track and embankment. as required by the Railway. The submittal shall include, if needed, shop drawings or other Contractor's detailed plans for structures and parts thereof which will carry Railway facilities; proposed methods of construction and supporting data, including design computations, soil descriptions and other pertinent information. After review by the Engineer, the required number of sets of the above submittal including plans, shop drawings and details bearing the appropriate registered Engineer seals, with supporting data and documents, shall be forwarded to the

Railway for approval. Prior to beginning work on a Railway right-of-way, the shop drawings and details, with supporting data and documents, shall be approved by the Railway.

11. The Contractor shall notify the Railway's representative in writing as specified in the license agreement or permit in advance of the proposed time of the beginning of construction of piers, supports or structures adjacent to the track or of drainage pipe, utilities or structure under or adjacent to the track.

12. Contractor shall maintain all temporary clearances as required by the Railway during construction.

13. Unless otherwise specified by special provisions, the Contractor shall provide insurance of the following kinds and amounts:

    a. Regular Contractor's Public Liability and Property Damage Insurance, including automobile, issued in the name of the Contractor shall be written to furnish protection to the Contractor respecting operations in performing work covered by the contract in regard to the liability with respect to bodily injury to or death of persons, and injury to or destruction of property, which may be suffered by persons other than the Contractor's employees as a result of operations in connection with construction of highway projects located wholly or partly within railroad right-of-way.

    b. When a Contractor sublets a part of the work on any project to a subcontractor, the Contractor shall be required to secure insurance protection in the Contractor's own behalf under Contractor's Public Liability and Property Damage Insurance policies to cover any liability imposed on the Contractor by law for damages due to bodily injury to or death of persons and injury to or destruction of property as a result of work undertaken by such subcontractors. In addition, the Contractor shall provide for, and on behalf of, any such subcontractors protection to cover like liability imposed upon the latter as a result of their operations by means of separate and individual Contractor's Public Liability and Property Damage policies. As an alternative, each subcontractor shall provide satisfactory insurance as described herein on the subcontractor's own behalf to cover the sub Contractor's individual operations.

    c. Railroad Protective Liability Insurance shall be purchased on behalf of the Railway by the Contractor. The standards for Railroad Protective Liability Insurance shall be in accordance with provisions of the Federal-Aid Policy Guide (FAPG) Part 646 as amended. The limits of liability for the kinds of insurance required above shall be as follows:

NORMAL COVERAGE (other than AMTRAK)
(1), (2) and (3)
Combined Single Limit for Bodily Injury Liability, Property Damage
Liability and Physical Damage to:
Property - $2,000,000 per occurrence
Aggregate Limit - $6,000,000 for the term of the policy

AMTRAK COVERAGE
(1), (2) and (3)
Combined Single Limit for Bodily Injury Liability, Property Damage
Liability and Physical Damage to:
Property - $5,000,000 per occurrence
Aggregate Limit - $12,000,000 for the term of the policy

The name of the Railway and the ratio of the estimated cost of operations within the Railway's property to the total estimated project cost, expressed by percent, will be specified in the project specifications. No direct payment will be made for providing the required insurance coverages by the Contractor. The Contractor shall furnish to the Railway the Railroad Protective Policy and certificates evidencing the other insurance coverage required above. The Railroad Protective Insurance Policy and all insurance certificates shall be approved by the Railway before any work may be started on the Railway's property by the Contractor or subcontractors. In addition, the Contractor shall furnish evidence of commitment by the insurance company to notify the Railway and the Engineer in writing of any material change, expiration or cancellation of the policy not less than 30 calendar days before such change, expiration or cancellation is effective. The insurance specified shall be kept in force until final acceptance of the contract.

14. The Contractor shall indemnify the Railway, its officers and employees 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 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.

15. Upon completion of the work, the Contractor shall, within 10 calendar days, remove from within the limits of the Railway's right-of-way all machinery, equipment, surplus materials, false work, rubbish or temporary buildings of said Contractor, and restore the Railway's premises substantially to their former condition satisfactory to the Railway's representative. Should the Contractor fail to make such removal and restoration within 10 calendar days, the Railway shall have the right to make such removal or restoration. The expense incurred shall be chargeable to the project on the Railway's force account statement and the City will reimburse the Railway for such work. The amount will be deducted from payments due the Contractor.

16. All costs incurred under this subsection shall be included in the contract prices of other pay items. Prior to final acceptance of the project, the Contractor shall secure a Certificate of Release from the railroad company and furnish same to the City stating that the Contractor has satisfactorily restored the Railway's premises and has completed payments for all railway services performed for the Contractor's account, and that the Railway waives all claims for damages due to the Contractor's operations within railway right-of-way under the contract. If the Contractor is unable to secure a Certificate of Release from the Railway, the Contractor shall submit an executed Contractor's Affidavit, to the Engineer.

108.8 RESPONSIBILITY FOR DAMAGE CLAIMS.

108.8.1 General. The Contractor and his surety shall indemnify and save harmless the City and all its officers, agents and employees from all suits, actions, or claims of any character, name and description brought for or on account of any injuries or damages received or sustained by any person, persons, or

property, by or from the said Contractor or his employees or by or in consequence of any neglect in safeguarding the work, or through the use of unacceptable materials in constructing the work or by or on account of any act or omission, neglect, or misconduct of the said Contractor or by or on account of any claims or amounts recovered by any infringement of patent, trademark, or copyrights or from any claims or amounts arising or recovered under the workmen's Compensation Law or any other law, ordinance, order or decree, and so much of the money due the said Contractor under and by virtue of his contract, as shall be considered necessary by the City, may be retained or in case no money is due, his surety shall be considered liable until such suit or suits, action or actions, claim or claims, for injuries or damages as aforesaid shall have been settled and satisfactory evidence to that effect furnished to the City, and the Contractor shall defend any and all suits arising out of any such claim and pay all costs and expenses in connection therewith including reasonable attorney fees.

108.8.2 Contractor's Responsibility. Until written notification of substantial completion of the project by the Engineer, the Contractor shall have the charge and care thereof and shall take every precaution against injury or damage to any part thereof by the action of the elements, or from any other cause, whether arising from the execution or from the non-execution of the work. The Contractor shall rebuild, repair, restore, and make good all injuries or damages to any portion of the work occasioned by any of the above causes before substantial completion and shall bear the expense thereof except damage to the work due to unforeseeable causes beyond the control of and without the fault or negligence of the Contractor, including but not restricted to Acts of God, of the public enemy or of governmental authorities.

108.8.3 Personal Liability of Public Officials. In carrying out the provisions contained herein or in exercising any power or authority granted to him by this Contract, there shall be no personal liability upon the Engineer, or his authorized assistants or representatives or any official acting for the City, it being understood that in such matters they act as the agents of the City.

108.8.4 No Waiver of Legal Rights. Inspection by the Engineer or by any of his duly authorized representative, any order, measurement, or certificate by the Engineer; any order by the City for the payment of money any payment for or acceptance of any work or any extension of time; or any possession taken by the City, shall not operate as a waiver of any provision of the contract; or any power therein reserved to the City or of any right of damages therein provided. Any waiver of any breach of the contract shall not be held to be a waiver of any other or subsequent breach.

The City reserves the right to correct any error that may be discovered in any estimate that may have been paid, and to adjust the same to meet the requirements of the contract and specifications. The City reserves the right to claim and recover, by process of law, sums as may be sufficient to correct any error or make good any deficit in the work resulting from such error, dishonesty, or collusion upon conclusive proof of collusion or dishonesty between the Contractor or his agents and the Engineer of his assistants discovered in the work after final payment has been made.

108.8.5 Indemnification. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify, defend, and hold harmless the City, its agents, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable .

In any and all claims against City, or any of its officers, directors, members, partners, employees, agents, consultants, or subcontractors by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or

other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts. The indemnification obligations of Contractor under Subsection 108.8.5 shall not extend to the liability of City or any of its officers, directors, members, partners, employees, agents, consultants and subcontractors arising out of:

1. the preparation or approval of, or the failure to prepare or approve maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or

2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

108.9 FINAL CLEANING UP. Before final acceptance, the Site, borrow and local material sources and all areas occupied by the Contractor in connection with the Work shall be cleaned of all rubbish, excess materials, temporary structural, haul roads and equipment; and all parts of the Work, including private property adjacent to the Site, which have been damaged or rendered unsightly during the Work shall be left in a neat and presentable condition acceptable to the Engineer, and if required, the Site shall be mowed; all at no additional cost to the City.

At the time of final acceptance, structures entirely constructed under the Project shall be free of rodents, insects, vermin and pests. Extermination work, if necessary, shall be arranged and paid for by the Contractor as part of the Work, and completed within the Contract Time. Extermination work shall be performed by a licensed agency in accordance with requirements of governing authorizes. The Contractor shall be liable for injury to persons or property and responsible for the elimination of offensive odors resulting from extermination operations.

108.10 ARCHAEOLOGICAL AND HISTORICAL FINDINGS. If the Contractor encounters cultural artifacts or archaeological or historical sites, operations shall be discontinued. The Engineer will contact the proper authorities in order that an appropriate assessment may be made to determine the disposition thereof and necessary actions relative to the site. When directed, the Contractor shall excavate the site to preserve the artifacts encountered. Such excavation will be paid for as extra work, including an appropriate adjustment in contract time. Borrow and muck disposal areas furnished by the Contractor will be subject to such assessment prior to use.

108.11 OVERTIME. is time worked outside of a Standard Work Week. Overtime requires written authorization from the Engineer. The Contractor must initiate the process by submitting an Overtime Authorization Request for the Engineer's authorization at least 48 hours in advance of starting overtime work. Submit a specific description of anticipated work activities planned for each week during which overtime is planned to be worked. If overtime is authorized, the actual work activities shall be limited to the planned work activities for that week and the Contractor shall reimburse the City all costs associated with inspector working overtime at $ 150/hour.

108.12 SAFETY PROGRAMS AND RESPONSIBILITIES.

108.12.1 Safety and Protection. Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:

1. all persons on the Site or who may be affected by the Work;

2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and

3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.

Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify owners of adjacent property and of Underground Facilities and other utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property.

Contractor shall comply with the applicable requirements of City's safety programs, if any. Contractor shall inform Engineer of the specific requirements of Contractor's safety program with which City's and Engineer's employees and representatives must comply while at the Site.

All damage, injury, or loss to any property caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Engineer or anyone employed by the Engineer or its subconsultants, or anyone for whose acts the City or Engineer and its subconsultants may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by the Contractor or any, Subcontractor or Supplier).

Contractor's duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and City has issued a Final Completion notice to Contractor.

108.12.2 Safety Representative. Contractor shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

108.12.3 Hazard Communication Programs. Contractor shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with Laws or Regulations. Contractor shall provide copies of material safety data sheets to the City Risk Management office.

108.13 CONTRACTOR SIGN.

Provide and maintain Contractor Sign(s) as specified in Technical Specification Section 4580 Project Identification Signs.

108.14 NOT USED.

108.15 PERMITS. Unless otherwise provided in the Special Provisions, Contractor shall obtain and pay for all construction permits and licenses. City shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of opening of Bids, or, if there are no Bids, on the Effective Date of the Contract. City shall pay all charges of utility owners for connections for providing permanent service to the Work.

END OF SECTION 108

SECTION 109

UTILITIES

109.1 GENERAL.

Utilities for the purposes of these specifications include, but not be limited to: tracks, overhead or underground wires, street lighting and traffic signals, fire alarm systems, pipe lines (water, sewer, oil, force main, gas, and storm), conduits, cables, ducts, transmission lines, structures and appurtenances owned, operated, or maintained by the City, Public Utilities, Private Parties, Special Utility Districts, businesses and individuals solely for their own use or use of their tenants.

When known, locations of surface and subsurface utilities and structures are shown on the plans for the convenience of the Contractor. The City does not guarantee that all such items are shown, nor does it assume responsibility for failure to show any structure or utility on the plans or to depict them in the exact location horizontally or vertically. Such failure shall not be cause for claims for extra compensation for extra work or for increasing the pay quantities. However, if an obstruction or utility is encountered that is not shown on the plans or is inaccurately shown on the plans which necessitates changes in lines or grades, or requires the building of special works, not otherwise shown in the plans and proposal, then a case for extra work may exist and the Engineer may authorize it.

The City shall make available to the Contractor, upon request, all TV video records that it may have on existing sewer lines that are affected by the project. With regard to existing utility systems, the plan, profile and "As-built" drawings that the Engineer, local utilities, or other agencies of government or private firms may furnish are for the Contractor's general information to show approximate depths, sizes, locations and elevations. The accuracy of these documents, relative to the actual location and sizes of underground utilities, cannot be guaranteed, since it is a recognized fact that underground piping is known to deflect, to settle, to become disjointed or displaced, and to slightly shift or migrate from its originally installed position, etc., and maintenance crews may modify or alter utilities without revising the existing drawings. Consequently, the Contractor is responsible for conducting an independent examination to determine the actual dimensions, sizes, depths, etc., of existing in ground utilities.

Test pits, for the purpose of locating underground utilities or structures in advance of the construction, shall be excavated and backfilled by the Contractor. Test pits shall be backfilled immediately after their purpose has been satisfied and the surface restored and maintained in a manner satisfactory to the Engineer. Test pits shall not be paid for separately. Costs for test pits shall be included in the price bid for other items. Test pits are at Contractor's option and expense. The Contractor's decision not to examine and determine the accuracy of drawings furnished by the City or by others is at the Contractor's sole risk. The contractor shall have no cause for additional compensation or time due to failure to verify the actual conditions and dimensions of underground facilities.

109.2 UTILITIES IN PUBLIC RIGHT-OF-WAY.

With the exceptions of water and sewer systems owned by the City and facilities specified in Section 109.4.6, the removal, adjusting, relocation or replacement of utility structures or facilities within the public right-of-way which, in the opinion of the Engineer, may be necessary for construction of the Work, shall be performed by the respective owners of the utilities at their expense.

City owned utilities including water services, water mains, sewers, sewer services and force mains that need to be adjusted or relocated shall be temporarily or permanently disconnected, adjusted or relocated are considered part of the Contractor’s work. If no pay item is included for the disconnection, relocation or adjustment; all labor, material, equipment, appurtenances and supplies to perform the relocations and adjustments shall be included in the unit price or lump sum price for pay item requiring the utility to be relocated or adjusted.

While it is the respective utility owner's responsibility to perform any work and bear any expense involved in relocations and adjustments called for on the plans or designated by the Engineer, it shall be the Contractor's responsibility to protect and maintain those utilities which, in the opinion of the Engineer, do not need to be disturbed in order to accomplish the Work required by thecontract.

109.3 NOTIFICATION OF PUBLIC AND PRIVATE UTILITIES. Prior to the advertisement of the Project for bidding, the City and the known utility owners affected by the Work in public rights-of-way will exchange information which provides, on the part of the utility, the location of all known facilities within the right-of-way and the avoidance of these utilities by the design of the Work by the City, where feasible. The City will not be responsible for the accuracy of the locations so designated by the utility owner. Service connections may or may not be shown.

When the Project is advertised for bidding, the Engineer will notify known owners of utilities affected and provide them with plans of the improvements. This notification will generally allow sufficient time for the removal, adjustment, relocation or replacement of facilities prior to the commencement of construction. When, in the opinion of the Engineer, extensive work on the part of the utility owner necessitates more time than normal notification would allow, sufficient time, as determined by the Engineer, shall be given to perform the work, either through prior notification or through a delay in the commencement of the project work. Utility work which, in the opinion of the Engineer, may be done more feasibly in conjunction with the construction work, may be allowed, and the scheduling of such work shall be approved by the Engineer, and the cooperation of the Contractor is required.

In the event of conflict these specifications and Louisiana R.S., the Louisiana R.S. shall govern.

109.4 COOPERATION BETWEEN CONTRACTOR AND UTILITIES.

109.4.1 General. When the Work Order is received, the Contractor shall notify Louisiana One Call and the owners of utilities affected of the approximate date upon which he will begin work and shall submit a progress schedule of the proposed work. This shall be deemed sufficient notice if the project progresses according to the progress schedule submitted with the notification. If changes in the schedule of work occur, the Contractor shall apprize both the owner of the utility affected and the Engineer so that adjustments in the work schedule of the utility can be made. The Contractor shall be responsible for damages to the utility facilities and construction delays resulting from failure to notify the utility and the Engineer of changes in procedure or location. In order to avoid misunderstanding, the Contractor and the utility representatives on the job should establish a close working relationship.

109.4.2 Abandoned Utilities. Utilities, shown on the plans to be abandoned, which interfere with construction shall be removed by the Contractor and, if so designated, will be paid for as provided in Section 302. If no provision is made for payment, the removal shall be considered incidental and the cost of such removal shall be included in the price bid for other items. If noted on the plans or in the Special Provisions or if directed by the Engineer a utility owner may salvage his abandoned facilities. The arrangements for such salvage between the utility owner and the Contractor must be approved by the Engineer. The condition of the area of salvage must be no worse after the salvage operation than it was prior to the salvaging as determined by the Engineer. The Engineer shall require the utility owner to make repairs to the area of salvage if, in his opinion, the area is not in a good condition as it existed just prior to the salvage operation. In the salvage operation, the Contractor shall not be responsible for the work of the utility.

109.4.3 Utilities Not Within Working Limits. The protection and preservation of utility facilities which are located within the right of way, but outside the normal limits of construction, as determined by the Engineer, shall be the responsibility of the Contractor. The Contractor shall be responsible for all damage to utilities which are due to his negligence.

109.4.4 Utilities To Be Adjusted. The owners of utility facilities which require relocation, removal, adjustment or replacement shall, if possible and feasible, perform this work prior to the commencement of the Contractor's work. Where utility work must be done in conjunction with the Contractor's work on the project or in conjunction with the work of other utilities, arrangements for when, how, and where the

operation is to proceed shall be worked out among the parties concerned. If disputes arise, the Engineer shall decide the course of action to be taken.

109.4.5 Utilities Conflicting With Operations. Those utility facilities which do not conflict with the improvement, but which are obstructions to the operations required for installation or which present unusual difficulty due to their close proximity to the area of the operation shall be located with certainty by the owners of the utility prior to the arrival of the Contractor's operation which would be hindered by the utility facility. The Contractor is required to preserve the utility facility in place without damage and shall be responsible for damages sustained, if the utility owner has located the facility by exposing it to the view of the Contractor or has otherwise shown the Contractor, with certainty, the location of the facility. Any other arrangements that the Contractor may make with a utility owner as a substitute for the requirements of this section shall require the approval of the Engineer, in writing.

109.4.6 Utilities to be Relocated or Adjusted Under A Contract Item. Those facilities owned by Public or Private Utilities which by reason of right of way or other agreements, rental to the City or other reasons, which require adjustment or relocation and are to be paid for under a contract item, shall have the adjustment or relocation work done on them by the utility owner. ; unless indicated differently elsewhere in the Contract Documents. The work done for relocation or adjustment of utilities owned by the City paid for under a contract item shall be performed by the Contractor.

The price bid for these items is set by the City and is based on preliminary estimates. The actual amount paid to the Contractor will be the amount of the invoice submitted by another contractor to the Contractor, or the amount of an invoice prepared by the Contractor, any of which must be substantiated by cost figures and which shall be approved by the Engineer.

109.4.7 Unknown Utilities. If, during the progress of the Contractor's work, underground utility structures or lines are found which were not indicated on the plans or if shown on the plans are in locations materially different from that shown, the City shall endeavor to discover the owner of the disclosed utility and have the owner perform any relocation or adjustment work necessary, however, if the owner cannot be immediately determined or if the Engineer decides that adjustment is necessary immediately, the Engineer may order the Contractor to perform the necessary work and pay him as prescribed in Section 105.

109.4.8 Mislocated Utilities. The owner of a utility shall be wholly responsible for the proper location of his facilities which are affected by construction work performed according to these specifications. Improperly located or mislocated facilities which are damaged during construction shall be the responsibility of the utility, providing notification according to Section 109.3 has beengiven.

109.5 WORK BY UTILITIES. All excavation and backfill work done by owners of utilities on projects for the City shall be performed to the same standard as required of the Contractor for the installation of similar items. Except for work performed by the utility owner under Section 109.4.2, it shall be the responsibility of the Contractor to inform the Engineer if the utility owner does not use a suitable backfill material or achieve an adequate compaction in his operation.

109.6 UNDERGROUND FACILITIES AT OTHER WORK SITES

The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to Sites other than public rights-of-way is based on information and data furnished to Engineer by the owners of such Underground Facilities, including City, or by others.

1. Engineer and City shall not be responsible for the accuracy or completeness of any such information or data provided by others; and

2. the cost of all of the following will be included in the Contract Amount, and Contractor shall have full responsibility for:

    a. reviewing and checking all such information and data;

    b. locating all Underground Facilities shown or indicated in the Contract Documents;

c. coordination of the Work with the owners of such Underground Facilities, including City, during construction; and

d. the safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work

If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated with reasonable accuracy in the Contract Documents, Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith, identify the owner of such Underground Facility and give written notice to that owner and to Engineer. Engineer will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence or location of the Underground Facility. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.

If Engineer concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued to reflect and document such consequences. An equitable adjustment shall be made in the Contract Amount or Contract Time, or both, to the extent that they are attributable to the existence or location of any Underground Facility that was not shown or indicated with reasonable accuracy in the Contract Documents and that Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated. If City and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment in Contract Amount or Contract Time, City or Contractor may make a Claim therefor as provided in Section 105, Changes in Work.

END OF SECTION 109

SECTION 110

PROSECUTION AND PROGRESS OF WORK

110.0 CONTROLLING ITEM OF WORK.

The controlling item of work will be established by a Construction Progress Schedule developed by the Contractor and reviewed by the Engineer. Progress Meetings will be scheduled as specified in Technical Specification Section 4200 Project Meetings. At these meetings, the Contractor will provide a progress update indicating whether or not the project is on, behind, or ahead of schedule. An updated construction progress schedule will be submitted at the Progress Meeting that incorporates any approved changes in schedule and overall contract time. If the project is behind schedule a recovery plan to get the project back on schedule shall be submitted for review by the Engineer. The Engineer will notify the Contractor if it does not believe the recovery schedule will result in meeting the contract time within seven (7) calendar days. Failure of the Engineer and City to respond within the designated response time or at all does not relieve the Contractor of his responsibility to complete the contract within the contract time.

110.1 SUBLETTING OF CONTRACT.

Contractor shall not employ any Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, against whom City may have reasonable objection. Contractor shall not be required to employ any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against whom Contractor has reasonable objection.

Prior to entry into any binding subcontract or purchase order, furnish an informational submittal identifying proposed Subcontractors, along with their Louisiana Contractors License Number and the expiration date if applicable. The initial submittal shall include Subcontractors identified on FSC Form 2 submitted prior to execution of the Contract. Proposed Subcontractors shall be deemed acceptable to the Engineer unless a substantive, reasonable objection is raised within 7 days. Refer to Section 40 – Fair Share Requirements, 4.0 Addition/Replacement of Subcontractors After Submission for additional requirements. The Contractor shall maintain adequate records at all times to show compliance with the licensure requirements of all subcontracts and Subcontractors.

If no objection is raised, the Contractor will be permitted to sublet a portion of the work but shall be required to pay at least 51 percent of wages paid under the contract to workmen, mechanics or labors who are employed directly by the Contractor's own organization. Any items designated in the contract as "Specialty Items" may be performed by subcontract, and the cost of any such Specialty Items so performed by subcontract may be deducted from the total cost before computing the amount of work required to be performed by the Contractor with his own organization. No subcontracts or transfer of contract shall serve to relieve the Contractor of its liability under the contract and bonds.

A Subcontractor shall not subcontract any portion of its authorized work.

Contractor shall be fully responsible to City and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions. Nothing in the Contract Documents:

a. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between City or Engineer and any such Subcontractor, Supplier or other individual or entity; nor

b. shall create any obligation on the part of City or Engineer to pay or to see to the payment of any moneys due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.

Contractor shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work under a direct or indirect contract with Contractor.

Contractor shall require all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work to communicate with Engineer through Contractor. The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.

All Work performed for Contractor by a Subcontractor or Supplier will be pursuant to an appropriate agreement between Contractor and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of City and Engineer. Whenever any such agreement is with a Subcontractor or Supplier who is listed as a loss payee on any property insurance required in the Special Provisions, the agreement between the Contractor and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against City, Contractor, Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, Contractor will obtain the same.

110.2 NOTICE TO PROCEED. The written "Notice to Proceed" will stipulate the date on which the Contract Time will commence to begin and on which the Contract shall start to perform its obligations under the Contract Documents.

110.3 CONSTRUCTION PROGRESS SCHEDULE Provide a Construction Progress Schedule in accordance with requirements of Technical Specification Section 4310 Construction Schedule.

110.4 PROSECUTION OF WORK.

110.4.1 General. The Contractor shall provide sufficient materials, equipment and labor to guarantee completion of the project in accordance with the plans and specifications within the contract time. If the completed work on any contract is behind the approved progress schedule, the Contractor shall take immediate steps to restore satisfactory progress.

Each item of construction shall be prosecuted to completion without delay and in no instance shall the Contractor transfer his equipment or forces from uncompleted construction without prior notice to, and approval of, the Engineer. If the prosecution of the work is discontinued for an extended period of time, the Contractor shall give the Engineer written notice at least 48 hours before resuming operations.

110.4.2 Disqualification. The Contractor's progress will be reviewed every two weeks and determined monthly at the time of each partial pay estimate. Progress will be based on the total amount earned by the Contractor as reflected by the partial pay estimate. Contractor's progress will be compared to the expected amount earned based on the construction progress schedule and schedule of values submitted at the start of the project. If the Contractor's progress is more than 10% behind the expected amount earned, he will be notified that he will be subject to disqualification if his progress becomes delinquent by more than the percentages specified hereinafter, and such additional notification will be made as the Engineer deems necessary concerning the progress delinquency of the Contractor.

Prior to the elapsing of 25% of the contract time, the Contractor will be disqualified if his progress on any contract, is more than 20% behind the expected amount earned. After 70% of the contract time has elapsed, the Contractor will be disqualified if his progress on any contract is more than 15% behind the expected amount earned.

During the period of disqualification, the Contractor will not be permitted to bid on future contracts nor will he be approved as a subcontractor on future contracts until all work on the contract has been satisfactorily completed or the progress has recovered to within 10% of the construction progress schedule and expected amount earned.

110.5 LIMITATION OF OPERATIONS. The Contractor shall conduct the work at all times in such manner and sequence as will assure the least interference with traffic. He shall have due regard to the location of detours and to the provisions for handling traffic. He shall not open up work to the prejudice or detriment of work already started, and the Engineer may require the Contractor to finish a section on which work is in progress before work is started on any additional sections if the opening of such section is essential to public convenience.

110.6 CHARACTER OF WORKMEN; METHODS AND EQUIPMENT. The Contractor shall at all times employ sufficient labor and equipment for prosecuting the work to full completion in the manner and time required by these specifications.

110.6.1 Personnel. All workmen shall have sufficient skill and experience to perform properly the work assigned to them. Workmen engaged in special work or skilled work shall have sufficient experience in such work and in the operation of the equipment required to perform the worksatisfactorily.

Any person employed by the Contractor or by any subcontractor who, in the opinion of the Engineer, does not perform his work in a proper and skillful manner or is intemperate or disorderly shall, at the written request of the Engineer, be removed forthwith by the Contractor or subcontractor employing such person and shall not again be employed in any portion of the work without the approval of the Engineer. Should the Contractor fail to remove such a person or fail to furnish suitable and sufficient personnel for proper prosecution of the work, the Engineer may suspend the work by written notice until such orders are complied with.

110.6.2 Methods and Equipment. All equipment proposed for use on the work shall be of sufficient size and in such mechanical condition as to meet requirements of the work and to produce a satisfactory quality of work. Equipment used on any portion of the project shall be such that no damage to the roadway, adjacent property or other highways will result from its use.

When the methods and equipment to be used by the Contractor in accomplishing the construction are not prescribed in the contract, the Contractor is free to use any methods or equipment that will accomplish the contract work in conformity with the requirements of the contract.

When the contract specifies the use of certain methods and equipment, such methods and equipment shall be used unless others are authorized by the Engineer. If the Contractor desires to use a method or type of equipment other than specified in the contract, he may request authority from the Engineer to do so. The request shall be in writing and shall include a full description of the methods and equipment proposed and the reasons for desiring to make the change. If approval is given, it will be on the condition that the Contractor will be responsible for producing construction work in conformity with contract requirements. If, after trial use of the substituted methods or equipment, the Engineer determines that the work produced does not meet contract requirements, the Contractor shall discontinue the use of the substitute method or equipment and shall complete the remaining work with the specified methods and equipment. The Contractor shall remove the deficient work and replace it with work of specified quality or take such other corrective action as the Engineer directs. No change will be made in basis of payment for the construction items involved or in contract time as a result of authorizing a change in methods or equipment under these provisions.

110.7 DETERMINATION AND EXTENSION OF CONTRACT TIME. The number of days or the dates stated in the Agreement to: achieve Milestones; if any; achieve Final Completion; and complete the Work so that it is ready for final payment excluding retainage will be known as the Contract Time. When any period of time is referred to in the Contract Documents by days, it will be computed to exclude the first and include the last day of such period. If the last day of the applicable jurisdiction, such day will

be omitted from the computation.

110.7.1 Working Day Basis. When the contract time is on a working day basis, the Engineer will furnish the Contractor a monthly statement showing the number of days charged to the contract for the preceding month and the number of days specified for completion of the contract.

The Contractor will be allowed 10 days in which to file a written protest setting forth in what respect said monthly statement is incorrect, otherwise the statement shall be deemed to have been accepted by the Contractor as correct.

If a protest is filed by the Contractor, the City shall conduct such reviews and investigations as required to rule on the protest within 30 days from the date the statement is furnished the Contractor. The number of days charged as listed, or revised within the above allotted time, shall become final at the end of this 30-day period, subject to change only through legal action.

When the Contract Time is on a Working Day basis, time will be charged for each day the Contractor can perform Work with his normal work force for 75 percent of the day or 6 hours in any 8-hour shift. The work force that is actively engaged in prosecuting Work will be considered as the "normal workforce".

A calendar day, with the exceptions stated herein, on which weather and other conditions not under control of the Contractor will permit construction operations to proceed for at least 5 continuous hours of the day with the normal working force engaged in performing the Work is considered a Working Day. No working days will be charged for the days listed below, except as specified in the subsequent paragraph.

a. Saturdays and Sundays

b. City-recognized holidays that are defined as regular legal holidays or special holidays that may be proclaimed by the Mayor or fixed by the City Council

c. Days on which delays, attributable solely to the Department or other governmental agencies, prevent the Contractor from proceeding with the Work in effect at the time of delay

d. Days on which delays are attributable to the direct effect of strikes, riots, or civil commotions.

If the Contractor performs Work which requires Engineering layout, supervisions, or inspection on Saturday, Sunday, or a City-recognized holiday, a Working Day will be charged regardless of the size of the working force or the number of hours worked. Any work done in connection with the continuing of curing, loading of test piles, watering of sod, etc. as required by the specifications is excluded from the work defined in this subsection, and a Working Day will not be charged if that is the only work performed.

110.7.2 Calendar Day Basis. When the contract time is on a calendar day basis, it shall consist of the number of calendar days stated in the contract beginning with the effective date of the Engineer's order to commence work, including all Saturdays, Sundays, holidays and non-work days. All calendar days elapsing between the effective dates of any written orders by the Engineer to suspend work and to resume work for suspensions not the fault of the Contractor shall be excluded.

When the contract completion time is a fixed calendar date, it shall be the date on which all Work on the Project is complete. The number of days for performance allowed in the contract as awarded is based on the original quantities and includes the time necessary to procure material, equipment and an adequate labor force to complete the work properly. If satisfactory fulfillment of the contract requires performance of work in greater quantities than those set forth in the proposal, the contract time allowed for performance shall be increased on a basis commensurate with the amount and difficulty of the added work.

If the Contractor finds it impossible, for reasons beyond his control, to complete the work within the contract time as specified or as extended in accordance with the provisions of this Subsection, he may, at any time prior to the expiration of the contract time as extended, make written request to the Engineer for an extension of time setting forth therein the reasons which he believes justify granting his request. 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 conditions beyond the control and without the fault of the Contractor, he may extend the time for completion in such amount as conditions justify. The extended time for completion shall be in full force and effect as though it were the original time for completion. When final acceptance has been made by the Engineer as prescribed in Subsection 111.8.

110.8 LIQUIDATED DAMAGES. For each calendar day or work day, as specified, that any work shall remain uncompleted after the contract time specified for the completion of the work required by the contract, the Contractor shall pay the City two thousand dollars ($2,000) not as penalty, but as liquidated damages until project is substantially complete. Once project has reached substantial completion, but not final completion liquidated damages shall be reduced to five hundred dollars ($500) for each calendar day or work day as specified. The amount of liquidated damages shall be deducted from any money due the Contractor or that becomes due the Contractor for work performed after the Final Completion Date. Due account shall be taken of any adjustment of the contract time for completion of the work granted under the provisions of Subsection 110.7.

Permitting the Contractor to continue the work after expiration of the contract time or extended contract time will in no way operate as a waiver on the part of the City of any of its rights under the contract. The City may waive such portions of the liquidated damages as may accrue after the work is in condition for safe and convenient use by the traveling public.

Contractor further acknowledges and agrees that in the event any provisions in any of the Contract Documents conflict with the provisions of this paragraph or otherwise provide for damages resulting from Contractor's delay, the provisions of this paragraph shall control, and such conflicting provisions and any Contract Documents shall not constitute, and shall not be construed as, a basis by which to render the provisions of this paragraph unenforceable.

The amount of liquidated damages will be deducted from any money due the Contractor under this contract, and the Contractor and his surety shall be liable for any liquidated damages in excess of amounts due or to become due to the Contractor.

110.9 TERMINATION FOR CAUSE. The occurrence of any one or more of the following events will justify termination for cause:

a. Contractor’s failure to begin the Work within the time specified in the Notice to Proceed;

b. Contractor’s failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Construction Progress Schedule;

c. Contractor’s unsuitable performance of the Work, neglect, refusal to remove materials, or refusal to correct any new Work rejected as unacceptable;

d. Contractor’s failure to complete the project within the Contract Time;

e. Contractor’s failure to resume Work which has been discontinued within a reasonable amount of time after receiving notice to do so;

f. Contractor becomes insolvent, is declared bankrupt, or commits any act of bankruptcy or insolvency;

g. Contractor allows any final judgment to stand against him unsatisfied for a period of 10 days;

h. Contractor makes an assignment for the benefit of creditors;

i. Contractor's disregard of Laws or Regulations of any public body having jurisdiction;

j. Contractor's repeated disregard of the authority of Engineer; or

k. Contractor's violation in any substantial way of any provisions of the Contract Documents.

If one or more of the events identified in the preceding paragraph occur, City may, after giving Contractor (and surety) seven days written notice of its intent to terminate the services of Contractor:

a. exclude Contractor from the Site, and take possession of the Work and of all Contractor's tools, appliances, construction equipment, and machinery at the Site, and use the same to the full extent they could be used by Contractor (without liability to Contractor for trespass or conversion);

b. incorporate in the Work all materials and equipment stored at the Site or for which City has paid Contractor but which are stored elsewhere; and

c. complete the Work as City may deem expedient.

If City proceeds with termination as described in the preceding paragraph, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by City arising out of or relating to completing the Work, such excess will be paid to Contractor. If such claims, costs, losses, and damages exceed such unpaid balance, Contractor shall pay the difference to City. Such claims, costs, losses, and damages incurred by City will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this Paragraph, City shall not be required to obtain the lowest price for the Work performed.

Notwithstanding the preceding paragraphs, Contractor's services will not be terminated if Contractor begins within seven days of receipt of notice of intent to terminate to correct its failure to perform and proceeds diligently to cure such failure within no more than 30 days of receipt of said notice.

Where Contractor's services have been so terminated by City, the termination will not affect any rights or remedies of City against Contractor then existing or which may thereafter accrue. Any retention or payment of moneys due Contractor by City will not release Contractor from liability.

If and to the extent that Contractor has provided a performance bond, the termination procedures of that bond shall supersede the provisions of this subsection.

110.10 TERMINATION OF CONTRACTOR'S RESPONSIBILITY. The contract will be considered complete when all work has been satisfactorily completed including restoration, the final inspection made and the work accepted by the chief Engineer. The Contractor will then be released from further obligation except as set forth in his contract bond, and except as provided in Subsection 108.9.2.

110.11 TERMINATION FOR CONVENIENCE. Upon seven days written notice to Contractor and Engineer, the City will terminate the Contract or portion thereof when the Contractor is prevented from proceeding with the Work as a direct result of an Executive Order of the President with respect to the prosecution of war or in the interest of national defense, or by court order. Upon seven days written notice to Contractor and Engineer, City may, without cause and without prejudice to any other right or remedy of City, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):

a. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;

b. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses;

c. all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others; and

d. reasonable expenses directly attributable to termination.

Contractor shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination. Acceptable materials, obtained or ordered by the Contractor for the work and that are not incorporated in the work shall, at the option of the Contractor, be purchased from the Contractor at the actual cost as shown by receipted bills and actual cost records at such points of delivery as may be designated by the Engineer. Termination of a contract or a portion thereof shall not relieve the Contractor of his responsibilities for the completed work, nor shall it relieve his surety of its obligation for and concerning any just claim arising out of the work performed.

110.12 COMPLETION.

110.12.1 Substantial Completion. When the construction as specified in the contract is substantially complete, the Contractor shall notify the City Engineer in writing that the work will be ready for inspection on a definite date which shall be stated in such notice. The notice shall bear the signed concurrence of the Engineer having charge of inspection and construction and shall be given at least ten (10) days prior to the date stated for the inspection. If the City determines that the work is as represented, it will make arrangements to have the substantial completion inspection commenced on the date stated in such notice, or as soon thereafter as practical. If the project is found to be substantially complete, the Engineer will notify the Contractor and will issue a certificate of Substantial Completion. Said certificate shall be dated as of the date of the inspection. If, however, the inspection discloses any work, in whole or in part, as being unsatisfactory, the Engineer will give the Contractor the necessary instructions for correction of same, and the Contractor shall immediately comply with and execute such instructions. Upon correction of the work, another inspection will be made which shall constitute the final inspection provided the work has been satisfactorily completed. In such event, the Engineer will notify the Contractor in writing of the completion as of the date of final inspection.

110.12.2 Partial Utilization. Prior to Final Completion of all the Work, City may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which City, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by City for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:

a. City at any time may request Contractor in writing to permit City to use or occupy any such part of the Work which City believes is substantially complete and ready for its intended use. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, City, and Engineer will follow the procedures of Subsection 110.12 for that part of the Work.

b. Contractor at any time may notify City and Engineer in writing that Contractor considers any such part of the Work substantially complete and ready for its intended use and request Engineer to issue a certificate of Substantial Completion for that part of the Work.

c. Within a reasonable time after either such request, City, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify City and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Subsection 110.12 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.

110.12.3 Final Completion. When the construction necessary to address deficient or incomplete work identified in the substantial completion inspection has been completed, the Contractor shall notify the City Engineer in writing that the work will be ready for final inspection on a definite date which shall be stated in such notice. The notice shall bear the signed concurrence of the Engineer having charge of inspection and construction and shall be given at least ten (10) days prior to the date stated for final inspection. If the City determines that the work is as represented, it will make arrangements to have final inspection commenced on the date stated in such notice, or as soon thereafter as practical. That inspection shall constitute the final inspection. If the project is found to be complete, the Engineer will notify the Contractor and will issue a certificate of Final Completion. Said certificate shall be dated as of the date of final inspection. If, however, the inspection discloses any work, in whole or in part, as being unsatisfactory, the Engineer will give the Contractor the necessary instructions for correction of same, and the Contractor shall immediately comply with and execute such instructions. Upon correction of the work, another inspection will be made which shall constitute the final inspection provided the work has been satisfactorily completed. In such event, the Engineer will notify the Contractor in writing of the completion as of the date of final inspection.

110.12.4 Contractor May Stop Work or Terminate.

If, through no act or fault of Contractor, (i) the Work is suspended for more than 90 consecutive days by City or under an order of court or other public authority, or (ii) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (iii) City fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to City and Engineer, and provided City or Engineer do not remedy such suspension or failure within that time, terminate the Contract and recover from City payment on the same terms as provided in Section 110.11.

In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or City has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to City and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this subsection are not intended to preclude Contractor from making a Claim under Section 105 for an adjustment in Contract Price or Contract Time nor otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this subsection.

END OF SECTION 110

SECTION 111

MEASUREMENT AND PAYMENT

111.1 MEASUREMENT OF QUANTITIES. All work completed under the contract will be measured by the Engineer according to United States standard measure. The Engineer shall be the judge as to the accuracy of any measurements or any approximations made in lieu of accurate determinations and his decisions shall be binding upon both parties.

When specified, pay quantities will be the design lengths, volumes, areas or weights as specified in the contract plans with adjustments thereto based on actual lengths, volumes, areas and weights measured in the field. Unless otherwise specified, longitudinal measurements for area computations will be made horizontally. Unless otherwise specified, transverse measurements for area computations will be the neat dimensions shown on the plans or ordered in writing by the Engineer.

A station when used as a definition or term of measurement will be 100 linear feet. Structures will be measured according to neat lines shown on the plans or as altered to fit field conditions.

All items which are measured by the linear foot, such as water lines, sewer, pipe culverts, underdrains, etc., will be measured parallel to the base or foundation upon which such structures are placed, unless otherwise specified. In computing volumes of excavation, the average end area method or other acceptable methods will be used. The thickness of plates and galvanized sheet used in the manufacture of corrugated metal pipe, metal plate pipe culverts and arches, and metal cribbing will be measured in decimal fractions of inches.

The term "ton" will mean the short ton consisting of 2,000 pounds. All materials which are measured or proportioned by weight shall be weighed on accurate, approved scales by competent, qualified Personnel at locations designated by the Engineer. If material shipped by rail, the car weight may be accepted provided the actual weight of material only will be paid for. However, car weights will not be acceptable for material to be passed through mixing plants. Trucks used to haul material being paid for by weight shall be weighed empty at such times as the Engineer directs, and each truck shall bear a plainly legible identification mark.

Materials specified to be measured by volume in the hauling vehicle shall be hauled in approved vehicles and shall be measured therein at the point of delivery. Vehicles may be of any size or type acceptable to the Engineer, provided the body of the vehicle is of such shape that the actual volume or capacity may be readily and accurately determined. All vehicles shall be loaded to at least a predetermined permanently fixed mark, which defines a known volume or capacity, upon arrival at the point of delivery. No vehicle will be approved unless its capacity, or the volume below the predetermined permanently fixed mark, is in multiples of 0.5 cubic yard except that when tail-gate spreader-boxes are used to place aggregate materials under Section 104.9, Load Restrictions, the volume of the spreader-box will be added to the volume of the vehicle.

Whenever possible and unless otherwise specified, pay quantities will be the designed volumes, areas or weights as specified in the contract plans and adjustments thereto. Asphaltic materials will be measured by the gallon or ton.

Net certified scale weights or weights based on certified volumes in the case of shipments by rail, truck or other transport will be used as a basis of measurement, subject to correction when material has been lost in transit, wasted or otherwise not incorporated in the work. When asphaltic materials are shipped by truck or transport, net certified weights or volume, subject to correction for loss or foaming, may be used for computing quantities.

Portland cement will be measured by the barrel, ton or hundred-weight (CWT). The term barrel will mean 376 pounds of cement. Timber will be measured by the thousand feet board measure (MFBM) incorporated in the structure. Measurement will be based on nominal widths and thicknesses and the extreme length of each piece.

The term "lump sum" when used as an item of payment will mean complete payment for the work described in the contract. When a complete structure or structural unit (in effect, "lump sum" work) is specified as the unit of measurement, the unit will be construed to include all necessary fittings and accessories.

Rental of equipment will be measured by the time in hours of actual working time and necessary traveling time of the equipment within the limits of the project unless special equipment has been ordered by the Engineer in connection with force account work in which case travel time and transportation to the project will be measured. If equipment has been ordered held on the job on a standby basis by the Engineer, half time rates for the equipment will be paid.

When standard manufactured items are specified such as fence, wire, plates, rolled shapes, pipe conduit, etc., and these items are identified by gage, unit weight, section dimensions, etc., such identification will be considered to be nominal weights or dimensions. Unless more stringently controlled by tolerances in cited specifications, manufacturing tolerances established by the industries involved will be accepted.

If conversion is necessary from United States standard units to International System of Units (SI units) or from SI units to U.S. standard units the guidelines, terminology, conversion factors and rules for rounding in the Standard Metric Practice Guide, AASHTO Designation: R 1 will be used.

111.2 SCOPE OF PAYMENT. The Contractor shall receive and accept compensation provided for in the contract as full payment for furnishing all labor, equipment, materials, appurtenances, supplies and incidentals for performing all work under the contract in a complete and acceptable manner and for all risk, loss, damage or expense arising out of the nature of the work or the prosecution thereof, subject to the Provisions of Subsection 108.9.

If the "Basis of Payment" clause in the specifications relating to any unit price in the bid schedule requires that the said unit price cover and be considered compensation for certain work or material essential to the item, this same work or material will not also be measured or paid for under any other pay item.

A back charge is a billing for Work performed or costs incurred by the City that should have been performed or incurred by the Contractor. The City may back charge the Contractor by deducting the actual costs from compensation earned for Work completed in accordance with requirements of the Contract Documents.

111.3 COMPENSATION FOR ALTERED QUANTITIES. When accepted quantities of work vary from the quantities in the bid schedule, the Contractor shall accept as payment in full, so far as contract items are concerned, payment at the original contract unit prices for the accepted quantities of work done. No allowance, except as provided in Subsection 105.2, will be made for any increased expense, loss of expected reimbursement or loss of anticipated profits suffered or claimed by the Contractor resulting either directly from such alterations or indirectly from unbalanced allocation among the contract items of overhead expense on the part of the bidder and subsequent loss of expected reimbursements therefore or from any other cause.

111.4 EXTRA WORK. Extra work shall be performed in accordance with the requirements of Section 105.3. Payment for Extra Work will be made as authorized in a Work Change Directive or Change Order.

111.5 PARTIAL PAYMENTS. Provided work is prosecuted in accordance with the provisions of the contract and with such progress as satisfactory to the City and Engineer, the Contractor will make or cause to be made, the first pay estimate within two calendar months from the date indicated to begin work in the "Notice to Proceed." The cutoff date for each successive pay estimate will be the end of each month thereafter until completion of the contract. Each pay estimate will be an approximation of the value of the work performed up to and including the date the estimate is made. The amount of said estimate, after deducting retainage and all previous payments, shall be due and payable to the Contractor. The pay estimates will be approximate and all pay estimates and payments shall be subject to corrections in the estimate rendered following discovery of any error in any previous estimates.

Should any defective work or material be discovered or should a reasonable doubt arise as to the integrity of any part of the work completed previous to the final acceptance and payment, there will be deducted from the first estimate rendered after the discovery of such defective or questioned work an amount equal in value to the defective or questioned work, and this work will not be included in a subsequent estimate until the defects have been remedied or the causes for doubt removed.

The payment of the pay estimate shall not be taken as an admission that the work is done or that its quality is satisfactory nor as a release of the Contractor from the responsibility for any portion thereof, but the whole work and all particulars relating thereto shall be subject to revision and adjustment by the Engineer at the time of final acceptance and final payment.

111.6 ELIMINATED ITEMS. Should any items contained in the proposal be found unnecessary for the proper completion of the work, the Engineer may, upon written order to the Contractor, eliminate such items from the contract and such action shall in no way invalidate the contract. When a Contractor is notified of the elimination of items, he will be reimbursed for actual authorized work done and all costs incurred, including mobilization of materials prior to said notification.

111.7 PAYMENT FOR STOCKPILED OR STORED MATERIAL.

111.7.1 General. Payment for stockpiled or stored material will be considered only for materials anticipated to be stored for periods in excess of 90 calendar days. When approved, advance payments may be made for fabricated or natural materials that are to be incorporated in the project when stockpiled materials are stored on the project or in a dedicated stockpile at an approved site outside the limits of the project within the State of Louisiana. Payments shall be limited to durable materials described herein and shall represent a significant portion of the project cost. Perishable articles and small warehouse items are not included. These materials shall meet the requirements of the specifications. Payment for stockpiled or stored materials will not constitute acceptance. It shall be the Contractor's responsibility to protect the material from damage while in storage.

Payment for materials stored outside the State of Louisiana will be considered, subject to approval of the City Engineer. This will generally be limited to adjacent states, except in cases where it will be in the best interest of the City to pay for these materials. If payment for stockpiled materials outside the State will affect the bid price for an item, the contractor shall submit a written request to the City Engineer prior to bidding.

Payment may be made for the invoice price for the materials, which shall not exceed 85 percent of the contract price for the items where the materials are to be incorporated. For fabricated materials purchased from commercial sources and delivered to approved storage, partial payment may be the invoice price plus freight and taxes. The quantity of material for payment will not exceed the total estimated quantity required to complete the project. The amounts advanced on stockpiled or stored materials will be recovered by the City through deductions made on payments as the materials are incorporated in the work.

Partial payment for stockpiled and/or stored materials shall be requested by the Contractor in writing and the following documents shall be furnished:

1. A copy of the invoices from supplier or manufacturer verifying the cost and quantity of material.

2. If storage is on private property, a copy of the lease or agreement granting the Department right of entry to property.

Within 30 calendar days after payment by the City, the Contractor shall submit a certified copy of invoices from the supplier for each item for which payment has been made. All such invoices submitted shall state the amount received by the supplier as payment in full for the materials. If this certification of

payment is not presented within the 30-day period, the advanced payment will be deducted from future progress payments. Title and ownership of materials for which advancements have been made by the City shall not vest in the City until such materials are incorporated in the work and the work accepted by the City. The making of advancements by the City shall not release the Contractor from the responsibility for any portion thereof.

111.7.2 Fabricated or Manufactured Materials. Fabricated or manufactured materials may include but is not limited to the following: Structural steel, fabricated structural steel items, steel piling; reinforcing steel; valves, electrical equipment; mechanical equipment; precast concrete items (valves, vaults, manholes, etc.); structural timber; timber piling; fencing and guard rail materials; fabricated sign structures and sign panels.

111.7.3 Other Material. These materials will normally be large quantities of natural or manufactured aggregate. The Contractor's request for payment of stockpiled natural material shall give a detailed description of the material, its intended use and location of the site. This material will be inspected and approved after placement in stockpiles on the project. Approval of the stockpiled material will be in writing.

111.8 ACCEPTANCE AND FINAL PAYMENT. Upon completion of the work, the Engineer will execute a certificate of final completion that the whole work provided for in the contract has been completed and accepted under the terms and conditions of the contract and said certificate of final completion will be recorded in the office of the Clerk of Court, Caddo Parish, Louisiana.

The City Engineer will issue the Contractor a letter of final acceptance, and the entire balance found to be due the Contractor, including all retained percentages, will be paid to the Contractor after the City has:

1. Satisfied itself that the quantities shown on the final estimate are correct,

2. The Contractor has complied with all requirements in Technical Specification Section 4700 Contract Closeout,

3. The Contractor has submitted to the City a "lien-free certificate" from the Clerk of Court, Caddo Parish, Louisiana, to the effect that there are no claims or liens recorded against the said contract. The date of said "lien-free certificate" shall not be prior to the expiration of 45 days after the certificate of final completion was recorded by the Contractor with the Clerk of Court, and

4. If the contract is for a paving assessment project, final payment will be made when the City Council of the City of Shreveport, in legal and regular session convened, approves and accepts the work of the Contractor and authorizes final payment.

Payment of the final estimate shall not operate to release the Contractor or his sureties from liability for any fraud in construction, or in obtaining progress payments, or in payment for materials, labor or other supplies or services incidental to the work, or for any and all claims for damages, loss or injury sustained by any persons through the fault, negligence or conduct of the said Contractor or any of his employees.

END OF SECTION 111

END OF PART 1

PART 2 MATERIALS

SECTION 200

AGGREGATES

200.1 GENERAL. The following specifications set forth the requirements for fine and coarse aggregates for Portland cement concrete, base and surface course aggregates for roadways, asphaltic concrete aggregate, crushed rock, crushed concrete, rip-rap stone. All aggregates shall be clean, hard sound, durable, uniform in quality, and free of any detrimental quantity of soft, friable, thin, elongated or laminated pieces, disintegrated material, organic matter, oil, alkali, or other deleterious substance. Unless otherwise specified, all percentages referred in Section 200 will be determined by weight.

200.2 FINE AGGREGATE:

200.2.1 General. Sand will consist of natural or manufactured granular material or a combination thereof, free of deleterious amounts of organic material, mica, loam, clay and other substances not suitable for the purpose intended.

200.2.2 Gradation. Sand shall conform to following gradations:

PERCENTAGE PASSING SIEVES

Sieve Size	Portland Cement Concrete	Mortar
3/8"	100	
No. 4	95-100	100
No. 8		
No. 16	45-90	95-100
No. 50	7-30	
No. 100	0-7	0-25
No. 200		0-10

200.2.3 Sand for Portland Cement Concrete. Sand for Portland cement concrete will be washed and will conform to the gradation specified for Portland cement concrete in Subsection 200.2.2. The maximum percentages of deleterious substances shall not exceed the following values:

	Percent
Material Passing No. 200 Sieve	3.0
Coal or Lignite	0.25
Clay Lumps	0.5

200.2.4 Sand for Asphalt Concrete. The sand will consist of clean, hard, durable, siliceous grains graded from coarse to fine and shall be reasonably free from vegetable matter or other deleterious substance. The fraction passing the No. 40 sieve will be non-plastic. The sand equivalent value of the fraction passing the No. 4 shall not be less than 35 when tested in accordance with AASHTO Designation: T 176 (Alternate Method No. 1 - Air Dry). These tests shall be performed when deemed necessary by the Engineer.

200.2.5 Sand for Mortar. The sand will conform to the gradation specified for mortar in Subsection 200.1.2.

200.2.6 Sand for Pneumatic Placed Concrete. Sand for pneumatic placed concrete will be washed and will Conform to the gradation for Portland cement concrete in Subsection 200.1.2. The amount of deleterious substances shall not exceed the limits prescribed in ASTM C-33.

200.2.7 Fill Sand. Fill sand for use in backfilling of pipe trenches, or for mixing with site excavated earth to improve the compaction of backfill in trenches under pavement shall be a sandy material which will easily compact to a stable foundation. It may be sand dredged from a river, a mixture of sand and gravel and sandy loam or other suitable material approved by the Engineer.

200.2.8 Sand for Pavement Base. Sand for pavement base will be granular material and will conform to Section 200.5.1.

200.3 COARSE AGGREGATE FOR PORTLAND CEMENT CONCRETE. Concrete aggregate shall be composed of gravel, crushed rock, crushed slag or a blended mixture of crushed rock and gravel. Blending of crushed rock and gravel shall produce a uniform, consistent percentage of each. All concrete aggregate shall be washed before delivery to the batching plant and shall conform to thefollowing:

Tests	Tests Method No.	Percent (By Weight)
Abrasion Loss	AASHTO T96	40% Max
Soundness	AASHTO T104	
Gravel	5 cycles	15% Max.
Crushed stone	5 cycles	15% Max.
Material Passing the No. 200 Sieve		1.0*
Clay Lumps	AASHTO T112	0.25
Soft Fragments	AASHTO T189	5.0
Iron Ore (Included in Soft Fragments)		
Max. Retained 3/4"		1.5
Max. Passing 3/4"		0.5
Coal and Lignite	AASHTO T113	1.0
Sticks (Wet)		0.25
Totals: Clay Lumps, Soft Fragments, Coal and Lignite, and Sticks		5.0

* In crushed aggregates, if material finer than the No. 200 sieve consists of the dust of fracture essentially free of clay or shale, the percentage may be increased to 1.5.

a. Gravel: This aggregate shall be reasonably free of clay coating of any character. Gravel which contains disintegrated or soft stone or shale, or excess of flat pieces, shall not beused.
b. Crushed Slag: Crushed slag shall consist of angular fragments reasonably free from flat or elongated pieces.

The crushed slag shall have a minimum dry rodded weight of 70 pounds per cubic foot when tested in accordance with AASHTO Designation: T 19 and shall be properly cured and stored such that it results in a chemically inert and stable aggregate. Because of its high absorption property, slag in stockpiles shall be kept uniformly wet.

Crushed slag shall contain not more than 10 percent by weight of glassy particles and show an abrasion loss of not mora than 40 percent. Higher percentages may be allowed for slags having demonstrated a satisfactory service record, at the discretion of the Engineer.

Concrete coarse aggregate will be designated by grade and shall conform to the following gradations, tested in accordance with AASHTO T27.

CONCRETE AGGREGATE GRADATIONS

Percentage Passing Sieves (By Weight)

Sieve Size	Grade D	Grade B	Grade A
2 ½"	100	-	-
2"	90 - 100	100	-
1 ½"	-	85 - 100	100
1"	40 - 80	-	95 - 100
¾"	-	20 - 88	-
½"	-	-	25 - 60
No. 4	0 - 6	0 - 6	0 - 10
No. 8	-	-	0 - 5

200.4 BASE COURSE AGGREGATES

200.4.1 Crushed Stone.

200.4.1.1 General. Crushed stone shall consist of fragments of hard, durable particles of stone showing an abrasion loss of not more than 45 percent, containing not more than 5 percent of soft, friable material, and shall be free from an excess of flat or elongated pieces.

200.4.1.2 Grading. The aggregate shall be uniformly graded and shall conform to the following gradation, tested in accordance with AASHTO 27.

Crushed Stone Base

Sieve Size	Percentage Passing Sieve
1 ½"	95 - 100
¾"	65 - 95
No. 4	0 - 15

200.4.1.3 Quality Requirements. The material shall conform to the following:

Tests	Test Method	Requirements
Abrasion Loss	AASHTO T96	45% Max.
Soundness	AASHTO T104	15% Max.

200.3.1 Crushed Concrete Base. Crushed concrete shall conform to the following grading requirements:

Sieve Size	Percentage Passing Sieve
1 ½"	100
¾"	70
No. 4	35 - 65
No. 200	5 -12

200.4 SURFACE COURSE AGGREGATE.

200.4.1 Gravel. Gravel shall consist of hard, durable, siliceous particles reasonably free of sticks and other deleterious matter, and shall meet the following gradation requirements:

Sieve Size	Percentage Passing (By Weight)
1 ½"	95 to 100
No. 4	0 to 15
Clay & Silt	2 percent max.

Gravel shall show an abrasion loss of not more than 45 percent.

200.4.2 Crushed Stone. Crushed stone shall consist of fragments of hard, durable particles of stone showing an abrasion loss of not more than 45 percent, containing not more than 5 percent soft, friable material, and shall be free from an excess of flat or elongated pieces. The material shall meet the following gradation requirements:

Sieve Size	Percentage Passing (By Weight)
1 ½"	95 to 100
¾"	0 to 15
Clay & Silt	2 percent max.

200.4.3 Binder. The binder shall be siliceous material conforming to the following gradation requirements:

Sieve Size	Percentage Passing (By Weight)
No. 4	85 to 100
No. 40	65 to 100
No. 200	10 to 60

Binder shall not contain more than a total of 4 percent by weight of foreign matter. It shall meet the following physical characteristics:

Liquid Limit (Max)	35
Plasticity Index	4-12

200.4.4 Sand Clay Gravel. Sand clay gravel shall be a mixture of sand, clay, and gravel; amixture prepared by either the mixing of gravel or crushed stone, sand and binder; or by the addition of gravel or crushed stone and/or binder to natural sand clay gravel.

The mixture as determined by visual inspection shall be reasonably free from deleterious materials. The combined materials shall meet the following gradation requirements:

Sieve Size	Percentage Passing (By Weight)
1 1/2"	95 to 100
3/4"	40 to 75
No. 4	20 to 50
No. 200	12 to 25

The fraction of sand clay gravel passing the No. 40 sieve, shall show the following physical characteristics:

Liquid Limit (Max)	35
Plasticity Index	0-12

The binder material used for preparation of an artificial mixture of sand clay gravel shall not have a plasticity index in excess of the plasticity index indicated above for the final product.

When tested by the Los Angeles abrasion test, the fraction of the sand clay gravel retained on the No. 4 sieve shall show an abrasion loss of not more than 45 percent.

200.5 ASPHALTIC SURFACE TREATMENT AGGREGATE. Aggregates for asphaltic surface treatment shall be from a source approved by the Department and may be uncrushed gravel; crushed aggregate (gravel, stone or slag); a combination of crushed and uncrushed gravel; or expanded clay aggregate.

200.5.1 Crushed Gravel. This aggregate shall consist of clean, tough, durable stone and shall be crushed and screened to conform to the gradation specified. A minimum of 80 percent of the crushed gravel retained on the No. 10 sieve shall have one or more fractured faces. Crushed gravel shall not show an abrasion loss of more than 40 percent and shall show a soundness loss of not more than 15 percent by weight when subjected to 5 cycles of the magnesium sulfate soundness test.

200.5.2 Crushed Stone. This aggregate shall consist of clean, tough, sound, durable particles of stone. The particles of stone shall be reasonably free from dust, vegetable or other deleterious matter and shall not show an abrasion loss of more than 40 percent. The stone shall be reasonably free from an excess of flat or elongated particles and shall show a soundness loss of not more than 15 percent by weight when subjected to 5 cycles of the magnesium sulfate soundness test.

200.5.3 Crushed Slag. Crushed slag shall consist of angular fragments reasonably free from flat or elongated pieces, dirt or other objectionable matter. The crushed slag shall have a minimum dry rodded weight of 70 pounds per cubic foot when tested in accordance with AASHTO Designation: T 19, and shall be properly cured and

stored such that it results in a chemically inert and stable aggregate.

Crushed slag shall contain not more than 10 percent by weight of glassy particles and show an abrasion loss of not more than 40 percent. Higher percentages may be allowed for slags having demonstrated a satisfactory service record, at the discretion of the Engineer.

200.5.4 Uncrushed Gravel. This aggregate shall consist of clean, tough, durable stone reasonably free from sticks and clay coating. Gravel shall be reasonably free from an excess of flat or elongated particles of stone and shall show an abrasion loss of not more than 40 percent and shall show a soundness loss of not more than 15 percent when subjected t 5 cycles of magnesium sulfate soundness test.

200.5.5 Expanded Clay Aggregate. This aggregate shall be manufactured by the rotary kiln process and shall consist of angular fragments reasonably uniform in density and reasonably free from flat or elongated particles or other deleterious substances. Expanded clay aggregate shall show an abrasion loss of not more than 40 percent. The soundness loss shall not exceed 10 percent by weight when subjected to 5 cycles of the magnesium sulfate soundness test using No. 4 to 3/8 inch and 3/8 inch to 3/4 inch size aggregate.

200.5.6 Gradation Requirements. All the above types, when tested, shall conform to the gradation requirements specified in following table.

Percent Passing (By Weight)

	Size 1 (Fine)		Size 2 (Fine)		Size 3
U.S. Sieve	Uncrushed Gravel or Crushed Aggregate	Expanded Clay Aggregate	Normal Gradation 3 Application Surface Treatment	Gradation for 2 Application Surface Treatment (Shoulders only)	
1 1/2"	100	100	-	-	
1"	85 - 100	95 - 100	-	-	
3/4"	40 - 80	70 - 90	100	100	
3/8"	-	-	95 - 100	95 - 100	
1/2"	0 - 15	-	-	60 - 90	100
3/8"	-	-	-	-	90 - 100
No. 4	-	0 - 5	0 - 7	0 - 10	15 - 60
No. 10	-	-	-	-	0 - 15
No. 16	-	-	-	-	0 - 5

* Size 2 cover material for use with two application surface treatment for shoulders shall conform to the gradation requirements referenced to this note.

200.6 ASPHALTIC CONCRETE AGGREGATE.

200.6.1 Type I Mixture: The aggregate shall consist of crushed gravel, crushed slag, crushed stone or a combination of these materials, sand and mineral filler.

200.6.1.1 Crushed Gravel: Crushed gravel shall be from a source approved by the City and shall consist of clean, hard, tough, durable fragments, screened and crushed to meet the grading requirements. Gravel shall not show an abrasion loss of more than 40 percent. It shall show a soundness loss of not more than 15 percent by

weight when subjected to 5 cycles of the magnesium sulfate soundness test.

200.6.1.2 Crushed Stone: This aggregate shall be from a source approved by the Department and shall consist of clean, hard, durable fragments reasonably free from flat, elongated, soft or disintegrated pieces, dirt or other objectionable matter. Crushed stone shall not show an abrasion loss of more than 40 percent.

When subjected to 5 cycles of the magnesium sulfate soundness test, the weighted loss shall not exceed 15 percent. Higher percentages may be allowed for stone having a satisfactory service record, at the discretion of the Engineer.

200.6.1.3 Crushed Slag: This aggregate shall be from a source approved by the City and shall consist of angular fragments, reasonably free from flat or elongated pieces.

The crushed slag shall have a minimum dry rodded weight of 70 pounds per cubic foot when tested in accordance with AASHTO Designation T 19, and shall be properly cured and stored such that it results in a chemically inert and stable aggregate.

Crushed slag shall contain not more than 10 percent by weight of glassy particles, and show an abrasion loss of not more than 40 percent. Higher percentages may be allowed for slags having demonstrated a satisfactory service record, at the discretion of the Engineer.

200.6.1.4 Sand: Sand shall consist of clean, hard, durable, siliceous grains graded from coarse to fine and shall be reasonably free from vegetable matter or other deleterious substance. The fraction passing the No. 40 sieve shall be non-plastic.

The sand equivalent value of the fraction passing the No. 4 sieve shall not be less than 35 when tested in accordance with AASHTO Designation: T176 (Alternate Method No. 1 - Air Dry). These tests shall be performed when necessary by the Engineer.

200.6.2 Type 3 Mixture: The aggregate shall consist of the following:

a. Wearing Course Mixture: Crushed gravel, crushed slag, crushed stone, combined with screening of gravel, stone, slag or other approved materials; sand; and mineral filler.

b. Binder Course: The aggregate shall be the same as Type 1 binder course described under Subsection 200.6.1.

All materials for Type 3 mixes shall conform to the requirements under Subsection 200.6.2.

Screening shall be made by crushing any of the approved aggregates which prior to crushing conformed to the requirements under Subsection 200.6.1.

The Type 3 wearing course mixtures shall contain a minimum of 15 percent screening based on total aggregates as approved by the engineer; however, the amount of screening required may exceed the minimum if deemed necessary to meet the optimum physical properties.

The screening shall be a natural crusher run material meeting the following gradation. When gravel is used for screening, it shall be washed gravel and shall not have more than 10 percent passing the No. 4 sieve prior to crushing and shall meet the following gradation requirements after crushing.

Sieve	Percent Passing (By Weight)
3/8 "	100
No. 4	90 - 100
No. 40	10 - 45

The screening shall be stockpiled separately and fed into the plant through a separate cold feed. The percent of screening used in the mix will be determined volumetrically at the cold feed.

This measurement will be made by the ratios of the gate openings at the cold feed for plants that have a constant feed for all the cold feed bins. For plants that have variable speed cold feed belts, the percent of screening will be determined by measuring the percent of screening by volume of the total volume of aggregate on a given section of belt.

The sand shall conform to the requirements under Subsection 200.6.1.4.

200.6.3 Type 4 Mixture: The aggregate shall consist of expanded clay aggregate, sand and mineral filler. These materials shall meet the following requirements.

Expanded clay aggregate shall be manufactured by the rotary kiln process and consist of angular fragments reasonably uniform in density and reasonably free from flat or elongated pieces or other deleterious substances. Expanded clay aggregate shall not show an abrasion loss of more than 40 percent. The expanded clay aggregate shall have a dry rodded weight per cubic foot of not more than 50 pounds when tested in accordance with AASHTO Designation: T 19. The percent loss shall not exceed 10 percent after 5 cycles by the magnesium sulfate soundness test.

Sand shall conform to the requirements specified under Subsection 200.6.1.4.

200.6.4 Type 5 Mixtures: Type 5A - The aggregate shall consist of gravel, slag, stone or expanded clay, sand and mineral filler when needed.

Type 5B - The aggregate shall consist of gravel, slag, stone, expanded clay and sand; or sand clay gravel.

Pit run sand clay gravel may be used in Type 5B mixes provided the material is separated into two distinct sizes prior to final mixing. The separation shall be done by using a No. 4 screen or other approved sizes. For batch plants the screening process must be adequate to satisfy this requirement.

200.6.5 Mineral Filler: Mineral filler shall consist of limestone dust, pulverized lime, silica dust, shell dust, portland cement, cement stack dust or other approved materials.

Blending of pulverized anhydrous calcium sulfate (anhydrite) with the mineral fillers will be permitted provided the anhydrite does not constitute more than 30 percent of any blend with one or more of the other approved fillers.

Anhydrite shall not be contaminated with clay or other plastic mineral matter and shall conform to the requirements herein for mineral fillers.

The portion of pulverized anhydrite passing the No. 200 sieve shall not constitute more than 25 percent of the total material passing the No. 200 sieve, including natural fines, in any paving mixture.

Anhydrite shall not constitute more than 2 percent of the total aggregate, including all sizes, for any paving mixture.

The cement stack dust shall consist of material collected from waste rotary kiln gases discharged through a collector of a cement plant.

Limestone dust, silica dust, shell dust, cement stack dust, or a blend of one of these fillers with anhydrite dust, or a blend of anhydrite with hydrated lime or portland cement shall meet the following gradation requirements.

Sieve	**Percent Passing (By Weight)**
No. 30	100
No. 80	95 - 100
No. 40	70 - 100
No. 270	10 - 45

Mineral dust collected in bag houses of asphaltic concrete plants may be used as mineral filler in accordance with the following requirements. This type mineral filler that is produced by each plant must be approved by the Laboratory prior to use and the quantity required will be determined by the Materials Laboratory. Provisions must be made at the plant so the amount of mineral dust from the bag houses that is added to the mixture can be readily determined.

When the quantity of mineral dust being produced is less than that required in the mixture design, this material can be supplemented by the addition of an approved commercial filler.

Whenever mineral fillers are to be approved for use in asphaltic mixtures, the Laboratory will prepare mixtures of aggregate, filler and asphalt in proportions to meet the requirements of mixes being utilized, and this mixture shall have an index of retained Marshall stability of at least 75 percent, and a maximum of 1.0 percent volumetric swell, as determined in accordance with Louisiana DOTD Designation: TR 313.

Whenever portland cement or hydrated lime is used, tests for gradation requirements will not be made.

200.7 RIP-RAP STONE. Stone for rip-rap shall be quarry stone or cobblestone. Quarry stone shall be angular, and cobblestone shall be rounded. Stone shall be of such shape as to form a stable protection structure of the required section. Cobblestone shall not be used on slopes steeper than 2 to 1. Flat or elongated shapes will not be accepted unless the thickness of the individual pieces at least one-third the length.

Stone shall be sound, durable, hard, resistant to abrasion and free from lamination, weak cleavage planes, and the undesirable effects of weathering. It shall be of such character that it will not disintegrate from the action of air, water, or the conditions to be met in handling and placing. All material shall be clean and free from deleterious impurities, including alkali, earth, clay, refuse, and adherent coatings. When tested in accordance with AASHTO T85, the solid weight of the stone shall be at least 140 pounds Per cubic foot (based on bulk specific gravity) and the absorption shall not exceed 2 percent.

Visual elevation of the quarry, including examination of blast samples and diamond drill core samples, suitable tests and service records may be used to determine the acceptability of the stone. The contractor shall notify the Engineer in writing of the intended source of stone at least 60 days prior to use.

Unless otherwise specified, broken concrete may not be used for rip-rap stone. If broken concrete is specified as a substitute, then broken concrete conforming to these materials and gradation requirements may be used for rip- rap provided its solid weight is at least 130 pounds per cubic foot (based on bulk specific gravity) and is free of protruding reinforcement.

200.7.1 **Gradations**: Stone meeting the above requirements shall be graded within the following limits. If not otherwise specified or indicated on the plans, Type A Stone shall be furnished.

Percent By Weight	Stone Weight (Pounds) Type A	Type B	Type C
0 - 10	26 to 36	88 to 122	190 to 230
40 - 60	9 to 14	28 to 46	65 to 100
20 - 40	4 to 9	14 to 28	35 to 65

Spalls will include all quarry chips and fines weighing less than the specified minimum that are retained on a rock fork whose tines have a clear spacing of one inch.

END OF SECTION 200

SECTION 201

CONCRETE, MORTAR AND RELATED MATERIAL

201.1 PORTLAND CEMENT CONCRETE

201.1.1 Requirements

201.1.1.1 General. Concrete will consist of portland cement, or portland-pozzoland cement, concrete aggregates, water, and admixture when approved for use, in accordance with these provisions. Concrete will be specified by class or by compressive strength. When specified by class, the concrete will be designated by a letter. The concrete class used will be in accordance with Subsection 201.1.1.2, unless otherwise specified. Concrete specified by compressive strength will be designed by the contractor in accordance with Subsection 201.1.1.3. Approved admixtures will be in accordance with Subsection 201.1.5. Additional cement is permitted to obtain high early strength in concrete, except that total cement shall not exceed 700 pounds of cement per cubic yard (415 kg/m3) unless otherwise approved by the Engineer.

201.1.1.2 Concrete Specified by Class. The concrete class and maximum slump for the various types of construction shall be as designated in the following table. The exact proportions of aggregates and water to be used in the concrete will be determined by the Engineer from tests of the material to be used.

(*see following chart*) 1

CONCRETE PROPORTION TABLE

Class Type of Concrete	Average Compressive Strength psi at 28 Days	Grade of Coarse Aggregate	Minimum Bags of Cement of 94 lbs. each to one Cu. Yd. of Concrete	Maximum Water per Sack of Cement (a) (Gallons)	Air Entrainment Total Air (percent by) (volume((c)	Slump Range (Inches) Non-Vibrated Placing	Vibrated Paving	Slip Form Paving Placing (b)
Structural Class								
A	3,800	A	6.0	6.0	5 ± 2	2-5	2-4	1-1.5
D	3,300	A,B, or D	5.0	6.6	5 ± 2	2-5	1-3	N.A.
R	2,000	A,B, or D	4.0	8.0	5 ± 2	2-5	1-3	N.A.
S	3,800	A	7.0	6.0	5 ± 2	6-8	N.A.	N.A.
Pavement Class								
B	4,000 (d)	B	5.8	6.0	5 ± 2	N.A.	2-4	1-2.5
C	4,000 (d)	B (Crushed Slag)	6.0	6.0	5 ± 2	N.A.	2-4	1-2.5
D	4,000 (d)	B	5.4	6.0	5 ± 2	N.A.	2-4	1-2.5
E	4,000 (d)	B	5.0	6.0	5 ± 2	N.A.	2-4	1-2.5

N.A. - Not Applicable

(a) The maximum water-cement ratio (gal./sack) shall be reduced 5% when a water reducing admixture is used, and 10% when an air-entraining admixture, or air-entraining and water-reducing admixtures, is used.

(b) Also slump range for other concrete placed by extruded methods when it is allowed or specified.

(c) Total air content ranges when air entrainment is used.

(d) Average compressive strength for pavement type concrete shall be 3,600 psi when air entrainment is used.

201.1.1.3 Concrete Specified by Compressive Strength. When so specified, the contractor shall determine the mix proportions of concrete specified on the plans by its 28-day compressive strength within the minimum size coarse aggregate, and admixture limitations designated herein or in the special provisions.

Calcium chloride may be used only with the approval of the Engineer. Admixtures proposed for use will be evaluated in accordance with Subsection 201.1.5.

The proposed mix design will be evaluated from field tests of a trial batch conforming to the size of load, materials, proportions, slump, mixing and placing equipment and procedures to be used in the actual work. The trial batch procedure herein may be waived when test data of prior performance of the proposed mix designs presented by the contractor and approved by the Engineer. The contractor may utilize any strength data on file with the Department for this purpose.

When approved by the Engineer, trial batches may be placed in the work at designated locations where concrete of a lower quality is specified. Concrete so placed will be considered for purpose of payment to be of the type of concrete specified at that location.

Eight cylinders shall be molded from the trial batch containing the maximum water content indicated by the mix design. Four of the cylinders shall be tested at 7 days in order to establish 7-day average compressive strength information. The remaining four cylinders shall be tested at no more than 28 days after molding and the average compressive strength of the four cylinders shall be at least 600 psi (4.14MPa) greater than the specified strength. The minimum strength of any one cylinder shall not be less than the specified strength.

The placing of concrete specified by compressive strength shall not begin until the mix design has qualified in accordance with the aforesaid test criteria. Should the source of materials or established procedures change, new trial batches may be required.

201.1.1.4 Test for Portland Cement Concrete. Portland cement concrete will be sampled and tested in accordance with the following:

AASHTO

(1) Sampling Fresh Concrete	T-141
(2) Obtaining Drilled Cores	T-24
(3) Molding and Curing Specimens	T-23
(4) Compressive Strength	T-22
(5) Flexural Strength	T-97
(6) Slump	T-119
(7) Air Content	T-196 or T-152
(8) Unit Weight Yield	T-121
(9) Setting of Mortar	T-131

A compressive strength test will consist of the average strength of 2 cylinders fabricated from a single load of concrete except that, if any cylinder should show evidence of improper handling, molding, or testing, said cylinder will be discarded and the strength test shall consist of the strength of the remaining cylinder.

The frequency of sampling will be determined by the Engineer. The contractor shall afford the Engineer all reasonable access, without charge, for the procurement of samples of fresh concrete at time of placement.

Concrete specified by class under Subsection 201.1.1.2 shall attain the minimum 28-day strength designated.

Concrete specified by compressive strength under Subsection 201.1.1.3 shall attain the following 28-day strength: The average of any 3 consecutive strength tests shall be equal to or greater than the specified 28-day strength.

Not more than 10% of the tests shall be less than the specified 28-day strength. No test shall be less than 85% of the specified 28-day strength.

201.1.2 Portland Cement. At contractor's option, unless otherwise specified, all cement to be used or furnished shall be Type I, II or III conforming to ASTM C150 or Type IP (Portland - pozzolan) conforming to ASTM C-595. However, only one type of cement will be used on one Project. The contractor shall furnish a Certificate of Compliance signed by the manufacturer identifying the cement and stating that the cement complies with these requirements. Supporting test data will be furnished when requested by the Engineer.

Whenever suitable facilities approved by the Engineer are available for handling and weighing bulk cement, such facilities will be used. Otherwise, the cement shall be delivered in original unopened sacks that have been filled by the manufacturer. They will be plainly marked with the manufacturer's name or brand, cement type and weight.

Cement shall be stored in such a manner as to permit ready access for the purpose of inspection and sampling, and suitably protected against contamination or moisture. Should any cement delivered show evidence of contamination or be otherwise unsuitable, the Engineer may reject it and require that it be removed from the site.

All portland cement used in concrete for any individual structure shall be of the same brand and type unless otherwise approved by the Engineer.

201.1.3 Aggregates. Aggregates shall conform to the requirements prescribed in Subsections 200.1 and 200.2 and shall be approved by the Engineer prior to use. Aggregate shall be of such character that it will be possible to produce workable concrete within the limits of slump and water content in Subsection 201.1.1.2.

Methods of handling materials resulting in segregation, degradation or the combining of materials which results in failure to meet specifications shall not be permitted. The free moisture content of sand shall not exceed 8% at the time of batching.

Aggregates shall be non-reactive when tested in accordance with ASTM C 289 and evaluated in accordance with Appendix A-1 of ASTM C 33. Aggregates found to be potentially reactive may be used only upon written approval of the Engineer.

201.1.4 Water. Water used for concrete shall not contain deleterious substances. Water shall not contain an amount of impurities that will cause a change in the time of setting of portland cement of more than 25% nor a reduction in relative mortar strength at 7 and 28 days of more than 10% compared to results obtained with distilled water.

201.1.5 Admixtures. Admixture shall be used as specified or approved by the Engineer. The admixture shall be measured into each batch or load in liquid form by a mechanical dispensing device and method approved by the Engineer. The quantity dispensed shall not vary more than 5% from the quantity specified. If more than one admixture is used, each shall be dispensed by separate equipment in liquid form.

Calcium chloride shall not be used in pre-stressed concrete. Admixtures containing chloride ions in excess of one percent by weight of admixture shall not be used in pre-stressed concrete. Calcium chloride may be used in reinforced concrete only upon approval of the Engineer. Admixtures to be used in grouting ducts in pre-stressed units shall not contain chloride ions in excess of 0.25% by weight of admixture.

Samples of the admixtures proposed for use shall be submitted by the contractor to the Engineer sufficiently in advance of their intended use to determine compliance with specified requirements. Approval to use an admixture shall not relieve the contractor of the designated concrete strength requirements.

(a) Air-entraining Admixtures.

Air-entraining Admixtures shall conform to AASHTO M-154. Tests by an approved laboratory shall provide sufficient data to determine the time- strength characteristics to mix with the admixture.

When the air-entraining agent consists of a vinsol resinwater solution that has been neutralized with caustic soda (sodium hydroxide), the contractor may use such air-entraining admixtures without presentation of test data. In lieu of test data, the contractor shall furnish a certificate signed by the manufacturer attesting to this fact and stating the ratio of sodium hydroxide to vinsol resin, the percentage of solids based on the residue dried at 105°C, and that no other additive or chemical agent is present in this solution.

The concentration of dilution of the admixture shall be such that it is dispensed into each batch of concrete at a rate of not less than 1/2 fluid ounce per 100 lbs. (33 ml per 100 kg) of cement.

Adjustments shall be made in the weights of the aggregates used per batch to compensate for changes in yield due to air-entrainment.

If the contractor elects to use an air-entraining admixture, the Engineer may require that additional cement be added to the concrete mixture when the air content exceeds 5%. In no case shall air content exceed percent indicated in the Concrete Proportion Table (201.2).

The air content shall not deviate from the percentage specified or permitted by more than 2 percentage points.

(b) Water Reducing, Set Retarding and Accelerating Admixtures.
Water reducing, set retarding, and accelerating admixtures other than calcium chloride shall conform to AASHTO M-194, and shall not be used in greater dosages than those recommended by the manufacturer, or permitted by the Engineer. The permitted dosage of the admixture shall not exceed that which will result in an increase in the drying shrinkage of the concrete in excess of 20% when used in precast and prestressed concrete, or 10% when used in any other structural concrete.

The strength of concrete containing the admixture in the amount proposed shall, at the age of 48 hours and longer, be not less than that of similar concrete without the admixture.

The admixture shall not adversely affect the specified air content, unless permitted by the Engineer.

(c) Calcium Chloride.
When calcium chloride is permitted or required to accelerate setting time and to reduce the time necessary for the concrete to reach its specified strength, it may be processed from either a brine solution or flake. If prepared from flake, it shall conform to AASHTO M 144. The calcium chloride solution shall contain not less than 32% of anhydrous calcium chloride and the hydrogen ion concentration (pH) shall be not more than 10.4 nor less than 6.0. Calcium chloride solution shall be used at the rate of not more than 3 pints per 100 pounds (3.13 1 per 100 kg) of cement.

201.1.6 Proportioning

201.1.6.1 General. Aggregates and cement shall be proportioned by weight except that when the amount of concrete required for any one contract is 10 cubic yards (7.7 m3) or less, the materials may be measured by volume. Materials that are proportioned by volume shall be measured in containers of knowncapacity.

Weigh hoppers shall be charged from bins located directly over them or from conveyor belts. When conveyor belts are used, there shall be a separate belt for each size aggregate.

Bulk cement shall be weighed in an individual hopper and shall be kept separate from the aggregates until the ingredients are released for discharge. The cement hopper shall be attached to a separate scale for individual weighing.

The amount of water to be added to the mixture shall be measured into the mixing drum through a valve with a

positive cut-off. When water is measured by weight, it shall be weighed on a separate scale.

201.1.6.2 Combined Aggregate Gradings. The combined aggregates shall conform to the gradings specified in the following table:

COMBINED GRADINGS FOR PORTLAND CEMENT CONCRETE

PERCENTAGE PASSING SIEVES

Sieve Size	Grading A	Grading B	Grading C	Grading D	Grading E
2"	100	100			
1 ½"	95-100	95-100	100		
1"	64-80	80-96	95-100		
¾"	55-71	64-80	77-93	100	100
3/8"	37-53	40-52	50-70	92-100	90-100
No. 4	32-42	35-45	39-51	42-60	60-80
No. 8	25-35	28-38	31-41	33-47	50-70
No. 16	18-28	21-31	22-23	22-38	33-53
No. 30	10-18	10-20	12-22	17-25	19-35
No. 50	3-9	3-9	3-9	6-12	5-15
No. 100	0-3	0-3	0-3	1-5	2-6
No. 200	0-2	0-2	0-2	0-2	0-2

201.1.6.3 Concrete Consistency. The amount of water added at the mixer shall be regulated to take into account the free water in the aggregates. Free water is defined as the total water minus the water absorbed by the aggregate in a saturated surface-dry condition.

The amount of water used in the mixture shall not exceed the amount necessary to permit practical placement and consolidation of the concrete. Total free water in the mixture shall not exceed an amount producing the maximum slump specified in Subsection 201.1.1.2. When adverse or difficult conditions affect the placement of concrete, the Engineer may authorize a greater slump to be used, provided the cement is increased. Water shall be added at a ratio not to exceed 32 pounds per 100 lbs. (32 kg/100 kg) of added cement per cubic yard of concrete, and such additional water and cement shall be at the contractor's expense.

201.1.7 Mixing and Transporting

201.1.7.1 General. Machine mixing will be required in all cases other than those in which it would obviously prove to be impractical, in which event hand-mixing will be permitted. Mixing shall be commenced as soon as possible after the cement is placed in contact with the aggregates, but in no event shall the intervening period exceed 30 minutes.

All concrete mixers shall be of such design and construction and so operated as to provide a thoroughly and properly mixed concrete in which the ingredients are uniformly distributed. Mixers shall be maintained in proper and serviceable working condition, and any part or portion thereof that is out of order or becomes worn to such extent as to detrimentally affect the quality of mixing, shall be promptly repaired or replaced. Mixers shall not have any aluminum parts which will have direct contact with concrete.

201.1.7.2 Paving and Stationary Mixers. Paving and stationary mixers shall be equipped with an accurate automatic timing device so designed and constructed as to lock the discharge lever before aggregate and cement enter the drum and release such lever only after the specified mixing time has elapsed. The regulation of the setting of said device shall be under the supervision of the Engineer. Water control equipment shall also be provided with each concrete mixer.

The proper proportions of aggregate, cement, and water for each batch of concrete shall be placed in the mixer and shall be mixed for a period of not less than one minute after all such materials are in the drum. The minimum mixing time per batch for reinforced concrete, however, shall not be less than 1½ minutes. The rotating speed at which the mixer shall be operated shall conform to that recommended by the manufacturer.

The total volume of materials mixed in any one batch shall exceed neither the water level capacity of the mixer nor the manufacturer's guaranteed capacity of the mixer.

201.1.7.3 Transit Mixers. Transit mixers shall be equipped with an automatic device for recording the number of revolutions of the drum during the mixing period. Each mixer and agitator shall have attached thereto in a prominent place, a metal pilate or plates, installed by the manufacturer on which is plainly marked the capacity of the drum in terms of the volume of mixed concrete and the speed of rotation for the agitating and mixing speeds of the mixing drum or blades. Each mixer shall have an identification number painted on the truck in such a location that it can be easily read from the batching platform.

The total volume of materials introduced into the mixer shall not exceed the manufacturer's guaranteed mixing capacity. If the concrete so mixed does not meet the uniformity requirements of this subsection, the amount of materials charged into the mixer shall be reduced.

The drum of the mixer shall be completely emptied of any previously mixed load. The proper proportions of aggregate, cement, and water for each load of concrete shall be placed in the mixer and shall be mixed therein for not less than 70 nor more than 100 revolutions of the drum or blades at the speed designated by the manufacturer of the equipment as mixing speed. Additional revolutions of the drum shall be at the speed designated by the manufacturer of the equipment as agitating speed. The revolving of the drum shall be continuous until the concrete is completely emptied from the drum.

When concrete is being placed for pavement or concrete structures, all wash water shall be emptied from the mixer before any portion of the succeeding load is placed therein. For all other work, the mixer shall be empty or may carry 10 gallons (38 l) of water in the drum. Adequate control of ready-mixed concrete will normally require that additional water be added and mixed into the batch at the point of discharge. Water so added shall be mixed into the load for a minimum of 30 revolutions at the rated mixing speed. Water shall not be added to the load during transit. The total elapsed time between the addition of water at the batch plant and discharging the completed mix shall not exceed 90 minutes. Under conditions contributing to quick setting, the total elapsed time permitted may be reduced by the Engineer.

The Engineer shall be provided with a legible certified weigh-master's certificate (delivery ticket). When mix proportions have been designated for a project and are identified by number, the Engineer may accept a legible certified weighmaster's certificate which shall contain the following information: Name of Vendor, Name of Contractor, Project Location, number of cubic yards in the load, mix number, amount of water added at the plant (including water in aggregates) allowable water, time and rate of batching.

When the mix proportions are not designated by number, or when required by the Engineer, the certificate shall contain the following additional information:

1. Actual weights of cement and of each size of aggregate
2. Brand and type of cement
3. Brand, type, and amount of admixture

Space shall be provided on the certificate so that amount of water added on the job may be indicated.

201.1.7.4 Hand Mixing. Hand mixing will be permitted when the amount of concrete required for any one job is one cubic yard (0.8 m) or less. Hand mixed concrete shall be mixed on a water-tight platform or in a mortar box in batches not to exceed 1/3 cubic yard (0.3 m) each. The aggregates shall first be spread in a uniform layer over which the required quantity of cement shall be evenly distributed. The entire batch shall be turned with shovels until the ingredients are thoroughly blended before adding the water. After adding the proper amount of water, the batch shall again be turned with shovels until a uniform consistency is obtained. Methods of hand mixing which allow the loss of mixing water will not be permitted.

201.1.7.5 Transporting Batched Materials and Mixed Concrete. The compartments of trucks or other equipment used for the purpose of transporting proportioned dry aggregate and cement, or mixed concrete, shall be suitably constructed to adequately protect and prevent loss or leakage of the contents during charging, transit or discharging.

201.2 STEEL REINFORCEMENT FOR CONCRETE

201.2.1 General. The following specifications set forth the requirements for bar, wire, and wire mesh reinforcement. The reinforcement shall conform accurately to the dimensions and details indicated on the Drawings or otherwise prescribed. Before being placed in any concrete work, it shall be cleaned thoroughly of all rust, mill scale, mortar, oil, dirt, or coating or any character which would be likely to destroy, reduce, or impair its proper bonding with the concrete.

No reinforcing steel will be accepted under this specification until it has been approved by the Engineer as conforming with requirements prescribed therefore. When required by the Engineer, the contractor or vendor shall furnish samples therefore for testing and notify the Engineer as to when and where they will be available. Such samples shall be furnished at the expense of the contractor or vendor, but the cost of any testing that may be required will be borne by the Department. Samples shall only be taken in the presence of the Engineer. The contractor shall furnish a certified mill test report for each heat or size of steel when required by the Engineer.

201.2.2 Reinforced Steel. Unless otherwise specified, reinforcing steel shall be either Grade 40 or Grade 60 billet steel conforming to ASTM A 615. Varying grades shall not be used interchangeably in structures.

Steel bending processes shall conform to the requirements of the Manual of Standard Practice of the Concrete Reinforcing Steel Institute. Bending or straightening shall be accomplished so that the steel will not be damaged. Kinked bars shall not be used.

201.2.3 Wire Reinforcement. Wire reinforcement shall in all respects fulfill requirements prescribed in ASTM A 82.

201.2.4 Wire Mesh Reinforcement. Mesh reinforcement shall conform to ASTM A IS5. The gage of the wire and the dimensions of the mesh will be indicated in the Drawings or specified elsewhere. The wire mesh reinforcement shall be so constructed as to retain its original shape and form during the necessary handling. The effective cross-sectional area of the wire shall be equal to that specified or indicated on the Drawings.

201.2.5 Bar Mats. Fabricated Steel Bar or Rod Mat for concrete reinforcement shall conform to requirements of ASTM A 184.

201.2.6 Wire Ties. Wire for ties shall be black, annealed, not lighter than 16 gauge.

201.2.7 Prestressing Steel. Prestressing steel shall be high-tensile wire conforming to ASTM A 421, a high-tensile wire strand conforming to ASTM A 416, or high-tensile strength alloy bars conforming to the following requirements:

The cross-sectional steel area of wire strand shall be within 0.005 square inch (3.2 mm2) of the nominal steel area

shown in Table I of ASTM A 416 and in Table I in this subsection.

In the event the contractor elects to use a wire strand manufactured to a higher breaking strength than is specified in ASTM A 416, such higher strength strand shall, in addition, conform to the following requirements:

TABLE I - BREAKING STRENGTH REQUIREMENTS

Nominal Diameter (Inches)	3/8	7/16	1/2	(mm)	9.5	11	12.7
Breaking Strength (Lbs.), min.	23,000	31,000	41,300	(kN)	102.3	137.9	183
Nominal Steel Area (Sq. In.)	0.085	0.116	0.155	(mm2)	55	75	100
Nominal Weight, 1000 ft., (Lbs.)	292	400	525	(305m) (kg)	132.5	181.6	238

TABLE II - YIELD STRENGTH REQUIREMENTS

Nominal Diameter (Inches)	3/8	7/16	1/2	(mm)	9.5	11	12.7
Initial Load (Lbs)	2,300	3,100	4,130	(kN)	10.2	13.8	18.3
Minimum Load 1% Extension (Lbs)	19,600	26,400	35,100	(kN)	87.2	117.4	156.

High tensile strength alloy bars shall be thermally stress relieved to produce a suitable metallurgical structure and shall be proof-tested individually during the process of manufacturing to a minimum of 90% of the manufacturer's minimum guaranteed ultimate strength. The mechanical properties of the completed bars shall be as follows:

	Regular Grade	**Special Grade**
Ultimate tensile strength (min.)	145,000 psi (lOOOMPa)	160,000 psi (1102MPa)
Yield strength, measured by the 0.7% extension under load method (min.)	130,000 psi (896MPa)	140,000 psi (965MPa)
Elongation in 20 bar diameters after rupture (% min.)	4.0	4.0
Reduction of area (% min.)	25	20
Cold deflection (Test Method No. Calif. 641) (min.)	2.0 inches (51 mm)	2.0 inches (51 mm)
Modulus of elasticity at 70% of the manufacturer's minimum guaranteed ultimate strength (min)	25×10^6 psi (172.4GPa)	25×10^6 psi (172.4GPa)

Diameter tolerances shall conform to ASTM A 29

Bars of different ultimate strengths shall not be used interchangeably in the same member, unless otherwise permitted by the Engineer

In handling and shipping bars, care shall be taken to avoid bending, injury from deflection, scraping, or over stressing of the bars. All damaged bars will be rejected. When bars are to be extended by the use of couplers, the assembled units shall have a tensile strength of not less than the specified minimum ultimate tensile strength. Failure of any one sample to meet this requirement will be cause for rejection of the heat of bars and lot of couplers. The location of couplers in the member shall be subject to approval by the Engineer.

201.3 JOINT MATERIALS

201.3.1 Premolded Joint Filler. Premolded joint filler material shall consist of remolded strips of a durable resilient material.

Unless otherwise specified, remolded joint filler shall be one of the following types:

Preformed Expansion Joint Filler (Bituminous Type) ASTM D 994
Non-extruding and Resilient Filler (Bituminous Type) ASTM D 1751
Non-extruding and Resilient Filler (Non-bituminous Type)

ASTM D 1752

Type I	Sponge Rubber
Type II	Cork
Type III	Self-Expanding Cork

201.3.2 Wood Fillers. Boards shall be clear heart redwood, clear all heart red cedar, white pine, white spruce, sugar pine, western hemlock or white fir. All species other than redwood or cedar shall be treated with preservatives.

Wood preservative treatment shall be a pressure applied solution of copper chrome arsenate type wood preservative in accordance with Fed. Spec. TT-W-550 Type II and ASPA P-5. Each piece shall bear mark identifying treatment.

***201.3.3* Sealants.** The joint sealers shall conform to Section 201.3.3.7 Elastomeric Polymer. Other joint sealants may be used only with the written authorization of the City Engineer and in conformance with the following specifications and/or manufacturer's recommendations. Joint surfaces must be clean, dry, and free of any loose matter.

201.3.3.1 Asphalt-Mineral. Asphalt mineral filler shall be homogeneous and shall be composed of asphalt and mineral filler. The asphalt shall be free from impurities. The asphalt mineral filler shall conform to the following requirements:

	AASHTO Test Method	Min.	Max
Softening Pt.°F	T 53	125	145
Penetration at 32°F 200 g, 60 sec.	T 49	14	-
Penetration at 77°F 100 g, 5 sec.	T 49	50	70
Ductility at 77°F, cm	T 51	15	-
Asphalt Solubility, %	T 44	45	55
Mineral Filler, %	T 44	45	55
Water, %	T 55	-	2

201.3.3.2 Asphalt-Rubber. Rubber-asphalt sealant shall be hot pour, elastic type conforming to requirements of ASTM D 1190.

201.3.3.3 Polyurethane Polymer. Polyurethane component, job site mixed, self leveling urethane compound conforming to Fed Spec. TT-S-00227 Type I, class A, service temperature range - 40°F to 180°F.

201.3.3.4 PVC Extended Coal Tar. Shall be an approved single component polymer type elastomeric compound conforming to AASHTO T187.

201.3.3.5 Primer-Sealer. A liquid sealer, if required, shall be quick drying, non-staining of a type recommended by sealant manufacturer for type of substrate to which it is to be applied.

201.3.3.6 Sealant Backer. Backer rods shall be remolded polyurethane foam or butyl rubber foam or neoprene foam in size to fit condition.

201.3.3.7 Elastomeric Polymer. This elastomeric asphalt sealant is a two-component, cold-applied formulation of asphalt and urethane. Mixing of the components shall be in accordance with the manufacturer's recommendations.
The joint sealant must meet ASTM-D-1850 entitled Concrete Joint Sealer, Cold Application Type, Single, or Multiple Component.

201.4 CONCRETE CURING COMPOUND

201.4.1 General. Curing compound shall consist of a liquid which, when applied to fresh concrete by means of a spray gun, will form an impervious membrane over the exposed surfaces of the concrete.

The membrane may be either asphaltic or paraffin derivatives to which other water-proofing materials may have been added. Concrete curing compounds shall be designated by type as follows:

Type 1 - Clear or translucent with red fugitive dye

Type 2 - White pigmented

Type 3 - Light gray pigmented

Type 4 - Black pigmented

All compounds shall be furnished by the contractor and shall be delivered ready-mixed in sealed original containers bearing the manufacturer's name and product identification. At the time of use, pigmented curing compounds shall be thoroughly mixed, with the pigment uniformly dispersed throughout the mixture.

The rate of application shall be such that the compound forms a continuous, unbroken film when applied to the work. The Engineer will determine the permissible rate of coverage of a curing compound.

Unless otherwise specified, Type I curing compound shall be used.

201.4.2 Test Requirements. Curing compounds shall be tested in accordance with ASTM C 309.

201.5 CEMENT MORTAR

201.5.1 General. Cement mortar shall consist of a mixture of portland cement, sand and water. Cement and sand shall first be combined in the proper proportions and then thoroughly mixed with the required amount of water.

Cement mortar shall be designated by class and proportioned by loose volume as follows:

Designation	Proportions
Class "A" mortar	1 part cement to 1 part sand
Class "B" mortar	1 part cement to 1½ parts sand
Class "C" mortar	1 part cement to 2 parts sand
Class "D" mortar	1 part cement to 2½ parts sand
Class "E" mortar	1 part cement to 3 parts sand
Class "F" mortar	1 part cement to 3½ parts sand

The quantity of water to be used in the preparation of mortar shall be only that required to produce a mixture sufficiently workable for the purpose intended.

Mortar shall be used as soon as possible after mixing and shall show no visible signs of setting prior to use. Retempering of mortar will not be permitted.

201.5.2 Cement. Cement shall conform to the requirements of Subsection 201.1.2.

201.5.3 Sand. Sand shall conform to the requirements of Subsection 200.1.5. In proportioning the sand it shall be measured loose (without shaking or compacting) in measuring boxes or other suitable containers of known capacity.

201.5.4 Water. Water shall conform to the requirements of Subsection 201.1.4.

201.5.5 Admixtures. No admixture shall be used in mortar unless otherwise specified or approved by the Engineer.

201.5.6 Quick setting grout shall be a high strength, non-staining grout approved by the Engineer prior to use. It shall reach an initial set within 90 minutes at 70° F (21°C) and shall reach a minimum compressive strength of 2500 psi (19.2 MPa) within 24 hours. Shrinkage shall be less than 0.1 percent when tested, using the test procedures of ASTM C 596. The grout shall be mixed, handled, and placed in accordance with the manufacturer's instructions.

201.6 **HYDRATED LIME.** Hydrated lime for use in soil stabilization and conditioning shall conform to the requirements of ASTM C 207 Type N except the calcium oxide and magnesium oxide shall be a minimum of 90% on non-volatile basis. Hydrated lime shall have a maximum free moisture content of 1-1/2%.

Sampling and testing, when required by the Engineer, shall be done in accordance with ASTM C 25 and C 110.

END OF SECTION 201

SECTION 203

SOIL AND GRASSES

203.1 TOPSOIL. This specification describes Top soil, soil used where the primary concern is the support of plant life. Top soil maybe loam or sandy loam containing organic material, and will be reasonably free of rocks, clay balls, roots, weeds, trash and other debris. Top soil will be obtained from the upper layer of ground in fields, creek banks, woods or from other sources approved by the Engineer.

203.2 FERTILIZER.

203.2.1 General. Fertilizer, as described in this section, shall be commercial type, granulated or pelletized and will be furnished in suitable containers. All fertilizer will conform to the conditions of the commercial fertilizer law of 1948 (Act Number 93) issued by the Louisiana Department of Agriculture.

203.2.2 Composition. Fertilizer will be commercial 8-8-8 which will contain a minimum of the following components by weight: 8% Nitrogen (N); 8% available Phosphoric Acid (P_20_5); 8% soluble Potash (K_20). Substitutes for commercial 8-8-8 with higher percentages of Nitrogen, available Phosphoric Acid, and soluble Potash in equal percentages by weight (up to 16-16-16) will be allowed in lieu of commercial 8-8-8 in proportionately smaller amounts based on the overall amounts of Nitrogen, available Phosphoric Acid, and soluble Potash. Fertilizers shall be analyzed for the minimum percentage by weight of the required components and an analysis submitted for batches of 2000 lbs. if required by the Engineer.

203.3 GRASSES.

203.3.1 Seed.

203.3.1.1 General. Seed, as defined in these specifications, will be grass seeds and will conform to all requirements, rules, and regulations of Chapter 11, Title 3 of Louisiana Revised Statutes of 1950.

203.3.1.2 Seed Mixture. The standard seed mixture will be 100% Hulled Bermuda and will have a coverage of approximately 30 pounds per acre. If field conditions warrant, other types of seed, such as rye grass, may be used with the permission of the Engineer.

203.3.1.3 Seed Analysis. Each variety of seed will be furnished and delivered in separate bags or other containers. Each bag or container will bear an analysis tag which shall conform to the applicable requirements of the Rules and Regulations as promulgated by the Louisiana Seed Commission for enforcement of the Louisiana Seed Law (Acts 372 of 1956 and 1952.). The analysis tag will be a No. 6 standard shipping tag, minimum size, and will carry the information required by the Louisiana Seed Law, and in addition, will carry the laboratory number of the Louisiana Department of Agriculture for that particular lot number shown on the tag.

All seed furnished shall be of the previous season's crop and the date of the analysis shown on each tag shall be within six (6) months of the time of delivery to the project. The minimum percentage of pure live seed and the maximum percentage of weed permitted will be as follows:

Variety of Seed	Minimum Percentage of Pure Live Seed	Maximum Percentage of Weed Seed
Hulled Bermuda	86	1
Rye Grass	76	2

Undesirable weeds shall be interpreted to mean that list of weeds, except Bermuda, which has been approved and adopted by the Louisiana Seed Commission as being noxious in Louisiana.

203.3.2 Sod. Sod shall be field or nursery grown. Field Sod shall be strongly rooted grasses, not less than two years old, free of weeds, undesirable plants, stones and other material detrimental to development or maintenance of lawn. Nursery grown grass sod shall be Centipede, Tiffany Bermuda, Nomow Bermuda, Common Bermuda, or St. Augustine. Slab sod shall be cut with approved sod cutters. The designated area shall be mowed when necessary. Sod shall be cut to a minimum soil depth of 1 1/2 inches for field grown grass and 1 inch (25 mm) for nursery grown grass, and to a uniform width and in convenient lengths for handling. Soil shall be retained on roots of sod during excavating, hauling and planting.

203.4 MULCH: Mulching material shall be used for erosion control on areas that have been seeded as indicated on drawings.

203.4.1 Vegetable Mulch. Mulch shall be vegetative in character and shall consist of either stems or stalks of oats, rye, wheat or other approved straws. The contractor may also use hay obtained from various legumes and grasses such as lespedezas, clover, vetches, soybeans, bermuda, Dallis, carpet sedge, fescue or any combination thereof. Straw or hay shall be reasonably dry and free from mold, Johnson grass or other noxious weeds.

203.4.2 Asphalt Mulch. Asphalt mulch shall be an approved emulsified asphalt conforming to Subsection 204.3.

203.4.3 Wood Cellulose Fiber (Hydro-Mulch). Wood cellulose fiber for use with hydraulic application of grass seed and fertilizer shall consist of specially prepared wood cellulose fiber, processed to contain no growth or germination-inhibiting factors and dyed on appropriate color to facilitate visual metering of the application of materials. On an air-dry weight basis, the wood cellulose fiber shall contain a maximum of 12% moisture, plus or minus three percent at the time of manufacture. The pH range shall be from 3.5 to 5.0. The wood cellulose fiber will be manufactured so that:

203.4.3.1 After addition and agitation in slurry tanks with fertilizers, grass seeds, water, and other approved additives, the fibers in the material will become uniformly suspended to form a homogeneous slurry.

203.4.3.2 When hydraulically sprayed on the ground, the material will form a blotter like cover impregnated uniformly with grass seed.

203.4.3.3 The cover will allow the absorption of moisture and allow rainfall or applied water to percolate to the underlying soil.

203.5 MATTING. Matting shall be of jute composition of uniform open-weaved new unbleached, single jute yarn. Yarn shall be of loosely twisted construction and shall not vary in thickness by more than one-half its normal diameter. Jute matting shall be furnished in roll strips and shall conform to the following specifications:

Length - approximately 75 (68 m) yards
Width - 48" (122 cm) plus or minus one inch
78 warp ends per width
41 weft ends per linear yard (.914 m)
Weight to average 1.22 pounds (.54 kg) per linear yard, + 5%

Staples used with jute matting shall be "u" shaped number 11 gauge or heavier wire. They shall be 6 inches long and 1 to 10 inches wide. Handmade staples shall be made from 12 inch long number 8 gauge or heavier wire.

203.6 FIBER GLASS ROVING.

203.6.1 Description. This specification covers a continuous fiber glass roving used in combination with asphalt or other cementitious materials to control erosion on newly seeded slopes and drainagechannels.

203.6.2 General Requirements. The material shall be formed from continuous fibers drawn from molten glass, coated with a chrome-complex sizing compound, collected into strands and lightly bound together into roving with the use of clay, starch or like deleterious substances. The roving shall be wound into a cylindrical package approximately one ft. high in such a manner that the roving can be continuously fed from the center of the package through an ejector driven by compressed air and expanded into a mat of glass fibers on the soil surface. The material shall contain no petroleum solvents or other agents known to be toxic to plant or animal life.

203.6.3 Detailed Requirements. The fiber glass roving shall conform to the following requirements as per ASTM D-578:

PROPERTY	ALTERNATE	LIMITS
Strands/Rove	28-32	56-64
Fibers/Strand	368-468	184-284
Fiber Dia., (in.) (G) (cm)	.00035-.0004 (.00089) - (.0010)	.00035-.0004 (.00089)-(.0010)
Yards/lb. of Strand	6,500-7,000	13,000-14,000
Yards/lb. of Rove Organic content, Percent Max.	.75	.45
Package Wt., lbs. (kg)	28-37 (12.7-16.78)	28-37 (12.7-16.78)

END OF SECTION 203

SECTION 204

BITUMINOUS MATERIALS

204.1 ASPHALT CEMENT.

204.1.1 General. Asphalt cement shall be uncracked petroleum asphalt, steam, vacuum or solvent refined. The Asphalt shall be produced from asphaltic or semi-asphaltic base crude petroleum. It shall be free from admixture with any residues obtained by the artificial distillation of coal, coal tar, or paraffin oil and shall be homogeneous and free from water and shall not foam when heated to 350 degrees F. (177°C).

Asphalt cement shall not be heated during the process of its manufacture, storage, or during construction so as to cause injury as evidence by the formation of carbonized particles. At no time shall the temperature in storage be higher than 10 degrees F (5.5°C) below the actual flash point of the asphalt.

204.1.2 Testing Requirements. Asphalt cement shall be classified by penetration and shall conform to the requirements set forth in the following table:

Specification Designation	AASHTO Test Method	AC-20	AC-40	AC-5	AC-10
Flash Point (Open Cup) Degrees F, (C) Min.	T 48	450 (232)	450 (282)	350 (177)	425 (218)
Penetration at 77° F (25 C), 100g, 5 sec.	T 49	60-70	40-50	130-150	80-90
Viscosity, 275° F (135°C) poises	T201	300	400	175	250
Viscosity, 140°F (60°C) poises	T202	2000±4000	4000± 800	500±100	1000±200
Solubility in Trichloroethylene, %	T 44	99	99	99	99
Tests on Residue from Thin Film., Oven Test					
Viscosity, 140° F (60°C) poises	T202	8000-	16,000-	2000	4000
Ductility, 77°F (25°C) 5cm.	T 51	100±	100±	100±	100±
Spot Test (Standard Naptha Solvent)	T102	Neg	Neg	Neg	Neg

204.1.3 Test Report and Certification. At the time of delivery of each shipment of asphalt, the vendor supplying the materials shall deliver to the purchaser certified copies of the test report which shall indicate the name of the vendor, type and grade of asphalt delivered, date and point of delivery, quantity delivered, delivery ticket number, purchase order number, and results of the above-specified tests. The test report shall be certified and signed by an authorized representative of the vendor that the product delivered conforms to the specifications for the type and grade indicated.

Until the certified test reports and samples of the material have been checked by the Engineer to determine their conformity with the prescribed requirements, the material to which such report relates and any work in which it may have been incorporated as an integral component will be only tentatively accepted by the Contracting Agency. Final acceptance will be dependent upon the determination of the Engineer that the material involved fulfills the requirements prescribed therefore. The certified test reports and the testing required in connection with the reports shall be free of expense to the Contracting Agency.

204.1.4 Temperatures. Unless otherwise specified in these specifications, the various grades of asphalt cement shall be applied at a temperature range as indicated in the following table, the exact temperature to be determined by the Engineer. At no time after loading into a tank car or truck for transportation from the refinery to the purchaser, shall the temperature of the asphalt cement be raised to within 10 F (5.5° C) of the flash point.

Asphalt cement shall be heated in such a manner that steam or hot oils will not be introduced directly into the asphalt cement during heating. The Contractor shall furnish and keep on the site, at all times, an accurate thermometer suitable for determining the temperature of the asphalt cement.

204.1.5 Distributing Equipment. Distributing equipment shall meet the requirements of Subsection 204.2.5.

204.2 CUTBACK ASPHALT.

204.2.1 General. Cutback asphalt shall consist essentially of uncracked petroleum asphalt base stock and shall conform to the following classifications:

204.2.1.1 Medium-curing cutback asphalt, designated by the letters MC, shall consist of an uncracked petroleum base stock produced by the processing of asphaltic or semi-asphaltic base crude petroleum, blended with a kerosene-type solvent. The base stock for all MC materials shall be straight run asphalt produced within the penetration range of 100 to 300, and the end point of the kerosene-type solvent shall not exceed 525°F (274°C). Medium curing liquid cutback asphalt shall be free from water and show no separation.

204.2.1.2 Rapid-curing cutback asphalt, designated by the letters RC, shall consist of an uncracked petroleum asphalt base stock, produced by the process of asphaltic or semi-asphaltic base crude petroleum, blended with a naphtha or gasoline-type solvent. The base stock for all RC materials shall be straight run asphalt produced within the penetration range of 70-150. Rapid-curing cutback asphalt shall be free from water and show no separation.

The asphalt shall not be heated during the process of its manufacture or during construction so as to cause injury as evidenced by the formation of carbonized particles.

204.2.2 Test Requirements. Cutback asphalt shall consist of materials specified in the above classifications and shall conform to the requirements set forth in the following tables:

CUTBACK ASPHALT MEDIUM CURE

		MC-30		MC-70		MC-250	
	Test Method	Min.	Max.	Min.	Max.	Min.	Max.
Flash Point Open Tag, °F (°C)	AASHTO T 79	100 (38)	----	100 (38)	----	150 (66)	----
Viscosity, Saybolt-Furol	AASHTO T 72						
at 77°F (25°C), sec		75	150	----	----	----	----
at 140°F (60°C), sec		----	----	35	70	125	250
Distillation test, distillate percentage by volume of total distillate to 680°F; (360°C)	AASHTO T 78						
to 374°F (190°C)		----	----	----	----	----	----
to 437°F (225°C)		----	25	----	20	----	10
to 500°F (260°C)		40	70	20	60	15	55
to 600°F (316°C)		75	93	65	90	60	87
Residue from distillation to 680°F (360°C); percentage volume by difference 50		50	----	55	----	67	----
Tests on Residue:							
Penetration at 77°F (25°C) 100g., 5 sec.	AASHTO T 49	120	250	120	250	120	250
Ductility at 77°F, for residues to 200 pen.: 5 cm/min.	AASHTO T 51	100	----	100	----	100	----
Ductility at 77°F (25°C), 5 cm/min.	AASHTO T 51	----	----	----	----	----	----
Ductility at 60°F (15.5°C) for residues of 200-300 pen., 5 cm/min.	AASHTO T 51	100	----	100	----	100	----
Solubility in Trichloroethylene	AASHTO T 44	99.0	----	99.0	----	99.0	----

CUTBACK ASPHALT RAPID CURE

		MC-30		MC-70		MC-250	
	Test Method	Min.	Max.	Min.	Max.	Min.	Max.
Flash Point Open Tag, °F (°C)	AASHTO T 79	----	----	80 (27)	----	80 (27)	----
Viscosity, Saybolt-Furol	AASHTO T 72						
at 77°F (25°C), sec		----	----	----	----	----	----
at 140°F (60°C), sec		35	70	125	250	400	800
Distillation test, distillate percentage by volume of total distillate to 680°F; (360°C)	AASHTO T 7						
to 374°F (190°C)		10	----	----	----	----	----
to 437°F (225°C)		50	----	35	----	15	----
to 500°F (260°C)		70	----	60	----	45	----
to 600°F (316°C)		85	----	80	----	75	----
Residue from distillation to 680°F (360°C); percentage volume by difference 50		55	----	65	----	75	----
Tests on Residue:							
Penetration at 77°F (25°C) 100g., 5 sec.	AASHTO T 49	80	120	80	120	80	120
Ductility at 77°F, for residues to 200 pen.: 5 cm/min.	AASHTO T 51	----	----	----	----	----	----
Ductility at 77°F (25°C), 5 cm/min.	AASHTO T 51	100	----	100	----	100	----
Ductility at 60°F (15.5°C) for residues of 200-300 pen., 5 cm/min.	AASHTO T 51	----	----	----	----	----	----
Solubility in Trichloroethylene	AASHTO T 44	99.0	----	99.0	----	99.0	----

204.2.3 Test Reports and Certifications. Test reports and certifications will be furnished in accordance with Section 204.1.3.

204.2.3 Temperatures. Unless authorized by the Engineer, no cutback asphalt shall be spread when the air temperature is lower than 50° F. At 50°F the atmospheric temperature must be rising.

Unless otherwise specified in these specifications, the various grades of cutback asphalt shall be applied at temperatures within the limits specified in the table of application temperatures below the exact temperature to be determined by the Engineer.

At no time after loading into a tank car or truck for transportation from the refinery to the purchaser, unless authorized by the Engineer, shall the temperature of the cutback asphalt be higher than IO°F (5.5°C) below the actual flash point.

Cutback asphalt shall be heated in such a manner that steam or hot oils will not be introduced directly into the liquid asphalt during heating. The Contractor shall furnish and keep on the site, at all times, an accurate thermometer suitable for determining the temperature of the liquid asphalt.

204.2.5 Distributing Equipment. Distributor trucks shall be of the pressure type with insulated tanks. Spray bars shall have a minimum length of 9 feet (2.75 m) and shall be of the full-circulating type. The spray bar shall be adjustable to permit varying height above the surface to be treated. The nozzles attached to the bar shall be either of the conical or flat clotted type.

The distance center to center of the nozzles shall not exceed 6 inches (14.4 cm). The valves shall be operated by levers so that one or all valves may be quickly opened or closed in one operation. The valves which control the flow from nozzles shall be of a positive acting design so as to provide a uniform unbroken spread of bituminous material on the surface. The distributor shall be equipped with devices and charts to provide for accurate and rapid determination and control of the amount of bituminous material being applied and with tachometer of the auxiliary wheel type reading speed in feet per minute. The spreading equipment shall be so designed and articulated that uniform application of a bituminous material, in controlled amounts, may be made ranging from .02 to 1.0 gallon per square yard (.09 to 4.5 liters per sq. meter) of surface and with a range of pressure from 25 to 75 pounds per square inch (172 to 517 k Pa).

If a spray bar extension is used to cover a greater width, it shall be of the full-circulating type. The distributor shall be equipped with a hose and nozzle attachment to be used for spotting skipped areas and areas inaccessible to the distributor. The distributor shall also be equipped with pressure gauges and an accurate thermometer for determination of the temperature of bituminous material. Distributors and booster tanks shall be so maintained at all times as to prevent dripping of free bituminous material from any part of the equipment.

The Engineer reserves the right to order the discontinuance of use of equipment which in his opinion, fails to produce a satisfactory distribution of asphalt in accordance with specifications.

204.3 EMULSIFIED ASPHALT

204.3.1 General. Emulsified asphalt shall be composed of a paving asphalt base uniformly emulsified with water and an emulsifying or stabilizing agent. They shall be homogeneous throughout and if stored, shall show no separation of ingredients within 30 days after delivery. Emulsified asphalt shall be classified as rapid-setting or slow-setting type in either anionic or cationic emulsions.

(1) Penetration type and high viscosity type emulsions shall be designated by the letters RS (rapid setting).

(2) Mixing type emulsion shall be designated by the letters SS (slow setting).

ANIONIC EMULSIONS

Test Description	AASHTO Test Method No.	SLOW SETTING SS-1 Min.	SS-1 Max.	SS-1h Min.	SS-1h Max.
Furol Viscosity at 77 F (25°C), sec.	T 59	20	100	20	100
Settlement, 5 days, % (a)	T 59		5		5
Storage Stability 1 day (b)	T 59		1		1
Sieve Test (Retained on No. 20), %	T 59		0.10		0.10
Cement Mixing Test, %	T 59		2.0		2.0
Residue from distillation,%	T 59	57		57	
Penetration of residue at 77°F (25°C)	T 59	100	200	40	90
Solubility of residue,% in Trichloroethylene	T 59	97.5		97.5	
Ductility of residue at 77°F (25°C). 5 cm/min	T 59	40		40	

CATONIC EMULSIONS

Test Description	AASHTO Test No.	RAPID SETTING (d) CRS-2 Min.	CRS-2 Max.	MEDIUM SETTING CMS-2 Min.	CMS-2 Max.	SLOW SETTING COS-1h Min.	COS-1h Max.	CSS-1h Min.	CSS-1h Max.
Furol Viscosity at 77°F (25°C), sec.	T 59					20	100	20	100
Furol Viscosity at 122°F (50°C), sec.	T 59	100	400	50	450				
Settlement, 5 days, % (a)	T 59		5		5		5		5
Storage Stability Test 1 day (b)	T 59		1		1		1		1
Demulsibility 35 ml. 0.8% sodium dioctyl sulfosuccinate, %(c	T 59	40							
Sieve Test (Retained on No. 20), %	T 59		0.10		0.10		0.10		0.10
Particle Charge Test		Positive		Positive		Positive (a)		Positive (a)	
Cement Mixing Test, %	D 244						2.0		2.0
Oil distillate by vol. of emulsion %	T 59		3		12				
Residue from distillation, %	T 49	65		65			57		57
Penetration of residue at 77°F (25°C)	T 49	100	250	100	250	40	90	40	90
Solubility of residue, % in Trichloroethylene Ductility of residue 77° (25°C), 5 cm/min	D 2042 D113	97.5 40		97.5 40		97.5 40		97.5 40	

(a) The test requirement for settlement may be waived when the emulsified asphalt is used in less than 5 days time; or the purchaser may require that the settlement test be run from the time the sample is received until it is used, if the elapsed time is less than 5 days.

(b) The 24-hour (1 day) storage stability test may be used instead of the 5 day settlement test.

(c) The demulsibility test shall be made within 30 days from the date of shipment.

(d) A harder base asphalt meeting current paving asphalt specifications may be specified with the provision that the test requirements on the Residue from Distillation be waived.

(e) Must meet a pH requirement of 6.7 maximum (ASTM E.70) if the Particle Charge Test result is inconclusive.

The slow setting type emulsion shall conform to the following adhesion test:

Sixty grams of dry crushed rock shall be placed in an 8 ounce (235ml) seamless ointment tin, moistened with distilled water and then vigorously mixed with 10 grams of emulsified asphalt for not less than 3 minutes or until the aggregate is completely coated. The aggregate and emulsified asphalt shall be at room temperature at the time of mixing. After coating, the mixture shall be transferred to a Petri dish and placed in a constant temperature oven maintained at 140°F (60°C) for a period of 16 to 18 hours. At the end of this period, the dish and sample shall be removed from the oven and cooled to room temperature for one hour. The dish and sample shall then be immersed in distilled water maintained at 140° F (60° C) for one hour. While still in the water bath, using a shaded 70 watt lamp, the sample shall be examined for stripping. Thin translucent areas are considered completely coated. Exposed portions or edges are considered stripped. When emulsified asphalt is tested by this method 100% of all aggregate surfaces shall remain coated.

204.3.3 Test Reports and Certification. Test reports and certifications shall be made in accordance with Subsection 204.1.3.

204.3.4 Temperatures. Emulsified asphalt may be reheated, but at no time after loading for transportation from the refinery to the purchaser shall the temperature of the emulsion be raised above 160°F (71°C). During reheating, the emulsified asphalt shall be permitted to cool to a temperature of less than 40°F (4°C).

Emulsified asphalt shall be heated in such a manner that no steam or hot oils will be introduced into the asphalt. The contractor shall furnish and keep on the site an accurate thermometer suitable for determining the temperature of the emulsified asphalt.

204.2.2 Distributing Equipment. Distributing equipment shall be the same as specified in Subsection 204.2.5 except that hand spraying by means of hose or bar through a gear pump or air tank will be acceptable for applications to 0.10 gal. per square yard (.45 liters per square meter) for flat work or tacking of vertical edges. Uniform coverage will be required.

204.4 UNDERSEALING ASPHALT.

204.4.1 General. Undersealing asphalt shall be prepared by the refining of petroleum. It shall be uniform in character and shall not foam when heated to 350°F (177°C). All storage tanks, piping, retorts, booster tanks, distributors and other equipment used in delivering, storing or handling asphalt cement shall be kept clean and in good operating condition at all times and shall be operated in such a manner as to avoid any possible contamination of the contents with foreign materials.

204.4.2 Testing Requirements. Undersealing asphalt shall meet the requirements contained in the following table. All testing of undersealing asphalt, unless otherwise directed, shall be in accordance with the test methods given in the table.

	Test Method
Softening Point (Ring & Ball), °F (°C)	AASHTO 53 180 to 200° (82-93)
Penetration of Original Sample:	
At 32°F (O°C), 200g., 60 sec.	AASHTO 49 5+
At 77°F (25°C), lOOg., 5 sec.	AASHTO 49 15 to 30
At 115°F (46°C), 50g., 5 sec	AASHTO 49 60-
Ductility at 77°F (25°C), 5 cm/min.	AASHTO 51 2+
Flash Point (Cleveland Open Cup) °F (°C)	AASHTO 48 425+ (218)
Solubility $CC1_4$%	AASHTO 44 99.0
Loss at 325°F (163°C), 5 hrs., %	AASHTO 47 5-
Penetration of residue % of original	AASHTO 49 70+

204.5 ASPHALTIC CONCRETE

204.5.1 General. These specifications are applicable to asphaltic concrete wearing, binder and base course mixtures of the plant mix type or a combination of these courses, each consisting of a mixture of mineral aggregate and asphalt cement with additives as required.

The type of mixture furnished shall be as indicated on the Drawings or if more than one type is indicated, whichever type the contractor elects, but in any event shall be one of the following types:

204.5.1.1 Type 1 mix shall be composed of the following:

(a) Wearing Course: Crushed gravel, crushed slag, crushed stone or a combination of these materials, sand, mineral filler and asphalt cement.

(b) Binder Course: Crushed gravel, crushed stone, crushed slag, or a combination of these materials, sand, mineral filler and asphalt cement.

204.5.1.2 Type 3 mix.

(a) Wearing Course: Crushed gravel, crushed slag, crushed stone combined with rushed gravel, slag, stone or other approved types of screening, sand, mineral filler and asphalt cement.

(b) Binder Course: Crushed gravel, crushed slag, crushed stone, or a combination of these materials, sand, mineral filler, and asphalt cement.

204.5.1.3 Type 4 mix shall be composed of expanded clay aggregate, sand, mineral filler and asphaltcement.

204.2.2.1 Type 5 mix - Base Course:

(a) Mix 5A shall be composed of gravel, slag, stone, or expanded clay; sand; mineral filler (when needed); and asphalt cement.

(b) Mix 5B shall be composed of gravel, slag, stone, expanded clay; sand., and asphalt cement; or pit run sand clay gravel and asphalt cement.

The thickness of courses shall be in approximate conformity with the plan typical sections unless otherwise specified. If the contract provides for both binder and wearing courses, the contractor will be permitted, at his option, to substitute wearing course material for binder course material at no change in unit price. Should the contractor elect to make such substitution, the mixture will be laid in layers of such thickness that the compaction and surface requirements are met. No substitutions are allowed for Type 5 mixture without the written approval of the engineer. The mineral aggregate and asphalt cement shall be combined in such proportions that the mixture shall meet the following requirements by weight:

MIX	ASPHALT CEMENT PERCENT	AGGREGATE PERCENT	PERCENT CRUSHED RET. ON #4	PERCENT FILLER MINIMUM (1)
Type 1:				
WC	4.5 to 7.0	93.0 to 95.5	75 Min.	3
BC	3.8 to 7.0	93.0 to 96.2	60 Min.	2
Type 3:				
WC	4.5 to 7.0	93.0 to 95.5	80 Min.	2
BC	3.8 to 7.0	93.0 to 96.2	60 Min.	2
Type 4:				
WC & BC	6.0 to 8.5	91.5		2
Type 5:				
Base Courses				
(A)	3.5 to 8.5	91.5 to 96.5	As needed	As needed
(B)	3.5 to 8.5	91.5 to 96.5		

(1) When hydrated lime is used as filler only ½ as much will be required. When crushed stone aggregate is used, mineral filler may be reduced or eliminated with prior approval from the engineer.

A description of the various mixtures is given in Table II of this Section.

204.5.2 Materials.

204.5.2.1 Asphaltic Cement shall conform to Subsection 204.1, grade AC-40. A silicone additive shall be dispersed in the asphalt by methods and in concentrations as approved by the Engineer. An anti-stripping additive, added at the approximate rate of 0.5 percent by weight of the asphalt cement, shall be thoroughly mixed with the asphalt cement at the plant. The anti-stripping additive must be approved by the Engineer prior to use. The anti- stripping additive shall be dispersed by either (1) measuring into the transport or into the asphalt feed line between the transport and storage tank or (2) through pump one time prior to use. When crushed limestone or expanded clay is used as aggregate, anti-stripping additive will not be required.

204.5.2.2 Aggregates. Aggregate shall conform to Subsection 200.6, type one, three or four mixtures.

204.5.2.3 Filler. Mineral filler shall conform to Subsection 200.6.5.

204.5.3 Design and Quality Control of Mixtures

204.5.3.1 General. The contractor shall assume full responsibility for the design and quality control of the mixtures. He shall design the mixture in accordance with the physical properties contained in Table II of this Section. He shall assume responsibility for the initial determination and all necessary subsequent adjustments in proportioning of materials used to produce the specified job mix and other physical characteristics.

204.5.3.2 Job Mix Formula. No work shall be started nor any mixture accepted until the contractor has submitted, in writing for approval, his job mix formula for the mixture he proposes to furnish. The formula so submitted shall indicate a single definite percentage of aggregate passing each required sieve size, a single percentage of asphalt cement, a single temperature at which the mixture is to be produced, the wet and dry mixing time when pugmill mixing is used, and the amount and types of additives to be used.

Mixing shall be accomplished in a manner that will give a minimum coating of 95 percent of the course aggregate particles when tested in accordance with AASHTO Designation: T 195. The asphalt content and extracted gradation shall be within type tolerances applied to the job mix formula initially submitted by the contractor.

Individual materials from more than one source shall not be used alternately nor mixed when used in surface courses without the written consent of the engineer. Where additional sources of materials are submitted to the engineer for approval as described in the preceding paragraph, a job mix formula shall be established and approved before the new material is used. When unsatisfactory results or other conditions make it necessary, the contractor may be required to establish a new job mix formula.

204.5.4 Plant Equipment. Asphaltic concrete shall be mixed at a central mixing plant by either batch, continuous or dryer-drum mixing process at the option of the contractor. The aggregates and asphalt may be proportioned either by weight or volume. All plants used shall conform to the requirements given in the succeeding paragraphs.

204.5.4.1 General Requirements. The following requirements apply to all types of plants unless otherwise specified:

(a) Asphalt Preparation Equipment: The asphalt working tank shall be capable of uniformly heating the material, under positive control, to the required temperature. Heating shall be accomplished by approved means. The circulating system for asphalt cement shall be of adequate size to insure proper and continuous circulation during the entire operating period. All pipelines and fittings shall be heated or insulated. Tank capacity shall be sufficient for satisfactory plant operation. In addition to working tanks the contractor shall provide adequate storage tanks for asphalt.

(b) Cold Aggregate Feeder: The plant shall be provided with accurate mechanical means for uniformly feeding the aggregate into the dryer. The feeders shall be capable of delivering the maximum number of aggregate sizes required in their proper proportion. When more than one cold feeder is used, each shall operate as a separate unit, and the individual controls shall be integrated with a total master control.

In cases where the contractor elects to use either a dryer-drum process or screenless plant operation, the cold feed system will be such that it will control proportioning of aggregates accurate enough to produce a gradation consistently within the job mix formula. An automatic plant shut-off shall be provided to operate when any aggregate bin becomes empty or flow is interrupted.

(c) Dryer: The plant shall include one or more dryers that will continuously agitate the aggregates during the heating and drying process. The equipment shall be capable of heating and drying all aggregates specified in the necessary quantities to supply the mixing unit continuously at its operating capacity and at a specified temperature and acceptable moisture content.

(d) Thermometers: A thermometer shall be fixed in the asphalt feed line at an approved location near the discharge valve at the mixer unit except in dryer-drum plants where a recording thermometer shall be

located to indicate the temperature of the asphalt cement in storage. The plant shall also be equipped with an approved recording thermometer having an accuracy of ± 5°F (±2.5°C) and a sensitivity which will provide an indication of temperature change at the rate of not less than 10°F (5°C) per minute. It shall be placed at the discharge chute of the dryer to register automatically the temperature of the heated material. The immediate repair or replacement of any defective or unsatisfactory instrument by some approved temperature recording apparatus will be required.

(e) Dust Collector: The plant shall be provided with a dust collection system meeting all federal, state and local requirements.

(f) Asphalt Measuring Equipment: Asphalt may be introduced either by weighing or volumetric measurement. When scales are used, they shall read to the nearest pound. In cases where the asphalt is measured by volumetric means, provisions shall be made to periodically check the quantity of asphalt delivered by weight and the quantity and the rate of asphalt delivered will be continuously displayed in digital form.

All asphalt measuring, regardless of the method used, shall be accurate to one percent of the quantity measured. For continuous and batch plants, the asphalt shall be sprayed in a manner which gives the most rapid and complete coating.

(g) Mixer Unit: For batch and continuous methods of operation, the plant shall have an approved pugmill capable of producing a uniform mixture within the specified tolerances. For batch plants, the pugmill will be inspected by the engineer to determine its capacity. For continuous plants, the paddles shall be of a type adjustable for angular position on the shafts and reversible to retard the flow of the mix. The mixer shall carry a manufacturer's plate giving the net volumetric contents of the mixer at the several heights inscribed on the permanent gage.

(h) For continuous and dryer-drum plants and when storage or surge bins are used with all other type plants, the contractor will furnish tuck-platform scales for the purpose of determining the pay weights for the mix. The scales shall be of sufficient length to weigh the entire unit transporting the mix and shall be the product of a reputable manufacturer and of a simple rugged design with the minimum number of adjustments consistent with the accuracy required, all as approved by the engineer. The scales shall be accurate to 0.5 percent of the loads applied. The contractor shall have the scales certified by a qualified independent scale service prior to their use and in the event there is cause to believe that the scales are performing incorrectly, he shall furnish additional certification

The scales shall be equipped with an approved automatic printer system which will print the tare weight as well as the total weight of the unit and the mix.

In lieu of platform scales the contractor may weigh the mixture in a weigh box located under the surge or storage bin prior to loading into a truck provided the scales meet the requirements given in the preceding paragraphs.

204.5.4.2 Batch Plants. When batch plants are used, the contractor, at his option, can use either gradation control by means of screens or cold feed control without separating the dried aggregate into two or more sizes. If cold feed control is selected, a scalping screen will be required. The details of equipment requirements for each mode of operation shall be as described herein and the general requirements given in Heading 204.5.4.1 of this subsection.

(a) Screens: Plant screens capable of screening all aggregates to the sizes required for proportioning and having normal capacity in excess of the full capacity of the mixer or the dryer, shall be provided. The contractor shall expose the screens for inspection at the request of the engineer.

(b) Bins: The bin sizes shall be adequate for continuous operation of the plant at rated capacity. Bins shall be so arranged to insure separate and adequate storage of appropriate fractions of the aggregate. Adequate dry storage shall be provided for the mineral filler and provisions made for proportioning the filler for

each batch of mixture. Each hot bin shall be provided with an overflow pipe or chute (except the mineral filler bin) to prevent contamination of materials. Each size of aggregate, as required, shall be stored in separate bins when screens are used.

For screenless operation, aggregate shall be stored in one or more bins with adequate provisions to prevent segregation.

(c) Weigh Box or Hopper: Equipment shall include a means for accurately weighing each size of aggregate in a weigh box or hopper suspended on scales ample in size to hold a full batch. Gates on both bins and hopper shall be so constructed as to prevent leakage when they are closed.

(d) Plant Scales: Scales for any weigh box or hopper shall be the springless dial type and shall be of a standard make and design, accurate to 0.5 percent of the indicated load. They shall be designed, constructed and installed in such a manner as to be reasonably free from vibration. All scales for weighing the asphalt shall have a capacity which will insure accuracy within the tolerance specified elsewhere herein. Scales shall be tested as often as deemed necessary to insure their accuracy as directed by the engineer.

The contractor shall also provide an approved printer system which will print separately the weight of the aggregate and of the asphalt.

(e) Control of Mixing Time: The mixer shall have an approved timing device to prevent the entrance of additional material while the mixing operation is in progress, and the discharge gates shall be locked to insure proper mixing. The device shall also lock the asphalt bucket throughout the dry mixing period.

204.5.4.3 Continuous Mix Plants. When continuous plants are used, the contractor, at his option, can use either gradation control by means of screens or cold feed without separating the dried aggregate. If cold feed control is selected, a scalping screen will be required. The details of equipment requirements for continuous mix plants shall be as described herein and the general requirements given in Heading 204.5.4.1 of this subsection.

(a) Gradation Control Unit: The plant shall include a means for accurately proportioning each size of aggregate by volumetric measurement. The unit shall include a feeder mounted under the bins with each bin compartment having an accurately controlled individual gate to form an orifice for volumetrically measuring the material drawn from it. The orifice shall be rectangular, with one dimension adjustable by positive mechanical adjustment, and provided with a lock. Indicators shall be provided on each gate to show the gate opening in inches. If cold feed control is selected, one or more bins may be used for aggregate. Mineral filler, when specified, shall be proportioned separately from a hopper equipped with an adjustable feed which may be accurately and conveniently calibrated and which shall be interlocked with the aggregate and asphalt feeds.

(b) Weight Calibration of Aggregate Feed: Samples shall be taken and weighed as a means of calibrating gate openings. Material shall be fed out of a bin through the individual orifice and bypassed to an approved test box. The material from each compartment shall be taken separately. The plant shall be equipped to handle conveniently such test samples weighing not less than 200 pounds (90 kg). An accurate platform scale shall be provided by the contractor to weigh the test samples.

(c) Synchronization of Aggregate and Asphalt Feed: Satisfactory means shall be provided to assure positive interlocking control between the flow of aggregate from the bins and the flow of asphalt from the meter or other proportioning device. This shall be accomplished by interlocking mechanical means or by any positive method approved by the engineer. The aggregate bins shall be provided with signal devices and controls which will warn of low levels and which will automatically stop the flow of all aggregate and asphalt to the mixer when the aggregate in any one bin is so low that the feeder will not operate at set capacity. The asphalt storage system will be provided with signal devices and controls which will warn of low levels of asphalt and which will automatically stop the entire plant operation when the asphalt storage level is lowered to the point of exposing the feed end of the asphalt suction line.

If mineral filler is specified, the plant will include separate equipment to accurately proportion the mineral filler sufficiently in advance of the addition of the asphalt to give a proper dry mix time. This equipment shall be of such design as to give a constant flow of the material and shall include a storage bin of sufficient capacity and an adjustable calibrated gate. The filler feed system shall be interlocked with the aggregate control system and feed the material by mechanical means. A gravity type feed will not be permitted. When dust collected in bag houses is allowed for mineral filler, it may be added into the stream of dried aggregate provided the proper proportions can be assured.

(d) Control of Mixing Time: The plant shall be equipped with a positive means to govern the time of mixing. Mixing time shall not be altered unless approved by the engineer.

(e) Discharge Box: The plant shall be equipped with either a discharge box of sufficient size to collect the mix as it comes out of the pugmill to prevent segregation, or a surge bin.

204.5.4.4 Dryer-drum Plants. The details of equipment requirements shall be as described herein and the general requirements given under Heading (a) of this subsection.

(a) The complete dryer-drum process, including plant with necessary auxiliary equipment and controls, operating procedures, and testing and sampling methods during operation, must be approved by the Engineer prior to use. All new dryer-drum plants are required to demonstrate their ability to produce mixes that will meet specification requirements before placing final surface course.

(b) The system shall provide positive weight control of the cold aggregate feed by use of a belt scale or other device which is automatically coupled with the asphalt flow and interlocked with the asphalt measuring system to maintain the required proportions. The weighing will be continuous and be accurate to 0.5 percent. Proportioning of the mixture shall be in accordance with the job mix formula and within the allowable tolerances for control of mixtures. The system shall be equipped with automatic burner controls and shall provide for temperature sensing of the mixture at discharge.

The cold aggregate bins shall be of sufficient size to store the amount of aggregate required to keep the plant in continuous operation. Scalping screens shall be provided to insure removal of all objectionable material from the stockpiled materials prior to loading of the aggregates into the cold feed bins. An additional scalping screen will be required between the cold feed discharge and dryer in advance of the belt scale.

Provisions shall be made for introducing the moisture content of the cold feed aggregates into the belt weighing signal and correcting wet aggregate weight to dry aggregate weight. Dry or wet weight of the aggregate flow shall be displayed digitally in appropriate units of weight and time and totalized. The rate of flow of asphalt used will also be digitally displayed and totalized.

Means shall be provided for conveniently diverting aggregate delivery into trucks, front and loaders, or other containers for checking the accuracy of the aggregate delivery system.

(c) The asphalt pump shall be a positive displacement type pump. The asphalt storage system shall be equipped with a device for automatic plant shut-off when the intake of the pump is not working under required pressure.

For mineral filler a separate bin and feeder shall be furnished with its drive interlocked with the aggregate feeders. Mineral filler shall be introduced directly into the drum by approved means.

When the automatic asphalt adjustments or any other critical control and shutoff devices are not functioning, the plant will not be permitted to operate.

TABLE I

	Control Limits	
	Individual	Average of 2 Tests
¾" (19 mm) and larger	±9	±6
½" (12.7 mm)	±12	±9
⅜" (9.5 mm)	±10	±7
No. 4	±10	±7
No. 10	±9	±6
No. 40	±7	±5
No. 80	±5	±4
No. 200	±3	±2
Percent Asphalt	±6	±4
Temperature of Mix °F (°C)*	±25 (±14)	±25 (±14)
Percent Crushed	Minimum Value as specified in Table V of this Section.	

*As based on approved mixing temperature after discharge into the truck.

NOTE: When control limits as specified exceed the upper or lower limits for allowable gradations contained in Table II of this Section, the control limits are fixed at the same values as those required by the specification limits.

TABLE II

General Requirements for Asphaltic Concrete Mixtures

A. Grading Requirements (6)

U. S. Sieve	Type 1		Type 3	
	W.C.	**B.C.**	**W.C. (1)**	**B.C.**
1 1/2" (38.1 mm)	-	-	-	-
1 1/4" (31.7 mm)	-	100	-	100
1" (25.4 mm)	100	90-100	100	90-100
3/4" (19.0 mm)	85-100	75-100	85-100	75-100
1/2" (12.7 mm)	70-100	55-95	70-100	55-95
3/8" (9.5 mm)	-	-	-	-
No. 4	40-70	35-70	40-70	35-70
No. 10	25-55	20-50	25-55	20-50
No. 40	8-33	10-33	8-33	10-33
No. 80	4-20	5-20	4-20	5-20
No. 200	2-10	2-10	2-10	2-10
Asphalt %	4.5-7.0	3.8-7.0	4.5-7.0	3.8-7.0
Aggregate %	93.0-95.5	93.0-96.2	93.0-95.5	93.0-96.2
Mineral Filler % Min. (7)	8	2	2	2
% Crushed Ret. on No. 4	75 Min.	60 Min.	80 Min.	60 Min.
Asphalt Cement (3)	AC-40	AC-40	AC-40	AC-40
Course Agg. Types (4)	A, B, C	A, B, C, D	A, B, C	A, B, C, D

TABLE II - Continued

B. Minimum Acceptance Requirements

U. S. Sieve	Type 1		Type 3	
	W.C.	**B.C.**	**W.C. (1)**	**B.C.**
Marshall Stability (lbs.) (Kg) (Average of 4 tests)				
AC-20	1100 (399)	1100 (499)	-	-
AC-40	1200 (544)	1200 (544)	1700 (771)	1400 (635
Density %	95	95	95	95
Linear % of Roadway Surf. Tol.				
1/8" (1.58 mm) (with Auto. Screed)	0.0 - 1.0	-	0.0 - 1.0	-
3/16" (4.76 mm) (without Auto. Screed)	0.0 - 0.5	-	0.0 - 0.5	-

Acceptable Deviation from Control Tolerances or Gradation Limits for Nos. 4, 40 & 80 Sieves: 2% for individuals, 1% for average of two tests.

TABLE II - Continued

General Requirements for Asphaltic Concrete Mixtures

A. Grading Requirements (6)

U. S. Sieve	Type 4	Type 5		Mix Control Tolerance	
	W.C. & B.C.	**Base (A)**	**Base (B) (2)**	**Ind.**	**Av. of 2**
1 1/2" (38.1 mm)	-	100	100	± 9	± 6
1 1/4" (31.7 mm)	-		-	± 9	± 6
1" (25.4 mm)	-	80-100	80-100	± 9	± 6
3/4" (19.0 mm)	100	70-100	-	± 9	± 6
1/2" (12.7 mm)	80-100	55-85	-	± 12	± 9
3/8" (9.5 mm)	-	-	-	± 10	± 7
No. 4	55-85	35-60	35-75	± 10	± 7
No. 10	45-75	20-45	-	± 9	± 6
No. 40	20-55	10-30	10-55	± 7	± 5
No. 80	10-25	5-25	-	± 5	± 4
No. 200	2-12	2-10	2-15	± 3	± 2
Asphalt %	6.0-8.5	3.5-8.5	3.5-8.5	± .6	± .4
Aggregate %	91.5-94.0	91.5-96.5	91.5-96.5		
Mineral Filler % Min. (7)	2	As needed	-		
% Crushed Ret. on No. 4	-	As needed	-		
Asphalt Cement (3)	AC-40	AC-40	AC-20		
Course Agg. Types (4)	F	A, B, C, D, F	A, B, C, D, F		

TABLE II - Continued

B. Minimum Acceptance Requirements

U. S. Sieve	Type 4	Type 5		Mix Control Tolerance	
	W.C. & B.C.	**Base (A)**	**Base (B) (2)**	**Ind.**	**Av. of 2**
AC-20	1100 (499)	1100 (499)	800 (363)		
AC-40	1200 (544)	1200 (544)	-		
Density %	95	95	94		
Linear % of Roadway Surf. Tol. 1/8" (1.58 mm) with Auto Screed)	.0-1.0	-	-	-	
3/16" (4.76 mm) (without Auto Screed)	-	-	-	-	

(1) Type 3 W.C. mixture shall contain a minimum of 15 percent screening based on total aggregates.

(2) Type 5B mixture is intended for bases under P.C.C. pavements and shoulder bases and low traffic roads only.

(3) Substitution of AC-20 for AC-40 in Types 1, 4 and 5(A) mixtures must have approval of engineer. No substitutions permitted for Types 3, 5(B).

(4) Type A - Crushed gravel, B - Crushed slag, C - Crushed stone approved for wearing surface, D – Crushed Stone, F - Expanded clay. Crushing not required in base mixtures.

(5) When Type 4 mixture is used for shoulder W.C., design values shall be same as Type 4.

(6) When W.C. mixture is substituted for binder course, the mix shall meet all physical requirements for wearing course mixtures.

(7) When 100% of the aggregate is crushed limestone, the mineral filler may be reduced or eliminated with prior approval from the engineer. When crushed limestone is used as the coarse aggregate only, the mineral filler will be required as shown.

204.6 ASPHALTIC CONCRETE FRICTION COURSE

204.6.1 General. The friction course shall be composed of asphalt cement with anti-stripping additive and either slag, expanded clay or crushed stone at the contractor's option.

204.6.2 Materials.

204.6.2.1 Asphalt Cement. Asphalt cement shall conform to Subsection 204.1. The type material used shall be asphalt cement Grade AC-40 containing an anti-stripping additive, added at the approximate rate of 0.5 percent by weight of asphalt cement and thoroughly mixed as described in Subsection 204.5. The anti-stripping additive shall be approved by the Engineer prior to use.

204.6.2.2 Aggregates. Slag, expanded clay and crushed stone aggregates shall conform to Subsection 200.6.

All aggregates will be sampled at the plant site prior to incorporation in the mixture.

Gradation of the finished mixture as obtained from extracted samples shall be as follows:

U.S. Sieve	Percent Passing (By Dry Weight)
1/2" (12.7mm)	100
3/8" (9.5 mm	90 to 100
No. 4	20 to 50
No. 10	0 to 15
No. 200	0 to 6

204.6.3 Proportioning. Mixture of materials shall be proportioned as follows:

	Percent Asphalt	Percent Aggregate	Percent Crushed Retained on No. 4 Sieve
Slag	6 - 12	88 - 94	-
Expanded Clay	13 - 17	83 - 87	-
Crushed Stone	4 - 10	90 - 96	95 (min.)

The contractor shall submit for the engineer's approval, a job mix formula for the mixture to be supplied for the project. The job mix formula shall be within the allowable tolerances of these specifications. This formula shall consist of proposed gradation, asphalt content, mixing time and mixing temperature. The approved job mix formula for the mixture shall be in effect until a modification is approved by the engineer. Should a change in sources of materials be used, a new job mix formula shall be established before the new material is used. When unsatisfactory results or other conditions make it necessary, the contractor may submit a new job mix formula.

The application of job mix formula and allowable tolerances for control of mix shall be in accordance with Subsections 204.5.3.1 and 204.5.3.2 with the following amendments. Table I of Subsection 204.5 deleted and the following substituted therefore.

TABLE I

JOB MIX FORMULA CONTROL LIMITS

U.S. Sieve	Individual	Average of 2 Tests
3/8 (9.5 mm)	± 10	± 7
No. 4	± 10	± 7
No. 10	± 9	± 6
No. 200	± 3	± 2
Percent Asphalt	± 6	± 4
Temperature of Mix°F (©)	± 25 (± 14)	± 25 (± 14)

Based on the approved mixing temperature measured after discharge. Mixing shall be accomplished to give a minimum coating of 95 percent of coarse aggregate particles when tested by AASHTO Designation: T 195.

204.7 BITUMINOUS SLURRY SEAL

204.7.9 Description. This item shall consist of a mixture of mineral aggregates portland cement or hydrated lime, emulsified asphalt and water properly proportioned, mixed for the purpose of spreading on either existing pavement or shoulders.

204.7.2 Materials

204.7.2.1 Mineral Aggregate. Mineral aggregate shall consist of sound and durable clay aggregate, slag, granite or asphaltic limestone screening. The material shall be free from dirt, organic matter, clay balls, clay films, dust or other objectionable matter. Aggregate shall be non-plastic and meet the following gradation requirements:

U.S. Sieve	Percent Passing
3/8" (9.5 mm)	100
No. 4	85-100
No. 16	40-80
No. 50	10-35
No. 100	10-25
No. 200	5-20

Expanded clay aggregate shall be manufactured by the rotary kiln process and consist of angular fragments reasonably uniform in density and reasonably free from flat or elongated pieces, or other deleterious substances. Expanded clay aggregate shall not show an abrasion loss of more than 40% by the Los Angeles abrasion test. The loss on soundness shall not exceed 10% after 5 cycles by the magnesium sulphate method.

Crushed slag shall be air-cooled, blast furnace slag, and shall consist of angular fragments reasonably free from flat or elongated pieces, dirt or other objectionable matter. Crushed slag shall not show an abrasion loss of more than 40% by the Los Angeles abrasion test. The slag shall not contain more than 10% by weight of glassy particles and the crushed slag shall have a minimum dry weight of 70 pounds per cubic foot.

Granite shall consist of clean, tough durable stone and shall not show an abrasion loss of more than 40% by the Los Angeles abrasion test. The loss on soundness shall not exceed 15% by weight when subjected to 5 cycles of the magnesium sulfate soundness test.

Asphaltic limestone shall be crushed natural asphaltic limestone and shall consist of limestone rock which has been impregnated by the forces of nature with not less than two per cent bitumen, practically free from dirt, decomposed rock and other foreign matter. Limestone shall show a percent wear of not more than 40 by the Los Angeles Abrasion Test.

204.7.2.2 Bituminous Material. The binder used shall be a SS-lh grade anionic emulsified asphalt or a CSS-lh grade quick setting cationic emulsion as specified in Subsection 204.3. The binder and the aggregate shall be compatible, to obtain a homogeneous slurry mix.

204.7.2.3 Water. Water used in the mix shall be potable and free from an appreciable amount of soluble salts.

204.7.2.4 Portland Cement or Hydrated Lime. Portland cement shall conform to the requirements given

in AASHTO Designation: M85. Hydrated lime shall conform to the requirements given in ASTM Designation: C207.

204.7.2.5 Additives. The contractor is advised that certain quickset emulsions require additives to regulate the breaking time of the emulsion. If an additive is recommended by the emulsion producer, the contractor shall have a sufficient quantity of this additive on the job to use as deemed necessary.

204.7.3 Slurry Mixing Test. The aggregate and quickset bituminous material shall form a free flowing, smooth, creamy, homogeneous slurry with no segregation and be capable of being stirred with no evidence of balling or stiffening for a minimum period of 2 minutes when tested in accordance with Louisiana DOTD Designation: TR 315.

204.7.4 Slurry Setting Test. When pressed lightly with a piece of white paper towel, the slurry mix shall show No Brown Stain when tested in accordance with Louisiana DOTD Designation: TR315.

204.7.5 Proportioning. The mixture shall be composed of mineral aggregate, Portland cement or hydrated lime used in the mixture shall be from 1 1/2% to 4% of the mineral aggregate by volume. The amount of emulsified asphalt used in the mixture shall be approximately 15% to 30% by volume of the mineral aggregate. The minimum amount of water necessary to obtain a fluid and homogeneous mixture shall be added. The amount of water in the mixture may be varied slightly for various surface condition. The contractor shall make trial batches, at his expense, to determine the final blend of materials to be used, within the limits set forth herein.

204.8 SOIL ASPHALT ROAD MIX

204.8.1 Description. Soil asphalt road mix shall be composed of a compacted mixture of soil and asphaltic material. The soil and asphaltic material shall not be mixed when the ambient temperature is below 60° F (15°C) and is falling. The asphaltic mixture shall be mixed or placed only when weather conditions, in the opinion of the Engineer, are favorable.

204.8.2 Materials.

204.8.2.1 Soil. Soil shall consist of approved soil, free from vegetation or other objectionable matter and may be either the material encountered in the existing roadbed; the material secured from sources shown on the plans or approved by the Engineer; or of a combination of existing material and additional soil from approved sources, all as shown on plans.

Where plans provide for the use of additional soil from approved sources, the pits utilized shall be cleaned of all grass, roots, vegetation or other objectionable matter; and overburden and any other material considered unacceptable by the Engineer shall be removed from the pits. The pits shall be opened in such manner as to expose all the various strata of acceptable material, and unless otherwise directed, the material shall be secured in successive vertical cuts extending through all of the exposed strata, in order that a uniformly mixed material will be secured.

It is the intention of this specification to utilize materials existing on the road-bed where they are of such quality as to produce the results desired. Where satisfactory materials do not exist, material secured from approved sources shall be mixed with the existing soil or shall be furnished in sufficient quantity to construct the entire base course, all as shown on plans.

The Engineer may vary the proportions of the different types of soil to produce the most satisfactory material within the soil constant limits specified.

When the processed soil is properly tested by standard laboratory methods, the material shall meet the requirements indicated on plans.

204.8.2.2 Asphaltic Material (Road Oil). The asphaltic material shall be of the type and grade shown on

plans, and shall conform to requirements for the grade specified, as described in the following table.

ROAD OILS

TYPE-GRADE	RO-3		RO-4		RO-95	
	Min.	Max.	Min.	Max.	Min.	Max.
Water, %	-	0.2	-	0.2	-	0.2
Asphalt content of 85 to 115 penetration by vacuum distillation	60	-	55	-	80	-
Flash Point, C.O.C., F (C)	225 (107)	-	175 (69)	-	250 (121)	-
Furol Viscosity: At 122F (49C), sec at 140F (60C), sec.	- 200	- 320	100 -	160 -	- -	- -
Loss at 212F (100C), 20g., 5 hrs., %	-	6.0	-	6.0	-	-
Loss at 325F (164C), 50g., 7 hrs., %	-	-	-	-	2.0	6.0
Penetration of residue after evaporation loss, 100g., 5 sec.	-	-	-	-	175	250
Ductility of residue at 77F (25C) 5 cm/min., of cms	100	-	100	-	-	-
Solubility in Trichloroethylene, %	99.0	-	99.0	-	99.0	-
Flcat Test at 122F (49C), sec.	-	-	-	-	140	175
Spot Test	Neg.		Neg.		Neg.	
Test on 85 to 155 penetration residue by vacuum distillation residue by weight, %	-	-	-	-	80	-
Ductility, 77F (25C), 5 cms/min., original residue, cms	-	-	-	-	100	-
Subjected to Thin Film Test, cms	-	-	-	-	100	-

204.9.1 Asphalt Material Additives.

(a) Anti-Strip: Anti-strip additives for asphalt materials shall be approved products listed in QPL 57 and will be tested in accordance with DOTD TR 317.
(b) Silicone: Silicone additives for asphalt materials shall be approved products listed in QPL 22.
(c) Polymers: Polymer modified asphalt materials shall be approved products listed in QPL 41. Polymer additives shall be preblended with the asphalt material. In-line blending will not beallowed.

Table 204.9-1
Performance Graded Asphalt Cements

Property	AASHTO Test Method	PG76-22m [1]		PG70-22m [1]		PG64-22 [1]		PG58-28 [1]	
		Spec.	Deviation	Spec.	Deviation	Spec.	Deviation	Spec.	Deviation
Test on Original Binder		100	90 or Remove	100	90 or Remove	100	90 or Remove	100	90 or Remove
Rotational Viscosity @ 135°C, Pa-s [2]	TP 48	3.0	- - -	3.0	- - -	3.0	- - -	3.0	- - -
Dynamic Shear, 10 rad/s, G*/Sin Delta, kPa	TP 5	1.00+ @ 76°C	0.99-	1.00+ @ 70°C	0.99-	1.30+ @ 64°C	1.29-	1.00+ @ 58°C	0.99-
Flash Point, 0C	T 48	232+		232+		232+		232+	- - -
Solubility, % [3]	T 44	99+	- - -	99+	- - -	99+	- - -	99+	- - -
Separation of Polymer, 163 °C, 48 hours, °C difference in R & B from top to bottom [4]	DOTD TR 326	2-	- - -	2-	- - -	- - -	- - -	- - -	- - -
Force Ductility Ratio (f2/f1, 4°C, 5 cm/min., f2 @ 30 cm elongation)	T 300	0.30+	0.29-	- - -	- - -	- - -	- - -	- - -	- - -
Force Ductility, 4°C, 5 cm/min, 30 cm elongation, kg	T 300	- - -	- - -	0.23+	0.22-	- - -	- - -	- - -	- - -
Tests on Rolling Thin Film Oven Residue	T 240	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
Dynamic Shear, 10 rad/s, G*/Sin Delta, kPa	TP 5	2.20+ @76°C	2.19-	2.20+ @70°C	2.19-	2.20+ @64°C	2.19-	2.20+ @58°C	2.19-
Elastic Recovery, 25° C, 10 cm elongation, % [5]	T 301	60+	59-	40+	39-	- - -	- - -	- - -	- - -
Ductility, 25° C, 5 cm/min, cm	T 51	- - -	- - -	- - -	- - -	100+	99-	- - -	- - -
Test on Pressure Aging Vessel Residue	PP 1								
Dynamic Shear, @ 25 °C, 10 rad/s, G* Sin Delta, kPa	TP 5	5000-	- - -	5000-	- - -	5000-	- - -	5000-@ 19°C	- - -
Bending Beam Creep Stiffness, S, MPa @ -12°C.	TP 1	300-	- - -	300-	- - -	300-	- - -	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] Separation of Polymer Test - to be used for preblended modified asphalt cement materials.

[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 204.9-2

PG 70-22m Alternate [1]

Property	AASHTO Test Method	PG 70-22m Alternate[2]	
		Specification	Deviation
		100	90 or Remove
Test on Original Binder:			
Rotational Viscosity @ 135°C, Pa-s[3]	TP 48	3.0-	- - -
Dynamic Shear, @ 70°C and 10 rad/s, G*/Sin Delta, kPa	TP 5	1.50+	1.49-
Flash Point °C	TP 48	232+	- - -
Solubility %[4]	T 44	99+	- - -
Softening Point, Ring & Ball °C	T 53	70.0+	69.9-
Test on Rolling Thin Film Oven Residue:	T 240		
Mass Loss %	T 240	1.00-	1.01+
Dynamic Shear, @ 70°C and 10 rad/s, G*/Sin Delta, kPa	TP 5	2.20+	2.19-
Test on Pressure Vessel Aging Residue	PP 1		
Dynamic Shear, @ 25°C and 10 rad/s, G*/Sin Delta, kPa	TP 5	5000-	- - -
Bending Beam Creep Stiffness, S @ -12°C, MPa	TP 1	300-	- - -
Bending Beam Creep Slope, @ -12°C, m value	TP 1	0.003+	- - -

[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.

Table 204.9-3

Anionic Emulsified Asphalt

	Test Method	Percent of Contract Unit Price/Liter or Shipment [1]					
		SS-1			SS-1h		
		Specifications		Deviations	Specifications		Deviations
		100	80	50 or Remove[2]	100	80	50 or Remove[2]
Viscosity, Saybolt Furol @ 25°C, s	AASHTO T59	20 - 100	10 - 19	9-	20-100	10-19	9-
Residue by Distillation, % by wt.	AASHTO T59	---	101- 150	151+	---	101-150	151+
Sieve Test (Retained on 850µm)	AASHTO T59	57+	52 - 56	51-	57+	52-56	51-
Cement Mixing	AASHTO T59	0.1-	---	---	0.1-	---	---
Settlement, 5-day, %	AASHTO T59	2-	---	---	2-	---	---
Tests on Residue by Distillation:		5.0-	---	---	5.0-	---	---
Penetration, 25°C,	AASHTOT49	---			---		
100 g, 5 s, dmm		100 - 200	88 - 99	87-	40 - 90	30 - 39	29-
Solubility, %	AASHTO T44	---	201- 212	213+	---	91 - 101	101+
Ductility, 25°C,		97.5+	---	---	97.5+	---	---
50 mm/min, cm	AASHTO T51	40+	26 - 39	25-	40+	26 - 39	25-

1 When material is incidental to pay item, use invoice price per liter.
2 At the option of the engineer.

Table 204.9-4

Cationic Emulsified Asphalt (CRS-2, CMS-2, CSS-1 and CSS-1h)

	Test Method	Percent of Contract Unit Price/Liter or Shipment [1]											
		CRS-2			CMS-2			CSS-1			CSS-1h		
		Specifications Deviations			Specifications Deviations			Specifications Deviations			Specifications Deviations		
		100	80	50or Remove[2]	100	80	50or Remove[2]	100	80	50or Remove[2]	100	80	50or Remove[2]
Viscosity, SayboltFurol@50°C,s	AASHTOT59	100-400	56-99 401-444	55- 445+	50-450	26-49 451-499	25- 500+	---	---	---	---	---	---
SayboltFurol@25°C,s	AASHTOT59	---	---	---	---	---	---	20-100	10-19 101-150	9- 151+	20-100	10-19 101-150	9- 151+
ResiduebyDistillation %bywt.	AASHTOT59	65+	61-64	60-	65+	61-64	60-	57+	52-56	51+	57+	52-56	51+
OilDistillateby Volume,%	AASHTOT59	3.0-	---	---	12.0-	---	---	---	---	---	---	---	---
ParticleCharge	AASHTOT59	Pos.	---	Neg.	Pos.	---	Neg.	Pos.	---	Neg.	Pos.	---	Neg.
SieveTest (Retainedon850µm),%	AASHTOT59	0.1-	---	---	0.1-	---	---	0.1-	---	---	0.1-	---	---
Settlement,5-days,%	AASHTOT59	5.0-	---	---	5.0-	---	---	5.0-	---	---	5.0-	---	---
TestsonResidueby Distillation:													
Penetration@25 C, 100g,5s,dmm	AASHTOT49	100-250	84-99 251-266	83- 267+	100-250	84-99 251-266	83- 267+	100-200	89-99 201-212	87- 213+	40-90	30-39 91-100	29- 101+
Solubility,%	AASHTOT44	97.5+	---	---	97.5+	---	---	97.5+	---	---	97.5+	---	---
Ductility@25 C, 5cm/min,cm	AASHTOT51	80+	66-79	65-	40+	26-39	25-	40+	26-39	25-	40+	26-39	25-
Viscosity, 135 C,Pa-s	AASHTOT48	0.18+	0.13-0.17	0.12-	---	---	---	---	---	---	---	---	---

[1] When the unit of pay is not based on the liter, the deduction will be applied to the contract unit price.
2 At the option of the engineer.

Table 204.9-5

Emulsified Polymerized Asphalt (CRS-2P)[1]

	Test Method	Percent of Contract Unit Price/Liter or Shipment [2]		
		Specifications		Deviations
		100	80	50 or Remove [3]
Viscosity, Saybolt Furol @ 50° C	AASHTO T 59	100 - 400	56 - 99	55-
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	3.0-	---	---
Oil Distillate by Vol. of Emulsion, %		65+	---	---
Residue from Distillation, %			61-64	60-
Tests on Residue by Distillation:				
Penetration, 25°C, 100 g, 5 s, dmm	AASHTO T 49	10 - 20	8 -10	8-
			20 – 22.5	23+
Softening Point (Ring & Ball), °C	AASHTO T 53	38.0+	32.1 – 37.9	32.0-
			52.1 – 58.9	59.0+
Solubility, %	AASHTO T 44	97.5+	---	---
Tests on Residue by Evaporation [4]:				
Force Ductility Ratio				
(f2/f1, 4°C, 5 cm/min, f2 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 3cm.

Table 204.9-6

MC CutbackAsphalt

	Test Method	Percent of Contract Unit Price/Liter or Shipment [1]								
		MC-30			MC-70			MC-250		
		Specifications Deviations			Specifications Deviations			Specifications Deviations		
		100	80	50or Remove[2]	100	80	50or Remove[2]	100	80	50or Remove[2]
Flash Point, Open Tag, 0C	AASHTO T 79	38+	---	---	38+	---	---	66+	---	---
Viscosity, Saybolt Furol @	AASHTO T 72									
25 ^{0}C, s		75 - 150	58	57-	---	---	---	---	---	---
60 ^{0}C, s		---	---	168+ ---	35 - 70	24 - 34 71 - 81	23- 82+	125 - 250	100 - 124 251 - 275	99- 276+
Distillation Test, Distillate Percentage by Volume of										
Total Distillate to 360^0 C	AASHTO T 78									
to 225 ^{0}C		0.0 – 25.0	---	---	0.0 – 20.0	---	---	0.0 – 10.0	---	---
to 260 ^{0}C		40.0-	---	---	20.0- 60.0	---	---	15.0 - 55.0	---	---
to 316 ^{0}C		70.0-	---	---	65.0- 90.0	---	---	60.0 - 87.0	---	---
Residue from Distillation to 360 ^{0}C, Volume Percentage of Sample by Difference		75.0 93.0-	45.1 - 49.9	45.0-	55.0+	50.1 - 54.9	50.0-	67.0+	62.1 - 66.9	62.0-
Tests on Residue by Distillation:										
Penetration, 25 ^{0}C, 100 g, 5 s, dmm	AASHTO T 49	50.0+	102 - 119 251- 268	101- 269+	120 - 250	102 - 119 251 - 268	101- 269+	120 - 250	102 - 119 251- 268	101- 269+
Solubility, %	AASHTO T 44	120 - 250	98.6 - 98.9	98.5-	99.0+	98.6 - 98.9	98.5-	99.0+	98.6 - 98.9	98.5-
Ductility, 25 ^{0}C, for Residues to 200 Penetration, 5 cm/min, cm	AASHTO T 51	99.0+	76 - 99	75-	100+	76 - 99	75-	100+	76 - 99	75-
Ductility, 15.5^{0}C, for Residues of 200-300 Penetration, 5cm/min, cm	AASHTO T 51	100+	76 - 99	75-	100+	76 - 99	75-	100+	76 - 99	75-

[1] When material is incidental to the pay item, use invoice price per liter.
[2] At the option of the engineer.

Table 204.9-7

Cationic Emulsified Petroleum Resin (EPR-1)

	Test Method	Percent of Contract Unit Price/Liter or Shipment [1]		
		Specifications		Deviations
		100	80	50 or Remove[2]
Viscosity, Saybolt Furol @ 250C, s	AASHTO T 59	15 - 100	10 -15	9-
Residue by Evaporation, % by wt.	AASHTO T 59	57+	101 – 150	151+
Particle Charge	AASHTO T 59	Pos.	52 – 56	51-
Sieve Test (Retained on 850 µm), %	AASHTO T 59	0.1-	---	Neg.
Settlement, 5 Days, %	AASHTO T 59	5.0-	---	---

[1] When the unit of pay is not based on the liter, the deduction will be converted to an equivalent deduction in terms of unit of pay.
[2] At the option of the engineer.

Table 204.9-8

AEP Emulsified Asphalt

	Test Method	Percent of Contract Unit Price/Liter or Shipment [1]		
		Specifications		Deviations
		100	80	50 or Remove[2]
Viscosity, Saybolt Furol @ 500C, s	AASHTO T 59	15 - 150	10 -15 151 - 200	9- 201+
Residue by Evaporation, % by wt.	AASHTO T 59	50+	46 - 49	45-
Oil Distillate by Volume, %	AASHTO T 59	25.0-	---	---
Sieve Test (Retained on 850 µm), %	AASHTO T 59	0.1-	---	---
Storage Stability, 24 h, %	AASHTO T 59	1.0-	---	---
Settlement, 5 Days, %	AASHTO T 59	5.0-	---	---
Test on Residue by Evaporation:				
Penetration, 250C, 100 g, 5 s, dmm	AASHTO T 49	250+	---	---
Solubility, %	AASHTO T 44	97.5+	---	---

[1] If material is incidental to the pay item, use invoice price per liter.
[2] At the option of the engineer.

Table 204.9-9

Anionic Emulsified Polymer Modified Asphalt

Property	Test Method	SS-1P		
		Specification	Deviation	
		100	80	50 or Remove
Viscosity, Saybolt Furol @ 25°C, s	AASHTO T 59	20-100	10-19 101-150	9- 151+
Storage Stability, 24 Hour, %	AASHTO T 59	1.0-	---	---
Sieve Test, retained on the No. 20, %	AASHTO T 59	0.1-	---	---
Residue by Evaporation,% Tests On Residue From Evaporation Test:	AASHTO T59	57+	---	56-
Penetration, 25°C, 100g, 5s, dmm	AASHTO T 49	100-200	88-99 201-212	87- 213+
Solubility, %	AASHTO T 44	97.5+	---	---
Force Ductility Ratio f2/f1, 4°C, 5 cm/min, f2 @ 30 cm elongation	AASHTO T 300	0.15+	---	0.14-
Elastic Recovery [1], 10°C, 20 cm elongation, %	AASHTO T 301	30+	---	29-

[1] 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 204.9-11

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 @ 250C, 100 g., 5 s, dmm	T 49	55 - 100	54- 100+	75-125	74 126+
Viscosity, @ 600C, Pa-s	T 202	100+	99-	150+	149-
Rotational Viscosity @ 1350C, Pa-s [2]	TP 48	0.7-3.0	0.6- 3.1+	3.0-	3.1+
Force Ductility Ratio, f2/f1, 40C, 5cm/min, f2 @ 30 cm elongation	T 300	---	---	0.30+	0.29-
Softening Point, 0C	T 53	53+	52-	45+	44-
Flash Point, 0C	T 48	230+	228-	230+	228-
Solubility, %	T 44	99.0+	---	---	---
Separation of Rubber, 163 ^{0}C, 48 hours difference in R & B from top to bottom sample, 0C	DOTD TR 326	---	---	2-	---
Tests on Residue from Rolling Thin Film Oven Test:	T 240				
Elastic Recovery, 25 0C, 10 cm elongation, %	T 301[3]	---	---	55+	54-
Penetration Retention 25 0C, RTFO/Original	T 49	---	---	0.60+ 1.00-	0.59- 1.01+
Viscosity Ratio, 60 0C, 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 Pascal or less will typically have adequate mixing and pumping capabilities. Binders with rotational viscosity values higher than 3.0 Pascal 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.

END OF SECTION 204

SECTION 208

STORM DRAIN PIPE

208.1 STORM DRAIN PIPE.

208.1.1 Non-reinforced Concrete Pipe.

208.1.1.1 General. Concrete pipe shall conform to ASTM C14 and shall be Class III unless otherwise specified, shall be manufactured from Portland cement concrete. The plane of the ends of the pipe, except for special shapes, shall be perpendicular to the longitudinal axis of the pipe. The interior surface shall be smooth and well finished. Joints shall be either of the socket and spigot type or the tongue and groove type, as approved by the Engineer, and so constructed that, when laid, the pipe will form a continuous conduit with a smooth and uniform interior surface.

When shown on the plans, the pipe shall have a gasketed joint. The gasket shall be seated in an accurately shaped groove on the spigot and of the pipe section and the gasket shall be of suitable cross section and size to fill the groove and provide a water-tight joint when the pipe is laid. Alternate joint details may be used if approved by the Engineer. The gasket shall be manufactured from a synthetic rubber of neoprene base and shall conform to the requirements of ASTM C443.

The completed pipe shall be free from fractures, large or deep cracks, laminations, and surface roughness. Specimens which, when placed in a vertical position, do not give a metallic ring when struck with a hammer, or exhibit any of the defects listed as causes for rejection in ASTM C14, will be subject to rejection.

208.1.1.2 Dimensions. Each straight pipe of all sizes and classes shall be not less than 3 feet (0.91 m) in length unless otherwise specified for special purposes. The minimum length of 6 inches (152 mm) Wyes and Tees shall be 18 inches (.457 m) and 24 inches (610 mm) for 8 inch (203 mm) and larger Wyes and Tees. Other dimensions of pipe shall conform to ASTM C14.

208.1.1.3 Marking. Each pipe shall be marked clearly and legibly to show the class of pipe, the date of manufacture, and the name or trade mark of the manufacturer.

208.1.1.4 Test Requirements. When required by the Engineer the following tests shall be performed. Before pipe is delivered to the job site for use in any work, test pipe shall meet the requirements of the loading test described herein. The tests shall be made at the point of manufacture and shall be made under the supervision of the Engineer.

The Engineer will select at random and have tested one pipe for each 100 Pipes or fraction thereof in each lot.

The contractor shall furnish the test pipes without charge and shall provide adequate equipment and facilities for conducting tests. Unless otherwise specified, the contractor shall bear all costs involved in testing.

208.1.1.4.1 Loading Test. The loading test shall be the 3-edge bearing conforming to ASTM C14. Pipe shall withstand the loads as indicated in ASTM C-14 for the class of pipe specified.

208.1.2 Reinforced Concrete Pipe.

208.1.2.1 General. These specifications apply to reinforced concrete pipe intended to be used for the construction of storm drains, sewers, and related structures. Reinforced concrete pipe shall conform to ASTM C76 amended as follows:

a. Unless otherwise specified, Class III Reinforced Concrete Pipe, Wall A, B or C (Table 3) shall be furnished.

b. When extra strength pipe is required, Class IV Reinforced Concrete Pipe, Wall A, B or C (Table 4) shall be furnished.

The pipe shall be tested for permeability as specified in ASTM Designation: C14. Frequency of testing shall be a minimum of one pipe per lot of sizes up to and including 48 inches (1.2 m) in diameter and not to exceed one test per 1000 joints of pipe manufactured. The absorption test specified in ASTM Designation: C76 will be conducted at the discretion of the Engineer in cases where the pipe exhibits visual porosity.

208.1.2.2 Joints. Unless otherwise indicated on the Drawings, joints shall be of the tongue-and-groove or bell- and - spigot type containing one of the following type of gaskets. Type of gasket used shall be at contractor's option unless otherwise directed by the Engineer.

208.1.2.2.1 Gasket. - "O Ring". A confined "O Ring" flexible water tight gasket conforming to AASHTO M-198, Type A or B.

208.1.2.2.2 Gasket. - Rope Form. A preformed plastic sealing compound manufactured for pipe joints conforming to Fed. Spec. SS-S-00210, Type I.

208.1.2.2.3 Gasket. - Flexible plastic gasket conforming to AASHTO Designation M-1980-75 Type B.

208.1.2.2.4 Priming of the Joints. - Joints shall be primed.

208.1.2.3 **Methods of Acceptance.** Basis of acceptance shall be in compliance with ASTM C76.

208.1.2.3.1 D-Load Bearing Strength Method. The Engineer will select at random, at the point of manufacture, any number of lengths of pipe up to one length per hundred lengths from each run of pipe to be used for special testing to destruction in addition to the routine tests made under ASTM Specifications.

The required number of test specimens and the test pipe shall conform in all respects to the applicable requirements of ASTM C-76. The pipe shall be tested by one of the two standard methods of testing; namely, (a) the 3-edge bearing, (b) the sand bearing as prescribed in ASTM C-76, and the required strength of the pipe specimens undergoing the bearing tests shall conform with the D-load requirements designated herein.

208.1.2.3.2 Structural Design Method. Where structural details of the pipe are shown on the drawings, the manufacture of pipe shall be checked by making the appropriate tests on the concrete placed in the pipe forms, by inspection of the steel reinforcing cages that are to be used in the pipe, and by inspection of the fabrication of the pipe.

208.1.2.3.3 Stockpiled Pipe. Stockpiled pipe may be used when approved in advance by the Engineer and provided the pipe meets all other specified requirements. For the purpose of these specifications, "stockpiled" pipe shall be defined as pipe manufactured in quantity, which will meet requirements of this section, but which was not manufactured for use in specific projects; however, pipe which has been rejected by another agency will not be considered as "stockpiled" pipe, nor will such pipe be accepted.

208.1.3 Reinforced Concrete Pressure Pipe.

208.1.3.1 General. These specifications apply to three types of reinforced concrete pressure pipe, two of which are not prestressed and one prestressed, with internal diameters of 12 inches (305 mm) and

larger; and to be used in the transmission and distribution systems that carry water under pressures specified on the plans.

208.1.3.2 Manufacture and Tests. Reinforced concrete pressure pipe and fittings shall be manufactured and tested to conform to one of the following specifications:

a. AWWA C300 for the steel bar-reinforcement and cylinder type in pipe diameters of 24 inches (610 mm) and larger, for design pressure of 40 psi to 260 psi (276kPa to 1793kPa), and for external loading conditions as may be designated on the Drawings.

b. AWWA C301 for the prestressed steel wire-reinforcement and cylinder type, in pipe diameters of 30 inches (762 mm) and larger, for design pressures to a maximum of 350 psi (2413kPa), and for external loading conditions as may be designated on the Drawings.

c. AWWA C302 for the steel bar reinforcement (without cylinder) type, in pipe diameters 12 inches (305 mm) and larger, for design pressures of not more than 45 psi (310kPa), and for external loading conditions as may be designated on the Drawings.

208.1.4 Perforated Concrete Pipe. Perforated concrete pipe shall conform to the requirements of ASTM C-444, Type 2 and all applicable requirements of ASTM C14, Class 2.

208.1.5 Concrete Drain Tile. Concrete Drain Tile shall conform to ASTM C412 Standard Quality unless specified otherwise on the Drawings.

208.1.6 Reinforced Concrete Arch Pipe. Reinforced concrete arch pipe shall conform in all respects to ASTM C-506, Class II, III, or IV. The size and specific load bearing class shall be as required by the Drawings or the Engineer. Unless specified otherwise, Class III shall be used.

208.1.7 NOT USED.

208.1.8 NOT USED.

208.1.9 NOT USED.

208.1.10 Structural Plate for Pipe, Arches, and Pipe Arches.

208.1.10.1. General. Structural plate pipe, arches, and pipe arches shall be of the sizes, gages and dimensions designated on the Drawings and as specified herein.

208.1.10.2. Materials. Plates and nuts and bolts conform to the specifications of AASHTO Designation M 167. Galvanized surfaces which are damaged shall be repaired in accordance with the provisions in Subsection 210.8 "Galvanizing".

208.1.10.3. Bituminous Coating. Bituminous coating shall conform to the provisions of AASHTO Designation M 190. Damaged bituminous coatings shall be repaired by the contractor at his expense by applying bituminous material conforming to M 190.

208.1.10.4. Distortion. In advance of placing backfill material around circular structural plate pipe, the pipe shall be distorted. Distortion may be performed either at the fabricating shop or in the field. If the plates are distorted in the fabricating shop, the plates shall be distorted to provide an increase in the vertical diameter of the pipe, after assembly, of approximately 5% for the full length. Plates shall be marked in order to assure that they will be placed in proper position.

If the pipes are distorted in the field, the method of distortion shall conform to the details shown on the

plans. The vertical diameter shall be increased by the approximate percentages listed in the following table, throughout that portion of the pipe between shoulder lines.

Pipes using 1 or 3 gage top and side plates	-	1%
Pipes using 5 or 7 gage top and side plates	-	2%
Pipes using 8 or 10 gage top and side plates	-	3%

Between the shoulder lines and the outer ends of the pipe the distortion may decrease uniformly to zero.

208.1.11 Corrugated Aluminum Pipe And Pipe Arches.

208.1.11.1 General. Corrugated aluminum pipe, pipe arches, and connectors to be used or furnished shall be manufactured and inspected in conformance with the requirements of AASHTO M 196, AASHTO M 197, and as hereinafter specified. The size, type, and gage of the pipe to be furnished shall be shown on the Drawings. Corrugated aluminum pipe may be fabricated by riveting or using a helically corrugated aluminum pipe with a continuous helical lock seam paralleling the corrugations. Corrugated aluminum pipe arches shall consist of corrugated aluminum pipe which has been reformed to a multi centered pipe having an arch-shaped top with a slightly curved integral bottom.

The specifications contained herein for pipe shall also apply to pipe arches. Nominal diameter of dimensions as referred to in AASHTO M 196 and M 197 shall be defined as meaning the minimum inside dimension of the pipe.

208.1.11.2 Materials. Corrugated aluminum products covered by this section may be fabricated of the kind of base metal listed in M 196 and all pipe for any one continuous installation shall be fabricated of the same base metal.

208.1.11.3 Connecting Bands. The connecting bands shall conform to the requirements of AASHTO M 196, except that the minimum width of band for helical pipe shall be 12 inches (305 mm). The connecting bands shall be the same base metal as the pipe. The gage of the connecting bands for pipe arches and helically corrugated pipe shall be the same as for an equivalent diameter of circular pipe, The band couplers shall be connected with galvanized steel bolts of not less than B inch (13 mm) diameter.

208.1.11.4 End Finish. If head walls or flared end sections are not being provided and if called for on the plans or in the Special Provisions, the inlet and outlet of all culverts fabricated of 16 or 14 gage sheets shall be reinforced. The reinforcement shall consist of an aluminum rod not less than 7/16 inch (11.1 mm) in diameter rolled in the sheet, or by an aluminum band equivalent in cross section to 3/8 inch minimum thickness by 1B inches (9.5 mm to 38.1 mm) wide or at least the outer foot of 16-gage pipe shall be of at least 12-gage material, and the outer foot of 14-gage pipe shall be of at least 10-gage material. If a band is used, it shall be placed around the ends of the pipe and fastened with rivets or resistance spot welds at intervals of 10 inches (254 mm) or less.

208.1.11.5 Fabrication. Pipe fabricated by riveting shall conform to AASHTO M 196. Pipes fabricated with a continuous helical lock seam parallel to the corrugations shall conform to the requirements of AASHTO M 197 for Type I without perforations and as specified herein.

208.1.11.6 Bituminous Coating. When required by the Special Provisions, pipes and connecting bands shall be protected, both inside and outside, with a bituminous coating. The bituminous coating shall conform to the requirements of AASHTO M 190 and as hereinafter specified.

The minimum thickness of bituminous material for all coated pipe measured on the crests to a minimum depth of 1/8 inch (3.2 mm), and the width of Paving shall at least cover 1/3 of the periphery of pipe arches and 1/4 of the periphery of circular pipes. When corrugated aluminum pipes are to be bituminous coated,

the fabrication requirements specified in AASHTO M 196 shall be altered so that the rivet heads inside the pipe will be in the valley of the corrugations.

208.1.12 ABS Solid Wall Pipe.

208.1.12.1 General. Pipe, fittings and joints shall comply with ASTM D2751 except as modified herein. Joint solvent cement shall be an ABS cement conforming to ASTM D2235. Gaskets shall conform to the requirements of ASTM C443, Section 4 for rubber of synthetic rubber composition.

208.1.12.2 Pipe Acceptance. At the time of manufacture, each lot of pipe and fittings shall be inspected for defects, and tested for impact, stiffness and flattening in accordance with ASTM D2751. The Engineer may require certification by the manufacturer that the test results comply with specification requirements.

208.1.12.3 Marking. Pipe shall have a home mark to indicate full penetration of' the spigot when the joint is made. Pipe shall be marked at 5 feet (1.5 m) intervals or less with a marking number which identifies the manufacturer, SDR, and size of pipe.

208.1.13 ABS Composite Pipe

208.1.13.1 General. Pipe, fittings and joints shall comply with ASTM D2680, except as modified herein. The pipe shall consist of two concentric extruded thermoplastic tubes integrally connected by webs to form a circular truss. The longitudinal void spaces shall be filled with inert material.

Joint solvent cement shall be an ABS cement conforming to ASTM D2235. Gaskets shall conform to ASTM C443, Section 4 for rubber or synthetic rubber composition.

208.1.13.2 Pipe Acceptance. Each lot of pipe and fittings shall be inspected for defects and tested for stiffness and deflection in accordance with ASTM D2680. The Engineer may require certification by the manufacturer that the test results comply with specification requirements. A pipe lot shall consist of all pipe having the same marking number. The lot test specimen shall be a minimum length of 4 feet (1.2 m).

208.1.13.3 Marking. Pipe shall have a home mark to indicate full penetration of the spigot when a joint is made. Pipe shall be marked at 5 feet (1.5 m) intervals or less with a marking number which identifies the manufacturer and size of pipe.

208.1.13.4 Repair. There shall be no discontinuity of the pipe inner wall. Ruptures in the pipe outer wall may be repaired if the damage is limited to an area that can be encompassed by a 3 inch (76.2 mm) diameter circle superimposed over the damage. Cell filler repair is unnecessary. A solvent welded ABS repair patch, at least equal to the thickness of the pipe outer wall, shall extend at least 1 inch (25.4 mm) beyond the damage. When damage exceeds these limits, the damaged section shall be cleanly cut off the pipe.

208.1.14 Corrugated Steel Pipe And Pipe Arches.

208.1.14.1 General. Corrugated metal pipe, pipe arches and connectors shall be manufactured and inspected in conformance with AASHTO M 36 and as specified herein. The size, type, coating, and gage of the pipe to be furnished shall be as shown on the Drawings. Corrugated metal pipe arches shall consist of corrugated metal pipe which has been re-formed to multi-centered pipe, having an arch-shape top with a slightly curved integral bottom. Nominal diameter as referred to in AASHTO M 36 shall be defined as meaning the minimum inside dimension of the pipe.

208.1.14.2 Materials. Corrugated metal products provided for by this subsection may be fabricated of any of the base metals listed in AASHTO M 218 or ASTM A596 with 0.20% min. copper added. All pipe for each installation shall be fabricated from the same base metal.

208.1.14.3 Connecting Bands. The connecting bands shall conform to the requirements of AASHTO M36, except that the minimum width of the bands for pipe ends with annular and helical corrugations shall be 10 inches (254 mm) and 12 inches (305 mm), respectively, for pipe diameter 18 inches (457 mm) and larger. The connecting bands shall be the same base metal as the pipe and shall begalvanized.

The connecting bands shall have corrugations that mesh with the corrugations of the pipe and shall be connected at the ends by galvanized angles. Connecting bands less than 12 inches (305 mm) in width shall be connected by at least two galvanized bolts not less than B inch (12.7 mm) diameter Bands 12 inches (305 mm) or greater in width shall have at least three B inch (12.7 mm) diameter galvanized bolts. Other equally effective types of connecting bands may be used if approved by the Engineer.

When watertight joints are specified on the Drawings the connecting bands shall be placed over a 1/4 inch (6.4 mm) thick neoprene gasket, 0-ring type gasket, or a 1/4 inch layer of asbestos fiber asphalt caulking compound, except that the 0-ring type gasket shall not be used with pipes with helical ends. The 0-rings shall conform to Section 5 of ASTM C443 and have a minimum cross sectional diameter of 13/16 inch (20.6 mm).

208.1.14.4 End Finish. When no head walls or flared end sections are specified on the plans, the ends of all pipes fabricated of 16 or 14-gage sheets shall be reinforced. The reinforcement at the end of the pipe shall consist of a galvanized steel rod not less than 7/16 inch (11.1 mm) in diameter rolled in the sheet, or by a galvanized metal band with a minimum cross section of 3/8 inch by 1B inch (9.5 mm by 38.1 mm) or the outer 1 foot (305 mm) of pipe shall be fabricated of 12-gage material for 16-gage pipe, and 1O-gage material for 14-gage pipe. Where a band is used it shall be placed around the ends of the Pipe and fastened with rivets or' resistance spot welds at intervals of 10 inches (254 mm) or less.

208.1.14.5 Fabrication. Corrugated metal pipe may be fabricated by riveting, resistance spot welding, or by using a helically corrugated metal pipe with a continuous helical lock seam paralleling the corrugations, in conformance with AASHTO M 36.

208.1.14.6 Repair of Damaged Zinc Coating. Zinc coatings which have been field or shop cut, burned by welding, abraded, or otherwise damaged to such extent as to expose the base metal, shall be repaired and recoated in accordance with Subsection 210.8.4.

208.1.14.7 Coatings.

208.1.14.8 Bituminous Coating. When required by the Drawings, pipe and connecting bands shall be protected, both inside and outside, with a bituminous coating or with a bituminous coating containing an asbestos fiber. The bituminous coating shall conform to the requirements of AASHTO M 190 and as specified herein. The minimum thickness of bituminous coating for all coated pipe shall be 0.05 inch (1.27 mm) measured on the crest of the corrugations.

For paved invert corrugated metal pipe, the bituminous material shall cover the crests of the corrugations to a minimum depth of 1/8 inch (3.2 mm) and the width of paving shall cover at least 1/3 of the periphery of pipe arches and 1/4 of the periphery of circular pipe.

The bituminous material shall conform to Paragraph 4 of AASHTO M 190.

When corrugated metal pipe is to be bituminous coated, the fabrication requirements specified in AASHTO M 36 shall be altered so that the rivet heads inside the pipe will be in the valley of the corrugation. Damaged bituminous coatings shall be repaired by the contractor at his expenses by applying bituminous material conforming to the provision in this subsection.

END OF SECTION 208

SECTION 211

GEOTEXTILE FABRIC AND GEOCOMPOSITE SYSTEMS

211.1 GEOTEXTILE FABRIC.

(a) General Requirements: The geotextile fabric shall be composed of at least 85 percent by weight (mass) of polyolefins, polyesters, or polyamides. The geotextile fabric shall be resistant to chemical attack, rot and mildew and shall have no tears or defects which adversely alter its physical properties. When required, the geotextile fabric shall contain stabilizers and/or inhibitors added to the base material to make filaments resistant to deterioration due to ultraviolet and heat exposure. Edges of geotextile fabric shall be finished to prevent the outer yarn from pulling away from the fabric. Fibers of other composition may be woven into the geotextile fabric for reinforcing purposes. Durability of these fibers shall be equivalent to that of the geotextile fabric.

Geotextile fabric rolls shall be furnished with an opaque, waterproof wrapping for protection against moisture and extended ultraviolet exposure prior to placement. Each roll shall be labeled or tagged with the manufacturer's name, date of manufacture, batch number, name of product. Unless otherwise specified on the plans or in the project specifications, the geotextile fabric shall be an approved product.

(b) Detailed Requirements: The geotextile fabric shall comply with the requirements in Table 211-1 and shall be utilized as follows unless otherwise specified:

Use	Classes
(1) Drainage:	
Underdrains	A, B, C or D
Pipe and Precast Manhole Joints	A, B, C or D
Weep Holes	A, B, C or D
Bedding Fabric	B, C, or D
Approach Slabs	B, C, or D
Fabric for Geocomposite Drainage Systems[1]	B, C, or D
(2) Stabilization:	
Bulkheads	C or D
Flexible Revetments	C or D
Rip Rap	D
Railroad Crossings	D
Soil Stabilization	C, D, or S
(3) Paving Fabric:[2]	B or C (modified)
(4) Silt Fencing:	
Wire Supported	F
Self Supported	G

[1] Refer to Subsection 211.2 for additional requirements.
[2] Refer to Subsection 211.3 for additional requirements.

Table 211-1
Geotextile Fabrics

		Requirements Classes						
Property	**Test Method**	**A**	**B**	**C**	**D**	**S**	**F**	**G**
AOS, Metric Sieveμm, Max.	ASTM D 4751	300	300	300	212	600	850	850
Grab Tensile, N, Min.	ASTM D 4632	330	400	580	800	800	400	400
% Elongation @ Failure, Min.	ASTM D 4632	- - -	- - -	50	50	- - -	- - -	- - -
% Elongation @ 200 N, Max.	ASTM D 4632	- - -	- - -	- - -	- - -	- - -	- - -	50
Burst Strength, N, Min.	ASTM D 3787	440	620	930	1290	1390	- - -	- - -
Puncture, N, Min.	ASTM D 4833	110	130	180	330	330	- - -	- - -
Trapezoid Tear Strength, N, Min.	ASTM D 4533	110	130	180	220	220	- - -	- - -
Permittivity, Sec.-1, Min	ASTM D 4491	1.0	1.0	1.0	1.0	0.2	0.01	0.01
Grab Tensile Strength Retained after weathering 150 h, UVA lamps, %, Min	ASTM D 4632 ASTM G 53	70	70	70	70	70	- - -	- - -
Grab Tensile Strength Retained after weathering 500 h, UVA lamps, %, Min	ASTM D 4632 ASTM G 53	- - -	- - -	- - -	- - -	- - -	70	70

211.2 GEOCOMPOSITE DRAINAGE SYSTEMS. The geocomposite fabric drain shall consist of a non-woven geotextile fabric and a core as specified below with the geotextile completely enveloping the core. Fittings shall be as recommended by the manufacturer. The geotextile fabric shall be sufficiently secured to the core to prevent separation of the geotextile fabric and intrusion of the backfill material during installation. The geocomposite drainage system shall be an approved product.

(a) Geotextile Fabric: The fabric shall meet the requirements for Class B, C, or D geotextile fabric of Subsection

with the following modifications:

Property	Test Method	Requirements
Elongation, %, Min.	ASTM D 4632	20
Shear Seam Strength (Fabric to Fabric), N/mm width, Min.	ASTM D 4437	2600

(b) Cores for Wall Drains (Single Sided): The core shall be a flexible, solid-backed, rectangular design made of a polyolefin material not sensitive to moisture. The geocomposite design shall allow drainage of water from one side only. The core shall consist of supports having a minimum height of 5/16 inch (8 mm) upon which the fabric shall be securely fastened. The cross section open area of the core which will allow the passage of water shall be a minimum of 40 percent. The core shall meet the following requirements:

Property	Test Method	Requirements
Compressive Strength, kPa @ 20% Max. deflection, Min.	ASTM D 1621	308

211.3 PAVING FABRIC. In addition to the specifications for Class B or C geotextile fabric of Subsection 211.1, the paving fabric shall also comply with the following requirements:

Property	Test Method	Requirements
Asphalt Retention, L/sq m	AASHTO M 288	0.9
Change in Area at 135 C°, %, Max.	AASHTO M 288	15.0

END OF SECTION 211

SECTION 212

EROSION CONTROL MATTING AND HARDWARE

212.1 EROSION CONTROL MATTING AND HARDWARE.

(a) General: Erosion control systems shall consist of approved hydraulically applied fiber mulch systems, or rolled erosion control products (mats) including hardware and installation plan.

(b) Requirements: Erosion control systems shall comply with the performance requirements in Table 210-1 when evaluated in accordance with the City's qualification procedure for erosion control systems.

Table 212-1 Erosion Control Systems

Slope Protection			
Type[1]	Test Site Conditions for Evaluations	Maximum Sediment Loss, lb/yd ^{2} (kg/m ^{2})	Minimum Vegetation Density, %
A	3:1 Slope	0.06 (0.034)	80
B	2:1 Slope	0.06 (0.034)	80
Flexible Channel Liners			
Type[1]	Test Site Conditions for Evaluation	Maximum Sediment, inches (mm)	Minimum Vegetation Density, %
C	Shear Stress Range 0 to 2 psf (0 to 96 Pa)	0.45 (11.5)	70
D	Shear Stress Range 0 to 4 psf (0 to 192 Pa)	0.40 (10.0)	70
E	Shear Stress Range 0 to 6 psf (0 to 287 Pa)	0.40 (10.0)	70
F	Shear Stress Range 0 to 8 psf (0 to 383 Pa)	0.30 (8.0)	70

[1] Types are listed in increased order of protection.

The manufacturer's installation plan shall include a description of all hardware and shall comply with the installation procedure used during the evaluation of source approval. A copy of the approved installation plan shall accompany each shipment.

END OF SECTION 212

SECTION 215

SIGNS AND PAVEMENT MARKINGS

215.01 GENERAL REQUIREMENTS. The materials shall comply with these specifications, the plans and the MUTCD. When directed, the contractor shall furnish and prepare samples for testing in accordance with City instructions.

215.02 METALS.

(a) Ferrous Metals:

(1) Structural Steel: Structural steel for posts, stringers, framing and miscellaneous steel shall comply with ASTM A 709, Grade 36 (ASTM A 709M, Grade 250). Steel shall be galvanized in accordance with Subsection 210.8.

(2) Steel Pipe: Steel pipe or tubing for structures shall be Schedule 40 (STD) complying with ASTM A 53, Type E or Type S Grade B, or hot formed tubing complying with ASTM A 36 (ASTM A 36M) and ASTM A 501.

(3) Steel Posts for Small Signs, Markers and Delineators: Posts shall be steel of the flanged channel type shown on the plans, galvanized after fabrication in accordance with Subsection 210.8. Before fabrication, posts shall be within 3.5 percent of the specified weight (mass). Posts shall be fabricated from steel complying with either ASTM A 499, Grade 60 with chemical properties conforming to ASTM A 1 for 91-lb/yd (45 kg/m) or heavier rail steel, or ASTM A 576, Grade 1080 with 0.10 percent -0.20 percent silicon. Holes 3/8 inch (10 mm) in diameter shall be drilled or punched through the middle of each post on one inch (25-mm) centers for at least 36 inches (900 mm) from the top of each post.

(b) Aluminum Alloy: Structural members shall be aluminum complying with ASTM B 221 (ASTM B 221M) or ASTM B 429, Alloy 6061-T6. Miscellaneous aluminum shall comply with ASTM B 209 (ASTM B 209M), Alloy 6061-T6.

(c) Fittings:

(1) Structural Bolts, Nuts and Washers: High strength bolts shall be ASTM A 325 (ASTM A 325M), and other bolts shall be ASTM A 307, Grade A or Grade B. Bolts shall have hexagonal heads and be supplied with two flat and one lock washer and hexagonal-head nut. Bevel washers, where required, shall be wrought steel. Bolts, nuts and washers shall be galvanized in accordance with ASTM A 153 or by an approved mechanical galvanizing process complying with ASTM B 695 that provides the same coating thickness.

Anchor bolts shall be ASTM A 709, Grade 250 (ASTM A 709M, Grade 36) steel except the maximum tensile strength shall be 88,000 psi (605 MPa) and galvanized in accordance with Subsection 210.8 unless otherwise specified. Stainless steel bolts shall comply with ASTM A 320 (ASTM A 320M), Grade B 8, annealed or approved equal.

(2) Fasteners: Fasteners used in fabricating sign faces, including splice plates for joining two panels, sills and border angles, and attaching route marker shields shall be 1/4 inch (6 mm) aluminum blind rivets that provide positive mandrel retention. These rivets shall have a minimum tensile strength of 875 pounds (397 kg) and a minimum sheer strength of 850 pounds (386kg).

Fasteners used in attaching demountable legend to sign faces (except for shields) shall be 1/8 inch (3 mm) diameter blind rivets manufactured from aluminum alloy complying with ASTM B 316 (ASTM B 316M), Alloy 1100-H14.Fasteners for delineator, object marker and milepost assemblies shall be

vandal resistant and will be subject to approval prior to use.

215.03 FLEXIBLE POSTS. Flexible posts for small signs, markers and delineators shall be approved products listed in QPL 39.

215.04 SIGN PANELS.

(a) Permanent Sign Panels: Flat panels shall be aluminum sheets or plates complying with ASTM B 209, Alloy 6061-T6 or Alloy 5052-H38. Extruded aluminum panels shall comply with ASTM B 221 (ASTM B 221M), Alloy 6063-T6.

(b) Temporary Sign Panels: Panels shall be made from sheet aluminum, sheet steel, wood or plastic (barricades only).

(1) Aluminum: Aluminum sheeting shall be 0.080 inch (2 mm) thickness complying with ASTM B 209 (ASTM B 209M), Alloy 6061-T6 or Alloy 5052-H38.

(2) Steel: Steel panels shall be 16 gage (1.6 mm) continuous coat galvanized steel sheeting complying with ASTM A653, Coating Z275 (ASTM A 653M, Coating G 90).

(3) Wood: Plywood sheeting of exterior type Grades either High Density Overlay or Medium Density Overlay, are acceptable for use provided the following requirements are met.

Panels shall be a minimum of 5/8 inch (15 mm) thick and shall comply with the latest American Plywood Association specifications and be identified with the APA edge mark or back stamp to verify inspection and testing. Prior to application of reflective sheeting, the surface shall be abraded with steel wool or fine sandpaper, and wiped thoroughly clean. The surface shall be allowed to dry a minimum of 8 hours prior to application of sheeting. Cut edges of plywood panels shall be sealed with an approved aluminum pigmented polyurethane sealer.

(4) Plastic (barricades only): Plastic panels shall consist of high density polyethylene and shall be sufficiently rigid to maintain a flat surface.

215.05 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 by the City's Traffic Engineer.

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.

Type VI - An elastomeric-high-intensity retroreflective sheeting without adhesive. This sheeting is typically a vinyl microprismatic retroreflective material.

DOTD Type VII - A super-intensity retroreflective sheeting having high retroreflectivity values at wide entrance angles of +45° and +60 .° This sheeting is typically an unmetalized microprismatic retroreflective element material.

DOTD Type VIII - A super-intensity retroreflective sheeting having optimized performance over a broad range of observation angles. 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).

(c) Alternate Sheeting Types:

(1) DOTD Type VII: Minimum Coefficients of Retroreflection shall be as specified in Table 215-1. Luminance factors shall be as specified in Table 215-2.

Table 215-1
Coefficients of Retroreflection for DOTD Type VII Sheeting [1]

Observation Angle, degrees	Entrance Angle, degrees	White	Yellow	Red	Blue	Green	Orange	Flour. Orange
0.2	-4	800	660	215	43	80	300	200
0.2	+30	400	340	100	20	35	150	120
0.2	+45	145	85	25	7.6	12	50	50
0.2	+60	35	23	6.6	1.0	2.0	10	10
0.5	-4	200	160	45	9.8	20	100	80
0.5	+30	100	85	26	5.0	10	50	50
0.5	+45	75	60	18	2.8	6.0	20	20
0.5	+60	30	20	604	2.0	2.0	10	6.0

[1]Minimum Coefficient of Retroreflection (RA) (cd lx-1m-2)

Table 215-2
Luminance Factor (Y%)(Daytime Luminance)

Color	Minimum	Maximum
White	40	---
Yellow	24	45
Red	3.0	15
Blue	1.0	10
Green	3.0	9.0
Orange	12	30
Florescent Orange	30	---

(2) DOTD Type VIII: Minimum Coefficients of Retroreflection shall be as specified in Table 215-3. Luminance Factors shall be as specified in Table 215-2.

Table 215-3
Coefficients of Retroreflection for DOTD Type VIII Sheeting [1]

Observation	Entrance	Rotation	White	Yellow	Red	Blue	Green
0.20	-4	0	430	350	70	20	45
0.33	-4	0	300	250	53	15	33
0.50	-4	0	250	200	46	10	25
1.00	-4	0	80	65	14	4.0	10
0.20	30	0	235	190	39	11	24
0.33	30	0	150	130	25	7.0	18
0.50	30	0	170	140	25	7.0	19
1.00	30	0	50	40	11	2.5	5.0
0.20	40	90	150	125	25	6.0	15
0.33	40	90	85	75	14	4.0	8.0
0.50	40	90	35	30	4.0	1.5	3.5
1.0	40	90	20	13	5.0	0.7	2.0

[1] Minimum Coefficient of Retroreflection (RA) (cd lx -1 m -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 215-4.

Table 215-4
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	70 [5]	Not used		1 year	3 years
III	1 year	70 [6]		80 [6]	1 year	3 years
III (for drums)	1 year	70 [6]	1 year	80 [6]	1 year	1 year

VI	1/2 year	50	1/2 year	50	1/2 year	1/2 year
DOTD Type VII	1 year	50 [7]	Not used		1 year	Not used
DOTD Type VIII	Not used		3 years	80 [8]	Not used	3 years

[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 D4956 after the outdoor test exposure time specified.
[4] ASTM D4956, Table 1.
[5] ASTM D4956, Table 3.
[6] ASTM D4956, Table 4.
[7] Table 215-1.
[8] Table 215-3.

(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 215-5.

Table 215-5
Reflective Sheeting Performance Standards

Type	Retroreflectivity [1] -- Durability [2]				Colorfastness [3]
	Orange		All colors, except orange		
I	Not used		7 years	40 [4]	3 years
II	3 years	70 [5]	Not used		3 years
III	3 years	70 [6]	10 years	70 [6]	3 years
DOTD Type VII	3 years	50 [7]	Not used		3 years
DOTD Type VIII	Not used		7 years	50 [8]	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 D4956 after installation and the field exposure time specified.
[4] ASTM D4956, Table 1.
[5] ASTM D4956, Table 3.
[6] ASTM D4956, Table 4.
[7] Table 215-1.
[8] Table 215-3.

(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 II or Type III except that temporary advanced warning construction signs used on interstate highways shall meet the requirements of ASTM D 4956, Type III.

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 with the following modifications pertaining to artificial weathering. The reboundable reflective sheeting shall be tested for accelerated outdoor exposure at an angle of 45 degrees from the horizontal and facing south for 12 months in accordance with ASTM G7 Reflective sheeting for traffic cone collars shall meet the requirements of ASTM D 4956, Type VI.

(g) Sheeting Guaranty. The contractor shall provide the City with a guaranty from the sheeting manufacturer stating that if the retroreflective sheeting fails to comply with the performance requirements of this subsection, the sheeting manufacturer shall do the following:

Table 215-6
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 City 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 City 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
DOTD Type VII	<3 years	<5 years	Not used
DOTD Type VIII	Not used	<5 years	5-10 years

[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.

215.06 NONREFLECTIVE SHEETING.

(a) General Requirements: Nonreflective sheeting film shall consist of an extensible, pigmented, weather-resistant plastic film. Face side of film shall be supported and protected by a paper liner which is readily removable after application without the necessity of soaking in water or other solvents. Colors shall be matched visually and be within the limits shown in Table 10 of ASTM D4956.

(b) Adhesive Requirements: Sheeting shall have a precoated pressure-sensitive adhesive backing or a tack-free heat-activated adhesive backing, either of which may be applied without additional coats on either sheeting or application surface. Adhesive shall comply with ASTM D 4956, Class 1 (pressure sensitive) or Class 2 (heat activated).

(c) Physical Characteristics: The film shall be readily cut by normal fabricating methods without cracking, checking or flaking. Applied film shall be free from ragged edges, cracks and blisters. The material shall have demonstrated its ability to withstand normal weathering without checking, cracking or excessive color loss.

215.07 SIGN ENAMELS, PAINTS, SILK SCREEN PASTE AND OVERLAY FILM.

(a) Sign Enamels and Paints: These shall be applied in accordance with the sheeting manufacturer's recommendations. Final appearance as well as materials used shall be subject toapproval.

(b) Silk Screen Paste: Constituents used in manufacture of silk screen paste shall meet approval of the engineer. Silk screen paste shall be mixed at the factory, well ground to a uniform consistency and smooth texture, and shall be free from water and other foreign matter. It shall dry within 18 hours to a film that does not run, streak, or sag. Paste which has livered, hardened or thickened in the container, or in which pigment has settled out so that it cannot be readily broken up with a paddle to a uniform usable consistency, will be rejected. Paste and thinner shall be used in accordance with the sheeting manufacturer's recommendations. Paste shall have proper pigmentation and consistency for use in silk screen equipment. The material shall produce the desired color and the same retroreflectivity values as required for reflective sheeting of the same type and color when applied on reflective sheeting background. Paste shall meet the quality and test requirements for appearance, coarse particles, and moisture and water resistance as specified for sign paints.

(c) Overlay Film: Transparent electronic cuttable overlay film shall produce the desired color and the same reflectivity values as required for reflective sheeting of the same type and color when applied on reflective sheeting background. The film shall be an approved product listed in QPL 13.

215.08 TEMPORARY PAVEMENT MARKINGS.

(a) Temporary Tape: Temporary tape shall comply with ASTM D 4592, Type I (removable) or Type II (non-removable) and shall be an approved product listed in QPL-60.

(b) Painted Stripe: Paint shall be an approved traffic paint complying with Subsection 215.12. Glass beads for drop-on application shall comply with Subsection 215.13.

(c) Temporary Raised Pavement Markings for Asphaltic Surface Treatment: Temporary raised pavement markers for asphaltic surface treatment shall be flexible reflective tabs having a nominal width of 4 inches (10 cm). The markers shall be yellow with amber reflective area on both sides. The body of the marker shall consist of a base and vertical wall made of polyurethane or other approved material and shall be capable of maintaining a reasonable vertical position after installation. The initial minimum reflectivity at an entrance angle of -4 degrees and an observation angle of 0.2 degrees shall be 230 mcd/lx when measured in accordance with ASTM E 810.

The reflective material shall be protected with an easily removable cover of heat resistant material capable of withstanding and protecting the reflective material from the application of asphalt at temperatures exceeding 325°F (160°C). The markers shall be an approved product listed in QPL 74.

215.09 RAISED PAVEMENT MARKERS. Markers shall be either nonreflectorized or reflectorized, as specified. Markers shall be approved products listed in QPL 9. Infrared curves of materials used in markers shall match approved curves on file at the City's Traffic Engineer's Office.

(a) Nonreflectorized Markers:

(1) Description: Nonreflectorized markers shall consist of an acrylonitrile-butadiene-styrene polymer or other approved material, and shall be 4-by-6-inches (100-by-150-mm).

(2) Physical Requirements: Markers shall comply with ASTM D 4280. The color shall be in accordance with the plans and the MUTCD.

(b) Reflectorized Markers: Reflectorized markers shall comply with ASTM D4280, Designation H - Marker with hard, abrasion-resistant lens surface. 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).

(c) Adhesive:

(1) Epoxy Adhesive: Epoxy adhesive shall be Type V epoxy resin system complying with Subsection 1017.02.

(2) Bituminous Adhesive: The adhesive shall conform to ASTM D 4280 and shall be an approved product listed in QPL 59.

215.10 THERMOPLASTIC PAVEMENT MARKINGS.

(a) Description: This specification covers hot-sprayed or hot-extruded reflective thermoplastic compound for pavement markings on asphaltic or portland cement concrete pavement. Thermoplastic marking material applied to asphaltic surfaces shall consist of an alkyd based formulation. Thermoplastic marking material applied to portland cement concrete surfaces shall consist of either an alkyd based or hydrocarbon based formulation. Material shall be so manufactured as to be applied by spray or extrusion to pavement in molten form, with internal and surface application of glass spheres, and upon cooling to normal pavement temperature, shall produce an adherent, reflectorized pavement marking of specified thickness and width, capable of resisting deformation.

Material shall not scorch, break down, or deteriorate when held at the plastic temperature specified in DOTD Subsection 732.03(d)(1) for four hours or when reheated four times to the plastic temperature. Temperature-vs-viscosity characteristics of plastic material shall remain constant when reheated four times, and shall be the same from batch to batch. There shall be no obvious change in color of material as the result of reheating four times or from batch to batch.

(b) Suitability for Application: Thermoplastic material shall be a product especially compounded for pavement markings. Markings shall maintain their original dimension and placement and shall not smear or spread under normal traffic at temperatures below 140°F (60°C). Markings shall have a uniform cross section. Pigment shall be evenly dispersed throughout its thickness. The exposed surface shall be free from tack and shall not be slippery when wet. Material shall not lift from pavement in freezing weather. Cold ductility of material shall be such as to permit normal movement with the pavement surfaced without chipping or cracking.

(c) Standard Thermoplastic Pavement Markings: Materials shall be approved products listed in QPL 63 and shall comply with AASHTO M 249 and the specifications as stated herein with the following modifications:

(1) Color: The yellow thermoplastic shall comply with the requirements of Table 215-7 following table when tested in accordance with ASTM E 1349.

Table 215-7
Color Specification Limits (Daytime)

Color	1		2		3		4	
	x	y	x	y	x	y	x	y
Yellow	0.4756	0.4517	0.4985	0.4779	0.5222	0.4542	0.4919	0.4354

(The four pairs of chromaticity coordinates determine the acceptable color in terms of the CIE 1931 Standard Colorimetric System measured with Standard Illuminant C.)

(2) Whiteness Index: The white thermoplastic shall have a minimum whiteness index of 40 when tested according to ASTM E 313.

(d) Inverted Profile Thermoplastic Pavement Markings: Materials shall be approved products listed in QPL 63 and shall comply with AASHTO M 249 and these specifications as follows:

(1) Bead Content: Glass bead content for inverted profile thermoplastic pavement markings shall be in accordance with Table 215-8.

Table 215-8
Bead Content

U.S. Standard Sieve Size (Microns)	Class A[1]-- 10% min. (by wt.) of thermoplastic compound, Percent Retained	Class B[1]-- 25% min. (by wt.) of thermoplastic compound
14 (1400)	0-1	Beads shall meet gradation requirement of AASHTO M247, Type I. 1
16 (1190)	0-20	
18 (1000)	0-45	
20 (840)	30-80	
30 (595)	20-50	
Pan	0-10	

[1] Refer to Section 732 when applying as drop-on beads for inverted profile thermoplastic pavement markings.

(2) Bead Quality: The glass beads shall be coated with A-116 Silane or other adhesion promoting coating. The glass beads shall have a maximum of 3 percent irregular particles and a maximum of 5 percent air inclusions. The percentage of true spheres shall be 90 percent minimum for Class A beads and 80 percent minimum for Class B beads.

(3) Binder Content: The binder content of the thermoplastic material shall be 19 percent minimum.

(4) Titanium Dioxide: The titanium dioxide shall meet ASTM D476, Type II, Rutile grade - 93 percent minimum titanium content.

(5) Yellow Pigment: The yellow pigment for the yellow thermoplastic material shall be 4 percent minimum.

(6) Color: The yellow thermoplastic shall comply with the requirements of the Table 215-9 when tested in accordance with ASTM E 1349.

Table 215-9
Color Specification Limits (Daytime)

Color	1		2		3		4	
	x	y	x	y	x	y	x	y
Yellow	0.4756	0.4517	0.4985	0.4779	0.5222	0.4542	0.4919	0.4354

(The four pairs of chromaticity coordinates determine the acceptable color in terms of the CIE 1931 Standard Colorimetric System measured with Standard Illuminant C.)

(7) Whiteness Index: The white thermoplastic shall have a minimum whiteness index of 40 when tested according to ASTM E 313.

(8) Specific Gravity: The specific gravity of the thermoplastic pavement marking material shall not exceed 2.35.

(9) Flowability: After heating the thermoplastic material for four (4) hours ±5 minutes at 425±3°F (218±2°C) and testing flowability, the white thermoplastic shall have a maximum percent residue of 22 percent and the yellow thermoplastic shall have a maximum residue of 24percent.

(10) Reflectivity: The initial reflectance for the in-place marking shall have the minimum reflectance value of 450 mcd/lux/sq m for white and 350 mcd/lux/sq m for yellow when measured with a geometry of 1.5 degrees observation angle and 86.5 degrees entrance angle.

(11) Wet Reflectivity: The minimum in-place marking when wet shall have the minimum reflectance value of 200 mcd/lux/sq m for white and 175 mcd/lux/sq m for yellow when measured with a geometry of 1.5 degrees observation angle and 86.5 degrees entrance angle. The stripe shall be wet utilizing a pump type garden sprayer for 30 seconds. After 5 seconds, place the reflectometer on the stripe and measure the retro reflectance.

(12) Retained Reflectivity: The thermoplastic pavement marking material shall retain the minimum reflectance value of 130 mcd/lux/sq m for at least four years after placement. Failure to meet this requirement shall require the contractor to replace the portion of the material shown to be below these minimums. The contractor shall provide a written warranty indicating the terms of this requirement.

(13) Inverted Profile: The thermoplastic pavement marking material shall be applied to have a individual profiles having a minimum height of 0.140 inches (3.5 mm) with the recessed inverted profiles having a thickness of 0.025 to 0.050 inches (0.6 mm to 1.25 mm). The profiles shall be well defined and not excessively run back together.

215.11 PREFORMED PLASTIC PAVEMENT MARKING TAPE:

(a) General: Preformed plastic pavement marking tape shall be approved products listed on QPL 64 and shall comply with ASTM D4505 Type I, Type I - High Performance (as specified below) or Type V, except as modified herein. The marking tape shall be Grade A, B, C, D, or E. The type and color shall be in accordance with the plans and the MUTCD.

(b) Thickness: All preformed plastic pavement marking tape shall have a minimum overall thickness of 0.060 inches (1.5 mm) when tested without the adhesive.

(c) Friction Resistance: The surface of the Type I preformed plastic pavement marking tape shall provide a minimum frictional resistance value of 35 British Polish Number (BPN) when tested according to ASTM E303. The surface of the Type I - High Performance and Type V preformed plastic pavement marking tape shall provide a minimum frictional resistance value of 45 BPN when tested according to ASTM E303 except values for the Type V are calculated by averaging values taken at downweb and at a 45 degrees angle from downweb.

(d) Retroreflective Requirements: The preformed plastic pavement marking tape shall have the minimum specific luminance values shown in Table 215-10 when measured in accordance with ASTM D 4061.

Table 215-10
Specific Luminance

Type	Observation Angle, degrees	Entrance Angle, degrees	Specific Luminance (mcd/sq m/lx) White	Yellow
I	0.2	86	500	400
	1.0	86.5	300	175
I- High Performance	0.2	86	700	560
	1.0	86.5	400	225
V	0.2	86	1100	800
	1.0	86.5	700	500

(e) Durability Requirements: The Type I - High Performance preformed plastic pavement marking tape shall show no appreciable fading, lifting or shrinkage for a least 12 months after placement when placed in accordance with the manufacturer's recommended procedures on pavement surfaces having a daily traffic count not to exceed 15,000 ADT per lane. The Type V preformed plastic pavement marking tape shall show no appreciable fading, lifting or shrinkage for a least 4 years after placement for longitudinal lines and at least 2 years after placement for symbols and legends.
The Type V preformed plastic pavement marking tape shall also retain the following reflectance values for at least 4 years after placement for longitudinal lines and at least 2 years after placement for symbols and legends:

Observation Angle, degrees	Entrance Angle, degrees	Specific Luminance (mcd/sq m/lx)	
		White	Yellow
1.0	86.5	100	100

(f) Plastic Pavement Marking Tape Guaranty (Type I - High Performance and Type V): If the plastic pavement marking tape fails to comply with the performance and durability requirements of this subsection within 12 months for Type I - High Performance and 4 years for Type V, the manufacturer shall replace the plastic pavement marking material at no cost to the City.

215.12 TRAFFIC PAINT. The contractor shall have the option of furnishing either aklyd traffic paint or water-borne traffic paint; however, the same type paint shall be used throughout the project. Each paint container shall bear a label with the name and address of manufacturer, trade name or trademark, type of paint, number of gallons,

batch number and date of manufacture. Paints shall be approved products listed in QPL 36, shall show no excessive settling, caking or increase in viscosity during 6 months of storage, and shall be readily stirred to a suitable consistency for standard spray gun application. An infrared curve shall be generated in accordance with DOTD TR 610 and compared with the standard curve made during the initial qualification process.

(a) Alkyd Traffic Paint: This material shall be a rapid-setting compound suitable for use with hot application equipment. The material shall meet the requirements of Table 215-11.

Table 215-11

Alkyd Traffic Paint Physical Properties

		Requirements	
Property	Test Method	Min.	Max.
Weight, kg/L	ASTM D 1475	1.5	---
Viscosity @ 25°C, Krebs Units	ASTM D 562	85	115
Dry to No Pick Up, s	ASTM D 711	---	180
Directional Reflectance, %	ASTM E 97		
White		80	---
Yellow		50	---
Bleeding	Fed. Spec. TT-P-115	Pass	
Total Solids, % by mass	ASTM D 1644, Method A	70	---
Film Shrinkage	[1]	Pass	
Hiding Power		Pass	
Pigment, %	ASTM D 2371	50	55
Nonvolatiles in Vehicle, % by mass	ASTM D 215	35	---
Flexibility	Fed. Spec. TT-P-1952	Pass	
Pigment Composition	[3]	Pass	

[1] Film Shrinkage: With a film applicator, cast a wet film with a thickness of 30 mils (750μm) over a smooth glass plate. Allow sample to cure at room condition for 4 to 5 hours. Using a micrometer, measure the plate thickness before the film is cast using five measurements to obtain an average. The cured film shall have a minimum thickness o f 12 mils (300 μm).

[2] Hiding Power: The paint shall have a wet hiding power of at least 350 square feet per gallon (8.6 m 2 /L). The compound shall have sufficient hiding power to cover any pavement when applied at a wet film thickness of 15 mils (375 μm).

[3] Pigment Composition: White paint shall contain at least 1.5 pounds (180 g) of titanium dioxide (Ti02) pigment per gallon as determined using DOTD TR 523 with at least 92 percent Ti02 content. The Ti02 shall comply with ASTM D 476. Yellow paint shall contain at least 1.3 pounds (160 g) of medium chrome yellow pigment per gallon (L) as

determined using DOTD TR 523. Medium chrome yellow pigment shall comply with ASTM D 211, Type III.

(b) Water Borne Traffic Paint: This material shall be a rapid setting waterborne compound suitable for use with hot application equipment. The material shall meet the requirements of Table 215-12.

Table 215-12
Water Borne Traffic Paint Physical Properties

		Requirements	
Property	Test Method	Min.	Max.
Weight, kg/L	ASTM D 1475	1.5	---
Viscosity @ 25°C, Krebs Units	ASTM D 562	75	90
Dry to No Pick Up, s	ASTM D 711	---	10
Dry through, min.	ASTM D 1640	---	20
Volume Solids,%	---	58	---
Total Solids, % by mass	ASTM D 2369	70	---
Pigment, % by mass	ASTM D 3723	45	55
Nonvolatile Vehicle, % by mass	Fed. Test 141B	40	---
Bleed Ratio	Fed. Spec. TT-P-1952	0.96	---
Daylight Reflectance, %	Fed. Test 141B		
White		85	---
Yellow		54	---
Hiding Power (Contrast Ratio) at 250 µm	Fed. Test 141B	0.96	---
Flexibility	Fed. Spec. TT-P-1952	Pass	
Drying Time, min.	[1]	---	3
Fineness of Grind	ASTM D 1210	3	---
Freeze-Thaw	ASTM D 2243	Pass	
Heat Stability	Fed. Spec. TT-P-1952	Pass	
Color	[2]	Pass	
Volatile Organic Compounds (g/L)		---	150
Pigment Composition	[3]	Pass	

[1] Drying time to no track - Paint applied at 15 mils (375 µm) wet on the road surface with paint heated to 120-150°F

(50-65°C) shall not show tracking when a standard size automobile crosses in a passing maneuver at 3 minutes.
[2] Color - Yellow paint shall comply with the requirements of Table 215-13 when tested in accordance with ASTM E 1349. White shall be a clean, bright, untinted binder.
[3] The white paint shall contain a minimum of 1.0 pound per gallon (120 g/L) of titanium dioxide (Ti02) as determined using DOTD TR 523. The titanium dioxide shall comply with ASTM D 476.

Table 215-13
Water Borne Traffic Paint Color Specification Limits (Daytime)

Color	1		2		3		4	
	x	y	x	y	x	y	x	y
Yellow	0.4756	0.4517	0.4985	0.4779	0.5222	0.4542	0.4919	0.4354

(The four pairs of chromaticity coordinates determine the acceptable color in terms of the CIE 1931 Standard Colorimetric System measured with Standard Illuminant C.)

215.13 GLASS BEADS FOR DROP-ON APPLICATION: Glass beads shall comply with AASHTO Designation M247, Type I, with the following modifications shown in Table 215-14. Glass beads shall be coated with an adhesive promoting coating which shall also provide moisture resistance.

Table 215-14
Gradation of Glass Beads for Drop-On Application

Sieve Designation Standard, mm	Percent Passing
1.180	99-100
0.850	75-95
0.600	55-85
0.425	---
0.300	10-35
0.180	---
0.150	0-5

END OF SECTION 215

END OF PART 2

PART 3

EARTHWORK

SECTION 301

CLEARING AND GRUBBING

301.1 GENERAL. Clearing and grubbing shall consist of removing all natural and artificial objectionable materials from the right-of-way in construction areas, road approaches, material sites within the right-of-way, areas through which ditches and channels are to be excavated, and such other areas as may be specified on the Drawings. This work shall be performed in advance of grading operations and in accordance with the requirements herein specified, subject to erosion control requirements. Demolition of buildings and structures, other than foundations or slabs, shall be as specified on the plans.

The natural ground surface shall be cleared of all vegetable growth, such as trees, logs, upturned stumps, roots of downed trees, brush, grass, weeds, and all other objectionable materials within the limits of construction.

Grubbing shall extend to the outside excavation and fill slope lines, except that where slopes are to be rounded, the area shall extend to the outside limits of slope rounding. Within the limits of clearing, all stumps, roots 1½ inches (38 mm) in diameter or larger, buried logs, and all other objectionable material shall be removed 3 feet (0.9 m) below the existing ground surface or subgrade, whichever is deeper. No payment will be made to the contractor for clearing and grubbing outside the stated limits, unless such work is authorized by the Engineer.

Trees and plants that are not to be removed shall be fully protected from injury by the contractor at its expense. Trees shall be removed in such a manner as not to injure standing trees, plants, and improvements which are to be preserved.

301.2 PRESERVATION OF PROPERTY. Existing improvements, adjacent property, utility and other facilities, and trees and plants that are not to be removed shall be protected from injury or damage.

301.3 REMOVAL AND DISPOSAL OF MATERIALS. All materials removed shall be disposed of outside of the right-of-way, unless burning is permitted. Burning shall be done only if permitted by local regulations and at such times and in such manner as to prevent the fire from spreading to areas adjoining operations, the piles may be placed in the most convenient location at the side of the right-of-way and beyond slope lines where they may be burned without damage to the surrounding area. No accumulation of flammable material shall remain on or adjacent to the right-of-way. The roadway and adjacent areas shall be left with a neat and finished appearance.

301.4 PAYMENT. The lump sum price, or the price per acre, bid for clearing and grubbing shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in clearing and grubbing as shown on the plans, and as specified in these specifications, and as directed by the Engineer, including the removal and disposal of all the resulting materials. When the contract does not include a pay item for clearing and grubbing as above specified, full compensation for any necessary clearing and grubbing required to perform the construction operations specified shall be considered as included in the price bid for other items of work and no additional compensation will be allowed therefore. Partial payment will be limited to 10 percent of the original total

contract until the contractor has earned 40 percent of the original contract amount. Payment will be made under:

Item No.	Pay Item	Pay Unit
301 (1)	Clearing and Grubbing	Lump Sum
301 (2)	Clearing and Grubbing	Per Acre

END OF SECTION 301

SECTION 302

REMOVAL OF STRUCTURES AND OBSTRUCTIONS

302.1 DESCRIPTION. This work shall consist of the removal and satisfactory disposal of all buildings, fences, structures, old pavements, abandoned pipe line, and any other obstructions which are not designated or permitted to remain. It shall also include the salvaging of designated materials and backfilling the resulting trenches, holes, and pits. When the proposal does not include pay items for removal of structures and obstructions, as set out in this section, cost of such work shall be included in prices bid on other construction items.

302.2 CONSTRUCTION REQUIREMENTS. The Contractor shall remove and dispose of all buildings and foundations, structures, fences and other obstructions, any portions of which are on the right-of-way, except utilities and those for which other provisions have been made for removal. All designated salvageable material shall be removed, without unnecessary damage, in sections or pieces which may be readily transported and shall be stacked at specified storage areas by the Contractor within the project limits or hauled to a designated maintenance storage yard and stacked. All materials designated not to be salvaged may be destroyed or disposed of off the project outside the limits of view with written permission of the property owner on whose property material is placed. Copies of all agreements with property owners are to be furnished to the Engineer. Basements or cavities left by structure removal shall be filled to the level of the surrounding ground and, if within the prism of construction, shall be compacted to the approximate density of the surrounding ground.

302.3 REMOVAL OF BRIDGES, CULVERTS AND OTHER DRAINAGE STRUCTURES. Bridges, culverts and other drainage structures in use by traffic shall not be removed until satisfactory arrangements have been made to accommodate traffic. Unless otherwise directed, the substructures of existing structures shall be removed down to the natural stream bottom and those parts outside of the stream shall be removed down one foot (.3 m) below natural ground surface. Where such portions of existing structures lie wholly or in part within the limits for a new structure, they shall be removed as necessary to accommodate the construction of the proposed structure.

Steel bridges and wood bridges as specified, shall be carefully dismantled without unnecessary damage. This dismantling shall include the stripping of all hardware and the removal of all nails. Steel members shall be match marked before dismantling unless otherwise indicated. All salvaged material shall be stored or removed as specified in Subsection 302.2. Blasting or other operations necessary for the removal of an existing structure or obstruction, which may damage new construction, shall be completed prior to placing the new work.

302.4 REMOVAL OF PIPE. Unless otherwise provided, all pipe to be salvaged shall be carefully removed and every precaution taken to avoid breaking or damaging the pipe. Pipes to be relaid shall be removed and stored so that there will be no loss or damage before relaying. The contractor shall replace sections lost from storage or damaged by negligence or by use of improper methods. Pipes not to be relaid and considered usable shall be salvaged, cleaned of soils or other materials, stored or removed and stacked as specified in Subsection 302.2.

302.5 REMOVAL OF PAVEMENTS. SIDEWALKS. CURBS. ETC. Unless otherwise specified, all concrete pavements, base course, sidewalks, curbs, gutters, etc., designated for removal, shall be disposed of outside the right-of-way and beyond the limits of view of the traveling public in accordance with Subsection 302.2. When specified, ballast, gravel, bituminous material or other surfacing or pavement materials shall be removed and stockpiled as required in Subsection 302.2; otherwise, such materials shall be disposed of as directed by the Engineer.

302.6 ROCK EXCAVATION. Rock excavation shall include blasting, excavating grading, and disposing of material classified as rock and shall include the satisfactory removal and disposition of boulders 1/2 cubic yards (.38 cu.
m) or more in volume; solid rock; rock material that is in ledges, bedded deposits, and unstratified masses, which cannot be removed without systematic drilling and blasting; and conglomerate deposits that are so firmly cemented as to possess the characteristics of solid rock that is impossible to remove without systematic drilling and blasting.

The removal of any concrete structures or pavements,that may be encountered in the work shall not be included in this classification. If at any time during excavation, including excavation from borrow areas, the contractor encounters material that may be classified as rock excavation, such material shall be uncovered and the Engineer notified by the contractor. The contractor shall not proceed with the excavation of this material until the Engineer has classified the materials as rock excavation and has taken cross sections as required. Failure on the part of the contractor to uncover such material, notify the Engineer, and allow ample time for classification and cross sectioning of the undisturbed surface of such material will cause the forfeiture of the contractor's right of claim to any classification or volume of material to be paid for other than that allowed by the Engineer for the areas of work in which such deposits occur.

302.7 METHOD OF MEASUREMENT. When the contract stipulates that payment will be made for removal of obstructions on a lump sum basis, the pay items, "Removal of Obstructions", will include all structures and obstructions encountered within the right-of-way in accordance with the provisions as set out in this section. Where the proposal stipulates that payment will be made for the removal of specified items on a unit basis, measurement will be made by the unit stipulated in the contract.

302.8 BASIS OF PAYMENT. The accepted quantities of removal of structures and obstructions will be paid for at the contract lump sum price bid, which price shall be full compensation for removing and disposing of the obstructions in accordance with the contract. Unless specifically provided for there shall be no direct payment for the removal of pipe. Specific obstruction items, stipulated for removal or disposal under unit price pay items will be paid for at the contract unit price bid per unit specified in the proposal, which price shall be full compensation for removal and disposal of such items, excavation and subsequent backfill incidental to their removal. The price shall also include salvage of materials removed, their custody, preservation, storage on the right-of-way and disposal as provided herein.

ITEM NO.	PAY ITEM	PAY UNIT
302.1	Removal of Structures and Obstructions	Per Lump Sum
302.2	Removal of Bridges	Per Each
302.3	Removal of Reinforced Concrete Structures	Per Each
302.4	Removal of Steel Structures	Per Each
302.5	Removal of Building Structures	Per Each
302.6	Removal of Concrete Pavement	Per Square Yard
302.7	Removal of Pavement Base and Surface	Per Square Yard
302.8	Removal of Concrete Walks and Driveways	Per Square Yard
302.9	Removal of Concrete Curb and Gutter	Per Linear Foot
302.10	Removal of Concrete Curb	Per Linear Foot
302.11	Rock Excavation	Per Cubic Yard

END OF SECTION 302

SECTION 303

ROADWAYEXCAVATION

303.1 DESCRIPTION. Roadway excavation shall consist of excavation involved in the grading and construction of roadways, except structural excavation, separately designated. It shall include excavating, removing, hauling, placing, compacting, and satisfactorily disposing of all materials encountered in the excavation for the roadway, ditches, channel changes and all operations necessary for the roadway excavation in accordance with these specifications and in reasonably close conformity with the lines, grades, thickness and typical cross sections shown on the plans or established by the Engineer. Rock encountered in roadway excavation shall be defined, removed and paid for as provided in Subsection 302.6.

303.2 CLEARING AND GRUBBING. Prior to beginning excavation, grading, and embankment operations in any area, all necessary clearing and grubbing in that area shall have been performed in accordance with Section 301, Clearing and Grubbing.

303.3 SLOPES. Excavation slopes shall be finished in conformance with the lines and grades shown on the plans. Debris and loose material shall be removed. When completed, the average plane of the slopes shall conform to the slopes indicated on the plans and no point on the completed slopes shall vary from the designated plane by more than six inches (15.3 cm), measured at the right angles to the slope.

Tops of excavation slopes and ends of excavations shall be rounded as shown on the plans and these quantities shall not be included in the quantities of excavation to be paid for. This work will be considered as a part of finishing slopes and no additional compensation will be allowed therefore. Embankment slopes shall be finished in conformance with lines and grades shown on the plans. When completed, the average plane of embankment slopes shall conform to slopes indicated on the plans and no point on completed slopes shall vary from the designated plane by more than six inches (15.3 cm) measured at right angles to the slope. The placing and compacting of embankments shall conform to the applicable portions of Section 304.

303.4 SURPLUS MATERIAL. Unless otherwise shown on the drawings, or approved by the Engineer, no surplus excavated material shall be disposed of within the right-of-way. The Contractor shall make all arrangements for disposal of the material at off-site locations as may be approved by the owner of adjacent property, and shall upon request, file with the Engineer the written consent of the owner of the property upon which he intends to dispose of such material. Consideration shall be given to the abutting property owner, should he request the surplus material be placed on the abutting property.

303.5 UNSTABLE AND UNSUITABLE MATERIAL. Excavation operations shall be conducted so that material outside of the limits of slopes will not be disturbed. Material outside the planned roadway or ditch slopes which is unstable and constitutes potential slides in the opinion of the Engineer, material which has come into the roadway channel or ditch, and material which has slipped out of new or old embankments shall be excavated and removed. The material shall be excavated to designated lines or slopes either by benching or in such manner as directed by the Engineer. Such material shall be used in the construction of the embankments or disposed of as directed by the Engineer. Only those quantities of slide or slipout material which are actually removed as ordered by the Engineer will be paid for.

The above provisions shall not be so construed as to relieve the Contractor from his obligation to maintain all slopes true and smooth. The Contractor shall conduct his operations in such a way that the Engineer can take the necessary cross-sectional measurements before the backfill is placed. Where excavation to the finished graded section results in a subgrade or slopes of unsuitable or unstable soil, the Engineer may require the Contractor to remove the unsuitable or unstable materials by undercutting and backfill to the finished graded section with approved material.

Material shall be considered unsuitable for fill, subgrade, shoulders and other uses if it contains organic matter, soft spongy earth, or other matter of such nature that compaction to the specified density is unobtainable. The removal and disposal of such unsuitable material will be paid for as Roadway Excavation for the quantities involved, whether or not the removal of such material is shown on the Drawings.

303.6 METHOD OF MEASUREMENT. Measurement will be made by either of the following methods or as designated on Drawings.

(a) Contract Quantity Payment. The quantities of excavation for which payment will be made will be those shown in the contract for the various items, provided the project is constructed essentially to the lines and grades shown on the plans. When the plans have been altered or when disagreement exists between the Contractor and the Engineer, as to the accuracy of the plan quantities in any balance, or the entire project, either party shall have the right to request and cause the quantities involved to be measured in accordance with measured quantities. When the quantities are measured for payment, the original plan cross sections plotted on the plans shall be used as original field cross sections. Additional original cross sections may he interpolated at points where necessary to more accurately determine the quantities.

(b) Measured Quantities. When payment is specified on a volume basis, all accepted excavation shall be measured in its original position by cross-sectioning the area excavated, which measurements will include slides in unclassified material not attributable to carelessness of the Contractor. Volumes will be computed from the cross-section measurements by the average end area method. Measurements will be made for unsuitable materials actually excavated and removed to obtain proper compaction in cut sections and in foundations for fill sections.

No measurement will be made of the suitable material temporarily removed and replaced to facilitate compaction of the material for the full depth shown on the plans. Where it is impractical to measure material by the cross-section method due to the erratic location of isolated deposits, acceptable methods involving three-dimensional measurements may be used.

(c) Vehicular Measurement. When specified in the project specifications or authorized by the Engineer, excavated material may be measured by the cubic yard in approved hauling vehicles at the point of delivery.

303.7 BASIS OF PAYMENT. The accepted quantities of roadway excavation will be paid for at the contract unit price per cubic yard. Such price shall include excavating, sloping, rounding tops and ends of excavations, loading, depositing, conditioning, spreading, and compacting the material complete in place and disposal of surplus material.

ITEM NO.	PAY ITEM	PAY UNIT
303.1	Roadway Excavation	Per Cubic Yard
303.2	Roadway Excavation (Vehicular Measurement)	Per Cubic Yard
303.3	Excavation & Embankment	Lump Sum

END OF SECTION 303

SECTION 304

FILL CONSTRUCTION

304.1 DESCRIPTION. Fill construction shall consist of constructing embankments except as may otherwise be specified, including the preparation of the areas upon which they are to be placed; the construction of dikes; areas as shown on the plans and where unsuitable material has been removed; and the placing and compacting of material in holes, pits, and other depressions as directed by the Engineer.

304.2 PLACING. Rocks, broken concrete, or other solid materials shall not be placed in embankment areas where piling is to be placed or driven. When embankments are constructed on a hillside sloping more than 6:1 from the horizontal, the slope of the ground on which the embankment is to be placed shall be plowed or cut into steps before the fill is placed. Material thus cut out shall be recompacted along with the new embankment material at the contractor's expense. Where a new road is to be constructed on an old road, the old road shall be plowed or scarified and broken up full width to a depth of not less than 6 inches (15.24 cm), regardless of height of new fill, and recompacted as directed. Unless shown otherwise by the plans or special provisions, heavy sod and objectionable vegetable matter shall be completely removed to a minimum depth of approximately 6 inches (15.24 cm). This area shall then be compacted to a relative compaction of not less than 90%, as determined by Method A or AASHTO Designation T 99 (Standard).

Roadway embankment of earth material shall be placed in layers or lifts approximately parallel to the finished grade line not exceeding approximately 8 inches (20.32 cm) (loose measurement). Each lift shall be placed for the full width of the embankment and compacted as specified before the next layer is placed. Effective spreading equipment shall be used on each lift to obtain reasonably uniform thickness prior to compacting. As the compaction of each layer progresses, necessary spreading and manipulating will be required to assure uniform density. Water shall be added or removed, if necessary, in order to obtain the required density.

304.3 COMPACTING. Fill shall be constructed in compacted layers of uniform thickness and each layer shall be compacted in accordance with the requirements herein specified with the following exception. Embankments constructed of rock fills, sand fills placed in water and in the first layer of fills constructed through or into lakes, streams, swamps and other soft areas shall be constructed and compacted in such a manner as to permit construction of superimposed layers as specified. These materials shall be placed in accordance with Subsection 304.2.

In cut areas, for the full width of roadbed in all cut sections, the top 6 inch (15.3 cm) layer on which fill or base material is to be placed, shall be thoroughly scarified and the moisture content increased or reduced as necessary. This 6 inch (15.3 cm) layer shall then be compacted to not less than 95% of the maximum density. When required by the plans, the top of the embankment in both cut and fill sections shall be constructed of selected material and compacted to not less than 95% of maximum density.

All material in embankments requiring density control, as per the load zone drawing, shall be placed in layers not to exceed 8 inches (20.32 cm) in thickness, and shall be compacted to not less than 95% of maximum density. At the time of compaction, the moisture content of fill material shall be such that the specified relative compaction will be obtained and the fill will be firm and unyielding. Fill material which contains excessive moisture shall not be compacted until the material is dry enough to obtain the required relative compaction. Full compensation for any additional work involved in drying fill material to the required moisture content shall be considered as included in the contract price paid and no

additional compensation will be allowed therefore.

Compaction of embankments may be accomplished by any satisfactory method or methods that will obtain the required density unless a specific method is required by the special provisions. Dumping and rolling areas shall be kept separate and no lift shall be covered by another until density complying with the requirements of this subsection is secured. Relative compaction shall be determined by Method A of AASHTO Designation T 180.

304.4 BASIS OF PAYMENT. Fill construction as defined in this Section is a method of construction the payment for which shall be included in Roadway Excavation, Borrow Excavation, Channel Excavation or Structural Excavation.

END OF SECTION 304

SECTION 305

BORROW EXCAVATION

305.1 DESCRIPTION. This work shall consist of excavating from borrow pits, transporting material to the proper site, placing and compacting of material for the construction of fills in accordance with these specifications and in reasonably close conformity with the lines, grades, thickness and typical cross sections shown on the plans or established by the Engineer.

305.2 MATERIAL. The material for Borrow Excavation shall be tested and classified by the laboratory before being placed in embankments and, subject to the restrictions for suitable material hereinafter contained, shall be American Association of State Highway Officials Soil Identification Classes (AASHTO Designation: M 145) A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-3, A-4, A-5, A-6, except that material in the A-5, A-6, classes considered unsatisfactory by the Engineer will not be accepted, and should a material of the A-3 class (sand) be used, the contractor will be required to use on slopes a material of the A-4, A-5, and/or A-6 Classification. Should a material of the A-1-b class (coarse sand or gravelly sand) be used, the contractor will be required to use on slopes a material of the A-4, A-5, A-6, A-7-5, and/or A-7-6 classification at the discretion of the Engineer.

305.3 LOCAL BORROW. Local borrow shall consist of material excavated and used in the construction of fills or for use as selected material or for other construction purposes. Local borrow shall be material which is excavated from sources shown on the drawings, or designated by the Engineer. The contractor will have no choice or selection of the source of material to be excavated. Local borrow shall be excavated to the lines and grades established by the Engineer.

305.4 IMPORTED BORROW. Imported borrow shall consist of material required for construction, and unless otherwise designated, the contractor shall make his own arrangements for obtaining imported borrow and he shall pay all costs involved. Imported borrow shall be the best material available from sources indicated on the plans, or approved by the Engineer.

The contractor shall notify the Engineer sufficiently in advance of opening any material sites so that cross-section elevations and measurements of the ground surface after stripping may be taken and sufficient time for testing the material will be allowed. It shall be the responsibility of the contractor to provide all soil test information.

Clearing, grubbing, stripping of pits, and material not used in the embankment will not be measured or paid for. The contractor shall provide and maintain all necessary haul roads from the borrow pits to the work at his own expense.

305.5 PLACING AND COMPACTING. Local borrow and imported borrow shall be placed and compacted as specified in Section 304.

The contractor shall satisfy himself that there is sufficient space available in fill locations for placing any excavated material, before placing imported borrow. Any excess excavation which develops as a result of placing imported borrow in advance of completing excavation shall be disposed of at the contractor's expense in accordance with the provisions in Subsection 303.4 and a corresponding reduction in the quantity of imported borrow to be paid for will be made, for which the contractor will have no claim for compensation.

Borrow pits shall be excavated to regular lines to permit accurate measurement; depth of excavation throughout the areas of borrow pits shall be as uniform as practicable and the side slope shall be dressed to such slope as may be directed, leaving the borrow pit area in a clean and safe condition.

305.6 METHOD OF MEASUREMENT. Quantities of borrow will be measured as specified for Roadway Excavation in Section 303.6.

305.7 BASIS OF PAYMENT. Quantities of borrow excavation will be paid for at the contract unit price per cubic yard. Such price shall include excavating, sloping, and cleaning of borrow area, hauling, depositing, spreading and compacting the material complete in place, and disposal of surplus material. Material excavated at the borrow site and not used on the work will be deducted from the computed quantities and will not be paid for.

ITEM NO.	PAY ITEM	PAY UNIT
305.1	Local Borrow Excavation	Cubic Yard
305.2	Imported Borrow Excavation	Cubic Yard
305.3	Local Borrow Excavation (Vehicle Measurement)	Cubic Yard
305.4	Imported Borrow Excavation (Vehicle Measurement)	Cubic Yard

END OF SECTION 305

SECTION 308

STRUCTURAL EXCAVATION AND BACKFILL

308.1 DESCRIPTION. Structural excavation shall consist of the removal of material for the construction of foundations for bridges, retaining walls, headwalls for culverts, and other structures, and other excavation designated on the plans or in these specifications as structural excavation.

Structural excavation and backfill shall consist of furnishing material, if necessary, and placing and compacting backfill material around structures to the lines designated on the plans or specified or directed by the Engineer.

Structural excavation and backfill shall include the furnishing of all materials and equipment and the providing of other facilities which may be necessary to perform the excavation and place and compact backfill, and the subsequent removal of facilities, except where they are required or permitted by the plans or by the Engineer to remain in place. It shall also include the wasting or disposal of surplus excavated material in a manner and in locations approved by the Engineer.

308.2 STRUCTURAL EXCAVATION. When footing concrete or masonry is to rest on an excavated surface, care shall be taken not to disturb the bottom of the excavation and final removal of the foundation material to grade shall not be made until just before the concrete or masonry is placed.

When any structural excavation is completed the Contractor shall notify the Engineer who will make an inspection of the excavation. No concrete or masonry shall be placed until the excavation has been approved by the Engineer. The elevation of the bottoms of footings, as shown on the plans, shall be considered as approximate only and the Engineer may order in writing, such changes in dimensions or elevation of footings as may be necessary to secure a satisfactory foundation.

308.3 STRUCTURAL BACKFILL. Backfilling operations shall conform to the followingrequirements:

Structural backfill shall not be placed until the structure footings or other portions of the structure or facility have been inspected by the Engineer and approved for backfilling. No backfill material shall be deposited against the back of concrete abutments, concrete retaining walls, or the outside walls of cast-in-place concrete culverts until permission shall have been given by the Engineer and until test cylinders show the strength to be twice the working stress used in the design.

If the working stress used in the design is not known, such backfill shall not be deposited until the concrete has developed a strength of not less than the 28 day design compressive strength as determined by test cylinders cured under conditions similar to those prevailing at the site.

Unless otherwise specified, the placement and compaction of structural backfill shall conform to the requirements of Section 304.

Compaction of structural backfill by ponding and jetting will be permitted when, as determined by the Engineer, the backfill material is of such character that it will be self-draining when compacted and that foundation materials will not soften or be otherwise damaged by the applied water and no damage from hydrostatic pressure will result to the

structure. Ponding and jetting of the upper 3 feet (.91 m) below finished subgrade will not be permitted in roadway areas.

When ponding and jetting is permitted, material for use in a structure backfill shall be placed and compacted in layers not exceeding 4 feet (1.22 m) in thickness. The work shall be performed without damage to the structure and embankment, and in such a manner that water will not be impounded.

308.4 PAYMENT. Unless otherwise provided in the Proposal, no payment will be made for structure excavation or backfill as such; the cost thereof under normal circumstances being considered as included in the price bid for the construction or installation of the items to which such excavation or backfill is incidental or appurtenant.

Payment for such excavation or backfill will be made only when the Proposal provides. Unless otherwise shown on the plans, the quantity of the structure excavation, whether paid for as a separate item or not, shall be that volume in place included between a vertical plane I foot (305 mm) outside of and parallel with the outermost horizontal dimensions of the structure and between the surface of the existing ground and the footing subgrade.

Item No.	Pay Item	Pay Unit
308(1)	Structural Excavation	Per Cubic Yard

END OF SECTION 308

PART 4

ROADWAY SUBGRADE PREPARATION AND BASE COURSE

SECTION 401

SUBGRADE PREPARATION

401.1 GENERAL. This section shall govern the preparation of natural, filled or excavated roadbed material prior to the placement of sub-base or base material, pavement, curbs and gutters, driveways, sidewalks or other roadway structures. The Contractor shall be responsible for protection of the subgrade during construction.

PREPARATION OF SUBGRADE. Scarifying and compacting will be required for dry soils which are impervious to the penetration of water, for soils which contain excessive amounts of moisture which may result in unstable foundations, for soils which are non-uniform in character which may result in non-uniform relative compactions and subsequent differential settlements of finished surfaces, or when pavement is to be placed directly on existing roadbed material.

After rough grading has been completed, and when scarifying and compacting are required, the roadbed shall be loosened to a depth of at least 6 inches (150 mm). The loosened material shall then be worked to a finely divided condition and all rocks larger than 3 inches (75 mm) in diameter shall be removed. The moisture content shall be brought to optimum by the addition of water, by the addition and blending of dry suitable material or by the drying of existing material. The material shall then be compacted by approved equipment to the specified relative compaction.

Uniform pervious soils, that allow the immediate penetration of water or uniform impervious soils which will allow the penetration of water to a depth of at least 6 inches (150 mm) after the addition of a suitable wetting agent, will not require scarifying unless a condition previously set forth in this subsection requires such processing. When scarifying is not required, the moisture content of the top 6 inches (150 mm) of the subgrade material shall be brought to optimum by the addition of water at the surface, and the material shall be compacted by approved equipment to the specified relative compaction.

401.2 LIME TREATMENT.

401.2.1 General. Lime treatment shall consist of the treatment of one or more courses of subgrade material with hydrated lime mixed, compacted and finished to conform to the lines, grades, thicknesses and typical cross-sections as indicated on the Plans. It includes furnishing, hauling, spreading, and mixing of the lime.

401.2.2 Materials. Lime shall be as specified in Subsection 201.6. Water shall be as specified in Subsection 201.1.4.

401.2.3 Equipment. Shall be as specified in Section 402.

401.2.4 Mixing. Where designated, the depth of subgrade indicated on the Drawings shall be treated with commercial grade hydrated lime. The percentage of lime to be incorporated shall be as specified on the Drawings, or project specifications, or as established by the Engineer.

401.2.5 Mixing. Where designated, the depth of subgrade shown on the plans shall be treated with amounts of commercial grade hydrated lime as established by the Engineer. The lime may be placed on the subgrade in either dry form or may be applied as a slurry. The lime or lime slurry shall be thoroughly mixed with the material to be treated as soon as practical. The contractor shall handle the processing of lime in such a manner that lime dust will not be hazardous to workmen nor to the public. Initial mixing shall be performed the same day the lime is placed. After preliminary mixing, the section so treated shall be shaped, lightly compacted and cured for a period of 48 hrs. or as directed by the Engineer. During the curing period, the moisture content of the mixture shall be maintained from 2 to 5 percent above the optimum required for compaction.

Following the curing period, the contractor shall again mix the treated material until 100% of the slaking fraction passes the 1½ inch (38.1 mm) sieve and a minimum of 70% passes the No. 4 sieve using approved road mixers or other approved equipment which is capable of thoroughly mixing and processing the combined materials.

401.3.5 Compaction and Grading. Compaction shall begin immediately after the final mixing. Each course of lime treated subgrade shall be compacted to 90% of maximum density, as determined by AASHTO Designation T-180, Method A, except that when pavement, curb, gutter, driveways, sidewalks, or other structures are to be placed directly upon the lime treated material the top 6 inches (150 mm) thereof shall be compacted to 95% of maximum density, and in accordance with the applicable provisions of Subsection 401.5.

When compacting and shaping are completed, the subgrade shall be kept moist until the first layer of base or other surfacing material has been placed, in order to prevent shrinkage cracks.

401.4 CEMENT TREATMENT OF SUBGRADE. Sub-base treatment with portland cement shall be constructed in accordance with the requirements of Section 402.

401.5 COMPACTION. The top 6 inches (150 mm) of subgrade material shall be compacted to a relative compaction of 95%. After compaction and trimming, the subgrade shall be firm, hard, and unyielding. Prior to placement of base material, the contractor shall be required to test the subgrade with an approved mechanical device.

401.6 SUBGRADE TOLERANCES. Subgrade for pavement, sidewalks curb and gutter, driveways, or other roadway structures shall not vary more than 0.02 foot (6 mm) from the specified grade and cross-section. Subgrade for sub-base or base material shall not vary more than 0.04 foot (12 mm) from the specified grade and cross-section. Variations within the above specified tolerances shall be compensating so that the average grade and cross-section specified are met.

401.7 GRADING OF AREAS NOT TO BE PAVED. Roadway areas shall be graded to meet the tolerances for base subgrade. The surface shall be constructed to a straight grade from the finish pavement or curb elevations shown on the plans to the elevation of the existing ground at the extremities of the area to be graded.

401.8 ADJUSTMENT OF MANHOLE FRAME AND COVER SETS TO GRADE. Utility manhole and vault frames and covers within an area to be paved or graded will be set by the owners thereof to finish grade. Sewer and storm drain manhole frames within the area to be paved or graded shall be set to finish grade by contractor. Manholes in asphaltic concrete pavement shall be set to finish grade. In the case of portland cement concrete pavement, manhole frames shall be set to finish grade before paving. Repaving required as a result of reconstructing or adjusting all manhole and vault frames and covers to grade shall be the responsibility of the contractor and the cost thereof shall be included in the bid item for pavement.

401.9 PAYMENT. Payment for preparing a subgrade will be considered as included in the item of work for which the subgrade is prepared.

Payment for grading operations in areas designated as "grade only" will be considered as included in the price for excavation or fill.

Payment for adjusting manhole frames and covers to grade, will be made under Section 601.

Payment for lime treated subgrade, except for the payment for hydrated lime, will be made on the basis of the price bid per square yard for the processing and compaction of the lime treated material complete in place for the widths and thicknesses shown on the plans. Payment for hydrated lime will be made on the basis of the price bid per one hundred pounds, dry weight, delivered and placed as directed by the Engineer. Payment for cement treatment of sub-base shall be made as specified in Section 402, "Soil Cement Base".

Item No.	Pay Item	Pay Unit
401.4	Soil-Lime Processing (12" depth) (6.5% Lime by weight)	Ton

END OF SECTION 401

SECTION 402

SOIL CEMENT BASE

402.1 GENERAL. This work consists of scarifying, pulverizing, blending, shaping and stabilizing select material or the existing roadbed material with portland cement in accordance with these specifications, in reasonably close conformity with the lines, grades, thickness and sections shown on the plans or established by the Engineer. For bid purposes, the estimated rate of portland cement required for stabilization is 10.5% by volume; however, the actual rate of portland cement to be used for stabilization will be determined by an independent laboratory employed by the City. If the actual rate of cement differs from the estimated rate, an adjustment will be made for this difference, as specified in Subsection 402.8.

402.2 MATERIALS. Materials shall conform to the following subsections:

Cement	201.1.2
Water	201.1.4
Emulsified Asphalt	204.3
Cutback Asphalt	204.2

402.2.1 Soil. Soil shall consist of the material existing in the area to be paved, or of an approved imported select soil or of a combination of these materials proportioned as directed by the Engineer. Soil for soil cement base course shall consist of materials that will stabilize with cement. Soil with a liquid limit greater than 35, a plasticity index greater than 15 shall not be used.

402.3 EQUIPMENT. Equipment necessary to produce a finished base course which meets specification requirements shall be furnished and maintained by the contractor. Mixing machines shall be approved by the Engineer prior to use.

402.4 PREPARATION OF ROADBED. The contractor shall scarify and pulverize the materials to be stabilized for the full width and depth of the cement stabilized base course. If the existing roadway has asphaltic surfacing the surfacing shall be pulverized and uniformly mixed with the materials below the surfacing. Any surfacing materials or base materials which cannot be pulverized to the satisfaction of the Engineer shall be removed from the roadway and disposed of as directed by the Engineer, all at no cost to the City.

Test samples will be taken after the materials have been thoroughly pulverized and blended. Materials failing to meet specifications shall not be stabilized until the necessary corrective measures have been taken to assure compliance. After the roadbed has been prepared as specified above, the contractor shall shape the roadbed to the required section and uniformly compact the roadbed material to the satisfaction of the Engineer.

402.5 CONSTRUCTION METHODS. Depending upon existing conditions, construction methods shall facilitate either mixing of materials with in place soil or plant mixing of soil and materials. The method to be used shall be indicated on the Drawings or as directed by the Engineer.

402.5.1 In-Place Soil.

402.5.1.1 Mixing. After the roadbed material to be stabilized has been prepared, portland cement shall be uniformly spread and mixed with the material and shaped to the required section. Prior to mixing, the percent of cement to be used for stabilization will be determined by laboratory tests in accordance with Louisiana DOTD

Designation: TR 432 and the method of mixing shall be such that the amount of cement used can be readily determined.

Water shall be added as needed by means of the mixer and shall be uniformly incorporated in the mixture in the amounts required to attain the optimum moisture content specified for the mixture. The optimum moisture of the mixture will be determined by the laboratory tests in accordance with Louisiana DOTD Designation: TR 418. The percentage of moisture in the mixture on the basis of dry weight shall not vary from the specified optimum percentage of moisture by more than ± 2% at the time of compaction.

402.5.1.2 Placing, Compacting, and Finishing. Soil-cement shall be uniformly compacted to at least 95% of relative compaction. The mixture shall be placed on the moistened subgrade, or previously completed soil-cement, using mechanical spreading equipment that will produce layers of such width and thickness that it will compact to the required dimensions of the completed soil-cement layers.

The mixture may be spread and compacted in one layer where the required thickness is 8 inches (200 mm) or less. Where the required thickness is more than 8 inches, the mixture shall be spread and compacted in two or more layers of approximately equal thickness, provided that the maximum compacted thickness of any one layer does not exceed 8 inches (200 mm). Compaction shall commence within 30 minutes after being placed on the grade and shall proceed continuously until complete. Final compaction of the mixture to the specified density shall be completed within 2 ½ hours after the application of water during the mixing operation.

When two or more layers of soil-cement are to be placed, the surface which will be in contact with succeeding layers shall be kept continuously moist for 7 days or until the placement of the subsequent layer. Any loose material on the surface of the completed layer shall be removed and the surface moistened immediately before placement of the next layer. No standing water will be permitted. At the start of compaction, the mixture shall be in a uniform, loose condition throughout its full depth.

During finishing operations, the surface of the soil-cement shall be shaped to the required lines, grades and cross-section and shall be kept moist. The finished surface of the soil-cement shall conform to the requirements of Subsection 401.6.

402.5.2 Plant Mixing.

402.5.2.1 Mixing. The soil materials shall be combined with portland cement and water by travel plant, central plant or other approved methods and shaped on the approved subgrade. Water needed to bring the moisture content of the mixture to within the tolerance specified herein shall be added and uniformly mixed with the materials. If prior to spreading the cement the moisture content of the soil is excessive, the soil shall be manipulated until the moisture content is such that the tolerance specified herein for the mixture can be met.

The percentage of cement will be determined in accordance with Louisiana DOTD Designation: TR 432 prior to mixing. The method of mixing shall be such that the amount of cement used can be readily determined. When centralplant mixing is used, a reduction of 1 percent in the volume of cement required will be permitted.

The optimum moisture of the mixture will be determined by the Laboratory in accordance with Louisiana DOTD Designation: TR 418. The percentage of moisture in the mixture, on the basis of dry weight, shall not vary fromthe specified optimum percentage of moisture by more than ± 2 percent at the time of compaction. A minimum of 70 percent of the pulverized soil, as determined by Louisiana DOTD Designation: TR 431, shall pass the No. 4 sieve after mixing.

402.5.2.2 Transporting and Placing on Subgrade. Transportation and spreading methods shall be such that minimum damage is done to the subgrade. It shall be the contractor's responsibility to place and spread sufficient material to obtain required width and compacted thickness. Every effort shall be made to prevent subgrade materials from contaminating the base course. Such contamination will require retesting and correction of deficiencies. Base course materials shall not be placed, spread or mixed on portland cement concrete or asphaltic concrete pavements, and base course construction operations shall be conducted in such manner that pavement surfaces, edges and joints are not damaged.

402.5.2.3 Compacting and Finishing. The mixture shall be uniformly compacted immediately upon completion of mixing or placement. The number and type of rollers used shall be sufficient to uniformly compact the base course to the specified depth and width, and within the specified time. Vibratory rollers will not be permitted in areas with high water tables. The surface shall be kept uniformly moist at all times during compaction and final finishing. For soil containing 65 percent or more silt, classified as silty loams or silts, and having a plasticity index of 5 or less, compaction shall be by a sheep's foot or similar type roller followed by a light pneumatic roller not exceeding 10 tons.

Compaction shall continue until the base course density or degree of compaction is 95%. Degree of compaction shall be the percent of the material in its original undisturbed state as determined by ASTM-1557 maximum density at or above optimum moisture content. At all places inaccessible to rollers, such as edges adjacent to curb and gutter sections, the mixture shall be compacted using devices that will obtain uniform compaction to required density without damage to adjacent structures. All compaction shall be completed within 3 hours after initial mixing of cement with base course materials.

Upon expiration of the 3-hour period after initial mixing, only blading of the base course surface will be allowed, and the bladed material shall not be drifted along the base but shall be wasted on the shoulders. The finished base course shall have a smooth, uniform, closely knit surface, free from ridges, waves, laminations, loose material or laitance.

402.6 CURING. After placement and compaction of the soil-cement is completed, it shall be protected against drying and from traffic for three (3) to seven (7) days and to a compressive strength equal to or exceeding 300 psi. Verification of minimum compressive strength shall be made in accordance with Louisiana Department of Transportation and Development TR432, Method B or C. Curing shall be moist (water fogging), bituminous seal, or other method approved by the Project Engineer. If moist curing is used, exposed surfaces of the soil-cement shall be kept continuously moist with a fog spray for 72 hours. If a bituminous curing is used, it shall consist of liquid asphalt or emulsified asphalt.

The bituminous curing seal shall be applied in sufficient quantity to provide a continuous membrane over the soil-cement at a rate of between 0.10 and 0.20 gallons per square yard (0.45 and 0.91 liter per m^2) of surface with the exact rate determined by the Engineer. It shall be applied as soon as possible after the completion of final rolling. The surface shall be kept moist until the seal is applied. At the time the bituminous material is applied, the soil-cement surface shall be dense, shall be free of all loose and extraneous material, and shall contain sufficient moisture to prevent excessive penetration of the bituminous material.

402.7 REPAIR. If the soil cement is damaged, it shall be repaired by removing and replacing the entire depth of affected layers in the damaged area. Feathering will not be permitted for repair of low areas.

402.8 MEASUREMENT AND PAYMENT. Cement treated soils, base, and subbase will be paid for by the ton of cement placed, mixed, and compacted as shown on the Plans or as directed by the Engineer. The unit price shall include payment for all materials, labor and equipment used in the treated mixture, mixing, spreading, shaping, compacting, trimming, and curing.

Item No.	Pay Item	Pay Unit
402.1	In-place Soil Cement Base Course (8 inch depth) (10.5% cement)	Ton

END OF SECTION 402

SECTION 403

BASE COURSE

403.1 AGGREGATES

403.1.1 General.

A) Untreated crushed stone base for pavement, curb, gutter and similar improvements shall be constructed of material as specified in Subsection 200.3.1.

B) Untreated crushed aggregate base for pavement, curb, gutter and similar improvements shall be constructed of material as specified in Subsection 200.3.1 or of crushed concrete as specified in Subsection 200.3.2.

403.1.2 Spreading. Imported aggregate bases shall be delivered to the roadbed as uniform mixtures, and each layer shall be spread in one operation. Segregation shall be avoided and the base shall be free from pockets of coarse or fine material.

Aggregate bases shall be deposited on the roadbed at a uniform quantity per linear foot, which quantity will provide the required compacted thickness within the tolerances specified herein without resorting to spotting, picking up or otherwise shifting the aggregate base material. At the time aggregate base is spread, it shall have a moisture content sufficient to obtain the required compaction. Such moisture shall be uniformly distributed throughout the material.

Where the required thickness is 0.50 foot (150 mm) or less, the base material may be spread and compacted in one layer. Where the required thickness is more than 0.50 foot (150 mm) the base material shall be spread and compacted in two or more layers of approximately equal thickness, and the maximum compacted thickness of any one layer shall not exceed 0.50 foot (150 mm). Each layer shall be spread and compacted in a similar manner.

When subgrade for aggregate base consist of cohesionless sand and written permission is granted by the Engineer, a portion of the aggregate base may be dumped in piles upon the subgrade and spread ahead from the dumped material in sufficient quantity to stabilize the subgrade. Segregation of aggregates shall be avoided and the material as spread shall be free from pockets of coarse or fine material.

403.1.3 Compacting. Rolling shall always be commenced along the edge of the area to be compacted and the roller shall gradually advance toward the center of the area to be compacted. Rollers shall be operated along lines parallel or concentric with the center line of the road being constructed, and no material variation there from will be permitted. All rollers must be maintained in good mechanical condition.

Unless otherwise specified, the relative compaction of each layer of compacted base material shall not be less than 95%. The surface of the finished aggregate base at any point shall not vary more than 0.02 foot (6 mm) above or below the grade established by the Engineer. Base which does not conform to the above requirements shall be reshaped or reworked, watered and thoroughly recompacted to conform to the specified requirements.

403.2 SAND-CLAY-GRAVEL

403.2.1 General. Sand-clay-gravel base shall consist of furnishing and placing a base course of sand-clay-gravel on a prepared subgrade in accordance with these specifications and in reasonably close conformity with the lines, grades, thickness and typical cross sections shown on the plans or established by the Engineer. It includes furnishing, hauling, placing, spreading, watering, compacting and maintaining the base course.

403.2.2 Materials. Sand-clay-gravel base shall be constructed of base material specified in Subsection 200.3.3 unless otherwise specified on the Drawings. The sand-clay-gravel shall be completely mixed and tested by an approved testing laboratory, to determine that it meets the specifications, before it is hauled to the job site. The Engineer may reject material which requires the addition of more than 5% additive on the job site to meet the specified requirements, but in any event the Contractor shall not be relieved from the responsibility of providing a base composed of sand-clay-gravel which meets the specifications.

403.2.3 Equipment. All necessary equipment shall be on the project, in satisfactory working condition, and shall have been approved before construction begins. Spreading equipment shall be of such weight and type to adequately spread the material. Rollers or other equipment used to compact base may be any approved type or combination of types that will obtain the required density. Provisions shall be made by the Contractor for furnishing sufficient water at the work site. Water vehicles or other approved sprinkling devices shall be provided.

403.2.4 Preparation of Subgrade. Unless otherwise shown on the plans the preparation of subgrade shall be completed in accordance with the requirements of Section 401 prior to the placing of base course material.

403.2.5 Placing of Material. Sand-clay-gravel base 6 inches (150 mm) or less in compacted thickness may be placed in a single layer and those more than 6 inches (150 mm) in thickness shall be built up in successive layers of approximately equal compacted thickness not to exceed a maximum thickness of six inches (150 mm).

The pre-mixed base material may be dumped directly on the prepared subgrade, but it shall be uniformly distributed over the subgrade either by hand or from approved spreaders or other mechanical equipment. When using mechanical equipment for spreading material, dump piles shall be so spread as to insure uniform compaction of the material. Transportation and spreading methods shall be such that minimum damage is done to the subgrade. Every effort shall be made to prevent materials from the subgrade from becoming mixed with or incorporated into the aggregate mix. Such introduction will require retesting and correction of deficiencies.

403.2.6 Compaction and Shaping. After distribution, the base material shall be watered and then immediately bladed to a uniform layer that will net the required thickness after rolling. If the materials deposited are not uniformly blended together, the blading operation shall be continued to such extent as may be necessary. The quantity of water applied shall be that amount which will assure optimum moisture under proper compaction resulting in a relative compaction of not less than 95% as determined by a laboratory test, using AASHTO Designation T 180, Method A, except that the compaction test shall be accomplished in three layers using 25 strokes of the rammer per layer, care being exercised in connection with watering operations to avoid wetting the subgrade or any lower base course to detrimental extent. Upon completion, the base shall be firm, hard and unyielding, with a true, even and uniform surface conforming to the grade and cross-section specified.

Sand-clay-gravel base may vary not more than ½ inch above or below required grade and cross section, except that the compacted base for bituminous pavements may vary not more than 1/4 inch above or below required grade and cross

section provided such variations are compensating.

When a new sand-clay-gravel base course is constructed on an existing gravel base the old base material shall be scarified slightly and blended and mixed with the first course of new material added. The cost of this work shall be included in the cost of constructing the sand-clay-gravel base course.

403.3 SAND

403.3.1 Description. Sand base shall consist of furnishing and placing a base course of sand on a prepared subgrade in accordance with these specifications, in reasonably close conformity with lines, grades, thickness and typical cross sections shown on the plans or established by the Engineer. It includes furnishing, hauling, placing, spreading, watering, compacting and maintaining the base course.

403.3.2 Materials. Sand shall conform to the provisions of Subsection 200.1.

403.3.3 Equipment. All necessary equipment shall be on the project, in satisfactory working condition, and shall have been approved before construction begins. Spreading equipment shall be of such weight and type to adequately spread the material. Rollers or other equipment used to compact base may be any approved type or combination of types that will obtain the required density. Provisions shall be made by the Contractor for furnishing sufficient water at the work site. Water vehicles or other approved sprinkling devices shall be provided.

403.3.4 Preparation of Subgrade. Unless otherwise shown on the plans, the preparation of subgrade shall be completed in accordance with the requirements of Section 401 prior to the placing of base course material.

403.3.5 Placing of Material. Transportation and spreading methods shall be such that minimum damage is done to the subgrade. The base course shall be placed in one or more approximately equal layers as necessary and as directed in order to obtain the required compaction. The thickness of each layer shall in no event exceed 6 inches (150 mm) compacted thickness. It shall be the contractor's responsibility to place and spread sufficient material to obtain required width and compacted thickness. Every effort shall be made to prevent materials from the subgrade from becoming mixed with or incorporated into the aggregate mix. Such introduction will require retesting and correction of deficiencies.

403.3.6 Compaction and Shaping. The requirements for compacting, shaping and testing shall be in conformance with those set forth in Subsection 403.2.6 "Compacting and Shaping" for sand-clay-gravel base course.

403.3.7 Measurement and Payment. Quantities of aggregate base will be measured by ton, cubic yard, or square yard, as shown in the Proposal. The volumetric or area quantities of base material shall be those of the compacted base in place within the limits of the dimensions shown on the plans.

The weight of material to be paid for will be determined by deducting (from the weight of material delivered to the work) the weight of water in the material (at the time of weighing) in excess of one percentage point more than the optimum moisture content. No payment will be made for the weight of water deducted as provided in this subsection.

Payment shall be full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing aggregate base, complete in place, as shown on the plans, and as specified in these

specifications and as directed by the Engineer.

ITEM NO.	PAY ITEM	PAY UNIT
403.1	Crushed Stone Base Course (thickness)	Cubic Yard

END OF SECTION 403

SECTION 404

BASE REINFORCEMENT

404.1 GEOTEXTILE FABRICS.

404.1.1 General. This work consists of furnishing and placing geotextile fabric in accordance with these specifications and in conformance with the details shown on the plans.

404.1.2 Materials. The geotextile fabric shall comply with Section 211.

404.1.3 Construction Requirements. Rolls of geotextile fabric shall be kept covered and protected from ultraviolet degradation at all times until use. Geotextile fabric that has been installed shall be covered with embankment within 7 calendar days. When ultraviolet damage occurs, the geotextile fabric shall be removed and replaced. The geotextile fabric shall be placed at the locations shown on the plans or as directed. Adjacent rolls of geotextile fabric will be overlapped or sewn. When rolls are overlapped, the overlap shall be a minimum of 18 inches (450 mm), or as specified in the plans, including the ends of the rolls.

The top layer of the geotextile fabric shall be parallel with adjacent rolls and in the direction of embankment placement. When rolls are sewn, the contractor shall join adjacent rolls by sewing with polyester or kevlar thread. Field sewing shall employ the "J" seam or "Butterfly" seam with the two pieces of geotextile fabric mated together, turned in order to sew through 4 layers of fabric and sewn with 2 rows of Type 401, two-thread chain stitch. Factory seams other than specified may be submitted to the Project Manager for approval.

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

404.2 MEASUREMENT AND PAYMENT. The quantities of geotextile fabric for payment will be the design lengths as shown on the drawings. Design quantities will be adjusted if the Engineer makes change to adjust to field conditions, in plan errors are proven, or if design changes are made. Payment for geotextile fabric will be made on a square-yard basis as shown in the Proposal. The price bid for geotextile fabric shall be considered to include full payment for all materials, labor, equipment and incidentals required to place the geotextile fabric in accordance with the drawings or these specifications. Should no pay item be included in the proposal for this item and the typical sections or specifications call for the use of geotextile fabrics, then payment for this item shall be considered incidental to the cost of the pavement, embankment or other pay items.

Item No.	Pay Item	Pay Unit
404.1	Geotextile Fabric	Per Square Yard

END OF SECTION 404

SECTION 405

PAVEMENT UNDERSEALING

405.1 DESCRIPTION. This work shall consist of raising, filling voids, and undersealing existing cementitious and asphalt pavements at locations as indicated on Contract Work Orders or as directed by the Project Engineer, through implementation of the process described in Section 405.2 using polyurethane materials as described in Section 405.3.

The Contractor shall have a minimum of 4 years experience lifting concrete pavement, utilizing the process described in Section 405.2 and using polyurethane materials as described in Section 405.3. The Contract shall be for 2 years and on mutual agreement can be extended further for 2 additional years. The bid price may be increased in years 2, 3, & 4 of the Contract by a maximum of 5% per year, but in no event to exceed the change in the United States Bureau of Labor Statistics Consumer Price Index and/or Wholesale Price Index during the contract period. The minimum Contract Work Order shall be 5000 pounds.

The contract may be canceled without assigning any reasons after the first year either by the Owner or the Contractor with a 90-day notice.

405.2 PROCESS. The Contractor shall provide for all equipment, materials, labor, and supervision required for the work. The Owner will provide on-site inspection personnel and engineering oversight for any special project conditions and specific project. The Contractor shall, at a minimum, provide the following equipment for such projects:

a. A truck-mounted pumping unit capable of injecting the high density polyurethane formulation beneath the pavements and controlling the volume of injected material along with the rate and magnitude of pavement lifting, if required.
b. Pressure and temperature control devices to assure and maintain proper temperature and proportionate mixing of the polyurethane component materials. All necessary electric generators, compressors, heaters, hoses, containers, valves and gauges to efficiently conduct and control the project work.
c. Pneumatic ane electric drills capable of efficiently drilling 14-mm to 18-mm diameter injection holes through pavements up to one (1) meter thick.
d. Suitable laser levels and/or dial indicator devices, used to insure that the pavement is raised to an even plane and to the required elevation.

A pavement profile from laser level readings or string lines shall be used to determine where the pavement needs to be raised. In the project area, a series of 14-mm to 18-mm diameter holes shall be drilled through the pavement and underlying base to an appropriate depth as determined by the Contractor. Care shall be taken to protect the pavement surrounding each hole from damage.

The material shall be injected through the drilled holes until all known or encountered voids under the pavement are filled. The rate and amount of material injection shall be determined by the Contractor. The Contractor shall be responsible for any pavement blowouts or excessive pavement lifting which may occur as a result of his work and shall repair the subject area to the satisfaction of the Project Engineer without additional cost.

Corrections to the grade of adjacent slab, if necessary and as determined by the Project Engineer, shall be made in the

same manner that is required for pavement that is raised. All raised pavements must match the existing grade or adjacent slabs that provide positive drainage. Final elevations shall be within 7-mm of the required elevations as determined by the profile of the Project Engineer.

The Contractor's injection nozzles shall prevent leakage during injection and shall be removed at completion or driven into the injection hole to a depth of 3.0 cm below the pavement surface. Holes shall be filled to the pavement surface with polyurethane material and a non-shrink grout. At the end of each work shift, the work area shall be left in a clean, swept, and neat condition.

405.3 POLYURETHANE MATERIAL. The material used for raising and undersealing pavements shall be a water blown, closed cell, high density polyurethane system. The material shall have a free rise minimum density of 48 kilograms per cubic meter (3.0 lbs./cubic ft.) and a minimum compressive strength of 40 PSI. The material shall be hydrophobic in its component reaction so that the injected product is not significantly compromised by soil moisture or free water under the pavement. The high density polyurethane formulation shall reach 90% of full compressive strength within 15 minutes from the time of injection.

405.4 TESTING AND DATA. In advance of contract work commencement, the Contractor shall provide to the Contract Administrator and/or the Project Engineer the following:

a. Material Safety Data Sheets for all pertinent materials.

b. A Certificate of Compliance from the manufacturer of the polyurethane component materials to be used. The certification shall include the results of density and compressive strength analysis performed in accordance with ASTM D 1622 and ASTM D 1621 respectively.

c. A report from an Industrial Hygienist who has conducted a personnel, production vehicle, and typical job-site safety review of the Contractor's implementation procedures involving the polyurethane component chemicals.

d. A satisfactory test, witnessed by the Project Engineer, of injection of the Contractor's polyurethane material into a 40-gallon container of ambient (70° F) temperature water. The resulting product shall demonstrate consistent closed cell polyurethane material. A list of 50 clients for which the Contractor has successfully completed polyurethane raising and/or undersealing pavement projects. The listing shall also contain contact names and phone numbers for the clients involved.

e. A copy of the Contractor's Employee Safety Manual specific to polyurethane pavement raising and undersealing work.

405.5 MEASUREMENT AND PAYMENT. Payment for all work done shall be determined by the Project Engineer and the Contract. The Contractor shall be paid per pound of material injected based upon the Contract unit price. The quoted price and payment shall include full compensation for furnishing all labor, supervision, materials, tools, equipment, and incidentals for all work as called for in this specification, or as directed by the Project Engineer.

At the request of the Inspector, all pumping units in service shall perform a product density test by injecting a sample of the unit's polyurethane material into a test cylinder of known volume. The sample's net weight and density result shall be witnessed by the Inspector or the Project Engineer. The density shall not be less than the requirement of Section

405.3 above. The Owner may test the contents and quality of the polyurethane at the Owner's expense at any time. Daily material usage shall be attested by the Inspector and the Contractor and reported on a field production report.

ITEM NO.	ITEM	PAY UNIT
405.1	Pavement Undersealing	Lbs.

END OF SECTION 405

END OF PART 4

SECTION 509

PORTLAND CEMENT CONCRETE PAVEMENT

509.1 GENERAL. Unless otherwise specified, Portland cement concrete pavement shall be constructed of concrete prepared as prescribed in Subsection 201.1. The contractor will be permitted to furnish Class B, C, D or E concrete; however, the same type pavement mixture shall be used throughout the project unless otherwise authorized by the engineer in writing.

509.2 FORMS AND HEADERS.

509.2.1 General. Forms and headers shall be either wood or metal. They shall be set plumb and true to line and grade, with the upper edge thereof set to the grade of the pavement to be constructed; and shall be rigidly installed on a true alignment and so maintained for a distance in advance of placing the pavement to provide for at least a one-day run of concrete. Headers shall rest firmly on the subgrade or base. They shall be oiled immediately prior to the placing of the concrete and shall remain in place for at least 12 hours after concrete has been placed. Forms and headers must be removed before the work will be accepted.

At contractor's option, methods of forming and finishing concrete pavements may or may not be the same methods used for forming and finishing concrete curbs, gutters and walks. Construction of concrete curbs, gutters and walks shall be as specified in Section 605.

509.2.2.1 Metal Forms. Straight side forms shall be made of metal having a thickness of not less than 7/32 inch and shall be furnished in sections not less than 10 feet in length. On long curves (150 foot radius or longer), straight forms of shorter lengths will be permitted. Forms shall have a depth not less than the prescribed edge thickness of the pavement and a base width at least equal to the depth, except as otherwise approved by the engineer. Flexible or curved forms of property radius shall be used on curves 150 foot radius or less and shall be of a design acceptable to the Engineer. Forms shall be provided with adequate devices for secure setting. Flange braces shall extend outward on the base not less than 2/3 the height of the forms. Forms with battered top surfaces and bent, twisted or broken forms shall be removed from the work. Repaired forms shall not be used until inspected and approved.

When acceptable, wooden forms shall be prescribed to the requirements as set forth by the specification listed below.

509.2.2.2 Wooden Forms. Wooden forms shall be constructed of 2-inch nominal lumber in pieces not less than 6 feet (4.9 m) long, except where changes in alignment or grade necessitate the use of material of smaller dimensions. The lumber used shall be free from warp and other imperfections which would impair the strength for the use intended; shall have square edges (which may be slightly beveled) and square ends; shall be surfaced on the upper edge; and shall not be more than ½ inch (12 mm) less in depth than the specified thickness of the edge of the pavement.

Such forms shall be secured by nailing to side stakes spaced not more than 4 feet (1.2 m) apart and driven into the subgrade vertically to a depth not less than 12 inches (305 mm), and so that the tops will be below the upper edge of the header. The stakes shall be of sufficient length and cross-sectional area to adequately resist lateral displacement of the headers during the paving operations.

Wooden headers shall be spliced by nailing a board to the outside of the headers. The board shall be at least 4 feet (1.2

m) long, l inch (25 mm) thick, and at least 6 inches (152 mm) wide (or the depth of the header, whichever is least), and shall be centered on the joint.

509.3 PLACING CONCRETE.

509.3.1 General. Concrete shall be placed on an approved subgrade sufficiently dampened to insure that no moisture will be absorbed from the fresh concrete. Immediately after being mixed, the concrete shall be deposited on the subgrade to the required depth over the entire width of the section.

At the end of each day's run, or at any time when operations are stopped for a period of more than 30 minutes, a rigid transverse header shall be placed vertically and at a right angle across the improvement at the location designated by the Engineer; and the pavement shall be finished to form a square, vertical joint against which the work may be resumed. Hand mixing may be used only if necessary to provide sufficient concrete to complete paving to the expedient header.

509.3.1.1 Grade Control. In the event of a split grade or other non-uniform cross section slopes of a pavement which deviate from the cross section slope as defined by the typical paving details, the following methods of concrete placement shall be used unless otherwise approved by the Engineer.

(a) The contractor will be required to use electronic grade controls on both sides of the Slip Form Paver in accordance with all specifications required in the use of Slip Form Pavers.

(b) Metal Forms. The contractor will be required to pour the first lane with Metal Forms in accordance with all specifications required for the use of Metal Forms.

509.3.2 Slip Form Construction. At the option of the contractor, and with the approval of the Engineer, concrete pavement may be constructed by the use of slip form paving equipment.

Slip form paving equipment shall be provided with traveling side forms of sufficient dimensions, shape, and strength to support the concrete laterally for a sufficient length of time during placement to produce pavement of the required cross section, and it shall spread, consolidate, screed, and float-finish the freshly placed concrete in such a manner as to provide a dense and homogenous pavement.

The concrete shall be distributed uniformly into final position by the slip form paver and the horizontal deviation in alignment of the edges shall not exceed 1/4 inch (6.3 mm) from the alignment established by the Engineer.

The concrete, for the full paving width, shall be effectively consolidated by internal vibration, with transverse vibrating units, or with a series of longitudinal vibrating units. Internal vibration shall mean vibration by means of vibrating units loaded within the specified thickness of pavement section and at a minimum distance ahead of the screed equal to the pavement thickness.

Concrete shall be given a preliminary finish by finishing devices incorporated in the slip form paving equipment. Final finishing for slip form pavement construction shall be as specified herein after.

509.3.3 Equipment. A list of all equipment used in the placement of concrete must be submitted to the Engineer prior to the commencement of construction. The Engineer will approve or disapprove the equipment requested by the contractor.

509.4 FINISHING.

509.4.1 General. The concrete shall be consolidated and the surface finished true to grade and cross-section. Upon completion the surface shall be free of any unevenness greater than 1/8 inch (3.2 mm) when checked with a 10-foot (3 m) straight-edge placed on the surface of the pavement. The straight edge shall be furnished by the contractor and shall be at the site of the work prior to the commencing of the placing of the concrete.

509.4.2 Tamping. The concrete shall be distributed uniformly between the side forms as soon as it is placed after which the concrete shall be struck off and tamped by means of a mechanical tamper. The tamper shall be operated at right angles to the center line of the pavement, and tamping continued until the concrete is thoroughly consolidated to the specified cross-section and sufficient mortar for finishing purposes has been brought to the surface.

Steel-shod hand tampers or vibrating bars may be substituted in those cases where the use of a mechanical spreader and tamper would be obviously impracticable. Approved concrete vibrating equipment shall be used in conjunction with the mechanical tamper to consolidate the concrete adjacent to the forms or existing pavement.

509.4.3 Floating.

(a) *General.* After tamping, the surface of the concrete shall be floated by either the finishing machine method or the transverse float method described below. Bridge decks may be floated by the longitudinal float method.

(b) *Finishing Machine Method.* The concrete shall be floated smooth and true to grade with an approved finishing machine.

(c) *Transverse Float Method.* The concrete shall be floated at least twice with a long-handled float at least 5 feet (1.5 m) wide, following which the surface of the concrete shall be finished smooth and true to grade, with a wooden float 16 feet (4.9 m) long, 2 inches (51 mm) thick, and 6 inches (152 mm) wide. It shall be rigidly ribbed and with adjustable screws between the rib and float board to insure a true and flat surface on the under side at all times. The float shall be operated from the side of the pavement, and parallel with the center line. The edge of the float shall be used to cut down all high areas, and the material so removed shall be floated into the depressions until a true surface is obtained. Each successive pass of the float shall half-lap the previous pass. The float shall be operated as far behind the tamping machine as the workability of the concrete will permit before its initial set.

(d) *Longitudinal Float Method.* The concrete shall first be floated with a double-handled longitudinal float not less than 16 feet (4.9 m) nor more than 20 feet (6.1 m) in length, having a troweling surface not less than 8 inches (203 mm) nor more than 10 inches (254 mm) wide.

The float shall be operated from bridges over the pavement with its length parallel to the center line of the improvement, and shall be worked back and forth transversely across the slab, planing off high spots and filling depressions. This operation shall be continued until the surface is reasonably smooth, after which the bridges may be advanced not to exceed 2/3 the length of the surface so floated, and the operation continued.

509.4.4 Straight-edge Testing and Surface Correction. After the floating has been completed and the excess water removed but while the concrete is still plastic, the surface of the concrete shall be tested for trueness

with a 10 foot straightedge. For this purpose, the contractor shall furnish and use an accurate 10 foot straightedge swung from handles approximately 3 feet longer than 1/2 the width of the slab. The straightedge shall be held in contact with the surface in successive position parallel to the road centerline and the whole area gone over from one side of the slab to the other as necessary.

Advance along the road shall be in successive stages of not more than 1/2 the length of the straightedge. Any depressions found shall be immediately filled with freshly mixed concrete, struck off, consolidated and refinished. High areas shall be cut down and refinished. Special attention shall be given to assure that the surface across the joints meets the requirements for smoothness. Straightedge testing and surface corrections shall continue until the entire surface is found to be free from observable departures from the straightedge and the slab conforms to the required grade and cross section.

509.4.5 Final Finishing. After being finished by one of the above methods, the outside edges of pavement shall be rounded to a ½ inch (13 mm) radius; and transverse contact joints expansion joints, and joints adjacent to an existing pavement shall be rounded to a 1/4 inch (6 mm) radius.

Final finish shall be obtained by using a Burlap Drag, in accordance with paragraph (a). Following the drag finish the final texture shall be obtained by the use of metal tines spaced either on 1/2 inch centers or on 1 inch centers. Grooves produced in the concrete shall be 3/16 inch in width with depth tolerances of 1/8 inch to 3/16 inch. All pavements shall conform to this requirement unless otherwise specified on the plans.

(a) *Drag Finish*. A strip of wetted burlap shall be provided, of a length not less than the width of the pavement slab. It shall be attached by one edge to a rigid frame supported over the pavement so that the free edge of the burlap will rest or drag on the surface of the concrete. The burlap shall be dragged back and forth longitudinally along the pavement until the surface of the slab is of uniform texture and appearance throughout its entire length.

(b) *Broom Finish.* When permitted or specified, the surface texture shall be a broom finish. It shall be applied when the water sheen has practically disappeared. The broom shall be drawn from the center to the edge of the pavement with adjacent strokes slightly overlapping. Corrugations produced in surface shall be uniform, 1/16" maximum in depth. Brooming shall be completed before the concrete is in such condition that the surface will be torn or unduly roughened by the operation. Finished surface shall be free from rough and porous areas, irregularities and depressions. Contractor will be permitted to use mechanical or manual brooming.

(c) *Tine Texturing***.** The metal tine texturing device shall be operated by approved mechanical means when texturing main roadway pavement lanes. When approved, manual methods may be used for tine texturing of ramps, crossovers, turnouts, split slab construction or other pavement sections. Tine texturing will not be required on parking areas, drives and other such areas. The adjacent concrete shoulder will require the same finish as the pavement.

Tines shall be approximately 0.025 x 0.126 inch (0.63 x 3.20 mm) steel flat wire, 4 to 5 inches (100 to 125 mm) in length, and randomly spaced with a minimum spacing of 3/8 inch (10 mm) and a maximum spacing of 1 1/2 inch (40 mm). No more than 50 percent of the spaces shall exceed 1 inch (25 mm). Grooves produced in the concrete shall be 3/16 inch (5 mm) in depth with a minimum depth of 1/8 inch (3 mm).

Depth of tine texturing on the travel lanes will be checked in accordance with DOTD TR 229. Pavement, which does

not meet the above requirements, will be corrected by regrooving. Tine texture on the shoulders will be visually inspected.

509.5 JOINTS.

509.5.1 General. Joints shall be as shown in the plans and shall be constructed where called for by the plans or where directed by the engineer. Joints in concrete pavements will be designated as longitudinal and transverse construction joints, expansion joints, and longitudinal and transverse contraction joints. All joints and joint fillers shall extend clearly to pavement edge or to each other, as the case may be.

Unless otherwise specified, transverse joints shall be constructed perpendicularly to the center line of the pavement, longitudinal joints shall be constructed parallel to the center line of the pavement. Joints shall not vary from specified or indicated line by more than 1/4 inch. The joint face shall be perpendicular to the surface of the pavement. No vehicular traffic of any kind will be allowed on the pavement until such time that the joints have been properly sealed.

509.5.2 Longitudinal Joint. The longitudinal joint shall not interrupt the continuity of any transverse joint. Deformed steel tie bars of specified length, size, spacing and material shall be placed perpendicular to longitudinal joints. They shall be placed by approved mechanical equipment or rigidly secured by chairs or other approved supports to prevent displacement. Tie bars shall not be coated with asphalt or other material or enclosed in tubes or sleeves. When adjacent lanes of pavement are constructed separately, steel side forms or other approved methods shall be used. Tie bars may be bent at right angles against the form of the first lane constructed and straightened into final position before concrete of the adjacent lane is placed or, in the lieu of bent tie bars, approved 2-piece connectors may be used. Tie bars which break or show evidence of fracture upon straightening shall be replaced when directed by the engineer by drilling 1 inch holes to a depth of 12 inches (31 cm) and pressure grouting the holes before insertion of the tie bars.

509.5.2.1 The groove for the longitudinal joint shall be formed by using a "T" iron wheel or other device that will insure a groove that is true in both vertical and horizontal alignment. All grooves shall be cut to the minimum depth shown on the plans and in such manner that the surface of freshly placed concrete will not be depressed or otherwise disturbed. Retempering of concrete adjacent to joints will not be permitted.

Strips of preformed joint filler material of the dimensions shown on the plans shall be inserted in the groove. After insertion, the top of the strip shall be flush with the surface or slightly below. In no case shall the distance between the top of the insert and the surface of concrete exceed 1/8 inch (3.17 mm). The joint shall be aligned and the surface of the pavement floated and checked with a 10 foot (3.1 m) straight edge. These fillers shall conform to Subsection 201.3.1.

509.5.2.2. A flexible joint forming device of the types shown on the plans may be used. Such joints shall be formed in accordance with plan details and the recommendation of the manufacturer. When the contractor desires to use a joint forming device not shown on the plans, the device and the method of installation must be approved in writing by the engineer.

509.5.2.3 Longitudinal joints may be sawed in conformance with Section 509.5.4.4.

509.5.3 Transverse Expansion Joints: The expansion joint filler shall be one of the following types:

509.5.3.1 Sealing Joints: When wood, bituminous, rubber or cork fillers are used to form the joint, they shall be

sealed in accordance with the plans. When wood filler is used, it shall be immersed in water for a period of not less than 24 hours before installation in the pavement. The boards shall be kept thoroughly wet until installed. The sealer shall conform to Subsection 201.3.3. The expansion joint filler shall be continuous from form to form and shaped to the subgrade. Preformed joint fillers shall be furnished in lengths equal to the pavement width or equal to the width of one land and depth equal to slab depth. Damaged or repaired joint fillers shall not be used unless approved by the engineer.

The load transfer device shall provide bracing adequate to hold the expansion joint filler in a vertical position. An expansion installing bar or other device shall be used if required to secure preformed expansion joint filler at proper grade and alignment during placing, vibrating and finishing of concrete. Care shall be taken to prevent indentations, deformations or punctures of the filler. Finished joints shall not deviate more than 1/4 inch (6.35 mm) in the horizontal alignment from a straight line. If joint fillers are assembled in sections, there shall be no offsets between adjacent units. No plugs of concrete shall be permitted within the expansion space.

509.5.3.2 Transverse expansion joints may be sawed in conformance with Section 509.5.4.4.

509.5.4 Transverse Contraction Joints (Dummy Joints): Transverse contraction joints shall consist of planes of weakness created in cross section of pavement and shall be constructed by one of the following methods:

509.5.4.1 Install a nonbituminous preformed filler board in a groove in the pavement formed and then sawed to the dimensions specified with one pass of the saw.

509.5.4.2 Install an approved removable joint forming device to form a joint to a width slightly less than the required width and to the required depth. The joint shall then be sawed to proper width and depth with one pass of the saw.

509.5.4.3 Install an approved removable joint device to form a joint to the required width and depth. This device shall be vibrated and remain in place for a minimum of 72 hours before removal. These devices may be reused provided they are cleaned of foreign materials and are undamaged in removal. They shall be reused only with prior approval of the engineer. Once the joint device is removed, the joint shall then be sawed to proper width and depth with one pass of the saw. Unless otherwise specified, the joints shall include load transfer devices.

509.5.4.4 Transverse contraction joints (Dummy Joints) may be constructed by sawing to the depths, widths and at the locations as called for by the plans, without tearing, raveling, or uncontrolled cracking of the concrete. Sawing shall be performed as soon as the concrete has set enough to permit sawing without tearing.

509.5.4.5 Transverse expansion joints may be sawed in conformance with Section 509.5.4.4.

509.5.4.6 Longitudinal joints may be sawed in conformance with Section 509.5.4.4.

509.5.4.7 Transverse Construction Joints shall be constructed when there is an interruption of more than 30 minutes in the concreting operations. No transverse joint shall be constructed within 10 feet of an expansion joint, contraction joint or plane of weakness. If sufficient concrete has been mixed at the time of interruption to form a slab at least 10 feet (3.1 m) long, the excess concrete back to the preceding joint shall be removed and disposed of as directed. Hand vibrators shall be used to ensure proper consolidation of the concrete adjacent to the construction joint.

509.5.6 Load Transfer Devices: Load transfer devices, either dowel assemblies or cantilever type assemblies, as specified hereinafter. Dowels shall be held in positions parallel to the surface and centerline by a metal basket with sand shoes that are left in the pavement. Load transfer devices may be placed by an approved mechanical device provided satisfactory positioning and alignment is attained. Load transfer devices for construction joints shall be the dowel assembly type.

509.5.6.1 Dowel Bars: Dowel bars shall be plain round bars conforming to ASTM Designations: A 615, A 616, or A 617. The sleeves for dowel bars shall be an approved material and design to cover 2-inches of the dowel, with a closed end, and with a suitable stop to hold the end of the sleeve at least 1 inch from the end of the dowel bar. Dowels shall be smooth, free of burrs, projections and deformations which may prevent pavement slippage. Dowels shall be coated with one coat of an approved paint and thoroughly coated with an approved lubricant to prevent concrete from bonding to the dowel. In lieu of painted and lubricated dowels, plastic coated dowel bars may be used. An approved sleeve shall be furnished with each dowel bar used in expansion joints. The sleeve shall fit the dowel bar tightly and the closed end shall be watertight.

Paint to be used for painting dowel bars shall conform to AASHTO Designation: M 72. Plastic coated dowel bars shall be undercoated with an adhesive and then given a final outer coat of approved extruded polyethylene plastic.

509.5.6.2 Cantilever Devices: Cantilever type devices shall be fabricated cast malleable iron conforming to details shown on the plans. The castings forming each of the 2 sections shall be of material conforming to ASTM Designation: A 47, Grade No. 35018. Each load transmission unit of the cantilever type shall consist of 2 identical castings providing a cantilever arm on which the other half of the unit shall bear, and each casting shall have an upper tension anchor and a lower compression anchor, all constructed in accordance with the general dimensions shown on the drawings.

The castings shall be cleaned and ground as necessary in order that each may be in conformity with the required dimensions and assembled into complete unit providing coincidence of bearing on both the vertical and horizontal sliding faces. The castings shall be sufficiently smooth so that there will be no interference with smooth sliding operation.

509.5.7 Overlaid Pavement. Where the plans provide that concrete pavement be overlaid with asphaltic concrete, the sawing and sealing of longitudinal and transverse joints will not be required.

509.6 **CURING.** The pavement shall be cured by a concrete curing compound conforming to the requirements of Subsection 201.4. Curing shall commence as soon as free water leaves the surface of the concrete but not later than 3 hours following the deposit of the concrete upon the subgrade. The entire pavement surface shall be covered with Type 1, 2 or 3 pigmented curing compound, as approved by the Engineer. The curing compound shall be applied to the entire pavement surface, by spraying at the rate of 1 gallon per 200 square feet (1 liter per 5 square meters) of pavement surface.

Spraying equipment shall be of the fully atomizing type, equipped with a tank agitator of an approved type which provides for continual agitation of the compound during application. The use of non-agitating type hand pumped garden sprayers will not be permitted except for small and inaccessible areas as may be permitted by the Engineer.

509.6.1 Surface Test: As soon as the concrete has hardened, the pavement surface shall be tested with a 10 foot rolling straightedge or other device approved by the City. The testing device shall be provided and calibrated by the contractor. The contractor shall also perform the test in the presence of a city inspector.
Areas showing high spots of more than 1/8 inch on roadways and 1/4 inch on ramps and connections, but down with an

approved grinding tool to an elevation where the area or spot will not show surface deviations in excess of 1/8 inch when tested with a 10 foot straightedge, except deviations of 1/4 inch will be permitted on ramps or connections with radii of 250 feet or less and on ramps with grades of 4 percent or more. Where the surface deviation in 10 feet exceeds 1/2 inch, the pavement shall be removed and replaced by and at the expense of the contractor.

509.7 TRAFFIC AND USE PROVISIONS. The concrete pavement shall be immediately barricaded upon its installation, and no vehicular traffic will be permitted thereon until the expiration of at least 7 days.

Pavement constructed of concrete which has been treated in accordance with Subsection 201.1.1.1 to obtain an early increase in strength may be opened to traffic 3 days after it is placed, if directed by the Engineer.

At least 3 days shall elapse from the time the concrete is placed before any mechanical tamper, spreader, or finishers which will be supported by the edge of the new pavement may be operated in adjacent lanes.

509.8 MEASUREMENT AND PAYMENT. Payment for concrete pavement will be made on a square-yard basis as shown in the Proposal. The price bid for concrete pavement shall be considered to include full payment for all materials, labor, equipment and incidentals required to place the concrete pavement in accordance with the Drawings or these Specifications. Length and width measurements to determine the quantity will be made in horizontal planes.

Item No.	Pay Item	Pay Unit
509.1	Portland Cement Concrete Pavement (Thickness) (Specific street)	Square Yard

END OF SECTION 509

END OF PART 5

PART 6

CONCRETE CONSTRUCTION

SECTION 601

CONCRETE STRUCTURES

601.1 GENERAL. Concrete bridges, culverts, catch basins, retaining walls, abutments, piers, footings, foundations and similar structures shall be constructed in conformity with the Drawings. Concrete for use in work constructed under this section shall conform to the requirements of Subsection 201.1. When the class of concrete is not specified or indicated on the Drawings, the class of concrete used shall be Class A.

601.2 SUBGRADE FOR CONCRETE STRUCTURES. Earth subgrade upon which concrete is placed shall be firm and free from water. Ground water shall be kept below subgrade until the concrete has set. When the subgrade is in dry earth, it shall be thoroughly dampened with water to insure that no moisture will be absorbed from the fresh concrete. When the design details for the project provide for the construction of filter or drain material consisting of gravel (or combination of gravel, clay, sand), which material will be subgrade for concrete, the placing of steel reinforcement and placement of concrete shall follow the installation of the filter or drain material as closely as practical. The filter or drain material shall be kept de-watered to the extent necessary to prevent any portion of concrete materials being deposited in water. No payment will be made for de-watering other than as may be included in the prices bid for various items of work or when an item for de-watering is provided.

601.3 FORMS. Forms shall be of suitable material and of a type, size, shape, quality, and strength to insure construction as designed. The forms shall be true to line and grade, mortar tight, and sufficiently rigid to resist deflection during placing of the concrete. The responsibility for their adequacy shall rest with the contractor. All dirt, chips, sawdust, nails, and other foreign matter shall be completely removed from forms before any concrete is deposited therein. The surface of forms shall be smooth and free from irregularities, dents, sags, and holes that would deface the finished surfaces. Forms previously used shall be thoroughly cleaned of all dirt, mortar, and foreign matter before being re-used. Before concrete is placed in forms, all inside surfaces of the forms shall be thoroughly treated with an approved releasing agent which will leave no objectionable film on the surface of the forms that can be absorbed by the concrete. Care shall be exercised that no releasing agent is deposited on previously placed concrete.

Forms for all surfaces that will not be completely enclosed or hidden below the permanent surface of the ground shall be made of surfaced lumber, or material which will provide a surface at least equal to surfaced lumber or plywood. Any lumber or material which becomes badly checked or warped, prior to placing concrete, shall not be used.

Forms for all exposed surfaces of bridges, viaducts, over-crossings and similar structures shall be constructed of plywood or an approved equal. Plywood for forms shall be of the grade "Exterior B-B (concrete form)", conforming to the latest Product Standard for Soft Plywood, Construction and Industrial, of the National Bureau of Standards.

Unless otherwise shown on the plans, all sharp edges shall be chamfered with 3/4-inch by 3/4-inch (19 mm by 19 mm) triangular fillets. Forms for curved surfaces shall be so constructed and placed that the finished surface will not deviate from the arc of the curve. Forms for girders and slabs shall be cambered as may be required by the Engineer.

Form clamps or bolts, approved by the Engineer, shall be used to fasten forms. The use of twisted wire loop ties to hold forms in position will not be permitted, nor shall wooden spreaders be used unless authorized by the Engineer. Clamps or bolts shall be of sufficient strength and number to prevent spreading of the forms. They shall be of such type that they can be entirely removed or cut back 1 inch (25.4 mm) inside the finished surface of the concrete. All forms for outside surfaces shall be constructed with stiff wales at right angles to the studs, and all form clamps or bolts shall extend through and fasten such wales.

Forms for cast-in-place concrete drain conduits or sewer structures will not be required for concrete to be placed directly against the sides of the excavation, provided the faces of the excavation are firm, compact, able to stand without sloughing, and must be outside the concrete lines shown on the plans at all points.

601.4 REMOVAL OF FORMS.

601.4.1 General. The periods of time for form removal set forth herein are permissive only and subject to the contractor assuming all risks that may be involved. The time periods are minimum with no allowance therein for external loads. At times of low temperature, or other adverse conditions, the Engineer may require the forms to be kept in place for longer periods of time.

601.4.2 Bridges. The period of time set forth herein are based on the use of Type II cement. Forms and false work supporting concrete beams, arch ribs, slabs, or other members subject to direct bending stress shall not be removed in less than 21 days after the concrete has been placed, unless concrete test cylinders show a strength of not less than 3,000 pounds per square inch (20.68 MPa) in compression, when cured under conditions similar to those affecting the structure. Forms and false work supporting the bottom slab of the superstructure of box girder structures shall remain in place 14 days after placing of the deck of the superstructure. Forms for the webs of box girders shall be removed before the deck slab is placed. Side forms for beams, girders, columns, railings, or other members in which the forms do not resist dead load bending, may be removed within a period of 2 to 5 days, as authorized by the Engineer, provided that satisfactory arrangements are made to cure and protect the concrete thus exposed.

601.4.3 Miscellaneous Structures. The period of time set forth herein are based on the use of Type II cement. Forms for concrete members (except bridges) subject to bending stresses, where the member relies upon forms for vertical support, may be removed 7 days after concrete is placed. Curb forms shall not be removed until the concrete has set sufficiently to hold its shape but shall be removed in time to permit proper finishing.

601.4.4 Standard Structures.

(a) General. Except as otherwise stipulated, the periods of time set forth herein for removal of forms are based on the use of Types II, III, IV, or V portland cement.

(b) Standard Catch Basins.

(1) Outside forms and inside wall forms which do not support the top slab forms------ 16 hours.
(2) Top slab forms ------- 48 hours if Type II or V cement is used; 24 hours if Type III cement is used.

(c) Standard Transition Structures.

(1) Outside forms and inside wall forms which do not support thetop slab form ------- 16 hours.

(2) Top slab forms ----- as specified for box section slab forms.

601.4.5 Channels and Conduits.

(a) General. Except as otherwise specified, the periods of time set forth herein are based on the use of Types II, III, IV or V portland cement.

(b) Forms Removal. Forms for open channels and forms and shoring for box sections and arch sections of sewers and storm drains may be removed as follows:

(1) Forms for open channel walls -------16 hours.

(2) Outside forms of box sections and inside wall forms of box sections which do not support the slab forms ----------16 hours.

(3) Arch sections in open cut ----- 12 hours.

(4) Slab forms for box sections------ Design strength.

(a) Type II cement ------48 hours or 6 hours per foot (19 hours per meter) of span between supports, whichever is greater.

(b) Types III cement----- 24 hours or 3 hours per foot (9.85 hours per meter) of span between supports, whichever is greater.

(c) Type V cement------ 56 hours or 7 hours per foot (22.96 hours per meter) of span between supports, whichever is greater.

601.5 FALSE WORK. The contractor shall submit detailed plans of the false work proposed to be used. Such plans shall be in sufficient detail to indicate the general layout, sizes of members, anticipated stresses, grade of materials to be used in the false work, and typical soil conditions. All false work shall be designed and constructed to provide the necessary rigidity and to support the loads. False work for the support of a superstructure shall be designed to support the loads that would be imposed if the entire superstructure were placed at one time.

False work and forms shall be so constructed as to produce in the finished structure the lines and grades indicated on the plans. Suitable jacks or wedges shall be used in connection with the false work to set the forms to the grade or camber shown on the plans, or to take up any settlement in the form work before or during the placing of concrete. Single wedges for this purpose will not be permitted, it being required that all such wedges be in pairs to insure uniform bearing. Dead load deflection in stringers and joists will be compensated for by varying the depths of the joists or by using varying depth nailing strips. Arch centering shall be removed uniformly and gradually, beginning at the crown and

working toward the haunches to permit the arch to take its load slowly and evenly. Centering for adjacent arch spans shall be struck simultaneously.

601.6 PLACING REINFORCEMENT.

601.6.1 General. Before placing reinforcement steel, the contractor shall submit a reinforcing steel placing plan. Reinforcing bars shall be accurately placed as shown on the plans and shall be firmly and securely held in place in accordance with the "Manual of Standard Practice" of the Concrete Reinforcing Steel Institute, using concrete or metal chairs, spacers, metal hangers, supporting wires and other approved devices of sufficient strength to resist crushing under full load. Metal chairs which extend to the surface of the concrete (except where shown on the plans) and wooden supports, shall not be used. Placing bars on layers of fresh concrete as the work progresses and adjusting bars during the placing of concrete shall not be permitted. Before placing in the form, all reinforcing steel shall be cleaned thoroughly of mortar, oil, dirt, loose mill scale, loose or thick rust, and coatings of any character that would destroy or reduce the bond. No concrete shall be deposited until the placing of the reinforcing steel has been inspected and approved.

601.6.2 Splicing. Splices of bars shall be made only where shown on the plans or as approved by the Engineer. Where bars are spliced, they shall be lapped at least 30 diameters, unless otherwise shown on the plans. Splicing shall be accomplished by placing the bars in contact with each other and wiring them together. Welding of reinforcing steel will not be permitted unless specifically authorized by the Engineer.

601.6.3 Bending Reinforcement. Bends and hooks in bars shall be made in the manner prescribed in the "Manual of Standard Practice" of the Concrete Reinforcing Steel Institute. Bars shall not be bent or straightened in a manner which will injure the material. Bars with kinks or unspecified bends shall not beused.

601.6.4 Welded Wire Fabric. Welded wire fabric shall be spliced not less than twomeshes.

601.7 PLACING CONCRETE.

601.7.1 General. Concrete shall be conveyed, deposited, and consolidated by any method which will preclude the segregation or loss of ingredients. Equipment used in conveying and depositing concrete shall not have any aluminum component coming into direct contact with the concrete. All surfaces against which concrete is to be placed shall be thoroughly moistened with water immediately before placing concrete. All ponded and excess water shall be removed to leave surface moist but not flooded. Chutes used in conveying concrete shall be sloped to permit concrete of the consistency required to flow without segregation. Where necessary to prevent segregation, chutes shall be provided with baffle boards or a reversed section at the outlet. Where a sequence for placing concrete is shown on the plans, no deviation will be permitted unless approved in writing by the Engineer.

601.7.2 Grouting. Where concrete is to be deposited against hardened concrete at horizontal construction joints, placing operations shall begin be conveying a grout mixture through the placing system and equipment and depositing the mixture on the joint. The grout mixture shall consist of a modification of the concrete specified to reduce the quantity of coarse aggregate in the mix larger than pea gravel size to one-half the quantity specified.

601.7.3 Depositing. To avoid segregation, concrete shall be deposited as near to its final position as is practicable. The use of vibrators for extensive shifting of the mass of concrete will not be permitted. Concrete that has been partially hardened, has been retempered, or is contaminated by foreign materials shall not be deposited in the

structure.
Concrete shall be placed in horizontal layers insofar as practical. Placing shall start at the low point and proceed upgrade unless otherwise permitted by the Engineer. Concrete shall be. placed in a continuous operation between construction joints and shall be terminated with square ends and level tops unless otherwise shown on the plans. Concrete shall not be permitted to fall more than 6 feet (1.829 m) without the use of pipes or tremies.

Pipes and tremies shall be at least 6 inches (152 mm) in diameter, or the equivalent cross sectional area for rectangular sections. Concrete shall not be placed in horizontal members or sections until the concrete in the supporting vertical members or sections has been consolidated and a 2-hour period has elapsed to permit shrinkage to occur.

601.7.4 Consolidating. Concrete shall be thoroughly consolidated in a manner that will encase the reinforcement and inserts, fill the forms, and produce a surface of uniform texture free of rock pockets and excessive voids. Structural concrete, except slope paving such as spillway aprons and channel lining, and concrete placed under water, shall be consolidated by means of high frequency internal vibrators of a type, size and number approved by the Engineer. The location, manner and duration of the application of the vibrators shall be such as to secure maximum consolidation of the concrete without separation of the mortar and coarse aggregate, and without causing water or cement paste to flush to the surface. Internal vibrators shall not be held against the forms or reinforcing steel.

The number of vibrators employed shall be sufficient to consolidate the concrete within 15 minutes after it has been deposited in the forms. At least two vibrators in good operating condition shall be available at the site of the structure in which more than 25 cubic yards (19.114 m3) of concrete is to be placed.

601.7.5 Joints. The work shall be so prosecuted that construction joints will occur at designated places on the plans unless otherwise authorized by the Engineer. The contractor shall construct, in one continuous concrete placing operation, all work comprised between such joints. Joints shall be kept moist until adjacent concrete is placed. Expansion and contraction joints in concrete structures shall be formed where shown on the plans. No reinforcement shall be extended through the expansion joints, except where specifically noted or detailed on the plans.

601.7.6 Placing Concrete Under Adverse Weather Conditions. Concrete for structures shall not placed on frozen ground nor shall it be mixed or placed while the atmospheric temperature is below 35 degrees F (1.67 degrees C), unless adequate means are employed to heat the aggregates and water, and satisfactory provisions have been made for protecting the work.

Concrete slabs shall not be placed on frozen ground, nor shall concrete be mixed or placed when the atmospheric temperature is below 35 degrees F (1.67 degrees C), or when conditions indicate that the temperature may fall to 35 degrees F (1.67 degrees C) within 24 hours, except with the written permission of the Engineer and only after such precautionary measures for the protection of the pavement have been taken as the Engineer may direct. Concrete shall be effectively protected from freezing or frost for a period of 5 days after placing.

Concrete for structures shall not be mixed or placed while the atmospheric temperature is above 115 degrees F (46 degrees C) unless adequate means are employed to cool the aggregate and water and satisfactory provisions have been made for protecting the work. In any case, the temperature of the concrete as placed shall not exceed 90 degrees F (32 degrees C). Concrete placement shall be stopped when rainfall is sufficient to cause damage to the work.

601.7.7 Concrete Deposited Under Water. When conditions render it impossible or inadvisable to dewater excavations before placing concrete, the contractor shall deposit under water, by means of a tremie when Permission is

granted by the Engineer. Concrete deposited in water shall be carefully placed in a compact mass and shall not be disturbed after being deposited. Water shall be maintained in a still condition at the point of deposit.

A tremie shall consist of a water-tight tube having a diameter of not less than 10 inches (254 mm) with a hopper at the top. The tube shall be equipped with a device that will close the discharge end and prevent water from entering the tube while it is being charged with concrete. The tremie shall be supported so as to permit free movement of the discharge end over the entire top surface of the work and to permit rapid lowering when necessary to retard or stop the flow of concrete. The discharge end shall be closed at the start of the work to prevent water entering the tube and shall be entirely sealed at all times, except when the concrete is being placed. The tremie tube shall be kept full of concrete. When a batch is dumped into the hopper, the flow of concrete shall be induced by slightly raising the discharge end, always keeping it in the deposited concrete. The flow shall be continuous until the work is completed and the resulting concrete seal shall be monolithic and homogeneous.

601.8 SURFACE FINISHES.

601.8.1 General. The classes of surface finish described herein shall be applied to various parts of concrete structures as specified. The invert of cast-in-place sewers and sewer structures shall be given a steel trowel finish. The invert in circular conduit is defined as the unlined portion of lined conduit or the bottom 60 degrees of circumference of the inside of unlined conduit. Unless otherwise specified, the invert of cast-in-place storm drains shall be given a wood float finish.

601.8.2 Ordinary Surface Finish. Immediately after the forms have been removed, all exterior form bolts shall be removed to a depth of at least 1 inch (25.4 mm) inside the surface of the concrete and the resulting holes or depressions cleaned and filled with mortar, except on the interior surfaces of box girders the bolts may be removed flush with the surface of the concrete. Mortar shall be Class "C" as specified in Subsection 201.5. White cement shall be added to the mortar in an amount sufficient to tint the mortar a shade lighter than the concrete to be repaired. Mortar shall be mixed approximately 45 minutes in advance of use. Care shall be exercised to obtain a good bond with the concrete. After the mortar has thoroughly hardened, the surface shall be rubbed with a Carborundum stone in order to obtain the same color in the mortar as in the surrounding concrete. All fins caused by form joints, and other projections shall be removed and all pockets cleaned and filled. Mortar for filling pockets shall be treated as specified for bolt holes.

Ordinary surface finish shall be applied to all concrete surfaces either as a final finish or preparatory to a higher class finish. On surfaces which are to be buried underground or surfaces which are completely enclosed, the removal of fins and form marks and the rubbing of a mortared surface to a uniform color will not be required. Ordinary surface finish, unless otherwise specified, shall be considered as a final finish on the following surfaces:

(1) The undersurface of slab spans, box girders, filled spandrel arch spans and floor slabs between T-girders of superstructures except for grade separation structures.

(2) The exposed surfaces of channel walls and the inside vertical surface of T-girders of superstructures except for grade separation structures.

(3) Surfaces which are to be buried underground, covered with fill, or for surfaces of culverts above finish grade which are not visible from the traveled way.

(4) Top surfaces which are to be buried underground shall be struck off and given a floatfinish.

601.8.3 Class 1 Surface Finish. Class 1 surface finish shall be applied to the following surfaces, unless otherwise specified.

(1) All surfaces of superstructures for grade separation structures.

(2) All surfaces of bridge piers, columns and abutments, culvert head walls and retaining walls above finished ground and to at least one foot below finished ground.

(3) The outside surfaces and bottom surface of outside girders, and the outside vertical surfaces and the under surfaces of cantilever sidewalks, safety curbs and floor slabs overhanging outside girders.

(4) Surfaces inside of culvert barrels having a height of 4 feet (1.22 m) or more for a distance inside the barrel at least equal to the height of the culvert.

After completion of the ordinary surface finish, the entire surface specified shall be sanded with a power sander or other approved abrasive means as required to obtain a uniform color and texture. The use of power Carborundum stones or discs will be required to remove unsightly bulges or irregularities.

The Class 1 surface finish shall not be applied until after the surfaces have been exposed to the elements for a period of 30 days, or until a uniform appearance of the surfaces can be secured. The specification for a Class 1 finish requires a smooth, even surface of uniform appearance with unsightly bulges removed and depressions due to form marks and other imperfections repaired. The degree of care in building forms and the character of materials used in form work are a contributing factor in the amount of such sanding and grinding required, and the Engineer shall determine the extent of such work required to meet the standard of this class of finish.

601.8.4 Class 2 Surface Finish. Class 2 surface finish shall be applied to the following surfaces unless otherwise specified:

A11 surfaces of concrete railings, including barrier railings, rail posts, rail end posts, and rail base. When Class 2 surface finish is specified, the ordinary surface finish and Class 1 surface finish shall be completed in succession. The process specified under Class 2 surface finish shall then be deferred until all other work which would in any way affect or mar the final finish is complete. The contractor shall then apply a brush coat or surface film of Class "A" mortar.

601.8.5 Special Surface Finish. Special surface finish will be allowed as a contractor's alternate in lieu of Class 1 and Class 2 surface finishes. When the special surface finish is used, it shall be used throughout the project in lieu of Class 1 and Class 2 surface finishes. The use of the special surface finish shall not relieve the contractor of full responsibility for performing the ordinary surface finish as required immediately following the removal of the forms.

The application of the special surface finish shall be in strict accordance with the manufacturer's instructions, and shall not be started until all other work which might damage or mar the surface finish is complete nor until finishing operations can be carried out continuously from beginning to completion on any structure. The mixture to beused shall be approved by the Engineer prior to use and the contractor shall submit manufacturer's data and a list of projects where the product has been used. The material from only one manufacturer shall be used on one structure.

601.9 CURING. As soon after the completion of the specified finishing operations as the condition of the concrete will permit without danger of consequent damage thereto, all exposed surface shall either be sprinkled with water, covered with plastic sheet, or covered with burlap, or when not required to be painted, sprayed with Type 1 curing compound conforming with Subsection 201.4.

When an impervious membrane (curing compound) is used, it shall be applied under pressure through a spray nozzle in such manner and quantity as to entirely cover and seal all exposed surfaces of the concrete with a uniform film. The membrane shall not be applied to any surface until all of the finishing operations have been completed; such surfaces being kept damp until the membrane is applied. All surfaces on which a bond is required, such as construction joints, sheer planes, reinforcing steel, and the like, of the curing compound in order to prevent any of the compound from being deposited thereon; and any such surface with which the compound may have come in contact shall immediately thereafter be cleaned.

Care shall be exercised to prevent any damage to the membrane seal during the curing period. Should the seal be damaged before the expiration of 10 days after the placing of the concrete, additional impervious membrane shall be immediately applied over the damaged area.

Should any forms be removed sooner than 10 days after the placing of the concrete, the surface so exposed shall either be immediately sprayed with a coating of the curing compound, or kept continuously wet by the use of burlap or other suitable means until such concrete has cured for at least 10 days. When tops of walls are cured by the curing compound method, the side forms, except for metal forms, must be kept continuously wet for the 10 days following the placing of the concrete.

601.10 PAYMENT. Payment for concrete structures will be made in conformity with the terms of the contract and will be based on unit prices of lump sums as set forth in the Proposal. When payment is provided for on a lump sum basis, such payment shall include full compensation for furnishing all labor, materials, reinforcing steel, tools and equipment and doing all work required to construct the structure in conformity with the plans and specifications.

Where concrete is scheduled for payment on the basis of cubic yards, the calculation of the quantity of concrete for payment will be made only to the neat lines of the structures as shown on the plans and on the basis of the concrete having the specified dimensions. Unit prices shall include furnishing all labor, materials, reinforcing steel, tools and equipment.

ITEM NO.	PAY ITEM	PAY UNIT
601(1)	Class A Concrete	Cubic Yard
601(2)	Class D Concrete	Cubic Yard
601(3)	Class R Concrete	Cubic Yard
601(4)	Class S Concrete	Cubic Yard
601(5)	Single Curb Inlets	Each
601(6)	Double Curb Inlets	Each
601(7)	Triple Curb Inlets	Each
601(8)	Grate Inlets (Types)	Each
601(9)	Cast-in-place Manholes	Each
601(10)	Junction Boxes	Each
601(11)	Headwalls	Cubic Yard
601(12)	Concrete Foundations (mast arm, street light)	Each

END OF SECTION 601

SECTION 602

PNEUMATIC PLACED CONCRETE

602.1 GENERAL. Air placed concrete construction shall be in accordance with this subsection and the applicable provisions of Section 601. Only personnel skilled in the techniques of air placement of concrete shall be utilized for air placed concrete construction. Unless otherwise specified, air placed concrete shall be applied by one of the following methods:

602.1.1 Method A (Gunite). A proportional combination of portland cement and aggregate pneumatically transported in a dry state through a pipe or hose to a nozzle where water is added immediately prior to discharge.

602.1.2 Method B (Shotcrete). A proportioned combination of portland cement, aggregate, and water mixed by mechanical methods, pumped in a plastic state through a pipe or hose to the nozzle where, by the addition of air, the mixture is forcibly propelled to the work.

602.2 EQUIPMENT. For Method A, the minimum air pressure shall be 45 psi (310.3kPa) on the gun tank when 100 feet (30.5 m) or less of hose is used and the pressure shall be increased 5 psi (34.5kPa) for each additional 50 feet (15.2 m) of hose. The pressure shall also be increased 5 psi (34.5kPa) for each 25 feet (7.6 m) that the nozzle is located above the elevation of the gun tank. The maximum nozzle diameter shall be 1-5/8 inches (41.3 mm) unless otherwise permitted by the Engineer. Water pressure at the nozzle shall be at least 15 psit (103.4kPa) above the air pressure at the nozzle.

For Method B, the pump system utilized to convey premixed concrete shall deliver a uniform and uninterrupted flow of material, without segregation or loss of the ingredients. The main run from the pump to the work shall be at least 3-inch (76 mm) diameter steel pipe or flexible hose reduced to 2-inch (51 mm) diameter at the point of expulsion. Aluminum pipe will not be permitted. The air compressor shall have the capacity to deliver at least 100 cubic feet per minute (.047m^3/s) for each operating nozzle.

602.3 MATERIALS. PROPORTIONING AND MIXING

602.3.1 Method A. Aggregates and portland cement shall comply with Subsections 200.1.3 and 200.1.2 respectively. Unless otherwise specified, the proportions by volume shall be 1 part cement to 4-1/2 parts sand. The sand shall contain not less than 3 percent nor more than 6 percent moisture by weight. The cement and sand shall be mixed thoroughly in a power mixer for at least 1-1/2 minutes. The dry-mixed material shall be used promptly after mixing and any material that has been mixed for more than 45 minutes shall be rejected and removed from the work site.

602.3.2 Method B. The concrete class shall comply with Subsection 201.1.1.2.

602.4 TESTS. The contractor shall make the work accessible to facilitate the preparation of test specimens. The strength of pneumatic placed concrete shall be determined from cores cut from the completed work, cores cut from test panels, compression test cylinders or a combination of these methods as directed by the Engineer.

The minimum strength of test specimens shall be:

7 day (cylinders)	2000 psi (13.79 MPa)
14 day (cores)	2300 psi (15.86 MPa)
28 day	3250 psi (22.41 MPa)

When a test specimen shows deficient strength, two cores taken from adjacent areas at the contractor's expense may be required for each deficient specimen. Should either core prove deficient, the work shall be subject to rejection.

602.5 PREPARATION OF SURFACES. Earth subgrade for pneumatic placed concrete shall be neatly trimmed to line and grade and free of all loose material. The subgrade shall be compacted as required by the plans.

Masonry, rock, asphalt and concrete surfaces to be covered by pneumatic placed concrete shall be free of loose material. Dust, dirt, grease, organic material or other deleterious substances shall be removed and the surface washed with water.

602.6 PLACEMENT. All surfaces shall be dampened before application and material shall not be applied to a surface on which free water exists. The velocity of the material as it leaves the nozzle shall be maintained uniformly at a rate satisfactory for the job conditions. Material that rebounds and does not fall clear of the work, or which collects on the surfaces, shall be removed. Rebound shall not be used in any portion of the work.

The nozzle shall be held at such distance and position that the stream of flowing material will impinge approximately at right angles to the surface being covered. Any portion of the in-place material which sags, is soft, contains sand pockets, or shows other evidence of being defective, shall be removed and replaced with new material. Reinforcement damaged or destroyed by such repairs shall be replaced by properly lapped additional steel.

Mortar blocks, metal chairs, clips, or spacers with wire ties, or other acceptable means shall be used to secure the reinforcement firmly in the position shown on the plans. Where material is placed on overhead surfaces, the amount of water in the mix shall be controlled to permit placement of layers of material approximately 3/4 inch (19 mm) thick without sag or slough.

602.7 FORMS AND GROUND WIRES. The forms shall be built in accordance with the applicable provisions of Subsection 601.3. All forms shall be constructed so as to permit the escape of air and rebound. Ground wires shall be installed in such a manner that they accurately outline the finished surface as indicated on the plans. They shall be located at intervals sufficient to insure proper thickness throughout. Wires shall be stretched tight and shall not be removed prior to application of the finish coat. Headers will be required where the plans indicate a formed edge or joint.

602.8 JOINTS. Construction joints shall be sloped off at an angle of approximately 45 degrees to the surface to which air placed material is being applied. Before applying air placed material in the adjacent sections, the sloped portion shall be thoroughly cleaned and wetted by means of air and water blast. Control joints shall be formed at the locations designated on the plans.

602.9 FINISH. Upon reaching the thickness and shape outlined by forms and ground wires, the surface shall be rodded off to true line and grade. Low spots or depressions shall be brought up to proper grade by placing additional air placed material. Ground wires shall then be broom finished to secure a uniform surface texture. Rodding and

working with a wood float will be held to a minimum. Rebound or accumulated loose sand shall be removed and disposed of by the contractor. When a nozzle finish is specified on the plans, the surface upon which the finish is to be applied shall be at the proper grade and prepared by sand and water blasting to remove all laitance prior to application of the concrete.

602.10 CURING. Air placed concrete shall be cured as prescribed in Subsection 601.9. The contractor shall, at all times, protect the finished work from being scarred or damaged.

602.11 MEASUREMENT AND PAYMENT. Quantities of pneumatic placed concrete will be computed from measurements of actual areas in the plane of the work and the dimensions shown on the plans. No compensation will be allowed for material placed in excess of the dimensions shown on the plans. The bid item price for pneumatic placed concrete shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals involved in the performance of the work. Such work shall include preparing the foundation, setting all form work and grounds, furnishing surfaces, curing, and structure backfill as shown on the plans.

Item No	Pay Item	Pay Unit
602 (1)	Pneumatic placed concrete	Cubic Yard

END OF SECTION 602

SECTION 603

PRECAST CONCRETE

603.1 DESCRIPTION. This specification covers the manufacture of precast reinforced concrete catch basins, drop inlets and manhole units. The finished units shall conform to the dimensions shown on the Drawings.

603.2 MATERIALS. The materials shall conform to the following Subsections: Portland cement concrete Subsection 201.1, reinforcing steel Subsection 201.2, manhole steps, frames, grates and covers Subsection 207.5.3, mortar Subsection 201.5, gaskets Subsection 201.3.1.

603.3 MANUFACTURE.

603.3.1 Testing and Inspection. Acceptability of the units will be determined by the results of compression tests on concrete cylinders and by inspection during manufacture, when required by the Project Specifications or the Engineer, to determine their conformance with the design and workmanship prescribed in these specifications and on the plans. The units shall attain a strength of 4,000 psi prior to shipping. Compressive strength tests shall be in accordance with AASHTO T22.

The units shall be considered ready for acceptance regardless of age when they conform to the strength requirements, as indicated by the specified tests. The manufacturer shall furnish all facilities and assistance required to carry on the sampling and testing in an expeditious and satisfactory manner.

603.3.2 Reinforcement. Reinforcement shall be as shown on the plans, with the following permissible variations in position:

Except at pipe connections, variations in the position of the reinforcement shall not exceed 1/4 inch (6.35 mm) from the position shown in the design. The cover on the reinforcement shall not be less than that shown on the plans.

603.3.3 Casting. When multiple castings are to be made using the same forms, form material shall be metal. The concrete in each sectional unit shall be placed without interruption, and shall be consolidated by the use of an approved vibrator, supplemented by such hand-tamping as may be necessary to force the concrete into the corners of the forms and prevent the formation of stone pockets or cleavage planes.

603.3.3.1 Openings for Pipes. Each opening shall be 4 (10.2 cm) ± ½ 12.7 mm) inch larger than the outside diameter of the pipe for which it is provided.

603.3.3.2 Steps and Ladders. When steps are required, the steps that are cast or mortared into the walls shall be aligned in each section so as to form a continuous ladder with rungs equally spaced vertically in the assembled unit.

603.3.4 Curing: The units shall be cured by steam curing or water curing methods as given herein for a sufficient length of time so that the concrete will develop the specified compressive strength.

(1) Steam Curing: The units may be steam cured as specified in Subsection 604.2.

(2) Water Curing: The units may be cured by being kept wet for not less than 72 hours under normal summer temperature conditions. In colder weather the water curing period shall be extended, as directed by the engineer, to provide equivalent curing. The units shall be protected from freezing from the time the concrete is placed and until curing is completed.

603.3.5 Removal of Forms. The forms shall remain in place until they can be removed without damage to the unit.

603.3.6 Workmanship. The unit shall be true to shape and their surfaces shall be smooth, dense and uniform in appearance. When approved by the engineer, 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 mortar as soon as the forms are removed. Such minor defects shall not constitute cause for rejection.

603.3.7 Rejection. Units shall be subject to rejection because of failure to meet any of the requirements specified above; and in addition, any of the following defects shall be cause for rejection.

(1) Defects that indicate imperfect mixing and molding.

(2) Defects indicating honeycombed or open texture.

(3) Exposure of the reinforcement when such exposure would indicate that the reinforcement is misplaced.

603.3.8 Marking. The name or trademark of the manufacturer and date of casting shall be stenciled on the unit in such a manner as to be clearly legible at time of delivery.

603.4 CONSTRUCTION REQUIREMENTS. Concrete construction shall conform to Section 601. Joints shall be full mortar joints and shall not be more than ½ inch (12.7 mm) wide. When specified, the outside faces of structures shall be plastered with ½ inch (12.7 mm) thick cement-sand mortar coat. Unless otherwise provided, exposed surfaces of concrete and masonry shall be cured by approved methods for a period of not less than 48 hours.

Precast concrete units shall be cast with the specified number and size of pipe openings to incorporate the unit into the drainage system; however, if additional pipe is required during construction for which no holes have been provided any damaged units are replaced or satisfactorily repaired. Precast units shall be set to within ± ½ (12.7 mm) inch of established grade on bedding material as shown on the plans or approved by the engineer. Joints for sectional precast units shall be sealed with flexible plastic gasket material so installed as to form a watertight seal.

Metal frames shall be set in full mortar bed. Conduit sections shall be flush on the inside of the structure wall and project outside sufficiently for proper connection with the next pipe section.

603.5 METHOD OF MEASUREMENT. Junction boxes, manholes, inlets and catch basins, both new and adjusted, will be measured by the unit. Excavation required for installation of these units will be considered incidental to the work and will not be measured for separate payment. Design quantities will be adjusted if the engineer makes changes to adjust to field conditions, if plan errors are proven, or if design changes are made. The design volumes are based on the plan depths of the structure and vertical planes 18 inches (46 cm) outside of and parallel to the neat lines of the structure as shown on the plans.

603.6 BASIS OF PAYMENT. The accepted quantities of new and adjusted junction boxes, manholes, inlets, and catch basins will be paid for at the contract unit price per each complete in place.

Item No	Pay Item	Pay Unit
603 (1)	Junction boxes	Each
603 (2)	Precast Manholes	Each
603 (3)	Inlets	Each
603 (4)	Catch Basins	Each

END OF SECTION 603

SECTION 605

CONCRETE CURBS, WALKS, GUTTERS, DRIVEWAYS

605.1 GENERAL. Concrete curbs, gutters, walks, combination curb and gutter, and driveways shall be constructed in accordance with these specifications and in reasonably close conformity with the lines, grades, dimensions indicated on the Drawings or established by the Engineer. Subgrade preparations shall conform to the requirements of Section 401.

605.2 MATERIALS

605.2.1 Portland Cement Concrete. Shall conform to Subsection 201.1, Class A. Concrete for integral curbs shall be either Class A or the same type concrete used in the roadway pavement.

605.2.2 Joint Materials: Shall conform to Subsection 201.3.

605.3 FORMS

605.3.1 Standard Forms. The forms for the curbing or gutter shall be of wood or metal, straight, free from warp and of sufficient strength when staked to resist the pressure of the concrete without springing. All forms shall be cleaned thoroughly and greased or soaped before concrete is placed against them. Forms which have become worn, bent or broken shall not be used until satisfactorily repaired and straightened. Repaired forms shall not be used until inspected and approved by the Engineer. An approved mechanical curb forming machine may be used without forms.

605.3.2 Slip Forms: At the option of the contractor and with the approval of the Engineer, slip form equipment may be used for the construction of concrete curb, gutter and walks. Slip form equipment shall be provided with traveling side and top forms of suitable dimensions, shapes, and strength to support the concrete for a sufficient length of time during placement to produce curb and gutter of the required cross section. The equipment shall spread, consolidate and screen the freshly placed concrete in such a manner as to provide a dense and homogeneous product. The slip form equipment shall have automatic sensor controls which operate from an offset control line. The line and grade of the slip form equipment shall be automatically controlled.

605.4 PLACING CONCRETE. Concrete shall be placed on a subgrade sufficiently dampened to ensure that no moisture will be absorbed from the fresh concrete. Concrete shall be placed in curb, gutter, and curb and gutter forms in horizontal layers not exceeding 6 inches (152 mm) in thickness, each layer being spaded along the forms and thoroughly tamped. Concrete may be placed in layers of more than 6 inches (152 mm) in thickness only when authorized by the Engineer and the spading and tamping is sufficient to consolidate the concrete for its entire depth.

After the concrete for walk has been placed, a strike-off shall be used to bring the surface to the proper elevation when compacted. It shall be spaded along the form faces and tamped to assure a dense and compact mass, and to force the larger aggregate down while bringing to the surface not less than 3/8 inch (9 mm) of free mortar for finishing purposes. After the concrete has been placed and tamped, the upper surface shall be struck off to the specified grade.

605.5 JOINTS.

605.5.1 Expansion Joints. Expansion joints shall be constructed in curbs, walk and gutter as shown on the plans or as specified herein. Such joints shall be filled with pre-molded joint filler. No such joints shall be constructed in driveways except as may be approved by the Engineer. One-half inch (13 mm) joints shall be constructed in curb and gutter at the end of all returns. Expansion joint filler 1/4 inch (6 mm) thick shall be placed in walk at round all utility poles which may project into the concrete along the line of the work, and in walk returns between the work and the back of curb returns when required by the Engineer.

Expansion joints shall be provided in curb gutters, walks directly opposite expansion joints of abutting concrete pavement. Where curbs, gutters and walks do not abut concrete pavement, expansion joints, ½ inch (12 mm) in width shall be provided at intervals not exceeding 40 ft.(9.7 m). Joint filler strips between walk and curb shall be the depth of the walk with the top set flush with the specified grade of the top of curb.

All expansion joint filler strips shall be installed vertically, and shall extend to the full depth and width of the work in which they are installed, and be constructed perpendicular to straight curb or radically to the lines of the curb constructed on a curve. Expansion joint filler materials shall completely fill these joints to within 1/4 inch (6 mm) of any surface of the concrete. Excess filler material shall be trimmed off to the specified dimension in a neat and workmanlike manner. During the placing of the concrete, the filler strip shall be held rigidly and securely in proper position.

605.5.3 Weakened-Plane Joints. In walks, joints shall be transverse to the line of work and at regular intervals not exceeding the width of the walk. At curves and walk returns, the joints shall be radial. Longitudinal joints shall be placed at mid-point of walks 8 ft. (2.4 m) or more in width. In gutter, including gutter integral with curb, joints shall be at regular intervals not exceeding 10 feet (6.10 m). Where integral curb and gutter is adjacent to concrete pavement, the joints shall be aligned with the pavement joints where practical. Control joints shall be accomplished with a jointer tool having a depth of 1/4 inch (13 mm) and a radius of approximately 1/8 inch (3mm).

605.6 FINISHING. The forms shall be removed within 24 hours after the concrete has been placed, and honeycombed areas and other minor defects shall be filled with mortar composed of portland cement and sand, mixed in the same proportion as provided for the concrete. Plastering will not be permitted on the faces of the curbing or gutter, and all rejected curb, walks or gutter shall be removed and replaced without additional compensation. The top and face of the concrete shall be finished while the concrete is still green by use of wood float, brush and water.

605.7 CURING. After finishing, the concrete shall be cured in accordance with Subsection 601.9.

605.8 DRIVEWAY ENTRANCES. Driveway entrances shall be provided in new curb at all existing driveways along the line of the work, at locations shown on the plans, and at such other locations as may be designated by the Engineer.

605.9 BACKFILLING AND CLEANUP. Backfilling to the finished surface of the newly constructed improvement must be completed before acceptance of the work. Upon completion of the work the surface of the concrete shall be thoroughly cleaned and the site left in a neat and orderly condition.

605.10 MEASUREMENT AND PAYMENT. The quantities of curbs and/or gutters, walks, driveways for payment will be the design lengths as indicated on the drawings. Design quantities will be adjusted if the Engineer makes changes to adjust to field conditions, if plan errors are proven, or if design changes are made. Unless otherwise

specified, all necessary excavation, backfill, joint materials, reinforcement will be considered incidental to the work and will not be measured for separate payment. When combination curb and gutter is specified, all gutters required in conjunction with catch basins will be included in the design quantities for combination curb and gutter

Handicap Curb Ramps will be measured for payment per each installation complete in place as shown on Standard Plans 605-6 through 605-12, regardless of type. Payment includes concrete ramp and flared sides with surface finish and truncated dome detectable warning mats as shown on the Drawings. Compacted granular fill, removal of curb and gutter and installation of depressed curb and gutter, if required, will be measured for separate payment.

ITEM NO.	PAY ITEM	PAY UNIT
605.1	Concrete Curb (Barrier) (Mountable)	Linear Foot
605.2	Concrete Gutter	Linear Foot
605.3	Combination Curb and Gutter (24" wide, 10" thick)	Linear Foot
605.4	Sidewalks (thickness)	Square Yard
605.5	Driveways (thickness)	Square Yard
S-005	Handicap Curb Ramp (All Types)	Each

END OF SECTION 605

SECTION 606

CONCRETE REINFORCEMENT

606.1 DESCRIPTION. The extent of concrete reinforcement is shown on the drawings and in schedules. The work includes fabrication and placement of reinforcement for cast-in-place concrete, including bars, welded wire fabric, ties and supports.

606.2 CODES AND STANDARDS. Comply with requirements of the following codes and standards, except as herein modified:

American Welding Society, AWS D12.1 "Recommended Practices for Welding Reinforcing Steel, Metal Inserts and Connections in Reinforced Concrete Construction."

Concrete Reinforcing Steel Institute, "Manual of Standard Practice."

American Concrete Institute, ACI 318 "Building Code Requirements for Reinforced Concrete."

606.3 SUBMITTALS

606.3.1 Mill Certificates: Submit steel producer's certificates of mill analysis, tensile and bend tests for reinforcing steel to Engineer.

606.3.2 Shop Drawings: Submit shop drawings for fabrication, bending, and placement of concrete reinforcement. Comply with the ACI 315 "Manual of Standard Practice for Detailing Reinforced Concrete Structures." Show bar schedules, stirrup spacing, diagrams of bent bars, arrangements and assemblies, as required for the fabrication and placement of concrete reinforcement.

606.4 DELIVERY, HANDLING AND STORAGE. Deliver reinforcement to the project site bundled, tagged and marked. Use metal tags indicating bar size, lengths, and other information corresponding to markings shown on placement diagrams. Store concrete reinforcement materials at the site to prevent damage and accumulation of dirt or excessive rust.

606.5 MATERIALS. All material shall conform to Subsection 201.2.

606.6 FABRICATION. Fabricate reinforcing bars to conform to required shapes and dimensions, with fabrication tolerances complying with CRSI "Manual of Standard Practice." In case of fabricating errors, do not rebend or straighten reinforcement in a manner that will injure or weaken the material. Unacceptable Materials: Reinforcement with any of the following defects will not be permitted in the work:

- Bar lengths, depths and bends exceeding CRSI fabrication tolerances.
- Bends or kinks not indicated on drawings or final shop drawings.
- Bars with reduced cross-section due to excessive rusting or other cause.

606.7 INSTALLATION. Comply with the specified codes and standards, and Concrete Reinforcing Steel Institute recommended practice for "Placing Reinforcing Bars," for details and methods of reinforcement placement and supports, and as herein specified. Clean reinforcement to remove loose rust and mill scale, earth, ice, and other materials which reduce or destroy bond with concrete. Accurately position, support, and secure reinforcement against displacement by form work, construction, or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers and hangers, as required.

Place reinforcement to obtain the minimum coverages for concrete protection. Arrange, space, and securely tie bars and bar supports together with 16 gage wire to hold reinforcement accurately in position during concrete placement operations. Set wire ties so that twisted ends are directed away from exposed concretesurfaces.

Install welded wire fabric in as long lengths as practical. Lap adjoining pieces at least one full mesh and lace splices with 16 gage wire. Do not make end laps midway between supporting beams, or directly over beams of continuous structures. Offset end laps in adjacent widths to prevent continuous laps.

Provide sufficient numbers of supports and of strength to carry reinforcement. Do not place reinforcement bars more than 2" (5.1 cm) beyond the last leg of any continuous bar support. Do not use supports as bases for runways for concrete conveying equipment and similar construction loads.

606.8 SPLICING. All reinforcement shall be furnished in the full lengths indicated on the plans. Splicing of bars, except where shown on the plans, will not be permitted without written approval. Splices shall be staggered as far as possible. Unless shown on the plans, bars shall be lapped 30 bar diameters for Grade 40, or 45 diameters for Grade 60. Construction joints shall not be made within the limits of the lapped bars.

In lapped splices, the bars shall be placed in contact and wired together in such a manner as to maintain a clearance of not less than the minimum clear distance to other bars and the minimum distance to the surface of the concrete as specified in Subsection 606.7. Welding of reinforcement steel shall be done only if detailed on the plans or if authorized by the engineer in writing.

606.8.1 Welding: Comply with the requirements of AWS D12.1 for field welding. Prior to field welding, determine the weldability of reinforcing bars by a laboratory chemical analysis of steel. Only steel conforming to the chemical requirements specified in AWS D12.1 may be welded.

606.8.2 Mechanical Butt Splicing. As an alternate to welding, splices may be made by an approved mechanical butt splicing method using a ferrous filler metal with an enclosing steel sleeve or mold. The splice shall develop at least the ultimate stress of reinforcing bars in tension.

Splicing shall be done using a standard, approved exothermic process whereby molten filler metal, contained by a high strength steel sleeve or mold of larger inside diameter than the bars, is introduced into the annular space between bars and sleeve or mold and also between ends of bars.

Upon cooling and hardening of filler metal, the splice shall be capable of transferring the stresses specified from one bar to the other by the mechanical strengths of splice components. The splice shall not depend upon fusion of filler metal with bars nor shall bars be heated to their melting point during the splicing process. Degrees of heat required to effect the splices shall not decrease the structural properties of the bars nor significantly affect the original hardness of bars.

Splices shall be made using manufacturer's standard jigs, clamps, ignition devices and other required accessories. The process shall be approved by the engineer. Except as otherwise specified, splicing shall be done in accordance with the manufacturer's recommendations.

606.9 MEASUREMENT AND PAYMENT

606.9.1 General: Unless unit prices are indicated in the project proposal for reinforcing steel, all costs in connection with concrete reinforcing steel shall be included in the Bid price for the particular item under which the concrete construction is performed.

606.9.2 Unit Price Method: The quantities of reinforcement for payment will be the design weights as specified on the plans and adjustments thereto. Design quantities will be adjusted if the engineer makes changes to adjust to field conditions, if plan errors are proven or if design changes are necessary.

Design quantities are based on theoretical weights of nominal size plain round bars as follows:

BAR NO.	WEIGHT LBS./LIN. FT.	WEIGHT KG/M
3	0.376	.560
4	0.668	.994
5	1.043	1.552
6	1.502	2.235
7	2.044	3.042
8	2.670	3.973
9	3.400	5.059
10	4.303	6.403
11	5.313	7.906
14	7.650	11.384
18	13.600	20.238

The following will be considered incidental to the work and will not be included in the pay quantities:

(a) Reinforcement furnished for testing purposes.

(b) Additional reinforcement used for laps in splices other than those shown on the plans.

(c) Additional weight of reinforcement used at the contractor's request as substitutions for reinforcement shown in the plans.

(d) Spacers, clips, chairs, and other material used in fastening reinforcement in place.

The accepted quantities of reinforcing steel will not be measured or paid directly, but will be considered subsidiary to the project.

END OF SECTION 606

END OF PART 6

PART 12

MISCELLANEOUS CONSTRUCTION

SECTION 1201

LANDSCAPING AND SEEDING

1201 REMOVAL OF EXISTING SOD. Where construction requires the permanent removal of sod on residential lots, the contractor is required to leave the removed sod with the homeowner if the homeowner so desires.

1201.1 DESCRIPTION. This work consists of performing required preparatory work, furnishing and installation of lawn and plant materials in accordance with the drawings, these specifications. Refer to Section 203 for soil and grass materials. Provide trees, plants, ground covers, and accessories, as shown and specified. The work includes:

1. Soil preparation
2. Trees, plants, and ground covers
3. Planting mixes
4. Mulch and planting accessories
5. Existing tree care
6. Tree relocation
7. Maintenance

1201.1.2 Quality Assurance.

A. Plant names indicated comply with "Standardize Plant Names" as adopted by the latest edition of the American Joint Committee of Horticultural Nomenclature. Names of varieties not listed conform generally with names accepted by the nursery trade. Provide stock true to botanical name and legibly tagged. No substitutions will be allowed unless approved in writing by the Engineer.

B. Comply with sizing and grading standards of the latest edition of "American Standard for Nursery Stock." A plant shall be dimensioned as it stands in its natural position.

C. All plants shall be nursery grown under climatic conditions similar to those in the locality of the project for a minimum of one year.

D. Stock furnished shall be at least the minimum size indicated. Larger stock is acceptable, at no additional cost, and providing that the larger plants will not be cut back to size indicated. Where a minimum and maximum size (size range) is specified, the average of the lot will approximate the midpoint of the specified size range and 50% of the lot will be within the middle 1/3 of the specified range. Where a caliper and height range are given the minimum of each range shall be the minimum acceptable.

Where called for, provided "specimen" plants with a special height, shape, or character of growth. Tag specimen trees or shrubs at the source of supply. The Engineer will inspect specimen selections at the local sources of supply

for suitability and adaptability to selected location. When specimen plants cannot be purchased locally, provide sufficient photographs of the proposed specimen plants for approval.

E. Plants may be inspected and approved at the place of growth for compliance with specifications requirements for quality, size, and variety. Such approval shall not impair the right of inspection and rejection upon delivery at the site or during the progress of the work.

1201.1.3 Submittals.

A. Submit the following material samples:
   1. Mulch
   2. Decomposed Pine Bark Soil Conditioner

B. Submit the following materials certification:
   1. Topsoil source and Ph value
   2. Plant fertilizer
   3. Pre-emergent herbicide

C. Upon plant material acceptance, submit written maintenance instructions recommending procedures for maintenance of plant materials.

1201.1.4 Deliver, Storage, and Handling.

A. Deliver fertilizer and herbicide materials in original, unopened, and undamaged containers showing weight, analysis, and name of manufacturer. Store in manner to prevent wetting and deterioration.

B. Take all precautions customary in good trade practice in preparing plants for moving. Workmanship that fails to meet the highest standards will be rejected. This should include spraying deciduous plants in foliage with an approved "Anti-Desiccant" immediately after digging when necessary to prevent dehydration. Dig, pack, transport, and handle plants with care to protect against injury. Inspection certificates required by law shall accompany each shipment invoice or order to stock and on arrival, the certificate shall be filed with the Engineer. Protect all plants from drying out. If plants cannot be planted immediately upon delivery, properly protect them with soil, wet bark mulch, or in a manner acceptable to the Engineer. Water heeled-in plantings daily. No plant shall be bound with rope or wire in a manner that could damage or break the branches.

C. Cover plants transported on open vehicles with a protective covering to prevent wind burn.

D. Provide dry, loose topsoil for planting bed mixes. Frozen or muddy topsoil is not acceptable.

1201.1.5 Project Conditions.

A. Notify Engineer at least 5 working days prior to installation of plant material.

B. Protect existing utilities, paving, and other facilities from damage caused by planting operations.

C. A list of plants, including a schedule of sizes, quantities, and other requirements is shown on the drawings. In the event that quantity discrepancies or material omissions occur in the plant materials list, the planting plans shall govern.

D. If an irrigation system will be installed prior to planting, locate, protect, and maintain the irrigation system during planting operations. Repair irrigation system components, damaged during planting operations, at contractor's

expense.

1201.1.6 Warranty.

A. Warrant plant material to remain alive and be in healthy, vigorous condition for a period of one year after completion and acceptance of the plant installation or for the warranty period required in the general conditions, whichever is longer.

B. During the warranty period, replace, in accordance with the drawings and specifications, all plants that are dead or, as determined by the Engineer, are in an unhealthy or unsightly condition, and have lost their natural shape due to dead branches, or other causes not due to the owner's negligence. The cost of such replacement(s) is at Contractor's expense. Warrant all replacement plants for one year after installation.

C. Warranty shall not include damage or loss of trees, plants, or ground covers caused by fires, floods, freezing rains, lightning storms, or winds over 75 miles per hour, winter kill caused by extreme cold and severe winter conditions not typical of planting area, acts of vandalism or negligence on the part of the Owner.

D. Remove and replace all plants within 7 calendar days, as determined by the Engineer, to be unsatisfactory during the initial planting installation.

1201.1.7 Materials.

A. Plants: Provide plants typical of their species or variety with normal, densely-developed branches and vigorous, fibrous root systems. Provide only sound, healthy, vigorous plants free from defects, disfiguring knots, sun scald injuries, frost cracks, abrasions of the bark, plant diseases, weeds, insect eggs, borers, and all forms of infestation. All plants shall have a fully developed form without voids and open spaces. Plants held in storage will be rejected if they show signs of growth during storage. Deciduous shade trees shall be straight and symmetrical with a crown having a persistent main leader unless otherwise specified. The size of the crown shall be in good overall proportion to the total height of the tree. Evergreen trees shall be of form typical of the species and not unnaturally sheared or color treated.

1. Dig balled and burlapped plants with firm, natural balls of earth of sufficient diameter and depth to encompass the fibrous and feeding root system necessary for full recovery of the plant. Provide ball sizes complying with the latest edition of the "American Standard for Nursery Stock". Cracked or mushroomed balls are not acceptable.
2. Container-grown stock: Grown in a container for sufficient length of time for the root system to have developed to hold its soil together, firm and whole.
    a. No plants shall be loose in the container.
    b. Container stock shall not be root nor pot bound.
3. Unless otherwise called for, provide tree species with a single main trunk. Trees that have the main trunk forming a "Y" shape are not acceptable.
4. Plants of one variety planted in rows shall be matched in form.

5. Plants larger than those specified in the plant list may be used when acceptable to the Engineer. If the use of larger plants is acceptable, increase the spread of roots or root ball in proportion to the size of the plant.
6. The height of the trees, measured from the crown of the roots to the top of the top branch, shall not be less than the minimum size designated in the plant list.
7. No pruning wounds shall be present with a diameter of more than one inch, and such wounds must show vigorous bark on all edges.
8. Evergreen trees shall be branched to the ground.
9. Shrubs and small plants shall meet the requirements for spread and height indicated in the plantlist.
    a. The measurements for height shall be taken from the ground level to the average height of the top of the plant and not the longest branch.
    b. Single stemmed or thin plants will not be accepted.
    c. Side branches shall be generous, well-twigged, and the plant as a whole well-bushed to the ground.
    d. Plants shall be in a moist, vigorous condition, free from dead wood, bruises, or other root or branch injuries.

1201.1.8 Accessories.

A. Topsoil for Planting Bed: Fertile, friable, natural topsoil of loamy character, containing not less than 1-1/2 percent organic matter, without admixture of subsoil material, obtained from a well-drained arable site, reasonably free from clay, lumps, coarse sands, stones, plants, roots, sticks, and other foreign materials, with acidity range of between Ph 6.5 and 7.0.

1. Identify source location of topsoil proposed for use on the project.
2. Provide topsoil free of substances harmful to the plants which will be grown in thesoil.

Public Roads Administration Classification shall be A-4 or A-6 silt loam. Extractable quantities of phosphorous, potassium, and magnesium shall be 100 parts per million each (minimum). Minimum extractable quantity of calcium shall be 1000 parts per million. Method of testing shall be as performed by State Cooperative Extension Service.

B. Soil Conditioner: One of the following:

1. Decomposed pine bark: Consisting of pure bark sawmill fines mixed with approximately 10% sand. Sawmill fines shall be 1/2 inch maximum size and shall have been compost a minimum of 2years.
2. Peat Moss: Commercial Quality Michigan or Canadian. Brown to black in color, weed and seed free granulated raw peat or baled peat, containing not more than 9% mineral content on a drybasis.

C. Fertilizer:

1. Plant Fertilizer Type "A": Commercial type approved by the Project manager, containing 12% nitrogen, 12% phosphoric acid, and 12% potash by weight; 1/4 of nitrogen in the form of nitrates, 1/4 in form of ammonia salt, and 1/2 in form of organic nitrogen. Apply to planting beds at a rate of one pound per fifty square feet.D.Herbicide: "Eptam", "Treflan" or "Surflan" or other pre-emergent herbicide approved for use with the plants specified.

D. Anti-Desiccant: Protective film emulsion providing a protective film over plant surfaces, permeable to permit transpiration. Mixed and applied in accordance with manufacturer's instructions.

E. Mulch: Premium grade shredded pine bark 3/4" to 2" diameter. Dry and free of pitch and excessive fines. Furnish in 3 cubic feet bags or bulk.

F. Water: Free of substances harmful to plant growth. Hoses or other methods of transportation furnished by Contractor.

G. Stakes for guying and staking: Wolmanized pine, 2" x 2" x length shown in drawings.

H. Guying/Staking Wire: No. 14 gage galvanized wire.

1. Turnbuckles: Galvanized steel of size and gage required to provide tensile strength equal to that of the wire. Turnbuckle openings shall be at least 3".

I. Staking and Guying Hose: Two-ply, reinforced garden hose not less than 1/2" inside diameter.

J. Jute Mat: Shall be "Ludlow Soil Saver" heavy jute mat as manufactured by Ludlow Corporation, 145 Rosemary Street, Needham Heights, MA 02194, or approved equal.

K. Metal edging: Steel or Aluminum Alloy, Painted (green) 3/16" thick x 4" depth with interlocking joints and pins, minimum 15" length, 30" on center.

L. Railroad Tie Bed Edgers: Used ties weathered so that excess creosote has leeched out and will not injure plants. 8' long of solid pine with no rot or deterioration and free of old metal spikes, plates, nails, or other hardware.

1201.1.9 Inspection.

A. Examine proposed planting areas and conditions of installation. Do not start planting work until unsatisfactory conditions are corrected.

1201.1.10 Preparation.

A. Planting shall be performed only by experienced workmen familiar with planting procedures under the supervision of a qualified supervisor. All plant stock shall be handled with reasonable care to prevent injuries to trunk, branches, roots, and leaves.

B. Locate plants as indicated or as approved in the field after staking by the Contractor. If obstructions are encountered that are not shown on the drawings, do not proceed with planting operations until alternateplant locations have been selected and approved by the Engineer.

C. Excavate circular plant pits with vertical sides, except for plants specifically indicated to be planted in beds. Provide shrub and tree pits at least twice the diameter of the root system. Depth of pit shall accommodate the root system plus 6". Scarify and compact the soil in the bottom of the pit.

D. After the planting pit has been dug, distribute over the soil from the pit: Soil Conditioner (1/4 by volume of soil from the planting pit) and topsoil (1/4 by volume of soil from the plant pit). Mix these thoroughly and evenly with the soil from the pit to form the planting mixture.

E. Remove all living vegetation from areas designated as planting beds and spade all bed areas to a depth of 12 ". Add 2" topsoil, 2" of soil conditioner, and fertilizer. Till bed areas to incorporate the mixture to a depth of 8 inches. Incorporate pre-emergent herbicide as recommended by the manufacturer.

1201.1.11 Installation.

A. Set plant material in the planting pit to proper grade and alignment. Set plants upright, plumb, and faced to give the best appearance or relationship to each other or adjacent structure. Unless otherwise directed by the Engineer, set plant so that when planted and settled it will bear the same relation to finished grade that it did to the soil surface in the original place of growth. No filling will be permitted around trunks or stems. Backfill the pit with planting mixture, firmly tamping to fill all voids. Do not use frozen or muddy mixtures for backfilling. Form a 3" high ring of soil around the edge of each planting pit to retain water.

B. Space ground cover plants in accordance with indicated dimensions. Adjust spacing as necessary to evenly fill planting bed with indicated quantity of plants. Plant to within 12" of the trunks of trees and shrubs within planting bed and to within 6" of edge of bed. Set plants in neat, straight rows, parallel to the nearest paving edge or header at intervals shown in the drawings.

C. Metal Edging: Anchor edging with minimum 3 pins/section.

D. Railroad Tie Edging: Cut to proper length and angle and install in the locations shown in the drawing. Supply rebars and spike into place as shown in the drawing.

E. Mulching: Mulch tree and shrub planting pits and shrub and ground cover beds with required mulching materials 2" deep immediately after planting. Thoroughly water mulched areas. After watering, rake mulch to provide a uniform finished surface.

F. Guying and Staking:

1. Stake/guy all trees immediately after lawn seeding or sodding operations and prior to acceptance. When high winds or other conditions which may affect tree survival or appearance occur, the landscape may require immediate staking/guying.
2. Stake trees under 3" caliper as shown in the drawings.
3. Guy deciduous trees over 3" caliper as shown in the drawing.
4. All work shall be acceptable to the Engineer.

G. Pruning:

1. Prune branches of deciduous stock, after planting, to balance the loss of roots and preserve the natural character appropriate to the particular plant requirements. In general, remove 1/4 to 1/3 of the leaf bearing buds; proportion shall in all cases be acceptable to the project manager. Remove or cut back broken, damaged, and unsymmetrical growth of new wood. Make cuts flush with trunk or intersecting

branch.

2. Multiple leader plants: Preserve the leaders which will best promote the symmetry of the plant. Cut branches flush with the trunk or main branch, at a point beyond a lateral shoot or bud a distance or not less than 1/2 the diameter of the supporting branch. Make cut on an angle.
3. Prune evergreens only to remove broken or damaged branches.

H. Care of Existing Trees:

1. Selectively prune existing trees in designated areas, under Engineer's direction. Remove sucker shoots, dead, rubbing and damaged branching.

I. Tree Relocation and Mechanical Transplanting:

1. Prune, dig, ball and burlap, and move designated trees for relocation to the designated plant storage area for heeling-in of materials until final planting areas area prepared.
    a. Maintain plants in storage areas by bracing plants in vertical position and setting balls in an enclosed berm of topsoil or bark. Water as required to maintain adequate root moisture.
    b. Re-burlap plant's balls if required before final transplanting operations.
    c. Move to final locations shown on the drawings and plant in accordance with specified tree planting requirements.
2. Where indicated on the plans, plants shall be mechanically dug and transplanted.
    a. Equipment: All mechanically dug plants shall dug, transported, and re-set using a self-contained hydraulic tree spade complete with four spade blades, levelers, and watering tank.
    b. The diameter of the tree spade shall be at least ten (10") inches for each one (1") of caliper of the plant to be transplanted, unless approved in writing by the Engineer.
    c. The receiving hole shall be prepared by firmly setting four (4) slow release fertilizer tablets (Agri-form or equal) into the sides of the hole, equidistant around the perimeter and 1' -2' below the existing grade.
    d. The top of the transplanted root ball shall be within two inches (2") of the surrounding grade. Contractor shall backfill, water and seal the crack between the rootball and the hole, adding sandy soil as required to fill all voids.
    e. Form a 3" high ring of soil around the edge of each transplanted plant to retain water.
    f. Mulch, prune, and maintain plants as specified elsewhere. Guying and staking shall be required unless high winds or other conditions which may effect tree survival or appearance occur.

1201.1.12 <u>Maintenance.</u>

A. Maintain planting until completion and acceptance of the entire project.

B. Maintenance shall include pruning, cultivating, weeding, watering, and application of appropriate insecticides and fungicides necessary to maintain plants free of insects and disease.

1. Re-set settled plants to proper grade and position. Restore planting saucer and adjacent material and remove dead material.
2. Tighten and repair guy wires and stakes as required.
3. Correct defective work as soon as possible after deficiencies become apparent and weather and season

permit.

4. Water trees, plants, and ground cover beds within the first 24 hours of initial planting. Irrigate all plants regularly in order to supplement natural rainfall to a total of 2" per week until final acceptance. Irrigation by hose or any other method shall not be applied with a force that will displace mulch or cause soil erosion and shall not be applied so quickly that it cannot be absorbed by the mulch andplants.
5. Replace mulch as needed.
6. In plant beds, grass and weeds shall not be allowed to reach a height of 3 inches before being completely removed, including the root growth. When plants are in groups other than cultivated beds, the Contractor shall not permit grass or other vegetation between them to become more than 5 inches in height.

1201.1.13 Acceptance.

A. Planted areas will be inspected at completion of the project; unless agreed to otherwise with the Engineer and accepted subject to compliance with specified materials and installation requirements.

B. Upon acceptance, the owner will assume plant maintenance.

1201.1.14 Cleaning.

A. Perform cleaning during installation of the work and upon completion of the work. Remove from site all excess materials, soil, debris, and equipment. Repair damage resulting from planting operations.

1201.2 TOPSOIL PREPARATION AND CONDITIONING.

1201.2.1 General. The thickness of topsoil shall be as shown on the plans or 4-inches; whichever is greater. Planting areas shall be free of weeds and other extraneous materials to a depth of 6 inches below finish grade before topsoil work. Soil shall not be worked when it is so wet or so dry as to cause excessive compaction or the forming of hard clods or dust.

1201.2.2 Fertilizing and Conditioning Procedures. The planting area shall be brought to finish grade before spreading the fertilizers or conditioning materials specified. After spreading, the fertilizing and conditioning materials shall be uniformly cultivated into the upper 6 inches (152 mm) of soil by suitable equipment operated in at least two directions approximately at right angles. The resulting soil shall be in a friable condition.

1201.2.3 Agricultural Lime. When specified in project specifications, agricultural lime shall be spread uniformly over the area to be limed at the rate of 2 tons per acre (1.8 metric ton/.404 h) with a spreader. The lime must be applied prior to seeding and may be applied in conjunction with the fertilizer. Several passes may be required to obtain the desired application rate. Soon after application, the entire area shall be disked, harrowed, or rototilled to incorporate the lime or lime-fertilizer into the top 3 to 6 inches (76 to 152 mm) of thesoil.

1201.3 FINISH GRADING. The finish grade shall be smooth, uniform, and free of abrupt grade changes and depressions to insure surface drainage. The finished grade below adjacent paving, curbs or headers shall be 1 inch (25 mm) in lawn areas and 2 inches (51 mm) in shrub or ground cover areas.

After fertilizing and conditioning, the soil shall be watered and allowed to settle to provide a stable surface, not overly

densified to the extent that it will present aeration and water infiltration. After the soil has dried out to a workable condition, the planting areas shall be regraded, raked, and smoothed to the required grades and contours. Finish surfaces shall be clean and suitable for planting.

1201.4 PLANTING.

1201.4.1 General. The types, sizes and quantities of plant materials shall be as called for in the contract documents. All plants will be inspected prior to placing, including plants previously approved at the nursery. The contractor shall be responsible for the condition of all plants, planted or otherwise, until acceptance. Planting shall be performed with materials, equipment, and procedures favorable to the optimum growth of the plants and in compliance with these procedures.

1201.4.2 Protection and Storage. The contractor shall keep all plant material delivered to the site in a healthy condition for planting. Plants shall not be allowed to dry out. Bare root stock shall be separated and "heeled in" in moist earth or other suitable material. Balled and burlapped plants shall have the root ball covered with moist sawdust, wood chips, or other approved materials.

1201.4.3 Layout and Plant Location. Planting areas will be indicated on the drawings. Detailed layout within the planting areas shall be performed by the contractor and approved by the Engineer prior to planting. The first row of plants in areas designated for center to center spacing of plants shall be located at one-half of designated spacing from the edge of the area.

1201.4.4 Tree and Shrub Planting. Planting holes shall be approximately square with vertical sides twice the depth and width of the plant container or ball, and shall be larger if necessary to permit handling and planting without injury or breakage of the root ball or root system. Any plant with a broken or cracked root ball before or during planting shall not be planted.

Containers shall be opened and removed in such a manner that the plant root is not injured. Balled plant wrappings shall be loosened or cut back after plant is positioned in the planting hole. The native soil at the bottom of planting holes shall be scarified to a depth of 6 inches (152 mm).

After planting, the plant shall be plumb, with the root crown at its natural growing depth with respect to finish grade. Planting shall be governed by the following requirements:

1. A layer of prepared soil mix shall be deposited in the planting hole.
2. The plant shall be set approximately at the center of the hole.
3. Prepared soil mix shall be deposited in the remainder of the hole to finish grade.
4. The backfill shall be thoroughly water-settled and additional prepared soil mix added to fill any remaining void below finish grade.
5. A circular watering basin slightly larger than the planting hole, 4 inches (102 mm) high for trees and 2 inches (51 mm) high for shrubs, shall be left around the plant. The bottom of the basin shall be at approximate finish grade or slightly lower. Type 1, 2, 3, or 4 mulch shall be spread at least 2 inches (51 mm) thick in the basin.
6. The plant shall be guyed and staked.
7. The area around plants shall be regraded to finish grade. Excess soil shall be disposed of by the contractor.

1201.4.5 Ground Cover and Vine Planting. Soil preparation and fine grading shall be completed prior to ground cover planting. Ground cover and vines shall be planted in moist soil and spaced as indicated on the plans. Each plant shall be planted with its proportionate amount of flat soil to minimize foot disturbance. Soil moisture shall be such that the soil does not crumble when removing plants.

Following planting, ground cover and vine areas shall be regraded to restore smooth finish grade and to insure proper surface drainage. A 1-inch (25 mm) layer of specified mulch shall be spread over the planted areas. Watering shall begin immediately following mulching.

When necessary to prevent plant damage from pedestrian traffic during the initial growing stage, the contractor shall erect temporary protective fencing to be removed at the end of the plant establishmentperiod.

Vines shall be tied to walls, fences, etc. in the manner prescribed on the plans. Temporary staking shall be removed at the end of the plant establishment period.

1201.5 LAWN PLANTING.

1201.5.1 General. Before planting lawn, all specified soil preparation and fine grading shall be completed.

1201.5.2 Seed Lawn Planting. Seed lawn planting may be accomplished by Method A (dry method) or Method B (hydraulic method). Seeding shall not be performed when the wind velocity exceeds 5 miles per hours (8km-hr) or is detrimental to the uniform distribution of the seed.

A. **Method A Seed Lawn Planting.** The area to be seeded shall be lightly raked to provide a seed bed. The required seed mixture shall be sown uniformly at the specified rate. Seeding shall be done on two operations with the spreader set to sow one-half the specified amount in each operation. The second sowing shall be at right angles to the first. After sowing, the area shall be evenly covered with an approvedmulch.

   The lawn area shall be watered in a manner so as not to cause surface erosion. Newly seeded surfaces shall be kept moist continuously throughout the germination period.

B. **Method B Seed Lawn Planting.** The seed, fertilizer, fiber and other materials in the slurry mixture shall be as specified. All materials shall be of such character that they will disperse into a uniform slurry when mixed with water. The mixture shall be such that an absorbent porous mat will be formed. All materials must be available for inspection prior to application. Weights and contents of containers shall be clearly identified. A green coloring additive shall be used in the slurry for visual inspection purposes.

   The slurry shall be applied under pressure at the specified rates. Areas to be planted by this method shall be moistened to a depth of 6 inches (152 mm) but shall not be surface wet at the time of application. The slurry planted areas shall be kept moist during the germination period, but puddling shall be avoided.

1201.5.3 Sod Lawn Planting. The type and thickness of sod and the areas to be sodded shall be in accordance with the contract documents.

Subgrade for sod shall be the specified thickness of the sod below finish grades. Soil conditioning and fine grading shall be completed before sodding. No heavy equipment shall operate over the subgrade after grading iscompleted.

The subgrade shall be moist but not wet when sod is laid. Sod shall be laid with closely fitted joints, and the ends of the strips shall be staggered. Openings shall be plugged with sod or topsoil.

Within two hours after installing sod and before rolling, the sod shall be lightly irrigated. All seams and joints shall then be rolled until the sod is well bonded to the subgrade. The area shall then be watered thoroughly to penetrate the subsoil at least 8 inches. Watering shall be repeated as necessary to keep the sod moist until rooted into the subgrade. Sodded areas shall be protected against foot traffic until the sod is well established.

1201. 6 MAINTENANCE AND PLANT ESTABLISHMENT. The contractor shall maintain all planted areas on continuous basis as they are completed during the progress of the work and during the establishment period, and shall continue to maintain them until final acceptance.

All planted areas shall be kept free of debris and shall be weeded and cultivated at intervals not to exceed 10 days. The first mowing of lawn areas shall be performed when the grass is 2½ inches (64 mm) high and shall be repeated as often as is necessary to maintain the lawn at a height of 2 inches (51 mm). In no case shall the lawn be cut lower than 1½ inches (38 mm) in height. Any required pruning of plants will be designated by the Engineer at the start of the plant establishment period, and the contractor shall perform the pruning as part of the plant establishment work.

The contractor shall request a final inspection to begin the plant establishment period after all planting and related work has been completed in accordance with the contract documents.

1201.7 METHOD OF MEASUREMENT.

a. Topsoil furnished, placed and accepted will be measured by the square yard in place.
b. Vegetative Mulch will be measured by the ton, complete in place and accepted. The weight for measurement will be the product of the number of bales used and the average weight per bale as determined on certified scales provided by the contractor.
c. Emulsified Asphalt placed and accepted will be measured by the gallon.
d. Fertilizer furnished, applied and accepted will be measured by the pound.
e. Agricultural Lime furnished, placed and accepted will be measured by the ton.
f. Plants. Furnishing and planting of the various types and sizes of plant materials will be measured per each, complete in place and accepted.
g. Lawn Planting. Method A (dry) will be measured by the pound of seed used complete in place and accepted.
h. Lawn Planting. Method B (hydraulic) will be measured by the square yard complete in place and accepted.
i. Sod Lawn. The quantities of sodding for payment will be the design areas as indicated on the drawings. Sod Lawn will be measured by the square yard complete in place and accepted.

1201.8 BASIS OF PAYMENT. The accepted quantities of landscaping items will be paid for at the contract unit price as follows:

Item No.	Pay Item	Pay Unit
1201(1)	Top Soil	Square Yard
1201(2)	Vegetative Mulch	Ton
1201(3)	Fertilizer	Pound
1201(4)	Lime	Pound
1201(5)	Plants (Type, Size)	Each
1201(6)	Lawn Planting Seed (A)	Pound
1201(7)	Lawn Planting Seed (B)	Square Yard
1201(8)	Sod Lawn	Square Yard
1201(9)	Asphalt Material	Gallon

Payment of unit price items includes all labor, materials, equipment, tools, supplies, incidentals required to complete the work as specified in this Section and the Contract documents.

END OF SECTION 1201

SECTION 1202

MOBILIZATION

1202.1 DESCRIPTION. This work consists of preparatory work and operations, including those necessary for movement of personnel, equipment, supplies and incidentals to the project site; the establishment of offices, buildings and other facilities necessary for work on the project; the cost of bonds and any required insurance; and other preconstruction expenses necessary for start of the work, excluding the cost of construction materials.

1202.2 BASIS OF PAYMENT.

a. When the contract does not include a pay item for mobilization, no direct payment will be made for mobilization.

b. When the contract contains a pay item for mobilization, payment will be made at the contract lump sum price, subject to the following provisions:

Partial payments for mobilization will be made in accordance with the following schedule up to a maximum of 10 percent of the original total contract amount, including this item, and payment of any remaining amount will be made upon completion of all work under the contract.

PERCENT OF TOTAL CONTRACT AMOUNT EARNED	ALLOWABLE PERCENT OF THE LUMP SUM PRICE FOR THE ITEM
1st Partial Estimate	25
10	50
25	75
50	100

Completion of the following work is required for payment of the first 25 percent of the lump sum price. No partial payment of Mobilization will be made until the first 25 percent is earned.

1. Providing an acceptable Baseline Schedule as specified in Section 4310 Construction Scheduling
2. Providing acceptable preconstruction photographs and video recordings as specified in Section 4322 Photographic Documentation
3. Providing all Contractor Signs in place as specified in Section 4580 Project Identification Signs
4. Providing all Maintenance of Traffic Plans as specified in Sections 103 Scope of Work and 4300 Submittals

Payment will be made under:

Item No.	Description	Unit
1202(1)	Mobilization	Lump Sum

END OF SECTION 1202

SECTION 1306

TEMPORARY SIGNS, BARRICADES, BARRIERS AND PAVEMENT MARKINGS

1306.01 DESCRIPTION. This work consists of furnishing, installing, maintaining, and removing temporary construction barricades, precast concrete barriers, lights, signals, pavement markings and signs; providing flaggers; and complying with all other requirements regarding the protection of the work, workers and safety of the public. Signs, barricades, barriers, channelizing devices, pavement markings, etc., shall comply with plan details, the MUTCD and these specifications.

Signs, barricades, barriers, channelizing devices, pavement markings and arrangements thereof, as shown on the plans, are minimum requirements. Appropriate signs for special conditions shall be furnished and installed as directed. Requirements for proper signs, barricades, barriers, channelizing devices, or other safety precautions promulgated by the contractor's insurers are not negated by these specifications. These specifications shall not be construed to relieve the contractor of responsibilities for the safety of the public, for liability in connection therewith, or compliance with State and local laws or ordinances.

1306.02 MATERIALS. Materials for temporary signs, barricades, barriers and related devices shall comply with the following Subsections:

(a) Temporary Pavement Markings: Temporary pavement markings shall be a minimum of 4 inches (100 mm) wide.

(b) Reflective Sheeting: Reflective sheeting requirements for temporary signs, barricades, channelizing devices, drums and cones shall comply with the following:

(1) Temporary Signs and Barricades: On the mainline of interstate highways, reflective sheeting for the first four temporary advanced warning signs shall comply with the requirements of DOTD Type VII (Fluorescent Orange). Reflective sheeting for all other temporary signs and barricades on the National Highway System (NHS) shall comply with the requirements of ASTM D 4956, Type III. On all other highways not part of the NHS, reflective sheeting for all temporary signs and barricades shall comply with the requirements of ASTM D 4956, Type III.

(2) Vertical Panels: Reflective sheeting for vertical panels used to channelize or divide traffic shall meet the requirements of ASTM D 4956, Type III.

(3) Drums: 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 Subsection 1015.05 of the LA DOTD Specifications.

(4) Cone Collars: Reflective sheeting for traffic cone collars shall meet the requirements of ASTM D 4956, Type VI.

1306.03 FABRICATION. Fabrication of temporary signs, barricades and related devices shall conform to Subsection 729.04 of the LA DOTD Specifications. Fabrication of precast concrete barriers shall conform to Section 805 of the LA DOTD Specifications.

1306.04 TEMPORARY SIGNS AND BARRICADES.

(a) General: Signs, barricades and related devices will be required when the contractor's work is in progress on portions of the work covered by the Notice to Proceed, or when operations are suspended but the

traveled portion of the road is not in a safe condition for the traveling public. During such times that barricades are not in place, appropriate regulatory signs shall be erected and maintained by the contractor. If a partial Notice to Proceed is issued, the contractor shall immediately begin erection of signs and barricades over the affected portions of the project to the extent necessary to comply with the requirements herein. When the full Notice to Proceed is issued, barricades shall be erected at the beginning and end of the project. Signing throughout the remainder of the project shall becompleted.

Construction work shall not begin until signs, barricades and other traffic control devices have been erected and approved. When signs to be furnished and erected by the contractor are in place and approved, the Department's forces will remove or cover any standard signs that are in conflict with temporary signs. When placing signs, the contractor shall cooperate with the engineer as well as the Department's forces responsible for removing Departmental signs, so that appropriate signs are in place at alltimes.

Signing shall remain in place and be maintained by the contractor, supplemented by additional signs as required, throughout the life of the contract. When previously used signs are to be erected on a project, the engineer will inspect and approve these signs before erection. The engineer will require any sign with reduced reflectivity or excessive color fading to be removed from the work zone. In case of a dispute over a rejected used sign, the Department at its discretion, may take such measurements or review reflectivity and color data obtained by the contractor to determine if the sign meets minimum standards for new materials. Signs that do not meet the minimum standards for new materials shall be replaced by the contractor at no direct pay.

Rejected signs will be marked "NOT FOR USE ON STATE PROJECTS", and the date and stamp will be obliterated. Signs placed by the contractor shall not be removed until the contract is completed and the Department's forces have erected permanent highway signs along the project. It will be the responsibility of the Department to see that all permanent highway signs are in place upon completion and acceptance of the project.

On projects where the surface course is constructed with asphaltic concrete or portland cement concrete, permanent striping and raised pavement markers (when required) shall be completed prior to removal of barricades. Signs, barricades and related devices furnished and placed by the contractor shall, upon removal, remain the contractor's property.

(b) Advance Warning Area: When specified, advance warning arrow panels for temporary traffic control shall be provided at locations shown on the plans or as directed. Panels shall be one of the specified types complying with the Department's MUTCD. If no type is specified, Type C panels shall be furnished.

(c) Construction Zone: In areas of the construction zone where construction or maintenance work has degraded the condition of the original highway, where work is in progress in the immediate vicinity of the travel-way, or where workers are in close proximity to traffic, a reduced speed limit of 10 mph less than the pre-existing speed limit will be used. Speed limits should be further reduced if the engineer determines that geometrics or work conditions warrant a reduction. Pre-existing speed limits of 35 mph or less generally do not warrant further reduction.

When SPEED ZONE AHEAD signs are required in the plans, supplemental signs with the legend HIGHER / TRAFFIC / FINES IN / WORK / ZONES signs shall also be required. These signs shall be black legend on white background and shall be 36 inches (900 mm) wide by 48 inches (1200 mm) tall for interstate applications and 24 inches (600 mm) wide by 30 inches (750 mm) tall for non-interstate applications. The signs shall be included in the Temporary Signs and Barricades pay item at no additionalcost.

1306.05 TEMPORARY PRECAST CONCRETE BARRIERS. Barrier units will be furnished by the contractor unless specified otherwise. Each barrier unit shall be 15-feet (4.6 m) in length. When the barrier units are furnished by the City the units will be furnished at no cost to the contractor. The contractor shall load the barrier units at the

location specified, deliver the units to the construction site and place them as required.

The contractor shall relocate barrier units as required during construction at no direct pay. Connecting pins and plastic reflectors shall be furnished by the contractor at no additional cost to the City. Reflectors shall have 7.0 square inches (4500 sq mm) minimum reflective area and be installed a maximum of 15 feet (4.6 m) apart (each side) in accordance with the manufacturer's recommendations. Damaged pins or reflectors shall be replaced as directed by the engineer.

After completion of the work, barrier units shall become the property of the City and shall be removed and transported by the contractor to the location specified and unloaded as directed. All costs of loading, transporting and unloading the barrier units shall be included in the price bid on this item. Barrier units damaged shall be satisfactorily repaired or replaced at no direct pay.

1306.06 PAVEMENT MARKINGS. Color, width and type of temporary pavement markings shall be in accordance with Table 1306-1 and the MUTCD. Temporary pavement markings shall be in place at the end of each day's operation. Temporary striping tape shall be applied by approved methods to the satisfaction of the engineer. Thermoplastic Pavement Markings shall be applied in accordance with Subsection 1303. Painted Traffic Striping shall be applied in accordance with Section 1304.

Table 1306-1
Temporary Pavement Markings [1]

		Two-lane Highways	Undivided Multilane Highways	Divided Multilane Highways
SHORT TERM	ADT<1500; or ADT>1500 and time<3 days	Lane lines 4-foot (1.2 m) tape on 40-foot (12 m) centers; with "Do Not Pass" and "Pass With Care" signs as required	N/A	N/A
	ADT>1500; Time>3 days and<2 weeks	Lane lines 4-foot (1.2 m) tape on 40-foot (12 m) centers with no passing zone markings	N/A	N/A
LONG	All ADT's with time <2 weeks	N/A	Lane lines 4-foot (1.2 m) tape on 40-foot (12 m) centers; double yellow centerline	Lane lines 4-foot (1.2 m) tape on 40-foot (12 m) centers

T E R M	All ADT's with time >2 weeks	Standard lane lines, no-passing zone markings, legends and symbols and when pavement width is 22 feet (6.7 m) or greater, edge lines	Standard lane lines, centerlines, edge lines, and legends and symbols	Standard lane lines, centerlines, edge lines, and legends and symbols.

[1] No passing zones shall be delineated as indicated whenever a project is open to traffic.

(a) Short-term Pavement Markings: Short-term pavement markings will be required on any pavement surface under traffic. Center lines on two-lane highways and lane lines on multilane highways shall be temporary striping tape a minimum of 4 feet (1.2 m) long on a maximum of 40-foot (12 m) centers. When short-term pavement markings require no-passing zone markings or double yellow center lines on undivided multilane highways, they shall be any of the temporary pavement markings listed in Subsection 1306.02. Removal of short-term pavement markings will only be required on the final surface.

(b) Long-term Pavement Markings: Long-term pavement markings will be required on any surface which is not covered by an additional surface in 2 weeks or less. Long-term pavement markings shall include, but are not limited to, standard lane and centerline markings (i.e., 10-foot (3 m) stripes on a maximum of 40-foot (12 m) centers), edge lines, no passing zone markings on 2-lane highways, stop bars, and legend and symbol markings as shown on the permanent pavement marking details. Layout work for exact location of markings will only be required on the final surface. These markings shall consist of any of the pavement markings listed in Subsection 1306.02. Long-term markings do not include the installation of raised pavement markings.

(c) Final Surface: On the final surface (portland cement concrete pavement or asphaltic concrete pavement), temporary markings shall be placed with sufficient accuracy to avoid conflict with permanent striping where possible. Temporary pavement markings on the final surface shall be any of the pavement markings listed in Subsection 1306.02.

Placing permanent markings over traffic paint will be acceptable on final surfaces provided the temporary markings have been placed in the final configuration (proper final layout) and the painted lines are not flaking or showing signs of deterioration.

The removal of temporary pavement markings, if required, shall be in accordance with the requirements for the type of permanent marking being used. There shall be no objectionable staining of pavement surface as a result of the removal procedure.

(d) Temporary Reflectorized Raised Pavement Markings: When required, temporary reflectorized raised pavement markings shall be installed in accordance with Section 1305.

1306.07 MEASUREMENT.

(a) Temporary Signs and Barricades: When the contract does not include a pay item for "Temporary Signs and Barricades," the providing of temporary construction signs, barricades and related devices will not be measured for payment. When a pay item for "Temporary Signs and Barricades" is included in the contract, the furnishing, erecting, maintaining and subsequent removing of temporary construction signs, barricades and related devices will be measured on a lump sum basis.

(b) Temporary Pavement Markings: When the contract does not include an item for "Temporary Pavement Markings," the providing of these markings will not be measured for payment. When the contract includes an item for "Temporary Pavement Markings", these markings acceptably furnished, placed, maintained and subsequently removed will be measured on a lump sum basis, or by the linear foot (lin m), or by the mile (km) as specified. When measurement is made by the linear foot (lin m) of striping, gaps will not be measured.

When measurement is made by the mile (km) of single strip per roadway per application, no deduction will be made for the standard design gaps in broken line striping; however, deductions will be made for the length of other gaps or omitted sections.

Temporary pavement legends and symbols will be measured per each legend or symbol. Temporary reflectorized raised pavement markers will be measured by counting the number of markers furnished,

placed and accepted. Removal of raised pavement markers will be at no direct pay.

Advance warning arrow panels will not be measured for separate payment but will be included in the contract lump sum price for Temporary Signs and Barricades.

(c) Temporary Precast Concrete Barriers: Temporary precast concrete barriers will be measured per each unit.

1306.08 **PAYMENT.** Payment for temporary construction signs, barricades and related devices will be atthe contract lump sum price in accordance with the payment schedule of Table 1306-2.

Table 1306-2

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	40
75	80
100	100

Payment for temporary pavement markings will be made at the respective contract unit prices. Payment for temporary precast concrete barriers will be made at the contract unit price per each. 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 DOTD Table 901-3 and Note 3 therein. Size, sampling, and testing of each concrete lot shall be in accordance with the Materials Sampling Manual. Payment will be made under:

Item No	**Pay Item**	**Pay Unit**
1306.1	Temporary Signs and Barricades	Lump Sum

END OF SECTION 1306

PART 40

GENERAL REQUIREMENTS

SECTION 4010

SUMMARY OF WORK

PART 1 GENERAL

1.01 LOCATION OF WORK

A. The work of this Contract is located along Annette Street, Spring Lake Drive, Steere Drive, Logan Street, and Samford Avenue, as shown in the Drawings.

1.02 SCOPE OF WORK

A. Furnish all labor, materials, equipment, appurtenances, supplies and incidentals required to replace select concrete panels along the roadways including, but not limited to, excavation, fill placement, crushed stone placement, compaction, formwork, tie-ins to existing concrete panels, concrete panel placement, concrete curb replacements, handicap accessible ramp replacements or new construction, sidewalk replacements, concrete joint construction, and related work as shown on the Drawings and as specified herein. Furnish and install all materials, equipment, appurtenances, supplies, and incidentals required to remove and replace an asphaltic concrete roadway on Samford Avenue with new reinforced concrete pavement, crushed stone base, geogrid, cement-stabilized subgrade, and all related work.

1.03 SUGGESTED WORK SEQUENCE

A. Perform Work in suggested sequence listed below to minimize disruption to residents. Completion dates of the various stages shall be in accordance with the approved construction schedule submitted by the Contractor.

1. Set up traffic control devices as required in compliance with the Manual of Uniform Traffic Control Devices (MUTCD).

2. Notify all residents and businesses along the street no less than forty-eight (48) hours prior to beginning work. The Contractor is responsible for providing and placing notices (door hangers) on all affected citizen's front doors and the front doors of businesses. Notification to residents and businesses shall be made from block corner to block corner.

3. Unless prior approval is obtained from the City Engineer, all streets are to remain open while work under this contract is in progress. It is anticipated the work will be completed in one-half of the street before beginning excavation and reconstruction on the opposite one-half.

4. If written approval is provided by the City Engineer permitting a street to be temporarily closed, the Contractor shall notify the Shreveport Police Department, Shreveport Fire Department, Caddo Parish School Board Transportation Department, Shreveport Solid Waste, and SporTran a minimum of two (2) working days prior to closing.

5. Remove concrete curb and paving, handicap ramps, and sidewalks as shown on the Plans. Construct handicap accessible ramps and sidewalks.

6. Coordinate with the City's Resident Project Representative (RPR) to verify the in situ base under the proposed panel is adequate. Testing to be paid for by the City of Shreveport.

7. Remove and replace insitu material with either select fill or geogrid and crushed stone, as determined by the RPR and / or the Project Engineer.

8. Place material and compact as per the Plans. Verify compaction with test. Test to be paid for by the City of Shreveport.

9. Construct concrete panel replacement.

10. Repeat steps 5 through 9 for the remaining streets.

1.04 CONTRACTOR'S USE OF PREMISES

A. Contractor will not have complete and exclusive use of the premises for the performance of the Work. Contractor shall coordinate the use of servitudes and right-of-way with the City as applicable. Refer to Section 108 Contractor's Responsibilities for additional requirements related to use of the premises.

B. Contractor shall limit the use of the premises for its Work and for storage to allow for:

1. Work by other contractors.

2. City occupancy

3. Public access to residences.

C. Contractor shall assume full responsibility for security of all its subcontractors' materials and equipment stored on the site.

D. Obtain and pay for use of additional storage or work areas if needed to perform the Work.

1.05 CITY-FURNISHED WATER

A. Water for Contractor's use is available only from water supply stations identified by the City. Obtaining water from fire hydrants is prohibited. Payment of a $150 deposit to the City for each connection is required. Access and connection to the water supply stations must be coordinated with the City. Connections to the water supply and use of water will not be permitted unless a City inspector is present. Contractor shall furnish all necessary hoses, valves, fittings and adapters for connection to the water supply. The Contractor shall be responsible for preventing run-offs during filling operations, and for disposal of run-offs per the appropriate codes. The City's obligation to furnish water is limited to the quantity and flow rates available from the designated source.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 4010

SECTION 4025

MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.01 SCOPE

A. This Section includes requirements for the measurement and payment of various elements of the Work which are not already specified in these Specifications.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.01 CONTRACT ITEMS

A. Not applicable

END OF SECTION 4025

SECTION 4026

PAY ESTIMATES

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. Pay Estimates will be prepared by the Contractor and submitted to the Engineer for review and acceptance. Supporting documentation and other items shall also be provided by the Contractor.

B. Unit Price Work will be measured for payment as specified in Standard Specification Section 111.

C. Stockpiled or Stored Material will be measured for payment as specified in Standard Specification Section 111. Refer to Standard Specification Section 111.7 for minimum storage period, maximum percentage of contract price, and other requirements.

D. The accepted Schedule of Values, specified in Technical Specifications Section 4370, will be used as the basis of payment for Contract Items measured by lump sum.

1.02 PREPARATION OF PAY ESTIMATES

A. Weekly quantity reports will be prepared by the Contractor each week, listing quantities of Unit Price Work and percentages of work items in the Schedule of Values completed each week. Each weekly report will be shall be signed by Engineer and Contractor, to acknowledge agreement on completed Work every week. .

B. The cutoff date for pay estimates is the last day of each month. The Contractor will prepare the Pay Estimate based on a summary of completed work items recorded on the agreed to weekly reports each month.

1.03 DOCUMENTATION ASSOCIATED WITH PARTIAL PAYMENTS

A. Prepare and furnish additional documentation to coincide with each partial payment. The value of each item of required documentation on a monthly basis, established in the approved Schedule of Values or in respective Contract Items, will be included in partial payments whenever the respective item is provided in a timely manner.

B. After receipt of the first partial payment and prior to receipt of subsequent payments, certify in writing that all subcontractors and suppliers have been paid for work and materials from previous partial payments received (less any retainage) by the Contractor.

C. On a monthly basis, furnish a completed Monthly Subcontractor Payment and Utilization Report – FSC Form 5 for first-tier and second-tier subcontractors.

D. Furnish an updated construction schedule as required in Technical Specification Section 4310.

E. Provide photographs in accordance with Technical Specification Section 4322.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 4026

SECTION 4035

CHANGE ORDER PROCEDURES

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. Promptly implement change order procedures.

1. Provide full written data required to evaluate changes.

2. Maintain detailed records of work done on a time-and-material/ force account basis.

3. Provide full documentation to Engineer on request.

4. Upload documentation of written changes in work to Unifier.

B. Designate in writing the member of Contractor's organization:

1. Who is authorized to accept changes in the Work.

2. Who is responsible for informing others in the Contractor's employ of the authorization of changes in the Work.

C. City will designate in writing the persons who are authorized to sign Field Orders, Miscellaneous Construction Authorizations, Work Change Directives, and Change Orders.

1.02 RELATED REQUIREMENTS

A. Standard Specification Section 100 Definitions and Abbreviations

B. Standard Specification Section 103 Scope of Work

C. Standard Specification Section 105 Changes in Work.

1.03 FIELD ORDER

A. Engineer may issue a Field Order for Contractor to proceed with a minor change which does not involve a change in Contract Amount or Contract Time.

B. Field Order will describe interpretations or clarifications of Contract Documents, order minor changes in the work, and/or memorialize trade-off agreements. Field Order will describe changes in the Work, both additions and deletions, with attachments as necessary to define details of the change.

1.04 CONTRACT CHANGE REQUEST

A. City may initiate changes to plans, specifications, character of work, or quantity of work by submitting a Change Proposal Request to Contractor. Request will include:

1. Detailed description of the Change, Products and location of the change in the project.

2. Supplementary or revised Drawings and Specifications.

3. The projected time span for making the change and a specific statement as to whether overtime work is, or is not, authorized.

4. A specific period of time during which the requested price will be considered valid.

5. Such request is for information only and is not an instruction to execute the changes, nor to stop work in progress.

B. Contractor may initiate changes in specified methods of construction and changes to plans and specifications which do not materially affect the Work, and which can be made at a reduction in cost or at no additional cost to the City, by submitting a written Change Proposal to the Engineer, containing:

1. Description of the proposed changes.

2. Statement of the reason for making the changes.

3. Statement of the effect on the Contract Amount and the Contract Time.

4. Documentation supporting any change in Contract Amount or Contract Time, as appropriate.

1.05 DOCUMENTATION OF PROPOSALS AND CLAIMS

A. Support each quotation for a lump-sum proposal and for each unit price which has not previously been established, with sufficient substantiating data to allow Engineer to evaluate the quotation.

B. On request, provide additional data to support time and cost computations

1. Labor required.

2. Equipment required.

3. Products required.

a. Recommended source of purchase and unit cost.

b. Quantities required.

4. Taxes, insurance and bonds.

5. Credit for work deleted from Contract, similarly documented.

6. Overhead and profit.

7. Justification for any change in Contract Time.

C. Support each claim for additional costs and for work done on a time-and-material/force account basis, with documentation as required in Standard Specification Section 105.3.2 Payment.

D. Document requests for Substitutions for Products as specified in Section 4630.

1.06 AUTHORIZATION OF CONTRACT CHANGES

A. City may authorize changes or extra work that involves changes to Contract Price or Contract Time with a Miscellaneous Construction Authorization, a Work Change Directive, or a formal Change Order.

B. City may issue a Miscellaneous Construction Authorization to authorize changes or extra work with payment from the Miscellaneous Construction Items, if indicated on the Bid Form, and changes to Contract Time. Authorization will describe changes in the Work, both additions and deletions, with attachments of revised Contract Documents to define details of the change. It will designate the amount of payment and any change in Contract Time. A Miscellaneous Construction Authorization does not change the Contract Amount or the Contract Time. Authorized changes to Contract Time will be included in a subsequent Change Order.

C. City may issue a Work Change Directive for Contractor to proceed with a change for subsequent inclusion in a Change Order, either with or without initiating a change by first submitting a Change Proposal Request. Authorization will describe changes in the Work, both additions and deletions, with attachments of revised Contract Documents to define details of the change and will designate the method of determining any change in the Contract Amount and any change in Contract Time. A Work Change Directive does not change the Contract Amount or the Contract Time. Changes to the Contract Amount and the Contract Time will be included in a subsequent Change Order.

D. A formal Change Order is the only document that can change the Contract Amount and the Contract Time. City may issue a Change Order to change the Contract Time as authorized in a Miscellaneous Construction Authorization, to change the Contract Amount and Contract Time as designated in a Work Change Directive, and to authorize extra work and changes initiated by the City.

1.07 METHODS OF COMPENSATION FOR CHANGES

A. Content of Lump Sum/Fixed Price changes will be based on

1. Engineer's Change Proposal Request and Contractor's responsive Change Proposal as mutually agreed between City and Contractor

2. Contractor's Change Proposal, as recommended by the Engineer

B. Content of Unit Price changes will be based on

1. Engineer's definition of the scope of the changes

2. Contractor's Change Proposal, as recommended by the Engineer

3. Survey of completed Work

C. Unit Prices will be those stated in the Contract or those mutually agreed upon between the City and the Contractor.

D. When the price for changes or extra work cannot be agreed upon, City will issue a Work Change Directive directing Contractor to proceed on the basis of time and materials/force account.

E. At the end of each day, submit itemized accounting and supporting data as provided in Standard Specification Section 105.3.2.2. Engineer will determine the allowable cost of such work.

1.08 ALLOWABLE COSTS FOR CHANGES

A. Allowable labor costs consist of payroll costs in the direct employ of the Contractor in the performance of the Work under schedules of job classifications agreed upon by the City and the Contractor. Such employees shall include superintendents, foremen, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs and other compensation of Contractor's officers, executives, principals, general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expediters, timekeepers, clerks, and other personnel employed by the Contractor, whether at the Site or in the Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedules of job classifications, are excluded from allowable labor costs. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. The expense

of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, may be included in the above to the extent authorized by the City.

B. Allowable material costs consist of the cost of materials furnished and incorporated into the work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to the Contractor. All trade discounts, rebates, and refunds and returns from sale of surplus materials shall accrue to the City, and the Contractor shall make provisions so that they may be obtained.

C. Allowable labor costs for Subcontractors are the same as specified for the Contractor.

D. Allowable equipment costs for owned or rented equipment shall be paid by the following conditions.

1. Allowable rates for owned equipment shall be the estimated cost reimbursement rates included within the original bid prices. If the Contractor's established original bid rates are not available, the allowable rates shall not exceed those shown in the Rental Rate Guide Book for Construction Equipment (Blue Book) Volumes 1, 2, or 3 as applicable. If Blue Book rates are used, reimbursement will not be made for owned service trucks or other support equipment and vehicles, since their costs are normally included in equipment operating costs.

2. Owned pickups, if directly used in the performance of extra work, are eligible for reimbursement at the flat rate of $50.00 per day. If used by a superintendent or used primarily for transportation of employees, their costs are included in overhead and separate reimbursements will not be made.

3. Payment for owned equipment will be made for the actual hours used in the extra work. Payment will not be made for time lost for breakdowns, repairs, or time after equipment is no longer needed for the extra work. If equipment is used intermittently while dedicated to the extra work, payment will be made for the duration that the equipment is dedicated to the extra work, but not more than 8 hours per day. While actually working during second and third shift work, payment will be made at one half the Blue Book ownership costs plus the estimated hourly operating costs. No reimbursement will be made while not actually working.

4. If ordered held available for extra work, idled owned equipment will be paid for at an hourly standby rate computed as one half of the agreed working rate per hour, excluding operating costs. Reimbursement for standby will not be paid when the equipment would normally be idle, such as Saturdays, Sundays, holidays, days when weather conditions prevent working, during breakdowns or servicing, or when the equipment has actually worked or been paid for 8 or more hours in the day or 40 or more hours in the week. No payment will be made for equipment downtime other than for time specifically ordered for extra work by the City.

5. Rental rates for rented or leased equipment shall be as paid by the Contractor. The allowable reimbursement for rented equipment shall be the agreed invoice cost. The invoice shall be marked "PAID" and initialed or signed by the Contractor. Allowable reimbursement for operating costs shall be as agreed between the City and Contractor.

1.09 ALLOWABLE MARKUP FOR CHANGES

A. The Contractor's fee for overhead and profit (markup) for changes shall be a fee based on the markup provided in Standard Specification Section 105.3.2.3.

1.10 CHANGE OF CONTRACT TIME

A. The Contract Time may only be changed by a Change Order. Changes to Contract Time identified in a Miscellaneous Construction Authorization or a Work Change Directive is evidence that City and Contractor expect that the change will be incorporated into a subsequently issued Change Order.

B. Where Contractor is prevented from completing any part of the Work within the Contract Time due to delay beyond control of the Contractor, the Contract Time will be extended in an amount equal to the time lost due to such delay.

C. If anyone for whom the City is responsible delays, disrupts, or interferes with the performance or progress of the Work, then the Contractor will be entitled to an equitable adjustment in the Contract Amount or the Contract Time or both. The Contractor's entitlement to an adjustment is conditioned on such adjustment being essential to the Contractor's ability to complete the Work within the Contract Time.

D. If the Contractor is delayed in performance or progress of the Work by fire, flood, epidemic, abnormal weather conditions, acts of God, acts or failures to act of utility owners not under control of the City, or other causes not the fault of and beyond control of City and Contractor, then the Contractor will be entitled to an equitable adjustment in Contract Time, if such adjustment is essential to the Contractor's ability to complete the Work within the Contract Time. Such an adjustment shall be the Contractor' sole and exclusive remedy for the delays described in this paragraph.

E. For the purpose of this specification, a delay extends the duration of critical path. With any request for changes to Contract Time, the Contractor shall furnish the Engineer with sufficient documented evidence of the impact of a delay to the critical path. Documentation shall include identifying work activities affected by the delay, demonstrating that the affected work activities are critical path activities, and the impact to the critical path.

F. With any request for changes to Contract Time for delays related to abnormal weather conditions, the Contractor shall furnish the Engineer with sufficient documented evidence to demonstrate the difference between normal and abnormal weather conditions for the Project location.

1.11 CORRELATION WITH CONTRACTOR'S SUBMITTALS

A. Periodically revise Schedule of Values to record each change as a separate item of work, and to record the adjusted Contract Amount.

B. Periodically revise the Construction Schedule to reflect each change in Contract Time.

1. Revise subschedules to show changes for other items of work affected by the changes.

C. Upon completion of work under a Change Order, enter pertinent changes in As-Built Drawings.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 4035

SECTION 4038

REQUESTS FOR INFORMATION

PART 1 GENERAL

1.01 DESCRIPTION OF REQUIREMENTS

A. This Section specifies the general methods and requirements of Requests for Information (RFIs).

1.02 REQUESTS FOR INFORMATION

A. When the Contractor believes that additional information or clarification of a contract requirement is needed, they may initiate an RFI.

B. The RFI process shall be limited to the clarification of technical and/or administrative matters. While the response to an RFI might lead to a change in the contract scope, cost or time, RFIs are not a substitute to the notification requirements stipulated in the Contract Documents.

C. A response to an RFI is not an authorization to perform any additional work that would require a change order or written amendment to the contract. If the Contractor believes the response an RFI requires a change to the Contract, Contractor shall promptly provide written notice to the Engineer in accordance with the General Provisions.

D. RFIs are not a substitute for the Submittals process specified elsewhere.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.01 ORIGINATION

A. The Contactor shall originate RFIs. Subcontractors and suppliers shall use the form appended to this section for submitting an RFI to the Contractor. RFIs submitted directly to the Engineer by subcontractors or suppliers will not be accepted.

1. RFIs shall be numbered consecutively. In the event the RFI requires a follow-up inquiry, a new RFI must be originated and the RFI's may be linked.

2. Enter a short description of the question as the Title. For Reference Documents, include Specification Section(s), Drawing(s), or Submittal ID for which information is requested.

3. Attach drawings, sketches, photographs or other relevant information.

4. Indicate the date by which the Contractor requests a reply.

5. Enter the question. If the question concerns an interpretation of the Contract Documents, enter the Contractor's interpretation.

6. The Contractor will select the Workflow Actions "SUBMIT" and "SEND" to transmit the RFI to the Engineer.

3.02 PROCESSING

A. All RFIs will be reviewed and answered by the Engineer.

B. The Engineer will generally respond to RFIs within seven calendar days of receipt, depending on the complexity of the inquiry.

C. The RFI Log will be maintained by the City, including the Status, Creation Date, and Due Date.

3.03 RESPONSES

A. If the RFI contains sufficient clarity, the Engineer will insert a response and "SUBMIT FOR ACKNOWLEDGEMENT". The Contractor shall "CLOSE" the RFI to indicate receipt.

B. If the RFI does not contain sufficient clarity, the Engineer may request additional information from the Contractor.

C. If the Contractor does not agree with the answer from a RFI, then the Contractor shall create a new RFI and link it to the original RFI.

END OF SECTION 4038
(RFI Form for Subcontractors and Vendors follows)

Request for Information for Subcontractors & Vendors

RFI Title:	RFI No.:
Project:	Date Response Required by:
Project No.:	Date Submitted:
Reference Documents	
Submittal ID:	Drawing No:
Specification Section:	Other:
Attachments:	
QUESTION:	
Contract Interpretation or Proposed Solution	
Cost Impact? Y/ N Estimated Cost:	Cost Impact Notes:
Schedule Impact? Y/N Est Impact (Days):	Sched Impact Notes:
Submitted By: Company:	Date:

Submit form to Contractor

SECTION 4110

STORM WATER PERMITTING PROCEDURES

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor and professional services necessary to prepare an Erosion Control Plan or Storm Water Pollution Prevention Plan (SWPPP) for use in compliance with storm water permit requirements.

1. Prepare an Erosion Control Plan for Work where less than one acre of land will be disturbed by construction activities.

2. Prepare a SWPPP for Work where one or more acres of land will be disturbed by construction activities.

3. Prepare a Notice of Intent (NOI) where 5 or more acres of land will be disturbed by construction activities, and submit the NOI to the State prior to commencing land-altering activities. Prepare and submit a Notice of Termination (NOT) to the State after Final Acceptance of the Work.

B. Determine the area of disturbance based on the overall length of the project and the construction methods utilized for the Work, regardless of sequencing. Use a minimum width of 12 feet along the length of open trench excavation for measuring disturbance. Determine additional width based on depth of excavation, dimensions of pipe and manholes, and specific methods of construction.

C. Refer to Standard Specification Section 310 for requirements to construct and maintain temporary erosion control features.

1.02 APPLICABLE REGULATIONS

A. Comply with all applicable Federal, State and local laws and regulations concerning storm water permitting.

1. City of Shreveport Code of Ordinances Article IV – Erosion and Sediment Control

2. LAC 33:IX.2511.B.15 (for ground disturbance area 1 acre to less than 5 acres)

3. LAC 33:IX.2511.B.14.j (for ground disturbance area 5 acres or more)

4. Title 40 CFR 123.5(a)(9), 122.26(a), 122.26(b)(14)(x) and 122.26(b)(15)

1.03 SUBMITTALS

A. Submit the Erosion Control Plan or SWPPP to the City before commencing land-altering activities including clearing, grading, excavating and filling.

B. Submit copies of the NOI and the NOT to the City for information.

1.04 EROSION CONTROL PLAN

A. The Permit Application and Erosion Control Plan shall satisfy requirements of Shreveport Code of Ordinances Section 34-123.

B. The Permit Application and Erosion Control Plan shall include the following items.

1. Grading and drainage plan showing

a. Date, scale, north arrow, and property lines

b. Location, type of use, and total percentage of existing and proposed improvements

c. Existing and proposed topographic features

d. Locations of all temporary and permanent runoff detention basins, along with any constructed and/or altered drainage systems

2. Erosion Control Plan showing

a. Description of temporary and permanent structural controls

b. Temporary and final stabilization

3. Schedule providing for site inspections at least every 2 weeks and after each rain event of ½ inch or more

4. List of measures to minimize offsite tracking of sediment on vehicles

5. Sequence of scheduled activities

6. The 100-year floodplains and/or floodways with related elevations

C. The Erosion Control Plan shall indicate the use of appropriate items specified in Section 310, Section 1201, Section 1203; shown on Standard Plans 310-1 through 310-11, and shown on the Drawings. Coordinate the plan with scheduling of ground disturbance activities.

1.05 STORMWATER POLLUTION PREVENTION PLAN

A. The SWPPP shall satisfy requirements of Louisiana DEQ Storm Water General Permit for Small Construction Activities or Louisiana DEQ General Permit for Discharges of Storm Water From Construction Activities 5 Acres or More.

B. The SWPPP shall include the following contents as described in the respective General Permit.

1. Site Description

2. Controls

3. Maintenance

4. Inspections

5. Non-Storm Water Discharges

6. Certification and Signature

C. The SWPPP shall indicate the use of appropriate items specified in Section 310, Section 1201, Section 1203; shown on Standard Plans 310-1 through 310-11, and shown on the Drawings. Coordinate the plan with scheduling of ground disturbance activities.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 STORM WATER POLLUTION PREVENTION PLANS

A. Post a notice near the main entrance to the construction site with the following information.

1. The LPDES permit number and effective date of the permit
2. The name and telephone number of a local contact person
3. A brief description of the project
4. Location of the SWPPP if the site is inactive or does not have an on-site location to store the plan

B. Make the SWPPP available on request to LDEQ, local government officials, and the operators of a municipal separate storm sewer receiving discharges from the site.

C. Amend the SWPPP as described in the respective General Permit whenever:

1. there is a change in design, construction, operation, or maintenance, which has a significant effect on the discharge of pollutants to the waters of the State and which has not otherwise been addressed in the SWPPP.
2. inspections or investigations indicate the SWPPP is proving ineffective or otherwise not achieving the general objectives of controlling pollutants in storm water discharges associated with construction activity
3. a new contractor or subcontractor will implement a measure of the SWPPP
4. measures are necessary to protect endangered and threatened species or historic properties.

END OF SECTION 4110

SECTION 4200

PROJECT MEETINGS

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. The Engineer will schedule and administer pre-construction meeting, periodic progress meetings and specially called meetings throughout progress of the Work.

1. Prepare agenda for meetings.
2. Make physical arrangements for meetings.
3. Preside at meetings.
4. Record the minutes; include significant proceedings and decisions.
5. Meeting minutes must be uploaded into Unifier within 2 working days after each meeting
6. Reproduce and distribute copies of minutes within 5 working days after each meeting.
    a. To participants in the meeting.
    b. To parties affected by decisions made at the meeting.

B. Representatives of Contractors, subcontractors and suppliers attending meetings shall be qualified and authorized to act on behalf of the entity each represents.

C. Attend meetings to ascertain that work is expedited consistent with Contract Documents and construction schedules.

1.02 PRE-CONSTRUCTION MEETING

A. Attend a preconstruction meeting.

B. Location: A central site, convenient for all parties, designated by the Engineer.

C. Attendance

1. Engineer and his/her professional consultants.
2. Resident Project Representative.
3. Contractor.
4. Major Subcontractors.
5. Major suppliers.
6. Utilities
7. Others as appropriate.

D. Suggested Agenda Items

1. Introduction of key project personnel

2. Lines of communication/procedures
3. Preconstruction submittal requirements
4. Key contract dates
5. Correspondence routing and distribution
6. Payment procedures
7. Submittal and shop drawing procedures
8. Project progress meetings
9. Project progress reports
10. City requirements and special project procedures
11. RPR duties, responsibilities, and limitations of authority
12. Permits and coordination with local building officials
13. Safety procedures
14. QM procedures
15. Construction work schedule (days, hours, holidays, overtime)
16. Control of work requirements
17. Fair Share reporting requirements (Form 5)
18. Material storage requirements
19. Contractor's staging area
20. Field Offices
21. Coordination with utilities
22. Homeowner/business notification and citizen complaints
23. Construction photographs and record drawings
24. Testing laboratory procedures
25. Conformed documents

1.03 PROGRESS MEETINGS

A. Attend construction progress meetings every two weeks and periodic meetings at regular intervals determined by the Engineer.

B. Attend called meetings as required by progress of the Work.

C. Location of the meetings: Project field office of Contractor or Engineer, or City Hall, or another location identified by the Engineer.

D. Attendance

1. Engineer and his/her professional consultants as needed.

2. Subcontractors as appropriate to the agenda.

3. Suppliers as appropriate to the agenda.

4. Others as appropriate.

E. Suggested Agenda Items

1. Review, approval of minutes of previous meeting.

2. Review of work progress since previous meeting.

3. Submittals

4. RFI's

5. Field Orders, Work Change Directives, Change Orders

6. Field observations, problems and conflicts.

7. Current Construction Schedule.

8. Progress, schedule, during succeeding work period.

9. Coordination of work activities.

F. Attend progress meetings and study previous meeting minutes and current agenda items, in order to be prepared to discuss pertinent topics such as deliveries of materials and equipment, progress of the Work, etc.

G. Provide a current submittal log at each progress meeting.

H. Provide a 4-week look-ahead schedule of anticipated working days and hours for the Engineer's use in planning work by the Resident Project Representative.

I. Provide an updated and accurate project schedule of work to be performed in the next 30 days. Remittance of partial pay estimates are dependent on submittal and approval of an updated monthly construction progress schedule.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 4200

SECTION 4300

SUBMITTALS

PART 1 GENERAL

1.01 SCOPE OF WORK

A. This Section includes the requirements for compiling, processing and transmitting submittals required for execution of the project.

B. The Contractor shall prepare and submit shop drawings, working drawings, fabrication details, mix designs, control diagrams, manufacturer information, installation manuals and guides, and product and material data as required in the Contract Documents.

All submittals and supporting data, catalogs, schedules, etc., shall be submitted as the instruments of the Contractor, who shall be responsible for their accuracy, completeness, and coordination. Such responsibility shall not be delegated, in whole or in part, to subcontractors or suppliers. These submittals may be prepared by the Contractor, subcontractors, or suppliers, but the Contractor shall confirm that materials, dimensions, catalog numbers, technical data and performance criteria meet all of the requirements of the Contract Documents, while conforming to structural, space, and access conditions at the point of installation. Designation of work "by others," if shown in submittals, shall mean that the Work will be the responsibility of the Contractor rather than the subcontractor or supplier who prepared the submittals. The Engineer will not accept receipt of submittals directly from subcontractors or vendors.

The Contractor shall ensure that there is no conflict with other submittals and notify the Engineer in each case where its submittal may affect the work of another Contractor of the City. The Contractor shall ensure coordination of submittals among the related crafts and subcontractors.

Submittals shall be prepared in such form that data can be identified with the applicable specification. The data shall clearly demonstrate compliance with the Contract Documents and shall relate to the specific equipment or piece of work to be furnished. Where manufacturer's standard drawings and catalog sheets are employed, they shall be marked clearly to show what portion of the data is applicable to this project.

C. Variances - Notify the Engineer in writing, at the time of submittal, of any deviations in the submittals from the requirements of the Contract Documents. Notify the Engineer in writing, at the time of re-submittal (resubmission), of all deviations from previous submissions of that particular submittal, except those deviations which are the specific result of prior comments from the Engineer.

D. All deliverables shall include submittal registry and major milestone list.

E. Submittals are categorized into two types: Action Submittals and Informational Submittals, as follows:

1 Action Submittal: Written and graphic information submitted by the Contractor that requires the Engineer's approval. The following are examples of action submittals:

a. Shop drawings.

b. Working drawings.

c. Product data.

d. Samples.

e. Operation & maintenance manuals.

f. Site Usage Plan.

g. Maintenance of Traffic Plans.

h. Work Plans

i. Proposed Testing Procedures

j. As-Built Drawings

k. Stainless steel inflow preventor installation form and photos

l. Construction Photography and Videography.

m. Test Records and Reports.

n. Outage Requests.

o. Warranties and Bonds.

p. Contract Close-out documents.

q. Submittals required by laws, regulations and governing agencies.

r. Submittals required by funding agencies.

s. Other requirements found within the Specifications.

1.02 **ACTION SUBMITTALS**.

A. Shop Drawings

1. Shop drawings may include, but are not necessarily limited to, custom prepared data such as fabrication and erection/installation (working) drawings, scheduled information, setting diagrams, actual shop work manufacturing instructions, custom templates, valve schedules, wiring diagrams, coordination drawings, equipment inspection and test reports, and performance curves and certifications, as applicable to the work.

2. Contractor shall verify all field measurements, field construction criteria, materials, dimensions, catalog numbers and similar data, and coordinate each item with other related shop drawings and the Contract requirements.

3. All details on shop drawings shall clearly show the relation of the various parts to the main members and lines of the structure and where correct fabrication of the work depends upon field measurements, such measurements shall be made and noted on the drawings before being submitted.

4. Submittal of all Shop Drawings shall be maintained up to date and uploaded into Unifier.

B. Maintenance of Traffic Plans: Prepare and submit maintenance of traffic plans where and when required by the Contract Documents and by local ordinances or regulations.

C. Product Data: Product data include, but are not limited to, the manufacturer's standard prepared data for manufactured products (catalog data), such as the product specifications, installation instructions, availability of colors and patterns, rough-in diagrams and templates, product photographs (or diagrams), wiring diagrams, performance curves, quality control inspection and reports, certifications of compliance (as specified or otherwise required), mill reports, product operating and maintenance instructions, recommended spare parts and product warranties, as applicable.

D. Samples.

1. Furnish samples required by the Contract Documents for the Engineer's approval. Samples shall be delivered to the Engineer as specified or directed. Materials or equipment for which samples are required shall not be used in the work unless and until approved by the Engineer.

2. Approval of a sample shall be only for the characteristics or use named in such approval and shall not be construed to change or modify any Contract Requirements.

3. Approved samples not destroyed in testing shall be sent to the Engineer or stored at the site of the work. Approved samples of the hardware in good condition will be marked for identification and may be used in the work. Materials and equipment incorporated in Work shall match the approved samples. Samples which fail testing or are not approved will be returned to the Contractor at his expense, if so requested at time of submission.

E. Contractor's Certification - Each submittal and sample shall have affixed to it the following Certification Statement:

"Certification Statement: by this submittal, I hereby represent that I have determined and verified all field measurements, field construction criteria, materials, dimensions, catalog numbers and similar data and I have checked and coordinated each item with other applicable approved submittals and all Contract requirements."

F. Project work, materials, fabrication, and installation shall conform to approved shop drawings, product data and applicable samples.

G. No portion of the work requiring a submittal or sample shall be started, nor shall any materials be fabricated or installed before approval of such item. Procurement, fabrication, delivery or installation of products or materials that do not conform to approved submittals shall be at the Contractor's risk. Furthermore, such products or materials delivered or installed without approved submittals, or in non-conformance with the approved submittals will not be eligible for payment until such time as the product or material is approved or brought into compliance with approved submittals. Engineer will not be liable for any expense or delay due to corrections or remedies required to accomplish conformity.

H. Site Usage: For Work on City property other than public rights-of-way, submit a proposed site staging plan including but not limited to the locations of office trailers, storage trailers, employee parking and material laydown. Such plan shall be a graphic presentation (drawing) of the proposed plan and shall include temporary utility connections and on-site traffic modifications as applicable.

I. As-Built Drawings: Before Final Completion, submit a record of all changes during construction as specified in Section 4720 As-Built Drawings.

J. Stainless Steel Inflow Preventers: Document the installation of each inflow preventer per Section 2400 Inflow Preventers.

K. Cured-In-Place Submittal Progress: Submit a record of all before, during and after documents per 1.03 E included in Section 2769 Cured-In-Place Pipe Lining

L. Work Plans: For Work in public rights-of-way and servitudes, prepare and submit work plans to indicate the number of simultaneous work sites, the planned sequence of construction, temporary street closures, and to demonstrate to the Engineer that Contractor has adequately planned the means and methods of construction to minimize unnecessary inconvenience to the public. Furnish updated work plans every two weeks or at the frequency designated by the Engineer.

M. Change orders shall follow formal submittal procedures to be uploaded to Unifier.

1.03 INFORMATIONAL SUBMITTALS

A. Submittal Registry: Prepare and submit a submittal registry as specified in this section.

B. Construction Schedule: Prepare and submit construction schedules and progress status reports as specified in Section 4310 Construction Schedules. Formal submittal of a lein free certificate in Unifier prior to 45 days of final completion.

C. Schedule of Values: On projects consisting of lump sums (in whole or in part) submit a proposed schedule of values providing a breakdown of lump sum items into reasonably small components – generally desegregated by building, area, and/or discipline. Refer to Section 4370 Schedule of Values for additional requirements. The purpose of the schedule of values is for processing partial payment applications. If requested by the Engineer, provide sufficient substantiation for all or some items as

necessary to determine the proposed schedule of values is a reasonable representation of the true cost breakdown of the Work. The schedule of values shall not be unbalanced to achieve early payment or over-payment in excess of the value of work or any other inequitable distribution of the costs. If, in the opinion of the Engineer, the schedule of values is unbalanced, Contractor shall reallocate components to achieve a balanced schedule acceptable to Engineer.

D. Statements of Qualifications: Provide evidence of qualification, certification, or registration, as required in the Contract Documents, to verify qualifications of licensed land surveyor, professional engineer, materials testing laboratory, specialty subcontractor, technical specialist, consultant, specialty installer, and other professionals.

E. Daily Reports: Contractor to supply electronic daily reports to the Engineer or upload documentation for daily reports to Unifier.

F. Construction Photography and Videography: Provide periodic construction photographs and videography as specified in Section 4322.

G. Storage of Materials on Private Property: If private property is used for storage purposes, furnish copies of written permission from owner and lessee as specified in Section 106.9.

H. Outage Requests: Provide sufficient notification of any outages required (electrical, flow processes, etc.) as may be required to tie-in new work into existing facilities. Unless specified otherwise elsewhere, a minimum of seven calendar days' notice shall be provided.

I. Test Records and Reports: Provide copies of all test records and reports as specified in the various technical specifications.

J. [Vendor Training Outlines/Plans: At least two weeks before scheduled training of City personnel, provide lesson plans for vendor training in accordance with the specification for O&M manuals.]

K. [Test and Start-up Reports: Manufacturer shall perform all pre-start-up installation inspection, calibrations, alignments, and performance testing as specified in the respective Specification Section. Provide copies of all such test and start-up reports.]

L. Certifications - Provide various certifications as required by the specifications. Such certifications shall be signed by an officer (of the firm) or other individual authorized to sign documents on behalf of that entity. Certifications may include, but are not limited to:

1. [Welding certifications and welders qualifications]

2. [Certifications of Installation, Testing and Training for all equipment]

3. Material Testing reports furnished by an independent testing firm

4. Certifications from manufacturer(s) for specified factory testing

M. Submittals required by laws, regulations and governing agencies.

1. Prepare and submit all documentation required by state or local law, regulation or government agency directly to the applicable agency. This includes, but is not limited to, notifications, reports, certifications, certified payroll (for projects subject to wage requirements) and other documentation required to satisfy all requirements. Provide to Engineer one copy of each

submittal made in accordance with this paragraph.

2. Prepare and submit all documentation required by funding agencies. This includes, but is not limited to segregated pay estimates and change orders when required to properly allocate funds to different funding sources; and certified payrolls for projects subject to wage requirements. Provide one copy of each submittal made in accordance with this paragraph to the Engineer.

N. Warranties and Bonds: Assemble a booklet or binder of all warranties and bonds as specified in the various technical specifications and in accordance with the specification on Warranties and Bonds; and provide two originals to the Engineer.

O. Contract Close-Out Documents: Submit Contract documentation as indicated in the specification for Contract Closeout.

P. Lien free certificate from Clerk of Court, Caddo Parish, LA shall be submitted in accordance with Section 111.8.

PART 2 PRODUCTS (NOT USED).

PART 3 EXECUTION.

3.01 SAMPLE TRANSMITTALS

A. Transmit submittal documents for each sample. Deliver samples directly to the City or the office of the Engineer, as indicated in the Contract Documents or as otherwise directed by the Engineer. Prepare separate transmittal sheets for each sample with sufficient information to correctly associate the sample with the submittal documents.

3.02 SUBMITTAL PROCEDURES

A. Contractor's Responsibilities

1. Coordination of Submittal Times: Prepare and transmit each submittal sufficiently in advance of performing the related work or other applicable activities, or within the time specified in the individual work of other related Sections, so that the installation will not be delayed by processing times including disapproval and resubmittal (if required). Coordinate with other submittals, testing, purchasing, fabrication, delivery and similar sequenced activities. Extensions to the Contract Time will not be approved for the Contractor's failure to transmit submittals sufficiently in advance of the Work.

2. Prepare and transmit submittals sufficiently in advance of construction requirements to allow for possible need of re-submittals, including the specified review time for the Engineer.

3. Engineer will be allowed a reasonable time within which to evaluate submittals and O&M manuals that require review by more than one engineering discipline. Resubmittals will be subject to the same review.

4. Submittals of operation and maintenance data shall be provided within 30 days of approval of the related submittal(s).

5. Before submission to the Engineer, review submittals as follows:

a. make corrections and add field measurements, as required

b. identify and describe each and every deviation or variation from Contract documents or from previous submissions, except those specifically resulting from a comment from the Engineer on a previous submission

c. include the required Contractor's Certification statement

d. provide field measurements (as needed)

e. coordinate with other submittals

f. indicate relationships to other features of the Work

g. highlight information applicable to the Work and/or delete information not applicable to the Work

6. If Contractor considers any correction indicated on the submittals to constitute a change to the Contract Documents, provide written notice thereof to the Engineer immediately; and do not release for manufacture before such notice has been received by the Engineer.

7. Contractor shall notify the Engineer 10 days prior to final inspection

8. The Contractor shall upload documentation to Unifier for any formal submittal to the City.

B. Engineer's Responsibilities

1. Engineer will not review submittals that do not include the Contractor's approval stamp and required certification statement. Such submittals will be returned to the Contractor, without action, for correction.

2. Partial submittals will not be reviewed. If, in the opinion of the Engineer, a submittal is incomplete, that submittal will be returned to the Contractor for completion. Such submittals may be returned with comments from Engineer indicating the deficiencies requiring correction.

3. If submittals meet the specified requirements, Engineer will forward copies to appropriate reviewer(s). Otherwise, noncompliant submittals will be returned to the Contractor without action.

4. Submittals which are transmitted in accordance with the specified requirements will be reviewed within 14 calendar days for original submittals and ten (10) calendar days for resubmittals. The time for review will commence upon receipt of the submittal.

5. Engineer may elect not to respond to Contractor regarding informational submittals meeting the Contract requirements. If an informational submittal does not comply with the Contract requirements, Engineer will respond accordingly to the Contractor within 14 calendar days. Thereafter, the Contractor shall perform the required corrective action, including retesting, if needed, until the submittal, in the opinion of the Engineer, is in conformance with the Contract Documents.

C. Review of Submittals

1. The review of shop drawings, working drawings, product data and samples will be for general conformance with the design concept and Contract Documents. They shall not be construed:

a. as permitting any departure from the Contract requirements

b. as relieving the Contractor of responsibility for any errors, including details, dimensions, and materials

c. as approving departures from details furnished by the Engineer, except as otherwise provided herein

2. The Contractor remains responsible for details and accuracy, for coordinating the work with all other associated work and trades, for selecting fabrication processes, for techniques of assembly, and for performing work in a safe manner.

3. If the submittals describe variations and indicate a deviation from the Contract requirements that, in the opinion of the Engineer are in the interest of the City and are so minor as not to involve a change in Contract Price or Contract Time, the Engineer may return the reviewed submittals without noting an exception.

4. Submittals will be returned to the Contractor with one of the following codes.

a. "ACCEPTED" – This code is assigned when there are no notations or comments on the submittal. When returned under this code the Contractor may release the material for manufacture.

b. "ACCEPTED AS NOTED" - This code is assigned when a confirmation of the notations and comments IS NOT required. The Contractor may release the material for manufacture; however, all notations and comments must be incorporated into the final product.

c. "ACCEPTED AS NOTED/CONFIRM" - This combination of codes is assigned when a written confirmation of the notations and comments is required. The Contractor may release the material for manufacture; however, all notations and comments must be incorporated into the final product. Written confirmation shall specifically address each notation and comment. Confirmation shall be furnished to the Engineer within 14 calendar days of the date of the Engineer's transmittal requiring the confirmation.

d. "ACCEPTED AS NOTED/RESUBMIT" - This combination of codes is assigned when a written confirmation of the notations and comments is required and are extensive enough to require a resubmittal of the entire package. This resubmittal is to address all comments, omissions and non-conforming items that were noted.

Resubmittal shall be furnished to the Engineer within 14 days of the date of the Engineer's transmittal requiring the resubmittal.

e. "NOT ACCEPTED" – This code is assigned when the submittal does not meet the intent of the contract documents. The Contractor must resubmit the entire package revised to bring the submittal into conformance. It may be necessary to resubmit using a different manufacturer/vendor.

f. “COMMENTS ATTACHED” – This code is assigned where there are comments attached to the returned submittal, which provide

additional information to aid the Contractor.

g. "RECEIPT ACKNOWLEDGED (Not subject to Engineer's Review or Approval)" – This code is assigned to acknowledge receipt of a submittal that is not subject to the Engineer's technical review and approval, and is being filed for informational purposes only. This code is generally used in acknowledging receipt of means and methods of construction work plans, field conformance test reports, and health and safety plans.

5. Repetitive Reviews: Submittals will be reviewed no more than 2 times at the City's expense. All subsequent reviews will be performed at the Contractor's expense. Reimburse the City for all costs invoiced by Engineer for the third and subsequent reviews.

3.03 SUBMITTAL LOG:

1. Contractor shall maintain the submittal registry for the duration of the work, showing current status of all Submittals and Distributees at all times. Contractor shall make the Submittal registry available to the Engineer for its review on request, and shall bring a copy of the Submittal registry to all Progress Meetings.

END OF SECTION 4300

SECTION 4310

CONSTRUCTION SCHEDULING

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. The Contractor shall prepare and submit to the Engineer for review, a schedule that clearly shows the sequence and interdependencies of activities required for complete performance of the Work required for this project, showing the order in which the Contractor and its Subcontractors propose to carry on the Work. The construction schedule shall be a critical path method (CPM) network presented in a time-scaled graphic (print-out). The critical path is defined as the path of activities with the longest continuous duration, which defines the earliest completion of the project.

B. The construction schedule shall, in general, determine the order in which the Work is to proceed. The schedule shall include activities to be performed by Subcontractors and shall demonstrate coordination of the Work. The Engineer will review the Contractor's approach to meet the specific requirements of the Project.

C. Develop a schedule to achieve Final Completion within the Contract Time and furnish sufficient forces and construction equipment as may be necessary to complete the Work in accordance with the schedule.

D. Designate the individual or an authorized representative who is responsible for development and maintenance of the schedule and reports. This individual or representative shall have direct project control and complete authority for updating and maintaining the schedule.

E. Contract Time on a Working Day Basis or a Calendar Day Basis extends from the date of Notice to Proceed through the date of Final Completion. All Work, including activities such as testing, training, O&M Manuals, startup, training, performance testing, As-Built Drawings, site restoration, etc. must be completed within the Contract Time. All Work shall be identified in the baseline schedule to be completed within the Contract Time.

F. If the latest version of Oracle Primavera P6 or Microsoft Project are not being used, submit the qualifications of the scheduling software proposed as an alternative. Engineer will review the alternative for use on the project.

1.02 CONTENT OF SCHEDULES

A. The schedule shall be organized by Work Breakdown Structure (WBS).

B. The duration of each Construction Activity may be no longer than two weeks.

Level of Effort (LOE) and procurement activities may have longer durations.

C. Construction Activities shall include submittal review and approval, and procurement of materials, plant and equipment.

D. Specifically identify activities on a per asset basis for the following list of structures or items, in addition to other structures or items as necessary.

1. Temporary lane closures, street closures and detours
2. One-half street construction locations
3. Curb repairs
4. Testing
5. Concrete construction
6. Testing
7. Site restoration
8. Final Site restoration

E. Include and explain the approach to allow for adverse weather interruptions that are normal for the project location. Normal weather shall mean seasonally average weather conditions, as recorded by NOAA.

F. The default calendar used shall be 5 days a week excluding City Holidays. Alternative calendars may only be used with justification that is accepted by the Engineer.

G. Include plan for all long lead items and materials.

H. Show the interdependencies of work that needs to be done by others under separate contract with the City or by other private/public utilities before the work on this Contract can be completed.

1.03 FORMAT OF SCHEDULES

A. Prepare CPM schedules in the form of a Time Scale Logic Diagram (TSLD) including the following:

1. Show each activity within each WBS or item.
2. Include columns of information for:
   a. Activity ID.
   b. Activity Description.
   c. Original Duration.
   d. Early Start and Finish.
   e. Late Start and Finish.
   f. Total Float.
3. Include a horizontal time scale by month or smaller units as appropriate. The Baseline Schedule shall show utilizing the entire Contract Time starting with the date of NTP.

4. Minimum font size is 10 points.

5. Sheet size: 11 inches x 17 inches., 1 sided, color

B. TSLD should be sorted by WBS, Item, and Early Start

1.04 SUBMITTAL TYPES DEFINED:

A. Submit a Baseline Schedule and Narrative Report within 14-days after notice- to-proceed (NTP). The baseline schedule for each project will be developed by applying the critical path method and utilizing the latest version of Primavera P6 or Microsoft Project scheduling software.

The Baseline Schedule is the formal planning document that reflects the approved strategy of the Project Team. The Baseline Schedule is the primary reference point for schedule and project performance and will be referred to throughout the life of the project.

All changes to the Baseline Schedule will be in accordance with the Standard Specifications, and formal re-baselines will be captured and identified in P6 as "Current Approved Project Baseline – MM/DD/YYY" and documented accordingly. Major changes to the baseline (re-baselining) will only be required if the project scope and/or strategy changes to the extent that the current baseline is not attainable or applicable for tracking purposes and must follow the formal change management process in order to formally change. Simple modifications can be made to the baseline schedule in order to maintain the link between the progress schedule and the baseline schedule. Simple modifications are defined as those that do not cause any change to the budget or the critical path.

B. Provide both PDF and electronic data files for each Baseline Schedule submittal. The Engineer will review and comment for incorporation into the Baseline Schedule. Incorporate review comments and resubmit the Baseline Schedule and Narrative Report for approval.

C. Once the Baseline Schedule and Narrative Report have been approved, prepare and submit revised monthly progress schedules and updated monthly narrative reports.

1.05 SUBMITTAL REQUIREMENTS

A. The Narrative Report shall consist of a written report providing an overview of the schedule, specific to each submittal. The Narrative Report for the Baseline Schedule submittal shall describe the Contractor's approach to executing the Work. The updated Narrative Reports provided with monthly updated schedules shall include the items specified in Paragraph 1.06.

B. The Narrative for the Baseline Schedule shall:

1. Explain key activities and assumptions on which the schedule is based.

2. Describe the Critical Path.

3. Discuss key deliveries that might adversely affect the project schedule.

4. Explain the Contractor's approach to adverse weather interruptions.

5. Show the interdependencies of work that needs to be done by others under separate contract with the City or by other private/public utilities before the work on this Contract can be completed. Explain the approach to coordinating with the City and private and public utilities.

6. Time constraints should be kept to a minimum and the use of any time

constraints must be explained why they were used or required.

C. The following reports are required for Baseline Submittal, with both PDF and electronic data files.

1. Activity – a report listing all activities, sorted only by Activity ID.

2. Early Start – a report listing all activities, sorted only by Early Start date.

3. Total Float – a report listing all activities, sorted by Total Float (ascending from low to high).

4. Predecessor/Successor – a report of all activities, sorted by ActivityID that lists the predecessor and successor activities for each activity.

1.06 PROGRESS REVISIONS

A. The construction schedule shall be kept up-to-date and the current updated schedule with both PDF and electronic data files shall be submitted to the Engineer monthly. If the Contractor fails to furnish a complete updated schedule submittal, the Engineer may withhold a portion of payment until the submittal is reviewed and approved.

B. Include the Physical Percent Complete – the Contractor's estimated physical percent complete for each activity as of the data date for the respective report.

C. Each month, indicate progress of each activity to data date of submission. Show

D. changes occurring since previous submission of schedule:

1. Major changes in scope.

2. Activities modified since previous submission.

3. Revised projections of progress and completion.

4. Other identifiable changes.

E. Provide an updated Narrative Report with each monthly status report describing:

1. Any changes to the critical path subsequent to the previous status

report

2. Any changes to the CPM relationships

3. Loss or gain in the Total Float, with explanation of the main cause of such loss or gain (Variance Report)

4. Problem areas, anticipated delays, and the impact on the schedule.

5. Remedial actions or recovery steps that will be employed to arrest and/or recover from delays

6. Schedule presentation of Look Back over update period and Look Ahead to next 2 update cycles.

7. Schedule report showing variance to Baseline.

8. Provide a list of all activities added, deleted, or modified since the last update

F. Provide an updated version of each report required for the Baseline Submittal, with both PDF and electronic data files.

1. Activity – a report listing all activities, sorted only by Activity ID.

2. Early Start – a report listing all activities, sorted only by Early Start date.

3. Total Float – a report listing all activities, sorted by Total Float (ascending from low to high).

4. Predecessor/Successor – a report of all activities, sorted by Activity ID that lists the predecessor and successor activities for each activity.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 RESPONSIBILITY FOR SCHEDULE COMPLIANCE

A. The Contractor agrees that whenever it becomes apparent from the current monthly schedule that delays to the critical path have resulted, and hence, that the contract completion date will not be met or when so directed by the Engineer, he will take some or all of the following actions at no additional cost to the City, submitting to the Engineer for approval, a written statement of the steps he intends to take to remove or arrest the delay to the critical path in the approved schedule.

1. Increased construction manpower in such quantities and crafts as will substantially eliminate, in the judgment of the Engineer, any delays to critical path or construction completion.

2. Increase the number of working hours per shift, shifts per working days per week, the amount of construction equipment, or any combination of the foregoing, sufficiently to substantially eliminate, in the judgment of the Engineer, any delays to critical path or

construction completion.

3. Reschedule activities to achieve maximum practical concurrency of accomplishment of activities, and comply with the revised schedule to eliminate delays to the Critical Path and construction completion date.

3.02 ADJUSTMENT OF CONTRACT SCHEDULE AND COMPLETION TIME

A. If the Contractor desires to make changes which affect the approved schedule, he shall notify the Engineer in writing stating what changes are proposed and the reason for the change. If the Engineer takes no exception to these changes, the Contractor shall revise, without additional cost to the City, all of the affected portion of the schedule.

B. The contract completion time will be adjusted only for causes specified in this contract. In the event the Contractor requests an extension of any contract completion date, he shall furnish such justification and supporting evidence as the Engineer may deem necessary for a determination as to whether the Contractor is entitled to an extension of time under the provisions of this contract. Engineer will, after receipt of such justification and supporting evidence make findings of fact and will advise the Contractor in writing thereof. If the Engineer finds that the Contractor is entitled to any extension of any contract completion date under the provisions of this contract, the Engineer's determination as to the total number of days extension shall be based upon the currently approved schedule and on all data relevant to the extension. Such data shall be included in the next monthly updating of the schedule. The Contractor acknowledges and agrees that actual delays in activities which, according to the schedule, do not affect any contract completion date shown by the critical path in the schedule do not have any effect on the contract completion date or dates, and therefore, will not be the basis for a change therein.

C. From time to time, it may be necessary for the contract schedule and/or completion time to be adjusted to reflect the effects of job conditions, weather, technical difficulties, strikes, unavoidable delays on the part of the City or its representatives, and other unforeseeable conditions which may indicate schedule adjustments and/or completion time extension. Under such conditions, the Contractor shall reschedule the work and/or contract completion time to reflect the changed conditions, and shall revise its schedule accordingly. It is specifically pointed out that the use of available float time in the schedule may be used by the City, as well as by the Contractor. Float time is defined as the amount of time between the early start date, and the late start date, or the early finish date and the late finish date, of any of the activities in the schedule.

D. Total Float in the approved CPM network is for the mutual benefit of the Project, i.e. either the City or the Contractor may take advantage of available Total Float. Therefore, without obligation to extend either the overall comple- tion date or any intermediate completion dates set out in the schedule, the City may initiate changes to the Work that absorb float time. Contractor- initiated changes that reduce the project total float time identified in the approved schedule may be accomplished with the Engineer's concurrence.

3.03 COORDINATING SCHEDULES WITH OTHER CONTRACT SCHEDULES

A. Where work is to be performed under this contract concurrently with and/or contingent upon work performed on the same facilities or area under other contracts, the Contractor's schedule shall be coordinated with the schedules of the other contracts. The Contractor shall obtain the schedules of the other appropriate contracts from the Engineer for the preparation and updating of his schedule and shall make the necessary changes in his schedule when indicated by changes in corresponding schedules.

3.04 CONSTRUCTION SCHEDULE SUBMITTAL PROGRESS MEASUREMENT AND PAYMENT

A. Preparation of a construction schedule will not be paid for directly, but will be considered subsidiary to the project.

END OF SECTION 4310

SECTION 4322

PHOTOGRAPHIC DOCUMENTATION

PART 1 GENERAL.

1.01 SCOPE OF WORK

A. Furnish all labor, materials, equipment and incidentals required to provide photographic and video preconstruction surveys of the Project as specified herein.

1.02 SUMMARY.

A. Section includes administrative and procedural requirements for the following:

1. Preconstruction photographs.

2. Preconstruction video recordings.

1.03 SUBMITTALS.

A. Qualification Data: For photographer and videographer

B. Digital Files: Submit digital photographs and video recordings on external hard drives that are formatted for all computers with a minimum space of 1 TB. Recordable discs and other storage media (including USB drives) are not acceptable. Transfer of image files by electronic mail is not acceptable. Package external hard drive in a plastic case. Affix self-adhesive labels to the hard drive and the case with the Project Number, Project Name and Contractor's name similar to the following example.

Project C21001
Full Depth Pavement Reclamation Project
John Q. Smith Construction Co., Inc.

C. Submit digital files within 30 days of taking photographs and video recordings.

D. Arrange digital file directory by assets. File directory for projects with streets shall be arranged by street segments as shown in the following example.

Willie Mays Street – David Raines to Audrey
Pictures
Video

1.04 QUALITY ASSURANCE.

A. Videographer Qualifications: An individual who has been regularly engaged as a professional videographer of infrastructure projects for not less than three years.

B. Photographer Qualifications: An individual who has been regularly engaged as a professional photographer of infrastructure projects for not less than 3 years.

PART 2 PRODUCTS.

2.01 DIGITAL PHOTOGRAPHS.

A. Provide digital photographs produced by a dedicated, fixed-lens or interchangeable-lens digital camera. Images made with cell phones, tablets, webcams, and wearable cameras are not acceptable.

B. Digital Camera shall have a minimum image resolution of 15 megapixels, and produce images in JPEG (.JPG) format with image dimensions of not less than 3200 X 2400 pixels.

C. Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation or modifications using image-editing software. Provide the following information on each photograph.

1. Project Number and Project Name

2. Contractor's Name

3. Drawing Number

4. Street segment

5. Time and Date that photograph was taken

6. Frame Number

2.02 DIGITAL VIDEO RECORDINGS.

A. Provide video recordings made with a dedicated digital video camera specifically made for video recordings. Video recordings made with cell phones, tablets, webcams, and wearable cameras are not acceptable. Video cameras must be mounted to a tripod while taking survey. Surveys taken while video camera is handheld are subject to being rejected.

B. Digital Video Camera shall have a minimum resolution of 720p (1280 x 720, progressive) and produce video recordings in either .MP4 or .WMV digital format. The minimum resolution of all video files shall be 720p (1280 X 720, progressive).

PART 3 EXECUTION.

3.01 PRECONSTRUCTION DOCUMENTATION.

A. Engage qualified individuals as specified in Quality Assurance Section 1.04.

B. Organize documentation by street segment. Document conditions on both sides of the roadway. Accurately record physical conditions on both sides of the roadway including adjacent structures, landscaping and other features of adjoining property. Include areas where materials may be temporarily stored and where Contractor's vehicles and equipment may be parked during work activities.

C. General: Take photographs that clearly show pre-existing conditions including apparent defects, damage or areas of concern in the project area. Exhibit correct exposure and focus, accurate color balance, maximum depth of field, minimal optical distortion, and minimal noise. Photographs that, in the Engineer's opinion, do not meet these quality criteria will not be accepted and shall be re-taken at no additional cost to the City.

3.02 PHOTOGRAPHS.

A. Take photographs that clearly show pre-existing conditions including apparent defects, damage or areas of concern in the project area. Exhibit correct exposure and focus, accurate color balance, maximum depth of field, minimal optical distortion, and minimal noise. Photographs that, in the Engineer's opinion, do not meet these quality criteria will not be accepted and shall be re-taken at no additional cost to the City.

3.03 VIDEO RECORDINGS.

A. Produce bright, clear, sharp pictures with accurate colors and free from distortion, excessive shake, or any other form of picture imperfection. The audio track of each video recording shall have proper volume, clarity and freedom from distortion and interference. Video recordings that, in the Engineer's opinion, do not meet these quality criteria will not be accepted and shall be re-recorded at no additional cost to the City.

B. Mount camera on tripod during all recording. At the beginning and end of each video recording, record the following:

1. Date & Time.

2. Project name, project number.

3. Contractor's name

4. Street segment.

C. Video shall show the project area from beginning to end of street segment. Include all curbs, mailboxes, driveways, houses, fences, sidewalks and any greenery that might be impacted during the Work. Include location markers such as street signs and house addresses.

END OF SECTION 4322

SECTION 4400

QUALITY CONTROL

PART 1 GENERAL

1.01 SCOPE OF WORK.

A. This Section includes requirements of a general nature related to the Contractor's responsibility for quality control involving inspections, tests, certifications, and reports. Refer to Section 4410 Testing and Testing Laboratory Services for additional requirements related to quality control.

B. Unless otherwise indicated in the Specifications, only new materials shall be incorporated in the Work. All materials furnished by the Contractor to be incorporated in the Work shall be subject to the inspection and approval of the Engineer. No material shall be processed for, or delivered to the Site without prior approval by the Engineer.

1.02 INSPECTIONS.

A. The Engineer shall have the right to inspect all materials at all stages of collection and processing, and shall be allowed access to the site and to the Contractor's and supplier's facilities to conduct such inspections. Onsite work shall be subject to continuous inspection. Inspection by the Engineer shall not release the Contractor from responsibility or liability with respect to material.

B. When local codes or laws require approval and inspection of the work by other agencies or organizations the Contractor shall obtain such approval and submit one signed original and three copies of the approval to the City.

1.03 QUALITY ASSURANCE – CONTROL OF INSTALLATION.

A. The Contractor shall monitor quality control over suppliers, products, services, site conditions, and workmanship, to produce Work of specified quality.

B. The Contractor shall comply with manufacturers' instructions, including each step in sequence.

C. The Contractor shall examine the areas and conditions where Work is to be performed and notify the Engineer of conditions detrimental to the proper and timely completion of the Work. The Contractor shall not proceed with the Work until unsatisfactory conditions have been corrected by the Contractor in a manner acceptable to the Engineer.

D. The Contractor shall request clarification from Engineer if manufacturers' instructions conflict with Contract Documents, and shall not proceed with the affected Work before receiving clarification.

E. The Contractor shall comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

F. Work shall be performed by persons qualified to produce workmanship of specified quality.

1.04 REFERENCES.

A. The Contractor shall comply with the reference specifications and standards at a minimum.

B. For products or workmanship specified by association, trade, or other consensus standards, the Contractor shall comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

C. The Contractor shall be familiar with applicable standards, and shall obtain copies of these standards where required by product specification sections.

D. The contractual relationship, duties, and responsibilities of the parties in Contract shall not be altered from the Contract Documents by mention or influence otherwise in any reference document.

1.05 INSPECTING AND PHYSICAL TESTING LABORATORY SERVICES.

A. Laboratory will be provided by the City as specified in Section 4410.

1.06 REPORTS.

A. The Contractor may, in lieu of the specified tests and at the option of the Engineer, submit for review a Certificate of Compliance in the form of a letter from the manufacturer. The Certificate shall state the following:

1. Manufacturer has performed all required tests.
2. Materials supplied meet all test requirements.
3. Tests were performed within six months of submittal of the Certificate.
4. Materials that were tested are the same type, quality, manufacture, and make as those specified.
5. Include identification of the materials.

B. Reports shall be submitted in accordance with Technical Specification Section 4300 Submittals.

PART 2 PRODUCTS (NOT USED).

PART 3 EXECUTION (NOT USED).

END OF SECTION 4400

SECTION 4410

TESTING AND TESTING LABORATORY SERVICES

PART 1 GENERAL

1.01 REQUIREMENTS

A. The requirements of this section are related to a testing laboratory provided by the City. The City will employ and pay for the services of an independent testing laboratory (Laboratory) in accordance with the requirements of Standard Specification Section 106.6. Employment of the Laboratory shall in no way relieve Contractor's obligations to perform the Work of the Contract.

B. Cooperate with the Laboratory to facilitate the execution of its required services.

1.02 RELATED REQUIREMENTS

A. Contractor shall employ and pay for an independent testing laboratory where specified in other sections.

1.03 LIMITATIONS OF AUTHORITY OF TESTING LABORATORY

A. Laboratory is not authorized to:

1. Release, revoke, alter or enlarge on requirements of Contract Documents.

2. Approve or accept any portion of the work.

3. Perform any duties of the Contractor.

1.04 CONTRACTOR'S RESPONSIBILITIES

A. Cooperate with Laboratory personnel, provide access to Work and to manufacturer's operations.

B. Secure and deliver to the Laboratory adequate quantities of representational samples of materials proposed for use in the Work and which require testing.

C. Provide to the Laboratory the proposed mix designs for Portland cement concrete, asphaltic cement concrete, flowable fill and other materials which require control by the Laboratory.

D. Materials and equipment used in the performance of Work under this Contract are subject to inspection and testing at the point of manufacture or fabrication. Standard requirements for quality and workmanship are indicated in the Contract Documents. The Engineer may require the Contractor to provide statements or certificates from the manufacturers and fabricators that the materials and equipment provided by them are manufactured or fabricated in full accordance with the standard specifications for quality and workmanship indicated in the Contract Documents. All costs of this testing and providing statements and certificates shall be a subsidiary obligation of the Contractor, and no extra charge to the City shall be allowed on account of such testing and certification.

E. Furnish incidental labor and facilities:

1. To provide access to work to be tested.

2. To obtain and handle samples at the project site or at the source of the product to be tested.

3. To facilitate inspections and tests.

4. For storage and curing of test samples.

F. Notify the Engineer at least 48 hours in advance of operations to allow for laboratory assignment of personnel and scheduling of tests. When tests or inspections cannot be performed after such notice, reimburse City for Laboratory personnel and travel expenses incurred due to Contractor's negligence.

i When such inspections do not take place, the Contractor is AT RISK of having uninspected work reconstructed / removed and payments not processed until proper inspection and or testing can be successfully completed.

G. Employ and pay for the services of the same or a separate, equally qualified independent testing laboratory to perform additional inspections, sampling and testing required for the Contractor's convenience.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 4410

SECTION 4562

DUST CONTROL

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Perform dust control operations, in an approved manner, whenever necessary or when directed by the City, even though other work on the project may be suspended.

B. Dust control shall be generally accomplished by cleaning, sweeping, and sprinkling with water. The use of water resulting in mud will not be permitted as a substitute for sweeping or other methods. Calcium chloride may be used when necessary to control dust nuisance.

C. Methods of controlling dust shall meet all air pollutant standards as set forth by Federal and State regulatory agencies.

PART 2 PRODUCTS

2.01 MATERIALS

A. Calcium chloride shall conform to AASHTO M144, Type I except the requirements for "total alkali chlorides" and other impurities shall not apply.

2.02 SWEEPING EQUIPMENT

A. When identified in the contract documents, furnish and operate a self-loading motor sweeper with spray nozzles at least once each working day to keep paved areas acceptably clean wherever construction, including restoration, is incomplete.

PART 3 EXECUTION

3.01 MAINTENANCE

A. Abate dust nuisance throughout all phases of construction until final acceptance of the Project.

END OF SECTION 4562

SECTION 4580
PROJECT IDENTIFICATION SIGNS

PART 1 GENERAL

1.01 REQUIREMENTS

A. Provide and maintain project signs.

1.02 SUBMITTALS

A. Submit details of Contractor Sign in accordance with the requirements of Section 4300. Use the sign format following the end of this section to prepare the appropriate wording for the Project. Show content, layout, lettering style, lettering size, and colors. Make sign lettering to scale, clearly indicating condensed lettering if used.

1.03 CONTRACTOR SIGN

A. Provide two (2) double-sided signs, to be used at the north end and south end of the street or as directed by the RPR or Project Engineer.

B. Construct signs with new materials in accordance with details shown on the Drawings. Maintain signs to present a clean and neat appearance throughout the Project duration.

C. Signs shall be painted and lettered by an experienced professional in the type of work required.

D. Payment for furnishing and maintaining Contractor Sign shall be included in Mobilization (no direct payment).

PART 2 PRODUCTS

2.01 CONTRACTOR SIGN MATERIALS

A. Sign Posts: 4"X 4" pressure treated wood posts, 12 feet long (minimum) for in-ground mounting.

B. Fasteners shall be galvanized steel. Attach sign to posts with ½"X 5-1/2" button head carriage bolts and secure with nuts and washers. Cover button heads with reflective film or coating to match the sign background.

C. Sign: 4'X 8' X ¾" exterior B-C plywood. Do not piece plywood sheets to fabricate a sign face.

D. Coating: White industrial grade, fast-drying, oil-based paint with gloss sheen for posts and sign. Paint both sides and all edges of sign prior to adding adhesive applications.

E. Sign Background: Reflective white 3M Scotchlite Engineer Grade, Pressure Sensitive Sheeting (White) or equal

F. Lettering: 3M Scotchcal Pressure Sensitive Films (Black), or equal, for lettering.

G. City will furnish an electronic City Seal for use by the Contractor.

2.02 CONTRACTOR SIGN LAYOUT

A. Lettering Style, Size, and Spacing: Helvetica Regular.

B. Condensed style text may be utilized if necessary to maintain sign composition.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install Contractor Sign prior to mobilization, at locations shown on the Drawings unless otherwise directed by the Engineer. Position sign so it is fully visible and readable to the general public.

B. Install signs level and plumb. Sink posts 3 feet to 4 feet below grade and stabilize posts to minimize lateral motion. Leave a minimum of 8 feet of post above grade for mounting sign.

C. One double-sided sign shall consist of 2 separate 4' X 8' panels mounted back-to-back on a single set of sign posts.

3.02 MAINTENANCE AND REMOVAL

A. Maintain signs and supports in a neat, clean condition; repair deterioration and damages to structure, framing and sign.

B. Remove signs, framing, supports, and foundations to a depth of at least 2 feet below grade upon completion of the Project. Restore area to a condition better than or equal to the existing condition prior to construction.

END OF SECTION 4580

CITY OF

Shreveport

YOUR TAX DOLLARS AT WORK

PROJECT:

....

EST. COMPLETION DATE:

.....

MAYOR:

TOM ARCENEUX

FOR INFORMATION:

PUBLIC WORKS -ENGINEERING

(318) 673-6000

CITY COUNCIL:

A - TABATHA TAYLOR

B - GARY BROOKS

C - JIM TALIAFERRO

D - GRAYSON BOUCHER

E - DR. ALAN JACKSON, JR.

F - JAMES GREEN

G - URSULA BOWMAN

SECTION 4600
DELIVERY, STORAGE AND HANDLING

PART 1 GENERAL

1.01 SCOPE OF WORK

A. This Section specifies the general requirements for the delivery, handling, storage and protection for all items and materials required in the construction of the Work. Refer to Section 106 for related general provisions. Specific requirements, if any, are identified in separate specifications for the related item.

B. Refer to Section 106 for general provisions related to storage and handling of materials.

C. Refer to Section 108 for general provisions related to storage of equipment and materials in streets.

D. Refer to Section 2000 and Section 3000 for specific requirements related to stringing pipe materials at the Site.

1.02 TRANSPORTATION AND DELIVERY

A. Transport and handle items in accordance with manufacturer's instructions.

B. Coordinate delivery from Suppliers with construction schedule to ensure minimum holding time for items that are hazardous, flammable, easily damaged or sensitive to deterioration.

C. Deliver products in manufacturer's original sealed containers or other packing systems, complete with instructions for handling, storing, unpacking, protecting and installing.

D. Provide necessary equipment and personnel to unload and handle all items and materials.

E. Promptly inspect shipment to assure that products comply with requirements, quantities are correct and items are undamaged.

F. If any item has been damaged, such damage shall be repaired at no additional cost to the City.

1.03 STORAGE AND PROTECTION

A. Store items and materials at an offsite laydown area until they are they are ready for delivery to the Site. Coordinate delivery to the Site with the installation schedule.

B. Store and protect products in accordance with the manufacturer's instructions, with seals and labels intact and legible. Storage instruction shall be studied by the Contractor and reviewed with the Engineer. Carefully follow storage instructions and maintain written documentation of compliance. Arrange storage to permit access for inspection.

C. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.

D. All paint and other coating products shall be stored in areas protected from the weather. Follow all storage requirements set forth by the paint and coating manufacturers.

1.04 STORAGE AT THE SITE

A. All items and materials delivered to the Site shall be unloaded and placed in a manner which will not hamper the Contractor's normal construction operation or those of subcontractors and other contractors and will not interfere with the flow of necessary traffic.

B. Unless otherwise specified in separate sections, items and materials may not be stored at the Site for more than 5 days without specific approval from the Engineer.

END OF SECTION 4600

SECTION 4630

SUBSTITUTIONS AND PRODUCT OPTIONS

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. The requirements of this Section apply to proposed Substitute Items. If in the sole discretion of the Engineer an item of material or equipment proposed by the Contractor does not qualify as an "or-equal" item, it will be considered a proposed Substitute Item. This Section includes supplementary requirements to those in the General Provisions.

B. The requirements of this Section do not apply to potential Suppliers or Bidders. Proposed Substitute Items will be accepted only from the Contractor.

1.02 SUBMITTALS

A. In order for proposed Substitute Items to be considered, the Contractor shall submit, within 30 days of Notice to Proceed, complete data as set forth herein to permit complete analysis of all proposed Substitute Items identified on the list. Proposed substitutions will not be considered unless the Contractor provides all of the required information within the 30 day period.

B. Furnish a separate submittal for each proposed Substitute Item. Each submittal shall include the following information.

1. Complete data substantiating compliance of the proposed Substitute Item with requirements stated in Contract Documents:

   a. Product identification, including manufacturer's name and address.

   b. Manufacturer's literature; identify:

      i Product description.

      ii Reference standards.

      iii Performance and test data.

      iv Operation and maintenance data.

   c. Samples, as applicable.

   d. Name and address of similar projects on which product has been used, and date of each installation.

2. Itemized comparison of the proposed Substitute Item with product specified. List significant variations. Substitution shall not change design intent and shall perform to same intent or better of that specified.

3. Data relating to impact on construction schedule occasioned by the proposed substitution.

4. Any effect of substitution on separate contracts.

5. List of changes required in other work or products.

6. Accurate cost data comparing proposed substitution with product specified.

   a. Amount of any net change to Contract Amount.

7. Designation of required license fees or royalties.

8. Designation of availability of maintenance services, sources of replacement materials.

1.03 EVALUATION OF PROPOSED SUBSTITUTE ITEMS

A. Substitutions will not be considered for acceptance when:

They are indicated or implied on shop drawings or product data submittals

They are requested directly by a Subcontractor or Supplier.

Acceptance will require substantial revision of Contract Documents.

B. Requests for substitutions which are not included on the list of proposed Substitute Items will not be considered unless evidence is submitted to the City that all of the following circumstances exist:

1. The specified product is unavailable for reasons beyond the control of the Contractor. Such reasons shall consist of strikes, bankruptcy, discontinuance of manufacturer, or acts of God.

2. The Contractor placed, or attempted to place, orders for specified products within 30 days after Notice to Proceed

3. Request for substitution is made in writing to the Engineer within 10 days of the date on which the Contractor ascertains that it cannot obtain the specified item.

4. Complete data as set forth herein to permit complete analysis of the proposed substitution is submitted with the request.

C. The Engineer's decision regarding evaluation of substitutions shall be considered final and binding. Requests for time extensions and additional costs based on submission of, acceptance of, or rejection of substitutions will not be allowed. All approved substitutions will be incorporated into the Contract by Change Order.

1.06 CONTRACTOR'S REPRESENTATION

A. In making formal request for substitution, Contractor represents that:

1. It has investigated proposed product and has determined that it is equivalent to or superior in all respects to that specified.

2. It will provide same warranties or bonds for substitution as for product specified.

3. It will coordinate installation of accepted substitution into the Work, and will make such changes as may be required for the Work to be complete in all respects.

4. It waives claims for additional costs caused by substitution which may subsequently become apparent.

5. Cost data is complete and includes related costs under his/her Contract, but not:

a. Costs under separate contracts.

b. City's costs for redesign or revision of Contract Documents.

1.07 ENGINEER DUTIES

A. Review Contractor's requests for substitutions within 14 calendar days.

B. Notify Contractor, in writing, of decision to accept or reject requested substitution.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 4630

SECTION 4700

CONTRACT CLOSEOUT

PART 1 GENERAL

1.01 SCOPE OF WORK

A. This Section specifies administrative, verification and procedural requirements for project closeout, including but not limited to:

1. Final cleaning (Section 4710).
2. As-Built Construction Schedule (Section 4310).
3. Warranties, guarantees, and bonds (Section 4740).
4. Reconciliation of final accounting and summary change order.
5. Final releases or waivers buildings, wells, utilities and railroads.
6. Confirmation that all issues related to impacted properties have been addressed
7. Letter of Final Completion.
8. Final Acceptance and Payment.

1.02 RELATED WORK

A. Completion (Standard Specification Section 110.12).

B. Acceptance and Final Payment (Standard Specification Section 111.8).

1.03 FINAL COMPLETION

A. Complete all Work, correct all deficiencies, and furnish all deliverables as specified, prior to Final Completion. The following list is not intended to be comprehensive, but includes examples of services and documentation which are part of the Work.

1. Field services by material suppliers and manufacturers
2. Initial operation and testing, performance testing, final acceptance testing
3. Startup and performance demonstration
4. Operating and maintenance instructions and manuals
5. Spare parts and maintenance materials
6. As-Built Construction Schedule
7. Warranties, guarantees, and bonds
8. Final cleaning and site restoration
9. Removal of project signs, temporary traffic control devices, and temporary facilities

10. Establish permanent erosion control and remove temporary erosion control items

B. Furnish submittals to Engineer that are required by governing or other authorities having applicable jurisdiction including but not limited to permit close out information, certificates of occupancy, etc.

C. When the construction as specified in the Contract is Substantially Complete the Contractor shall notify the City Engineer in writing and that the work will be ready for inspection on a definite date. The notice shall bear the signed concurrence of the Engineer having charge of inspection and construction and shall be given at least ten (10) days prior to the date stated for the inspection. If the City determines that the work is as represented, it will make arrangements to have the substantial completion inspection commenced on the date stated in such notice, or as soon thereafter as practical. If the project is found to be substantially complete, the Engineer will notify the Contractor and will issue a certificate of Substantial Completion. Said certificate shall be dated as of the date of the inspection. If, however, the inspection discloses any work, in whole or in part, as being unsatisfactory, the Engineer will give the Contractor the necessary instructions for correction of same, and the Contractor shall immediately comply with and execute such instructions.

D. When the Contractor determines that the incomplete or unsatisfactory Work identified during the substantial completion inspection is complete, it shall notify the City Engineer in writing that the Work will be ready for final inspection on a definite date. The notice shall bear the signed concurrence of the Engineer having charge of inspection and construction and shall be given at least 10 days prior to the date stated for final inspection. If the City determines that the Work is as represented, it will make arrangements to have final inspection commenced on the date stated or as soon thereafter as practical.

E. If the final inspection discloses any Work as being unsatisfactory, the Engineer will give the Contractor the necessary instructions for correction. Upon correction of the Work, another inspection will be made, and will constitute the final inspection if the Work has been satisfactorily completed.

F. When the Work is found to be complete, the City will notify the Contractor and issue a Letter of Final Completion. The Contractor shall record the Letter of Final Completion with the Clerk of Court in Caddo Parish no later than 45 days after the date of Final Completion. The recording date begins the “45 day lien free period” which is the last 45 days during which anyone may file a lien against the contract.

G. The date of Final Completion is the end of accrual of Contract Time and Liquidated Damages. The following date is the beginning of time for warranties, guarantees, and the maintenance and repair period.

1.04 FINAL ACCEPTANCE AND PAYMENT

A. If necessary to reconcile estimated and actual quantities of Contract Items, the City will prepare and execute a summary change order.

B. Contractor shall furnish all releases or waivers on buildings, wells, utilities, and railroads, as well as any maintenance bonds, certificates from the Health Department, tracings, brochures, or other items required by the Contract before Final Payment.

C. The City will acknowledge Final Acceptance of the Work and make final payment to the Contractor within 45 days following receipt of a clear lien certificate.

D. For a paving assessment project, the City Council must approve and accept the Work and authorize final payment.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 4700

SECTION 4710

CLEANING

PART 1 GENERAL.

1.01 SCOPE OF WORK.

A. Maintain the Site clean and free from rubbish and debris, including existing rubbish and debris identified in the Contract Documents to be removed. Execute cleaning of components of the Work during construction until final completion of the Project. No direct payment will be made for Work specified in this Section.

1.02 DISPOSAL AND CLEANING.

A. Conduct cleaning and disposal operations to comply with codes, ordinances, regulations and anti-pollution laws.

PART 2 PRODUCTS.

2.01 MATERIALS.

A. Use only those cleaning materials which will not create hazards to health or property and which will not damage surfaces.

B. Use only those cleaning materials and methods recommended by manufacturer of surface material to be cleaned.

C. Use cleaning materials only on surfaces recommended by manufacturer of the cleaning material.

D. Earth dams will not be permitted at catch basin openings, local depressions, or elsewhere, except in time of emergency. Temporary dams of sand bags, asphaltic concrete, or other acceptable material may be permitted when necessary to protect the Work, provided their use does not create a hazard or nuisance to the public. Such dams shall be removed from the Site as soon as their use is no longer necessary.

PART 3 EXECUTION.

3.01 PRIOR TO CONSTRUCTION.

A. Remove all existing waste material, rubbish and windblown debris identified in the contract documents from the work site prior to construction.

3.02 DURING CONSTRUCTION.

A. Execute periodic cleaning to keep the Work, the Site and adjacent properties free from accumulations of waste materials, rubbish and windblown debris, resulting from construction operations.

B. Provide on-site containers for the collection of waste materials, debris and rubbish.

C. Remove waste materials, debris and rubbish from the site periodically and dispose of at legal disposal areas away from the Site.

D. Remove materials and equipment from the Site as soon as they are no longer necessary.

E. Remove excess materials from excavation of catch basins and similar structures immediately. Sufficient materials which meet the specified requirements for backfill may remain.

F. Remove forms and form lumber from the Site as soon as practicable.

G. Engineer may direct the Contractor to perform cleaning if Engineer determines that cleaning is adequate or not being done frequently enough. Contractor shall immediately clean affected area identified by the Engineer at no additional cost to the City. The City reserves the right to clean or utilize a third-party to clean the site if after written notification to the Contractor that cleaning is inadequate or not being done frequently and action is not taken by the Contract to clean the identified area within one calendar day. Costs incurred by the City for cleaning will be reimbursed by the Contractor or back charged and withheld on pay requests.

3.03 DUST CONTROL.

A. Schedule operations so that dust and other contaminants resulting from cleaning process will not fall on wet or newly-coated surfaces.

3.04 FINAL CLEANING.

A. Employ skilled workmen for final cleaning.

B. Remove grease, mastic, adhesives, dust, dirt, stains, fingerprints, labels and other foreign materials from sight-exposed interior and exterior surfaces.

C. Broom clean exterior paved surfaces; rake clean other surfaces of the grounds.

D. Prior to final completion or City occupancy, conduct an inspection of sight-exposed interior and exterior surfaces and all Work areas, to verify that the entire Work is clean.

END OF SECTION 4710

SECTION 4740

WARRANTIES AND

BONDS

PART 1 GENERAL.

1.01 SCOPE OF WORK

A. This Section specifies general administrative and procedural requirements for warranties and bonds required by the Contract Documents, including manufacturer's standard warranties on products and special warranties.

1.02 SUBMITTALS.

A. Submit written warranties to the City prior to the date fixed by the City for Final Completion. If the Certificate of Final Completion designates a commencement date for warranties other than the date of Final Completion for the work, or a designated portion of the work, submit written warranties upon request of the Engineer.

B. When a designated portion of the work is completed and occupied or used by the City, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the City within 15 days of completion of that designated portion of the Work.

C. When a special warranty is required to be executed by the Contractor, or the Contractor and a subcontractor, supplier or manufacturer, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the City for approval prior to final execution.

D. Refer to the General Provisions, Special Conditions for Streets/Drainage and Water/Sewer and individual Technical Specification Sections for specific content requirements, and particular requirements for submittal of special warranties and bonds.

E. At Final Completion compile two copies of each required warranty and bond properly executed by the Contractor, or by the subcontractor, supplier, or manufacturer. Organize the warranty documents into an orderly sequence based on the table of contents of the Contract Documents.

F. Bind warranties and bonds in heavy-duty, commercial quality, durable 3-ring vinyl covered loose-leaf binders, thickness as necessary to accommodate contents and sized to receive 8-1/2in by 11-in paper.

G. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Contract Documents, with each item identified with the number and title of the Section in which specified and the name of the product or work item.

H. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address and telephone number of the installer, supplier and manufacturer.

I. Identify each binder on the front and the spine with the typed or printed title "WARRANTIES AND BONDS", the project title or name and the name, address and telephone number of the Contractor.

J. When operating and maintenance manuals are required for warranted construction, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

K. Schedule of Special Warranties

1. General Provision 103.5- Guarantees

L. Maintenance Bond: Furnish a two-year 10 percent maintenance bond as required in Special Conditions for Streets/Storm Drainage and Water/Sewer 5.4.

1.03 WARRANTY REQUIREMENT.

A. Related Damages and Losses: When correcting warranted work that has failed, remove and replace other work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted work.

B. Reinstatement of Warranty: When work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.

C. Replacement Cost: Upon determination that work covered by a warranty has failed, replace or rebuild the work to an acceptable condition complying with requirements of Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective work regardless of whether the City has benefited from use of the work through a portion of its anticipated useful service life.

D. City's Recourse: Written warranties made to the City are in addition to implied warranties, and shall not limit the duties, obligations, rights and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the City can enforce such other duties, obligations, rights, or remedies.

E. Rejection of Warranties: The City reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Contract Documents.

F. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the work that incorporates the products, nor does it relieve suppliers, manufacturers and subcontractors required to countersign special warranties with the Contractor.

1.04 DEFINITIONS.

A. Standard Product Warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the City.

B. Special Warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the City.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 4740

END OF PART 40