TECHNICAL SPECIFICATIONS
DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01010 - SUMMARY OF WORK

PART - I GENERAL

1.01 Scope of Work - The work to be done under these specifications consists of furnishing all plant, labor and materials and performing all work required in the construction and installation of those facilities shown in the drawings and described herein. The work shall conform to the Drawings prepared by the Engineer, GSA Consulting Engineers, Inc., which Drawings along with these Specifications and any Addenda issued during the bidding process form the Contract Documents, and which are filed in the office of the Owner. All work under the Contract Documents are under direct observation of the Engineer. A brief summary of work covered by the Contract Documents includes:

Relocation of various diameter water lines in multiple locations along LA 637 from LA 44 to US 61 to accommodate future roadway widening and drainage improvements along LA 637.

1.02 Owner-Furnished Items - The following is a list of Owner-Furnished items:

N/A

1.03 Source and Status of Funds - Funding for this project are as follows:

SOURCE	STATUS
St. John the Baptist Parish & LADOTD	Funds are in Place

1.04 Contractor's Responsibility Concerning Contract Documents

A. All Contract Documents are mechanically reproduced. The Contractor is responsible for checking his sets of the Contract Documents to assure they are complete in number and all sheets are legible. The Engineer will replace any copies of sheets as necessary without additional charge to the Contractor when notified.

B. Contractor is responsible for compliance with all Contract Documents, whether or not the set(s) issued to the Contractor are complete and totally legible.

SECTION 01010 - SUMMARY OF WORK

C. It shall be understood that the failure of the Contractor to review and verify his set(s) of Contract Documents for completeness and legibility which results in additional costs to the Contractor shall in no way increase the cost of the project to the Owner or the Owner's Engineer after bids are received.

D. Contractor shall have present on the jobsite at all times a minimum of two (2) complete sets of Contract Documents. One (1) set shall be used for record keeping for preparation of record drawings upon completion of project.

1.05 Existing Facilities - The Owner reserves the right to maintain, operate and occupy the following existing facilities in conjunction with the project:

None

1.06 Existing Utilities Coordination - If available to the Engineer during the design, the approximate location of known utilities has been indicated on the construction drawings. Exact location of these and any other utilities shall be made by the Contractor prior to Work or if unavailable by the Utility Owner, as work progresses.

A. The Contractor shall be responsible for notifying all public or private utilities, or other interested parties to make necessary adjustment of utility structure or appearances affected by work. The Contractor may notify each utility owner direct or contact LA ONE CALL; however, he shall be solely responsible for contacting each utility.

B. The Contractor will be responsible for any damages done by him to any utility structure owned or controlled by any agency, public or private, when the Contractor has followed the utility location procedure prescribed by state law and when that utility has been properly located. The Contractor shall perform and carry on the work so as not to interfere with or damage utility structures mentioned herein or shown on the Drawings or discovered during construction, which are to be left within the limits of the work.

C. The Owner will not be responsible for any delay or inconvenience to the Contractor in carrying out the work resulting from the existence, removal or adjustment of any public utility. Additional costs incurred as a result thereof shall be at no additional expense to the Owner.

D. The Contractor shall provide 48 hours notice to the respective utility owner prior to excavation or the crossing of highways, railroads, pipelines, cables, other utilities. The Contractor shall make the location of the Work available to any representative of the respective utility owner for a site visit. The utility owner representative shall locate the underground utility structure in accordance with the provisions of state law, and when necessary as determined by the utility owner shall approve the method of excavation to be utilized by the Contractor.

1.07 Scheduling of Work and Sequence of Construction

A. Prior to commencement of work, a proposed schedule of work and sequence of construction shall be submitted to the Engineer by the Contractor for approval as required elsewhere in these Specifications. Periodic updates of the progress schedule are required as part of the performance of the Work and the Contractor is hereby notified that periodic progress payments will be withheld should the required schedule updates not be submitted.

B. Should special sequence of construction be required, the sequence will be detailed in the Specification that is entitled "Special Project Requirements."

1.08 Continuation of Existing Systems - The construction of the proposed modifications and their connection to the existing systems shall be completed in accordance with a schedule developed by the Contractor and approved by the Engineer. The schedule shall insure that the operation of the facilities shall not be interrupted during the construction period. All temporary facilities including piping, pumping equipment and power required to maintain the operation of these facilities shall be provided, constructed and maintained by the Contractor as a portion of the bid price.

1.09 General Terms and Abbreviations

A. The standard units of measure shall be the inch-pound as defined by the U.S. National Bureau of Standards. Metric conversion, when necessary, shall be in accordance with ASTM SI10.

B. Abbreviations for words or terms utilized in the construction industry shall conform to the CSI Standard. Drawing symbols shall conform to applicable industry standards.

C. A list of abbreviations of various organizations is provided elsewhere in the Specifications along with contact addresses.

SECTION 01010 - SUMMARY OF WORK

1.10 Submittals - Requirements for submittals required as part of the Work are included elsewhere in the Specifications.

1.11 Alternates

A. When required by these specifications, pre-qualification of certain material and/or equipment will be required during the bidding phase of the project. The pre-qualification process requires all data and information be submitted to the Engineer FIFTEEN (15) days prior to receipt of bids as required by the General Conditions. Refer to the General Conditions for submittal requirements of product data and information.

B. Approvals of alternate material and/or equipment will be made by Addenda. If alternate material and/or equipment is not approved by Addenda and requires a pre-qualification by this paragraph, only those items specified in these specifications can be bid. No equipment and/or qualification can be submitted after the bid under the provisions of General Conditions. If an alternate material and/or equipment is approved by Addendum, the Contractor shall be responsible for providing design calculations and drawing revisions for alternate products which affect the existing design, specifications and drawings, including, but not limited to, hydraulics, structural, piping and electrical.

C. The costs for these alterations or revisions shall be solely borne by the Contractor under the prices submitted in the Bid Form and no additional cost to the Owner will be considered for such alterations or revisions to the Work. All design changes shall be approved by the Engineer prior to incorporation into the project. Items for which pre-qualification submittals are requested for this Project are as follows:

None

1.12 Quality Control

A. If desired by the Owner, a qualified testing laboratory will make field visits to sample such items as portland cement concrete, hot or cold-mix asphalt, earthwork fill and compaction, aggregate, welding, etc. The frequency of testing will be at the discretion of the Owner and the recommendations of the Engineer to the Owner.

B. Items that are measured in the delivery vehicle shall require presentation of delivery tickets that indicate volume or weight delivered to the Project Site. Delivery tickets shall be presented to the Resident Project Representative when the material is delivered to the project site. When such delivery of vehicle measure material is required, it shall be the Contractor's responsibility to coordinate the delivery with other operations on the project

so that the Resident Project Representative's presence will not be required at more than one location at the same time.

C. When materials are to be measured by weight, the tare weight of the vehicle shall be made when the vehicle's fuel tanks are half full. The level of fuel in the vehicle when the tare weight is determined shall be certified by the scale operator on the weight ticket. Should it be found that the tare weight for an individual vehicle was erroneously or fraudulently determined, the vehicle shall either be banned from further use on the project or the tare weight shall be redetermined based on full fuel tanks and all loads previously hauled by the vehicle shall be adjusted based on the redetermined tare weight and the redetermined tare weight shall be used for all subsequent loads hauled by the vehicle.

1.13 Regulatory Requirements - See Supplementary Conditions for articles, if such articles are included, detailing additional requirements of U.S. Government Agencies providing financial assistance to the project or any State Agency labor requirements.

1.14 Mobilization - Details for administration of the Contractor's mobilization to the project site are included elsewhere in the Specifications.

1.15 Field Office - The Contractor is not required to provide on-site field office for the Engineer and the Resident Project Representative. The office shall be a minimum of 10' x 10' x 8' with adequate lighting, heating, phone service, and sanitary facilities.

1.16 Adverse Weather Days

A. If requested the Contractor shall be granted time extensions for excessive adverse weather days, beyond the reasonably anticipated days of adverse weather. An adverse weather day is defined as a day when the Contractor, due to adverse weather conditions cannot perform the normal construction operations on the critical work item for at least six hours. Adverse weather days shall also include days subsequent to an adverse weather event where, in the opinion of the Engineer or his duly designated representative, weather conditions have rendered soil conditions unworkable to the point that at lease six hours of normal construction operations cannot be performed. This time extension must be requested monthly.

B. A certain amount of adverse weather days have been considered in setting the contract time on the project. The following are considered reasonably anticipated days of adverse weather on a monthly basis.

SECTION 01010 - SUMMARY OF WORK

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

1.17 Project Photographs and Audio-Video Records - When required as part of the Work, requirements for project photographs and audio-video records are included elsewhere in the Specifications.

1.18 Protection of Work - Until the acceptance of the work by the Engineer as evidenced in writing, said work shall be under the charge and care of the Contractor. The Contractor shall take every necessary precaution against damages to any part thereof by the elements or from any other cause. The Contractor shall rebuild, restore, repair, and make good, at his own expense, all injuries or damages to any portion of the work occasioned by any of the above causes before its completion and acceptance.

1.19 Examination of Site - By submitting a bid for this project, the Contractor verifies that he has made a visit the site and has become familiar with existing conditions under which the project is to be executed. No additional allowances will be made to the Contractor for any error or negligence on his part.

1.20 Tolerances -

A. Contractor shall verify in the field before any material or equipment is fabricated the dimension when those dimensions of existing structures or equipment is dependent as correctness of such information. Should dimensions as shown on the drawing vary from the field, then the Contractor shall notify the Engineer and jointly resolve the figure in favor of the correct dimensions.

B. All work and materials shall be within reasonably accepted manufacturing and construction tolerances as defined by the drawings, specifications, and the manufacturer of material and equipment. If those tolerances exceed limits, the Owner, with or without the Engineer's recommendation, may accept the work at a reduced value as allowed by the

General Conditions, provided the work will not be materially affected by the change and the interests of the Owner is protected.

1.21 Material and Workmanship - Unless otherwise indicated in these specifications or drawings, all materials and equipment shall be new and free from defects. The workmanship and methods of construction utilized shall be in accordance with the best modern practices.

1.22 Field Engineering - With the Engineer's assistance, the Contractor shall stake off the improvements and check dimensions and refer any discrepancies to the Engineer for correction. Elevations shall be established by the Contractor and then approved by the Engineer before the work proceeds.

A. Basic horizontal and vertical control points have been established or designated by the Engineer. These points shall be used as datum for the work. All additional survey, layout, and measurement work shall be performed by the Contractor as a part of the work.

B. The Contractor shall furnish all utility locating equipment, survey equipment, stakes and personnel, including competent, suitably qualified instrument men, rodmen, and chainmen for laying out the work and for measuring the work from boundary, baseline, and established benchmark reference points furnished by the Owner and Engineer.

C. Cut sheets, where required for lines laid to grade, especially for those items to be paid for by various increments of depth, will be prepared from surveys developed by the Contractor and submitted to the Engineer for review and approval.

D. The Contractor shall keep the Engineer informed, a reasonable time in advance, of the times and places which he wishes to do work so that horizontal and vertical control points may be established and any checking deemed necessary by the Engineer may be done with minimum inconvenience to the Engineer and minimum delay to the Contractor.

E. The Contractor shall remove and reconstruct work which is improperly located.

1.23 Temporary Facilities -

A. Regulations - The Contractor shall comply with governing regulations and recommendations for temporary facilities, including (but not necessarily limited to) code compliances, permits, inspections, testing and health and safety compliances.

SECTION 01010 - SUMMARY OF WORK

B. The Contractor shall provide and maintain in a neat, sanitary condition, such accommodations for the use of his employees as may be necessary to comply with the requirements and regulations of the State Department of Health in the State in which the work is being done or of other authorities having jurisdiction. He shall commit no public nuisance.

C. Temporary Utilities - When available, the following restrictions, changes, rates, and quantities apply for temporary utilities, such as fuel, electric power, telephone, water, etc.:

Temporary fuel, power, and telephone will be paid by the Contractor. Water for testing pipe will be provided by the Contractor.

D. Removal - When need for a temporary facility has terminated, the Contractor shall promptly remove such service unless requested by the Engineer to retain it for a longer period. Upon removal of temporary service, the Contractor shall leave the job site clean and level.

1.24 Measurement and Payment -

A. Measurement - See appropriate Measurement and Payment Section of the Specifications for the method of measurement and basis of payment. Measurement of unit price items will generally be by the standard inch-pounds system of units commonly used in the United States which are defined by the U.S. National Bureau of Standards.

B. Application for Payment - Application for payment by the Contractor shall be submitted on the form provided in the Contract Documents. For both unit price and lump sum contracts, a progress form indicating varying degrees of work completed shall accompany the Application for Payment. The frequency of progress payment submittals shall be jointly agreed to by the Owner and Contractor; however, if no agreement is made in writing to the Engineer then progress payment will be processed on a once-a-month basis preferably at the beginning of each month. Five (5) copies of the Application for Payment and the progress form shall be submitted to the Engineer.

1. In order to expedite the progress payment, the Contractor field foreman and the Resident Project Representative should review the completed work together.

SECTION 01010 - SUMMARY OF WORK

2. Upon receipt of the Application for Payment, the Engineer will review the work completed and prepare the Engineers Recommendation for Payment (E.J.C.D.C. Form 1910-8-C or the latest revision thereof) to be submitted to the Owner.

3. Based on the unit price or an approved schedule or breakdown of values, partial payment will be made for only that percentage of work completed and in place. Portions of unit price or lump sum contracts will be withheld until the entire item is completed. Cost of material and equipment on hand may be included in the estimate by inclusion of a list showing quantities, unit prices, and total costs for each item of material property stored at the site.

4. Insurance coverage, secure storage, and protection of the Owner's interest are also required for payment of material or equipment not incorporated into the Work. Material invoices shall be submitted for all materials in which payment is requested. Partial payment shall in no way be taken as an acceptance of the equipment involved, or as a release from the responsibility of any portion thereof. For pipeline items, 85%, 5%, and 10% of the scheduled value, respectively, will apply for the installation, testing, and clean-up of the pipeline respectively.

5. All excess material inventory at the completion of the project shall revert back or remain the property of the Contractor. The Owner at the completion of the project will pay for only that material that was actually incorporated into the project. No payment will be made for excess material inventory stored on the project that will not be utilized or eventually incorporated into the project.

C. Partial or Progress Payments - Partial or progress payments will be made for only that percentage of work completed and in place based on unit priced items or an approved schedule of values as described in the General Conditions for lump sum priced items. Less than full payment for an item and only proportional payments will be made prior to completion of all work components of the item, such as testing, clean up and equipment start-up.

1. If the Owner has secured Federal or State Funds which he is required to make payments to the Contractor, extend periods of payment processing may be required. Refer to Supplementary Conditions for period of payment processing by Engineer and Owner.

2. All work for the previous month shall be summarized for the 25th day of each month and submitted to the Engineer on or about the first of each month.

1.25 Final Payment - Final payment will be made in accordance with the section of the specifications entitled "Contract Closeout."

1.26 Change Order Procedures - See General and Supplemental Conditions.

PART - II PRODUCTS

(NOT USED)

PART - III EXECUTION

(NOT USED)

END OF SECTION

TECHNICAL SPECIFICATIONS
DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01030 - SPECIAL PROJECT REQUIREMENTS

PART - I GENERAL

1.01 SEQUENCE OF CONSTRUCTION

The Contractor shall refer to the Sequence of Construction on Sheet 3 of the Plans for the sequence of construction. Any deviations from the Sequence of Construction must be approved by the Project Engineer prior to initiation of such work.

1.02 PROTECTION AND RESTORATION OF PRIVATE PROPERTY

The Contractor shall conduct his operations so as to disturb the least amount of vegetation and improvements adjacent to the construction work that is required. The Contractor shall proceed with all work on each offset until all required work on each individual offset is complete. Within one week of completion of the installation of water force main, the Contractor shall clean and dress the work area to finished grade matching the terrain adjacent to the Work. Should weather conditions prevent the cleaning and dressing operations within the specified time limit, the cleaning and dressing operations shall be performed as soon as weather conditions permit.

1.03 REMOVE AND REPLACE PAVEMENT

The intent of these specifications is to relocate existing water utilities for future roadway and drainage improvements. When necessary, existing pavement shall be removed and replaced to the minimum extent necessary to perform the required relocation/removal work. Pavement shall be replaced as soon as possible after completion of relocation and removal of required utilities.

1.04 RESTORE AGGREGATE DRIVE

Requirements for replacement of aggregate drives shall be performed as soon as the construction work affecting the drive is complete. Aggregate drives shall be restored within one day of the completion of the installation of grinder stations and force mains.

PART - II PRODUCTS – NOT USED

PART - III EXECUTION – NOT USED

END OF SECTION

TECHNICAL SPECIFICATIONS
DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01035 - MODIFICATION PROCEDURES

PART I - GENERAL

1.01 REQUIREMENTS

A. Refer to Articles 10, 11 and 12 of the General Conditions with regards to changes in Contract Price and Contract Time.

B. 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.

C. 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.

D. Owner will designate in writing the person who is authorized to execute Change Orders.

1.02 DOCUMENTATION

A. Contractor may initiate a change by submitting a written notice to the Engineer containing:

1. Description of the proposed change.
2. Statement of the reason for making the change.
3. Statement of the effect on the Contract Price and the Contract Time.
4. Statement of the effect on the work of other Contractors.
5. Documentation supporting any change in Contract Price or Contract Time as appropriate and adequate for proper review by the Engineer.

B. If not required by any U.S. Government Agencies, Change Order form shall be E.J.C.D.C. Form No. 1910-8-B or the latest revision thereof. Change Order request shall be within thirty (30) days of the occurrence with the exception of inclement weather as outlined by other Sections of this Specification.

1.03 CONSTRUCTION CHANGE AUTHORIZATION

A. Change Orders 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 Sum and any change in Contract Time.

B. Change orders must have the Owner's and Contractor's approvals. Change orders on projects funded in whole or in part by loans or grants from agencies of the U.S. Government must be approved by the respective agency prior to their incorporation into the Project.

1.04 DOCUMENTATION OF PROPOSALS AND CLAIMS

A. Contractor shall support proposed lump sum proposal pricing and each unit price which has not previously been established with sufficient substantiating data to allow the Engineer to evaluate the pricing.

B. Contractor shall provide the following data to support proposed time and pricing of both lump sum proposals, unit pricing, and time and material proposals:

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. In addition, Contractor shall support each claim for work done on a time and material/force account basis with the following additional information:

1. Dates and times work was performed and by whom.
2. Time record, summary of hours worked, and hourly rates paid.
3. Receipts and invoices for:
   a. Equipment used, listing dates and times of use.
   b. Products used, listing quantities purchased.
   c. Subcontractors used, showing the same data as above.

1.05 PREPARATION OF CHANGE ORDERS

A. Engineer will prepare each Change Order.

B. Form: E.J.C.D.C. No. 1910-8-B

C. Change Order will describe changes in the work, both additions and deletions, with attachments of revised Contract Documents to define details of the change.

D. Change Order will provide an accounting of the adjustment in the Contract Price and in the Contract Time.

1.06 LUMP SUM/FIXED PRICE CHANGE ORDER

A. Engineer initiates the form, including a description of the changes involved and attachments based upon documents and proposals submitted by Contractor or requests from Owner or both.

B. Once Engineer has completed and signed the form, all copies will be sent to Contractor for execution. The Contractor shall execute the change order documents and return it to the Engineer within seven (7) days. After execution by Contractor, all copies will be sent to the Owner for execution. Engineer will make distribution of executed copies.

1.07 UNIT PRICE CHANGE ORDERS

A. Content of Change Orders will be based on either:

1. Engineer's definition of the scope of the required changes.
2. Contractor's proposal for a change, as recommended by Engineer.
3. Survey of complete work.

B. The amounts of the unit prices to be:

1. Those stated in the Contract Bid Form.
2. Those mutually agreed upon between Owner and Contractor.

1.08 CORRELATION WITH CONTRACTOR'S SUBMITTALS

A. Contractor shall revise monthly the Schedule of Values and Application for Payment forms to record each Change Order as a separate item of work and to record the adjusted Contract Price.

B. Contractor shall revise monthly the Construction Schedule to reflect each change in Contract Time, to include subschedules to show changes for other items of work affected by the changes.

C. Upon completion of work under a Change Order, the Contractor shall enter pertinent changes in Record Documents.

SECTION 01035 - MODIFICATION PROCEDURES

1.09 PROCEEDINGS WHEN CONTRACTOR DOES NOT EXECUTE THE CHANGE ORDERS

It is anticipated that at the time of submittal to the Contractor, negotiations will have been completed with all parties agreeing to the change(s) in the work, change in Contract Price, and change in Contract Time. In the event that no agreement can be reached and the Contractor fails to execute the Change Order within the specified time limit, the Owner may issue a Change Order without signature of the Contractor establishing a change to Contract Price or Contract Time in accordance with the provisions of Article 10 of the General Conditions. The Contractor will then be paid or assessed time on the basis of the Change Order for the change in work with the Contractor not relinquishing his rights to submit a claim in accordance with Articles 11 and 12 of the General Conditions.

PART II - PRODUCTS - NOT USED

PART III - EXECUTION - NOT USED

END OF SECTION

TECHNICAL SPECIFICATIONS
DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01041 - PROJECT COORDINATION

PART - I GENERAL

1.01 WORK PROGRESS

The Contractor shall furnish personnel and equipment which will be efficient, appropriate and large enough to secure a satisfactory quality of work and a rate of progress which will insure the completion of the work within the time stipulated in the Contract. If at any time such personnel appear to the Engineer to be inefficient, inappropriate, or insufficient for performing the quality of work required or for producing the rate of progress aforesaid, he may order the Contractor to increase the efficiency, change the character or increase the personnel and equipment, and the Contractor shall conform to such order. Failure of the Engineer to give such order shall in no way relieve the Contractor of his obligations to perform the work at the specified quality and rate of progress.

1.02 PRIVATE LAND

A. The Contractor shall be aware that his work will be performed adjacent to private property. The Contractor shall notify all property owners adjacent to and along the route of construction by means of either a printed circular or form letter of the general details of the construction. The letter shall also include names and telephones numbers for key project personnel so that property owners can report problems. These contact telephone numbers shall be given so that appropriate personnel can be contacted 24 hours a day, seven days a week.

B. The Contractor shall not enter or occupy private land outside the Owner's land, rights-of-way, or servitudes except by written permission of both the Owner and the Owner of the private land. Such permission shall be obtained by and at the expense of the Contractor and at no additional cost to the Owner.

C. Owners of adjacent private land shall be inconvenienced as little as possible by the construction work. Where possible, the Contractor shall maintain access across or over the work to adjacent property. At locations where an adjacent property has more than one access point for vehicular traffic, such as paved or aggregate surfaced driveways, grassed ramps, gaps, etc., the Contractor shall schedule his work so that at least one access point is usable by the property owner, his associates, or his clientele in the case where the adjacent property is a business establishment.

1.03 WORK LOCATIONS

Structures and pipelines shall be located substantially as indicated on the Drawings, but the Engineer reserves the right to make such modifications in locations as may be found desirable to avoid interference with existing structures or for other reasons. Where fittings are noted on the Drawings, such notation is for the Contractor's convenience and does not relieve him from laying and jointing different or additional items where required.

SECTION 01041 - PROJECT COORDINATION

1.04 OPEN EXCAVATIONS

A. All open excavations shall be adequately safeguarded by providing temporary barricades, caution signs, lights, and other means to prevent accidents to persons and damage to property. The Contractor shall, at no additional expense to the Owner, provide suitable and safe bridges and other crossings for accommodating travel by the public, Owner's and Engineer's personnel, and workmen. Bridges provided for access to private property during construction shall be removed when no longer required. If the excavation becomes a hazard, or if it excessively restricts traffic at any point, the Engineer may require special construction procedures such as limiting the length of open trench and prohibiting the stacking of excavated material in the street. Open trench excavations shall not remain open overnight and other open excavations shall be fenced or otherwise protected to prevent unauthorized access.

B. The Contractor shall take precautions to prevent injury to the public due to open trenches. All trenches, excavated material, equipment, or other obstacles which could be dangerous to the public shall be barricaded and well lighted at all times when construction is not in progress.

1.05 MAINTENANCE OF TRAFFIC

A. Open pits, trenches, unpaved streets, debris, or other obstructions due to construction that will prevent the normal flow of traffic during an extended construction stoppage, for any reason, shall be minimized. In the event an extended construction stoppage is found to be necessary, Contractor shall provide for normal traffic flow during extended construction stoppage, regardless of the cause.

B. All excavated material shall be placed so that vehicular and pedestrian traffic may be maintained at all times. If the Contractor's operation causes traffic safety hazards, he shall repair the road surface, provide temporary roadways, erect wheel guards or fences, or take other safety measures that are satisfactory to the Engineer.

C. Detours around construction areas will be subject to the approval of the Owner and the Engineer. Where detours are permitted the Contractor shall provide all necessary barricades and signs as required to divert the flow of traffic. While traffic is detoured, the Contractor shall expedite construction operations. The periods when traffic may be detoured will be strictly controlled by the Owner. It is the Contractor’s responsibility to properly notify all emergency service providers of closed streets or roads and the duration of closure, including but not limited to law enforcement, fire protection, and ambulance services.

1.06 CARE AND PROTECTION OF PROPERTY

A. The Contractor shall be responsible for the preservation of all public and private property, and shall use every precaution necessary to prevent damage thereto. If any direct or indirect damage is done to public or private property by or on account of any act,

omission, neglect, or misconduct in the execution of the work on the part of the Contractor, such property shall be restored by the Contractor, at no additional expense to the Owner, to a condition similar or equal to that existing before the damage was done, or he shall make good the damage in another manner acceptable to the Engineer and property owner.

B. All sidewalks that are disturbed by the Contractor's operations shall be restored to their original or better condition by the use of similar or comparable materials. All curbing shall be restored in a condition equal to the original construction and in accordance with the best modern practice.

C. Along the location of this Work, all fences, walks, brushes, trees, shrubbery, and other physical features shall be protected and restored in a thoroughly workmanlike manner. Fences and other features removed by the Contractor shall be replaced in the location indicated by the Engineer as soon as conditions permit. All grass areas beyond the limits of construction which have been damaged by the Contractor shall be regraded and sodded.

D. Trees close to the Work shall be boxed or otherwise protected against injury. The Contractor shall trim all branches that are liable to damage because of his operations, but in no case shall any tree be cut or removed without prior notification of the Engineer. All injuries to bark, trunk, limbs and roots of trees shall be repaired by dressing, cutting, and painting according to approved methods, using only approved tools and materials.

E. The protection, removal, and replacement of existing physical features along the line of work shall be a part of the work under the Contract, and all costs in connection therewith shall be included in the unit and/or lump sum prices established under the items in the Proposal.

F. Where fences must be removed for construction purposes or access, they shall immediately be reconstructed or replaced. The Contractor shall provide adequate temporary fence and gates as necessary to contain or restrict domestic animals within their proper areas during the life of this contract and shall provide reasonable safe and convenient means of access where and when required.

1.07 MAINTENANCE OF FLOW

The Contractor shall maintain the flow of sewers, drains, and water courses interrupted during the progress of the Work, including complete pumped bypass systems where necessary. The Contractor shall immediately remove all offensive matter. The entire procedure of maintaining existing flow shall be detailed in writing for approval by the Engineer well in advance of the interruption of any flow. All temporary works installed for flow maintenance shall be removed when the permanent work is finished and the areas cleaned and restored to good condition. Pavement removal and replacement which, in the opinion of the Contractor, is necessitated by placement of temporary flow control facilities, shall be considered as an item for convenience to the Contractor. Such costs for

pavement removal and replacement shall, therefore, be born by the Contractor at no additional expense to the Owner as required for other flow control measures. The intent of this Specification is that pavement removal be limited to the least amount possible and the Contractor shall investigate alternative methods for flow control which require the least amount of pavement removal.

1.08 CONNECTION TO WORK BY OTHERS

Pipeline construction by others may occur at the same time and in the same areas as work being done under this Contract. The Contractor will, therefore, conduct his operations as follows:

1. Sewer Lines

   a. If shown on the Drawings, sewers built by others may be connected to sewers and/or manholes constructed under this Contract.
   b. If the sewers and/or manhole by others have already been constructed, the manholes and/or sewers under this Contract shall be built at the exact locations of the connection as actually exist in the field. The Contractor is responsible for pot holing the connection points in advance of constructing manholes and/or sewers under this Contract to ensure the proper alignment at the connection point.
   c. If the sewers and/or manholes by others have not been constructed, the sewers shall be built at the exact locations of the connection as shown on the Drawings and plugged.

2. Force Mains & Waterlines

   a. Where shown on the Drawings, force mains and or water mains constructed under this Contract shall be connected to pipelines to be built by others. All connections at the Contract limits of force mains and or water mains shall be terminated with a standard mechanical joint bell end and plugged with a standard mechanical joint plug.
   b. If the force main or water mains by others have already been constructed, the pipelines built under this Contract will be connected to the mains constructed by others by removing all necessary plugs and making the connection(s). The Contractor shall pot hole connection points in advance of development of laying schedules for all pipe size of 16 inches and larger to ensure the proper alignment at the connection point. Upon completion of the tie-in connection(s), Contractor shall deliver all removed plugs to the Owner's facility.
   c. If the force mains or waterlines have not been constructed by others, the pipelines under this Contract shall be laid to the required line and grade, terminated as stated above at the location of the connection indicated on the Drawings, backfilled and marked with a stake.
   d. The notation on the Drawings at tie-in points states that the Contractor shall tie to facilities constructed by others or provide a plug. The intent of this instruction is

that, if a tie-in cannot be made, the Contractor shall furnish and install a plug at the terminal end as defined above.

1.09 PROTECTION OF CONSTRUCTION AND EQUIPMENT

A. All newly constructed work shall be carefully protected from injury in any way. No wheeling or walking or placing of heavy loads on it shall be allowed. All injured portions of the Work shall be reconstructed by the Contractor at no additional expense to the Owner.

B. All structures shall be protected in a manner approved by the Engineer. Should any of the floors or other parts of the structures become heaved, cracked or otherwise damaged, all such damaged portions of the work shall be completely repaired and made good by the Contractor at no additional expense to the Owner and to the satisfaction of the Engineer. Special attention is directed to substructure bracing requirements, described in other sections. If, in the final inspection of the work, any defects, faults or omissions are found, the Contractor shall cause the same to be repaired or removed and replaced by proper materials and workmanship without extra compensation for the materials and labor required. Further, the Contractor shall be fully responsible for the satisfactory maintenance and repair of the construction and other work undertaken herein for at least the guarantee period described in the Contract.

C. The Contractor shall take all necessary precautions to prevent damage to any structure due to water pressure during and after construction and until such structure is accepted and taken over by the Owner.

D. After the buildings or structures have been made weathertight and ready for the installation of pumps, motors, piping and other equipment, the interior temperature shall be maintained at a minimum temperature of 50° F., and thereafter until the completion of the contract, temperature shall not be allowed to drop below 50° F.

1.10 CLEANUP DURING CONSTRUCTION

During the course of the Work, the Contractor shall keep the site of his operations in as clean and neat a condition as is possible. He shall dispose of all residue resulting from the construction work and, at the conclusion of the work, he shall remove and haul away any surplus excavation, broken pavement, lumber, equipment, temporary structures, and any other refuse remaining from the construction operations, and shall leave the entire site of the Work in a neat and orderly condition. . In no case shall cleanup work lag more than 1,000 feet behind installation operations, unless prevented by adverse weather conditions. Cleanup operations shall be brought to within the above stated limit as soon as weather and soil conditions allow as determined by the Engineer. Should cleanup operations lag, the Engineer reserves the right to require suspension of installation operations until cleanup is brought within the above stated limit. Suspension of installation operations in order to bring cleanup into compliance shall not be grounds for claim for additional contract time or compensation.

SECTION 01041 - PROJECT COORDINATION

1.11 COOPERATION WITHIN THIS CONTRACT

A. All firms or persons authorized to perform any work under this Contract shall cooperate with the General Contractor and his subcontractors or trades, and shall assist in incorporating the work of other trades where necessary or required.

B. Cutting and patching, drilling, and fitting shall be carried out where required by the trade or subcontractor having jurisdiction, unless otherwise indicated herein or directed by the Engineer.

PART - II PRODUCTS

NOT USED

PART - III EXECUTION

NOT USED

END OF SECTION

TECHNICAL SPECIFICATIONS
DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01046 -MODIFICATIONS TO EXISTING STRUCTURES, PIPING AND EQUIPMENT

PART - I GENERAL

1.01 SCOPE OF WORK

Furnish all labor, materials, equipment, and incidentals required to modify, alter and/or convert existing structures as shown or specified and as required for the installation of new mechanical equipment, pumping units, piping, and appurtenances. Work shall be performed within the requirements of Special Project Procedures in Section 01100 and required Progress Schedules in Section 01310. Existing pumping units, piping, and equipment shall be removed and dismantled as necessary for the performance of structural alterations in accordance with the requirements herein specified.

PART - II PRODUCTS - NOT USED

PART - III EXECUTION

3.01 GENERAL

A. The Contractor shall dismantle and remove all existing pumping units, equipment, piping, electrical conduit and wiring, electrical panels, and other appurtenances required for the completion of the work. Where called for or required, he shall cut existing pipelines for the purpose of making connections thereto.

B. Anchor bolts for equipment and structural steel removed shall be cut off one inch below the concrete surface. Surface shall be finished as specified in Division 3.

C. No existing structure, equipment, or appurtenance shall be shifted, cut, removed, or otherwise altered except with the express approval of and to the extent approved by the Engineer.

D. When removing materials or portions of existing structures and when making openings in walls and partitions, the Contractor shall take all precautions and use all necessary barriers and other protective devices so as not to damage the structures beyond the limits necessary for the new work and not to damage the structures or contents by falling or flying debris.

E. Materials and equipment removed in the course of making alterations and additions shall remain the property of the Owner, except that items not salvageable, as determined by the Engineer and the Owner shall become the property of the Contractor to be disposed of by him off the site of the work at his own place of disposal. Operating equipment shall be thoroughly cleaned and then lubricated and greased for protection during prolonged storage as specified in other sections.

F. All work of altering existing structures shall be done at such time and in such manner as will comply with the approved time schedule. So far as possible before any part of the Work is started, all tools, equipment, and materials shall be assembled and made ready so that the work can be completed without delay.

G. All workmanship and new materials involved in constructing the alterations shall conform to the Specifications for the classes of work insofar as such specifications are applicable.

H. All cutting of existing masonry or other material to provide suitable bonding to new work shall be done in a manner to meet the requirements of the respective Section of these Specifications covering the new work. When not covered, the work shall be carried on in the manner and to extent directed by the Engineer.

I. Where holes in existing masonry are required to be sealed, unless otherwise herein specified, they shall be sealed with cement mortar or concrete. The sides of the openings shall be provided with keyed joints and shall be suitably roughened to furnish a good bond and make a watertight joint. All loose or unsound material adjacent to the opening shall be removed, and if necessary, replaced with new material. The method of placing the mortar seal shall provide a suitable means of releasing entrapped air.

J. Surfaces of seals visible in the completed work shall be made to match as nearly as possible the adjacent surfaces.

K. Nonshrink grout shall be used for setting wall castings, sleeves, leveling pump bases, doweling anchors into existing concrete and elsewhere as shown.

L. Where necessary or required for the purpose of making connections, the Contractor shall cut existing pipelines in a manner to provide an approved joint. Where required, he shall weld bends, flanges, or provide Dresser couplings, all as required.

M. The Contractor shall provide flumes, hoses, piping, etc., to divert or provide suitable plugs, bulkheads, or other means to hold back the flow of wastewater, water, or other liquids, all as required in the performance of the Work under this Contract.

3.02 WALL PENETRATIONS

Unless otherwise shown on the Drawings or specified herein, wall penetrations for pipes or conduits shall be made using a modular sealing strip such as the Link-Seal as manufactured by Thunderline Corporation, Wayne, Michigan, or approved equal. Wall sleeves for use with the sealing strips shall be Schedule 40, galvanized steel pipe. A suitable water stop approximately 1/4-inch thick by 2-inch wide shall be welded to the sleeve completely around the periphery of the pipe. The use of such sealing strips shall not relieve the Contractor of his responsibility of providing a guaranteed water tight seal.

Wall penetrations will be permitted only with the expressed approval of the Engineer. Wall seals exposed to sewage or sewage gasses shall be rated for corrosive service.

3.03 CLEANING AND REPAIRING EXISTING STRUCTURES

A. After dewatering and before commencing work on each structure, the Contractor shall remove and dispose of, away from the site and at a properly permitted disposal site, any sand, sludge, and other solids remaining in such structure.

B. When so noted on the Drawings, the interior of wet wells that are to be rehabilitated shall be pressure washed with a device that produces a pressure high enough to remove all loose concrete and aggregate from the surface of the existing structure.

C. Upon completion of the pressure washing process, the interior of the wet well shall be thoroughly inspected and any loose or unstable material shall be removed via hammer and chisel to reveal solid stable concrete.

D. Pock marks or other indentions in the interior surface of the wet well shall be grouted to fill the pock marks and indentions to the same surface level as was originally cast producing a uniform, dense surface.

E. Cracks, holes or other areas where active leaks are observed shall be chipped out to a minimum depth of one-half inch and shall be packed with a hydraulic non-shrink sealing grout to close the leak path. Additional grouting shall be placed as necessary to successfully seal the leak to provide a uniform smooth dry surface that will allow coating material to properly bond to the repaired substrate.

F. Coatings as defined in Division 09 shall be places on the interior of the repaired wet well structure, including any new concrete that is placed on the structure.

3.04 The use of explosives will not be permitted to complete any work under this Contract. Care shall be taken not to damage any part of existing buildings or foundations or outside structures.

END OF SECTION

TECHNICAL SPECIFICATIONS
DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01048 -UTILITIES COORDINATION

PART - I GENERAL

1.01 UTILITIES

Utilities for the purpose of these specifications shall be considered as including, but not limited to: pipelines, conduits, cables, transmission lines and appurtenances of Public Utilities and those of Special Utility Districts, Cities or Towns, businesses or individuals solely for their own use or for use of their tenants; and storm drains, sanitary sewers, street lighting, traffic signal and fire alarm systems, except those owned or under the direct control of the Owner.

1.02 UNDERGROUND INSTALLATIONS

Existing underground pipelines and utilities are indicated on the Drawings only to the extent such information was made available to or discovered by Engineer in preparing drawings. There is no guarantee as to the accuracy or completeness of such information, and all responsibility for the accuracy and completeness thereof is expressly disclaimed by the Owner and the Engineer.

1.03 UTILITIES LOCATED IN OWNER'S RIGHT-OF-WAY

A. Unless otherwise provided or excepted herein, the removal, adjusting, relocation, or replacement of utility structures or facilities within the Owner's right-of-way which may be necessary for construction of the work being done, in accordance with these Contract Documents, shall be at the expense of the owners of the utilities.

B. While it is the utility owner's responsibility to perform any work and bear any expense involved in relocations and adjustments within Owner's right-of-way, 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 the Contract.

1.04 RELOCATIONS OF EXISTING GAS LINES, TELEPHONE LINES, ELECTRIC LINES, CABLE TV LINES, AND WATER LINES

The Contractor shall notify the proper authority of the utility involved when relocation of these lines is required. The Contractor shall coordinate all work by the utility so that the progress of construction will not be hampered.

SECTION 01048 -UTILITIES COORDINATION

PART - II PRODUCTS

(NOT USED)

PART - III EXECUTION

3.01 GENERAL

The Contractor, when the Notice to Proceed is received, shall notify the owners of utilities affected by the work, 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 the work occur, the Contractor shall appraise 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 facility and construction delays resulting from failure to notify the utility and the Engineer of changes in procedure or location.

3.02 UTILITY CROSSINGS

It is intended that wherever existing utilities such as water, gas, telephone, electrical, drains, or other service lines must be crossed by a force main or waterline, deflection of the pipe within recommended limits and cover shall be used to satisfactorily clear the obstruction unless otherwise indicated on the Drawings. However, when in the opinion of the Owner or Engineer this procedure is not feasible, he may direct the use of fittings for a utility crossing as detailed on the Drawings.

3.03 TEST PITS

A. Test pits for the purpose of accurately locating underground utilities or structures that may interfere with installation of the Work both horizontally and vertically shall be excavated in advance of the Work. Test pits shall be backfilled immediately after their purpose has been satisfied and maintained in a manner satisfactory to the Engineer. The costs for such test pits, except as provided for in the Bid Form, shall be included in the cost of the work for which the test pits benefit. Backfill shall comply with the Specifications for backfill of pipe. The maximum number of test pits to be excavated shall be equivalent to two for each structure and one for each 200 lineal feet of pipeline.

B. Test pits for the purpose of locating underground pipelines or structures shall be excavated prior to development of laying schedules for all pipe sizes of 16 inches and larger. Underground utilities' and structures' locations shall be referenced to the project baseline by station and offset distance, left or right and measured perpendicular to the baseline, along with the elevation of the top of the utility or structure. The data shall also include the size and depth or diameter of the utility or structure.

C. This procedure shall be completed for the entire project and all underground utilities and structures shall be located as described above in conformance with the requirements of the field engineering provision detailed elsewhere in the Specifications. The data collected shall be used to develop a pipe laying schedule that accurately depicts the location of underground utilities and structures and details both horizontal and vertical deflections and adjustments of the proposed force main pipe required to eliminate conflicts. This laying schedule shall be submitted to the Engineer for approval prior to fabrication of the pipe.

3.04 PROTECTION OF EXISTING UTILITIES

A. The attention of the Contractor is drawn to the fact that during excavation, the possibility exists of the Contractor encountering various water, gas, telephone, electrical, or other utility lines not shown on the Drawings. The Contractor shall exercise extreme care before and during excavation to locate and flag these lines so as to avoid damage to the existing lines. Should damage occur to an existing line, the Contractor shall repair the line at no cost to the Owner.

B. The Contractor shall assume full responsibility for the protection of all utilities, public and private, including poles, services to buildings, gas pipes, water pipes, hydrants, sewers, drains, and electric and telephone cables, whether or not they are shown on the Drawings. The Contractor shall carefully support and protect all such utilities from injury of any kind. Any damage resulting from the Contractor's operation shall be repaired by him at no additional expense to the Owner.

C. 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.

D. The Contractor shall bear full responsibility for obtaining locations of all underground structures and utilities (including existing water services, drain lines, and sewers) as is required by state law. Services to buildings shall be maintained, and all costs or charges resulting from damage thereto shall be paid by the Contractor.

E. If, in the opinion of the Engineer, permanent relocation of a utility owned by the Owner is required, he may direct the Contractor, in writing, to perform the work. Work so ordered will be paid for at the Contract unit prices, if applicable, or as extra work as detailed in the General Conditions. If relocation of a privately owned utility is required, the Contractor will notify the Utility to perform the work as expeditiously as possible. The Contractor shall fully cooperate with the Owner and Utility and shall have no claim for delay due to such relocation.

F. The Contractor shall notify public and private utility companies in writing at least two, but not more than five full days (excluding Saturdays, Sundays, and legal holidays) before excavating near their utilities.

SECTION 01048 -UTILITIES COORDINATION

G. The Owner will not be responsible for any delay or inconvenience to the Contractor in carrying out the work resulting from the existence, removal or adjustment of any public utility. Additional costs incurred as a result thereof shall be at no additional expense to the Owner.

3.05 UTILITIES TO BE ADJUSTED

The owners of utility facilities that require relocation, removal, adjustment or replacement should, 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.

3.06 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 operations, should 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.

END OF SECTION

TECHNICAL SPECIFICATIONS
DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01050 - FIELD ENGINEERING

PART - I GENERAL

1.01 REQUIREMENTS INCLUDED

A. The Contractor shall provide and pay for field engineering services for:

1. Survey work required in execution of work.
2. Civil, structural, or other professional engineering services specified or required to execute the Contractor's construction method.

B. The method of field staking for the construction of the work shall be at the option of the Contractor. Basic horizontal and vertical control points have been established or designated by the Engineer. These points shall be used as datum for the work. All control points are to be verified and certified by a registered professional land surveyor and, along with additional survey, layout, and measurement work, shall be performed by the Contractor as a part of the work.

C. The accuracy of any method of staking shall be the responsibility of the Contractor. All engineering for vertical and horizontal control shall be the responsibility of the Contractor.

D. The Contractor shall be held responsible for the preservation of all stakes and marks. If any stakes or marks are carelessly or willfully disturbed by the Contractor, the Contractor shall not proceed with any work until he has reestablished such points, marks, lines and elevations as may be necessary for the prosecution of the work.

E. The Contractor shall retain the services of a competent surveyor, registered in the State of Louisiana, to layout the work and maintain a survey during construction. The Contractor shall be solely responsible for proper location of the work.

1.02 SURVEY REFERENCE POINTS

Locate and protect control points prior to starting site work, and preserve all permanent reference points during construction.

1. Make no changes or relocations without prior written notice to the Engineer.
2. Report to the Engineer when any reference point is lost or destroyed or requires relocation because of necessary changes in grades or locations.
3. Require surveyor to replace control points which may be lost or destroyed. Establish replacements based on original survey control.

SECTION 01050 - FIELD ENGINEERING

1.03 PROJECT SURVEY REQUIREMENTS

A. Establish temporary bench marks as needed, referenced to data established by survey control points. Record locations, with horizontal and vertical data, on Record Drawings.

B. Establish lines and levels, and locate and lay out, by instrumentation and similar appropriate means:

1. Site improvements, including utility slopes and invert elevations.
2. Batter boards for structures.
3. Controlling lines and levels required for mechanical and electrical trades.

C. From time to time, verify layouts by same methods.

D. Establish all lines and grades prior to construction of pipe work at 100 foot increments.

1.04 RECORDS

A. Maintain a complete, accurate log of all control and survey work as it progresses.

B. At Contract closeout, submit a survey of installation of structures and pipelines at the same scale as the Engineer's drawings indicating elevations and stationing at 100 foot increments and at all valve and fitting locations when applicable.

C. The record information shall also include GPS location data on all isolation valve operators, fire hydrants, air release valves, sanitary sewer manholes, pump stations and other structures as directed by the Engineer. Data shall be presented in a tabular format, which shall include Street or Road name, Plan Station Number of the Appurtenance being located, a description of the appurtenance (valve operator, manhole, etc), Geographic Coordinates recorded in the field, and map coordinates converted from the field data. Unless otherwise directed map coordinates shall be presented in US Feet State Plane Coordinates and the coordinate datum shall be NAD 83, South Zone.

1.05 SUBMITTALS

A. On request of the Engineer, submit documentation to verify accuracy of field engineering work including cut sheets when applicable.

B. Submit Drawings showing locations of all pipes and structures constructed. This Drawing shall be included with the Record Drawings.

PART – II PRODUCTS - NOT USED
PART - III EXECUTION - NOT USED

END OF SECTION

TECHNICAL SPECIFICATIONS
DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01060 - REGULATORY REQUIREMENTS

PART - I GENERAL

1.01 REQUIREMENTS INCLUDED

Abbreviations and acronyms used in Contract Documents to identify reference standards are listed in the Section of the Specifications entitled "Abbreviations."

1.02 QUALITY ASSURANCE

A. Application - When a standard is specified by reference, comply with requirements and recommendations stated in that standard, except when requirements are modified by the Contract Documents, or applicable codes establish stricter standards.

B. Publication Date - The publication in effect on the date of issue of Contract Documents, except when a specific publication date is specified.

C. See Supplementary Conditions additional articles for requirements of U.S. Government Agencies providing financial assistance to the project or any State Agency labor requirements.

D. Archaeology and Historic Preservation - If archaeological or historic resources (e.g. Indian pottery, projectile points or old china) are encountered during construction, contact the State Historic Preservation Office at: State of Louisiana, Dept. of Culture, Recreation and Tourism, P.O. Box 44247, Baton Rouge, LA 70804 (504) 342-8170.

E. Soil Erosion Control - See the specification for general project requirements. Detailed requirements such as fertilizer and seeding types, application rates, and seasons shall be subject to modification by the local soil and Water Conservation District.

F. Other

1. Merchantable timber must be harvested and sold commercially to satisfy requirements of the State of Louisiana Forestry Commission.

2. Siltation and sedimentation control shall be practices to satisfy requirements of the State of Louisiana Department of Wildlife and Fisheries.

G. Health and Safety - The Contractor shall comply with the Department of Labor Safety and Health Regulations for construction, promulgated under the Occupational and Safety and Health Act of 1970 (PL 91-596) and under Section 107 of the Contract Work Hours and Safety Standards Act (PL-91-54), and updated laws and acts.

H. Separation Between Sewer Lines and Water Lines - Where the separation between sanitary sewer and water lines is not clearly defined by dimensions on the drawings, a sewer shall not be closer horizontally than ten feet to a water supply main or service line,

except that where the bottom of the water pipe will be at least eighteen inches above the top of the sewer pipe, the horizontal spacing may be a minimum of six feet. Where gravity flow sewers cross above the water lines, the sewer pipe for a distance of ten feet each side of the crossing shall be ductile iron or PVC pipe, without any joint closer horizontally than ten feet to the crossing, or shall be fully encased in concrete. The thickness of the concrete including at the pipe joints shall be not less than four inches. These provisions are regulations of the State Sanitary Code and Ten States Standards. Unless otherwise approved by the Engineer, the locations, lines and grades shown on the Drawings shall not be changed.

I. Open Wastewater Bypassing - Temporary open wastewater bypass discharges shall generally be prohibited. The applicable State Pollution Control Agency and U.S.E.P.A. must approve open wastewater bypassing if the terms of the N.P.D.E.S. permit allow bypassing. Bypassing will be allowed only when absolutely necessary and the approval of the Engineer, the State and U.S.E.P.A. is mandatory.

1.03 FINANCING BY GOVERNMENTAL AGENCIES

A. When projects are funded by Federal or State agencies, the regulations and rules of the funding agency shall be strictly followed.

B. Contractor shall secure from the Owner or the funding agency the regulation applicable to his work and organization including all labor requirements.

C. The Contractor shall be responsible to comply with all rules and regulations as outlined by the funding agency.

1.04 COMPLIANCE WITH REGULATIONS

A. The Contractor shall observe and comply with all Federal, State, and local laws, ordinances, codes, orders, and regulations that in any manner affect those engaged or employed on the work, the materials used in the work, or the conduct of the work. If any discrepancy or inconsistency should be discovered in this Contract in relation to any such law, ordinance, code, order, or regulation, the Contractor shall report the same in writing to the Engineer. Any particular law or regulation specified or referenced elsewhere in these Specifications shall not in any way limit the obligation of the Contractor to comply with all other provisions of Federal, State and local laws and regulations.

B. The Contractor shall be responsible for securing all permits and licenses required and shall pay all fees required to complete the Work.

PART - II PRODUCTS - NOT USED

PART - III EXECUTION - NOT USED

END OF SECTION

TECHNICAL SPECIFICATIONS
DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01091 - REFERENCE STANDARDS

PART I - GENERAL

1.01 UNIT OF MEASURE

A. The standard units of measure shall be the inch-pound as defined by the U.S. National Bureau of Standards. Metric conversion shall be in accordance with ASTM E380.

1.02 STANDARD STATUS

A. All Standards referred to shall be current with latest addenda and supplements as of the date of the Contract Documents.

B. All work shall comply with all governing building and safety laws, ordinances and regulations relating to building and public health and safety laws having jurisdiction.

1.03 REFERENCE MATERIAL

A. All reference material utilized in the formation of these specifications can be obtained from local libraries or from the Engineer at the costs of reproduction.

PART II - PRODUCTS - NOT USED

PART III - EXECUTION - NOT USED

END OF SECTION

TECHNICAL SPECIFICATIONS
DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01092 - ABBREVIATIONS

PART 1 - GENERAL

1.01 DESCRIPTION

A. The following standards are referenced in the Contract Documents. The Contractor shall obtain copies of reference standards directly from the publication source when needed for proper performance of Work or when required for submittal by Contract Documents.

AA	Aluminum Association 818 Connecticut Ave. NW Washington, DC 20006	202/862-5100
AABC	Associated Air Balance Council 1518 K Street NW, Suite 503 Washington, DC 20005	202/737-0202
AAMA	American Architectural Manufacturer's Association 2700 River Road, Suite 118 Des Plaines, IL 60018	312/699-7310
AAN	American Association of Nurserymen 1250 I Street NW, Suite 500 Washington, DC 20005	202/789-2900
AASHTO	American Association of State Highway and Transportation Officials 444 North Capitol Street, Suite 225 Washington, DC 20001	202/624-5800
AATCC	American Association of Textile Chemists and Colorists P.O. Box 12215 Research Triangle Park, NC 27709	919/549-8141
ACI	American Concrete Institute P.O. Box 19150 22400 W. Seven Mile Road Detroit, MI 48219	313/532-2600
ACIL	American Council of Independent Laboratories 1725 K Street NW Washington, DC 20006	202/887-5872

SECTION 01092 - ABBREVIATIONS

ACPA	American Concrete Pipe Association 8320 Old Courthouse Road, Suite 201 Vienna, VA 22180	703/821-1990
ADC	Air Diffusion Council 230 N. Michigan Ave., Suite 1200 Chicago, IL 60601	312/372-9800
AGA	American Gas Association 1515 Wilson Blvd. Arlington, VA 22209	703/841-8400
AGMA	American Gear Manufacturers Association 1500 King Street, Suite 201 Alexandria, VA 22314	703/684-0211
AHA	American Hardboard Association 887B Wilmette Road Palatine, IL 60067	312/934-8800
AI	Asphalt Institute Asphalt Institute Building College Park, MD 20740-1802	301/277-4258
AIA	American Institute of Architects 1735 New York Ave. NW Washington, DC 20006	202/626-7300
A.I.A.	American Insurance Association 85 John Street New York, NY 10038	212/669-0400
AIHA	American Industrial Hygiene Association 475 Wolf Ledges Parkway Akron, OH 44311	216/762-7294
AISC	American Institute of Steel Construction 400 N. Michigan Ave., 8th Floor Chicago, IL 60611	312/670-2400
AISI	American Iron and Steel Institute 1000 Sixteenth Street NW Washington, DC 20036	202/452-7100

SECTION 01092 - ABBREVIATIONS

AITC	American Institute of Timber Construction 333 W. Hampden Ave. Englewood, CO 80110	303/761-3212
ALI	Associated Laboratories Eight Brush Street Pontiac, MI 48053	313/335-6114
ALSC	American Lumber Standards Committee P.O. Box 210 Germantown, MD 20874	301/972-1700
AMCA	Air Movement and Control Association 30 W. University Drive Arlington Heights, IL 60004	312/394-0150
ANSI	American National Standards Institute 1430 Broadway New York, NY 10018	212/354-3300
APA	American Plywood Association P.O. Box 11700 Tacoma, WA 98411	206/565-6600
A.P.A.	American Parquet Association 1650 Union National Plaza Little Rock, AR 72201	501/375-5561
API	American Petroleum Institute 1220 L Street NW Washington, DC 20005	202/682-8000
ARI	Air Conditioning and Refrigeration Institute 1501 Wilson Blvd. Arlington, VA 22209	703/524-8800
ARMA	Asphalt Roofing Manufacturers Association 6288 Montrose Road Rockville, MD 20852	301/231-9050
ASA	Acoustical Society of America 335 East 45th Street New York, NY 10017	516/349-7800

SECTION 01092 - ABBREVIATIONS

ASC	Adhesive and Sealant Council 1500 Wilson Blvd., Suite 515 Arlington, VA 22209	703/841-1112
ASCE	American Society of Civil Engineers 345 East 47th Street New York, NY 10017	800/548-ASCE
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers 1791 Tullie Circle NE Atlanta, GA 30329	404/636-8400
ASME	American Society of Mechanical Engineers 345 East 47th Street New York, NY 10017	212/705-7722
ASPE	American Society of Plumbing Engineers 3617 Thousand Oaks Blvd., Suite 210 Westlake, CA 91362	805/495-7120
ASSE	American Society of Sanitary Engineering P.O. Box 40362 Bay Village, OH 44140	216/835-3040
ASTM	American Society for Testing & Materials 100 Barr Harbor Drive West Conshohocken, PA 19428-2959	610/832-9585
AWI	Architectural Woodwork Institute 2310 S. Walter Reed Drive Arlington, VA 22206	703/671-9100
AWPA	American Wood Preservers' Association P.O. Box 849 Stevensville, MD 21666	301/643-4163
AWPB	American Wood Preservers' Bureau P.O. Box 6058 2772 S. Randolph Street Arlington, VA 22206	703/931-8180
AWS	American Welding Society	

SECTION 01092 - ABBREVIATIONS

	P.O. Box 351040 550 Le Jeune Road NW Miami, FL 33135	800/443-9353
AWWA	American Water Works Association 6666 W. Quincy Ave. Denver, CO 80235	303/794-7711
BANC	Brick Association of North Carolina P.O. Box 13290 Greensboro, NC 27415	919-273-5566
BHMA	Builders' Hardware Manufacturers Association 60 East 42nd St., Room 511 New York, NY 10165	212/682-8142
BIA	Brick Institute of America 11490 Commerce Park Drive, Suite 300 Reston, VA 22091	703/620-0010
BIFMA	Business and Institutional Furniture Manufacturers Association 2335 Burton Street SE Grand Rapids, MI 49506	616/243-1681
CAUS	Color Association of the United States 343 Lexington Avenue New York, NY 10016	212/683-9531
CAGI	Compressed Air and Gas Institute c/o Thomas Associates, Inc. 1230 Keith Building Cleveland, OH 44115	216/241-7333
CBM	Certified Ballast Manufacturers Association Hanna Building, Suite 772 1422 Euclid Avenue Cleveland, OH 44115	216/241-0711
CDA	Copper Development Association Box 1840, Greenwich Office Park 2 Greenwich, CT 06836	203/625-8210

SECTION 01092 - ABBREVIATIONS

CGA	Compressed Gas Association 1235 Jefferson Davis Highway Arlington, VA 22202	703/979-0900
CISPI	Cast Iron Soil Pipe Institute 1499 Chain Bridge Road, Suite 203 McLean, VA 22101	703/827-9177
CLFMI	Chain Link Fence Manufacturers Institute 1776 Mass Avenue N.W. Suite 500 Washington, DC 20036	202/659-3537
CLPA	California Lathing and Plastering Association 25332 Narbonne, Suite 170 Lomita, CA 90717	213/539-6080
CRI	Carpet and Rug Institute Box 2048 Dalton, GA 30720	404/278-3176
CRSI	Concrete Reinforcing Steel Institute 933 Plum Grove Road Schaumburg, IL 60195	312/490-1700
CTI	Ceramic Tile Institute of America 700 North Virgil Avenue Los Angeles, CA 90029	213/660-1911
DHI	Door and Hardware Institute 7711 Old Springhouse Road McLean, VA 22102	703/556/3990
DIPRA	Ductile Iron Pipe Research Association 245 Rivercase Parkway E, Suite 100 Birmingham, AL 35244	205/988-9870
DLPA	Decorative Laminate Products Association (Formerly the National Assoc. of Plastic Fabricators) 600 South Federal Street, Suite 400 Chicago, IL 60605	312/345-1600

SECTION 01092 - ABBREVIATIONS

ECSA	Exchange Carriers Standards Association Four Century Drive, 3rd Floor Parsippany, NJ 07054	201/538-6111
EIA	Electronic Industries Association 2001 Eye Street NW Washington, DC 20006	202/457-4900
EIMA	Exterior Insulation Manufacturers Association P.O. Box 75037 Washington, DC 20013	202/783-6582
ETL	ETL Testing Laboratories, Inc. P.O. Box 2040 Route 11, Industrial Park Cortland, NY 13045	604/753-6711
FCI	Fluid Controls Institute P.O. Box 9036 Morristown, NJ 07960	201/829-0990
FGMA	Flat Glass Marketing Association White Lakes Professional Building 3310 Harrison Topeka, KS 66611	913/266-7013
FM	Factory Mutual Engineering and Research 1151 Boston-Providence Turnpike Norwood, MA 02062	617/762-4300
FTI	Facing Tile Institute c/o Box 8880 Canton, OH 44711	216/488-1211
GA	Gypsum Association 1603 Orrington Ave. Evanston, IL 60201	312/491-1744
HEI	Heat Exchange Institute c/o Thomas Associates, Inc. 1230 Keith Building Cleveland, OH 44115	216/241-7333

SECTION 01092 - ABBREVIATIONS

HI	Hydronics Institute P.O. Box 218 35 Russo Place Berkeley Heights, NJ 07922	201/464-8200
HMA	Hardwood Manufacturers Association 805 Sterick Building Memphis, TN 38103	901/525-8221
ICEA	Insulated Cable Engineers Association, Inc. P.O. Box P South Yarmouth, MA 02664	617/394-4424
IEC	International Electrotechnical Commission 655 Fifteenth Street NW, Suite 300 Washington, DC 20015	202/639-4090
IEEE	Institute of Electrical and Electronic Engineers 345 E. 47th Street New York, NY 10017	212/705-7900
IESN	AIlluminating Engineering Society of North America 345 E. 47th Street New York, NY 10017	212/705-7926
IGCC	Insulating Glass Certification Council Route 11, Industrial Park Cortland, NY 13045	607/753-6711
ILI	Indiana Limestone Institute of America Stone City Bank Building, Suite 400 Bedford, IN 47421	812/275-4426
IMSA	International Municipal Signal Association P.O. Box 8249 Fort Worth, TX 76112	817/429-8638
IRI	Industrial Risk Insurers 85 Woodland Street Hartford, CT 06102	203/520-7300

SECTION 01092 - ABBREVIATIONS

ISA	Instrument Society of America P.O. Box 12277 67 Alexander Drive Reseach Triangle Park, NC 27709	919/549-8411
LPI	Lightning Protection Institute P.O. Box 458 Harvard, IL 60033	815/943-7211
MBMA	Metal Building Manufacturers Association 1230 Keith Building Cleveland, OH 44115	216/241-7333
MCAA	Mechanical Contractors Associations of America 5410 Grosvenor Lane; Suite 120 Bethesda, MD 20814	301/897-0770
MIA	Marble Institute of America 33505 State Street Farmington, MI 48024	313/746-5558
ML/SFA	Metal Lath/Steel Framing Association 600 South Federal Street, Suite 400 Chicago, IL 60605	312/346-1600
MSS	Manufacturers Standardization Society of the Valve and Fittings Industry 127 Park Street NE Vienna, VA 22180	703/281-6613
NAAMM	National Association of Architectural Metal Manufacturers 221 N. LaSalle Street Chicago, IL 60601	(312) 346-1600
NAPA	National Asphalt Pavement Association Calvert Building, Suite 620 6811 Kenilworth Avenue Riverdale, MD 20737	(301) 779-4880
NAPF	National Association of Plastic Fabricators (Now DLPA)	

SECTION 01092 - ABBREVIATIONS

NBGQA	National Building Granite Quarries Association c/o H.E. Fletcher Co. West Chelmsford, MA 08163	(617) 251-4031
NBHA	National Builders Hardware Association (Now DHI)	
NCMA	National Concrete Masonry Association P.O. Box 781 Herndon, VA 22070	(301) 435-4900
NCRPM	National Council on Radiation Protection and Measurement 7910 Woodmont Avenue, Suite 1016 Bethesda, MD 20814	(301) 657-2652
NEC	National Electric Code (by NFPA)	
NECA	National Electrical Contractors Association 7315 Wisconsin Ave. Bethesda, MD 20814	(301) 657-3110
NEIl	National Elevator Industry, Inc. 630 Third Avenue New York, NY 10016	(212) 986-1545
NEMA	National Electrical Manufacturers Association 2101 L Street NW, Suite 300 Washington, DC 20037	(202) 457-8400
NFPA	National Fire Protection Association Batterymarch Park Quincy, MA 02269	(617) 770-3000
N.F.P.A.	National Forest Products Association 1250 Connecticut Ave. NW Washington, DC 20036	(202) 463-2700
NHLA	National Hardwood Lumber Association P.O. Box 34518 Memphis, TN 38184	(901) 377-1818
NKCA	National Kitchen Cabinet Association P.O. Box 6830 Falls Church, VA 22046	(703) 237-7580

SECTION 01092 - ABBREVIATIONS

NOFMA	National Oak Flooring Manufacturers Association 8 North Third Street 804 Sterick Building, Suite 810 Memphis, TN 38103	(901) 526-5016
NPA	National Particleboard Association 18928 Premiere Court Gaithersburg, MD 20879	(301) 670-0604
NPCA	National Paint and Coatings Association 1500 Rhode Island Avenue NW Washington, DC 20005	(202) 462-6272
NRCA	National Roofing Contractors Association 8600 Bryn Mawr Avenue Chicago, IL 60631	(312) 693-0700
NSF	National Sanitation Foundation P.O. Box 1468; 3475 Plymouth Road Ann Arbor, MI 48106	(313) 769-8010
NSPE	National Society of Professional Engineers 1420 King Street Alexandria, VA 22314	(703) 684-2835
NSSEA	National School Supply and Equipment Association 2020 Fourteenth Street North, Suite 400 Arlington, VA 22201	(703) 524-8819
NTMA	National Terrazzo and Mosaic Association 3166 Des Plaines Ave. Suite 132 Des Plaines, IL 60018	(312) 635-7744
NWMA	National Woodwork Manufacturers Association (NWWDA)	
NWWDA	National Wood Window & Door Assoc. (Formerly NWMA) 205 West Touchy Avenue Park Ridge, IL 60068	(312) 823-6747
PCA	Portland Cement Association 5420 Old Orchard Road Skokie, IL 60077	(312) 966-6200

SECTION 01092 - ABBREVIATIONS

PCI	Prestressed Concrete Institute 201 N. Wells Street Chicago, IL 60606	(312) 346-4071
PDI	Plumbing and Drainage Institute (c/o Austin 0. Roche, Jr.) 5342 Boulevard Pl. Indianapolis, IN 46208	(317) 251-5298
PEl	Porcelain Enamel Institute 1111 Nineteenth Street Arlington, VA 22209	(703) 527-5257
RFCI	Resilient Floor Covering Institute 966 Hungerford Drive, Suite 12-B Rockville, MD 20805	(301) 340-8580
RIS	Redwood Inspection Service 591 Redwood Highway, Suite 3100 Mill Valley, CA 94941	(415) 381-1304
RMA	Rubber Manufacturers Association 1400 K Street NW Washington, DC 20005	(202) 682-4800
SAMA	Scientific Apparatus Makers Association 1101 Sixteenth Street NW Washington, DC 20036	(202) 223-1360
SDI	Steel Deck Institute P.O. Box 9506 Canton, OH 44711	(216) 493-7886
S.D.I.	Steel Door Institute (c/o A.P. Wherry and Associates, Inc.) 712 Lakewood Center North 14600 Detroit Avenue Cleveland, OH 44107	(216) 226-7700
SGCC	Safety Glazing Certification Council Route 11, Industrial Park Cortland, NY 13045	(607) 753-6711

SECTION 01092 - ABBREVIATIONS

SHLMA	Southern Hardwood Lumber Manufacturers Assoc. (Now HMA)	
SIGMA	Sealed Insulating Glass Manufacturers Association 111 E. Wacker Drive Chicago, IL 60601	(312) 644-6610
SJI	Steel Joist Institute 1205 48th Street North, Suite A Myrtle Beach, SC 29577	(803) 449-0487
SMACNA	Sheet Metal / Air Conditioning Contractors National Assoc. P.O. Box 70 Merrifield, VA 22116	(703) 790-9890
SPIB	Southern Pine Inspection Bureau 4709 Scenic Highway Pensacola, FL 32504	(904) 434-2611
SPRI	Single Ply Roofing Institute 1800 Pickwick Avenue Glenview, IL 60025	(312) 724-7700
SSPC	Steel Structures Painting Council 4400 Fifth Avenue Pittsburgh, PA 15213	(412) 578-3327
SWI	Steel Window Institute (c/o Thomas Associates, Inc.) 1230 Keith Building Cleveland, OH 44115	(216) 241-7333
TCA	Tile Council of America P.O. Box 326 Princeton, NJ 08542	(609) 921-7050
TIMA	Thermal Insulation Manufacturers Association 7 Kirby Plaza Mt. Kisco, NY 10549	(914) 241-2284
TPI	Truss Plate Institute 583 D'Onofrio Drive, Suite 200 Madison, WI 53719	(608) 833-5900

SECTION 01092 - ABBREVIATIONS

UL	Underwriters Laboratories 333 Pfingsten Road Northbrook, IL 60062	(312) 272-8800
UNI-BELL	Uni-Bell PVC Pipe Association 2655 Villa Creek Drive, Suite 155 Dallas, TX 75234	(214) 243-3902
WCLIB	West Coast Lumber Inspection Bureau P.O. Box 23145 Portland, OR 97223	(503) 639-0651
WCMA	Wall Covering Manufacturers Association 66 Morris Avenue Springfield, NJ 07081	(201) 379-1100
WIC	Woodwork Institute of California P.O. Box 11428 Fresno, CA 93773	(209) 233-9035
WRI	Wire Reinforcement Institute 8361 A Greensboro Drive McLean, VA 22102	(703) 790-9790
WSC	Water Systems Council 221 North LaSalle St. Chicago, IL 60601	(312) 346-1600
WSFI	Wood and Synthetic Flooring Institute 4415 West Harrison Street, Suite 242 C Hillside, IL 60162	(312) 449-2933
WWPA	Western Wood Products Association 1500 Yeon Building Portland, OR 97204	(503) 224-3930
W.W.P.A.	Woven Wire Products Association 2515 N. Nordica Ave. Chicago, IL 60635	(312) 637-1359

B. Names and titles of federal government standard or specification producing agencies are frequently abbreviated. The following acronyms or abbreviations as referenced in the contract documents indicate names of standard or specification producing agencies of the federal government.

SECTION 01092 - ABBREVIATIONS

CFR	Code of Federal Regulations Available from the Government Printing Office North Capitol Street between G and H Streets NW Washington, DC 20402 (Material is usually first published in the Federal Register)	(202) 783-3238
COE	Corps of Engineers (US Department of the Army) Chief of Engineers-Referral Washington, DC 20314	(202) 693-6456
CPSC	Consumer Product Safety Commission 1111 Eighteenth Street NW Washington, DC 20207	(202) 634-7700
CS	Commercial Standard (U.S. Department of Commerce) Government Printing Office Washington, DC 20402	(202) 377-2000
DOC	Department of Commerce 14th Street and Constitution Avenue NW Washington, DC 20230	(202) 377-2000
DOT	Department of Transportation 400 Seventh Street SW Washington, DC 20590	(202) 426-4000
EPA	Environmental Protection Agency 401 M Street SW Washington, DC 20460	(202) 829-3535
FAA	Federal Aviation Administration (U.S. Department of Transportation) 800 Independence Avenue SW Washington, DC 20590	(202) 426-4000
FCC	Federal Communications Commission 1919 M Street NW Washington, DC 20554	(202) 632-7000

SECTION 01092 - ABBREVIATIONS

FHA	Federal Housing Administration (U.S. Department of Housing and Urban Development) 451 Seventh Street SW Washington, DC 20201	(202) 755-5995
FS	Federal Specification (General Services Administration) Specifications Unit (WFSIS) 7th and D Streets SW Washington, DC 20406	(202) 472-2205 or 472-2140
GSA	General Services Administration F Street and 18th Street NW Washington, DC 20405	(202) 655-4000
LADOTD	Louisiana Department of Transportation & Development 1201 Capital Access Road Baton Rouge, LA 70804	(504) 379-1200
MIL	Military Standardization Documents (U.S. Department of Defense) Naval Publications and Forms Center 5801 Tabor Avenue Philadelphia, PA 19120-5099	(215) 697-2667
NBS	National Bureau of Standards (U.S. Department of Commerce) Gaithersburg, MD 20234	(301) 921-1000
OSCI	Office of Standards Code and Information National Bureau of Standards Gaithersberg, MD 20899	(301) 975-4029
OSHA	Occupational Safety and Health Administration (U.S. Department of Labor) Government Printing Office Washington, DC 20402	(202) 783-3238
PS	Product Standard of NBS (U.S. Department of Commerce) Government Printing Office	

	Washington, DC 20402	(202) 783-3238
REA	Rural Electrification Administration (U.S. Department of Agriculture) 14th Street and Independence Avenue SW Washington, DC 20250	(202) 382-1255
USDA	U.S. Department of Agriculture Independence Avenue between 12th and 14th Streets 5W Washington, DC 20250	(202) 447-4929
USPS	U.S. Postal Service 475 L'Enfant Plaza 5W Washington, DC 20260	(202) 245-4000

C. Names and addresses are subject to change but are believed to be, but are not assured to be, accurate and up-to-date as of the date of the contract documents.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

TECHNICAL SPECIFICATIONS
DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01100 - SPECIAL PROJECT PROCEDURES

PART - I GENERAL

1.01 DESCRIPTION

This section describes special procedures for alterations, preservation, security, hazardous material, and other types of projects demanding unique procedures.

1.02 INSTALLATION OF EQUIPMENT

A. Special care shall be taken to ensure proper alignment of all equipment with particular reference to mechanical equipment such as pumps and electric drives. The units shall be carefully aligned on their foundations by qualified millwrights and their base plates shimmed to correct elevation and alignment at the anchor bolts. The anchor bolts shall be set in place and the nuts tightened against the shims. The alignment of equipment shall be further checked after securing to the foundations, and, after confirmation of all alignments, the base plates shall be finally grouted in place. The Contractor shall be responsible for the exact alignment of equipment with associated piping, and under no circumstances will "pipe springing" be allowed.

B. All wedges, shims, filling pieces, keys, packing, grout, and other materials necessary to properly align, level, and secure equipment in place shall be furnished by the Contractor at no additional cost to the Owner. All parts intended to be plumb or level must be proven so.

1.03 SLEEVES, OPENINGS, AND ANCHORS

A. The Contractor shall provide all openings, channels, chases, etc., and install anchor bolts and other items to be embedded in concrete as required to complete the work under this Contract, together with those required by subcontractors, and shall do all cutting and patching, except cutting and patching of materials of a specified trade and as stated otherwise in the following paragraph.

B. The Contractor shall coordinate with equipment suppliers and subcontractors to provide all sleeves, inserts, hangers, anchor bolts, etc. of the proper size and material for the execution of the work. The Contractor shall be responsible for any corrective cutting and refinishing required to make necessary openings, chases, etc. In no case shall beams, lintels or other structural members be cut without the written approval of the Engineer.

1.04 PROVISIONS FOR CONTROL OF EROSION AND POLLUTANTS

Sufficient precautions shall be taken during construction to minimize the runoff of polluting substances such as silt, clay, fuels, oils, bitumens, calcium chloride, or other materials harmful to humans, fish, or other life, into the ground and surface waters of the state. Control measures must be adequate to assure that turbidity in the receiving waters

will not be increased more than 10 nephelometric turbidity units (NTU), or as otherwise required by the state or other controlling agency, in water used for public water supply or fishing unless limits have been established for the particular water. In surface water used for other purposes, the turbidity must not exceed 25 NTU unless otherwise required by the state or other controlling agency. Special precautions shall be taken in the use of construction equipment to prevent operations which promote erosion.

1.05 ROADSIDE CULVERTS AND STRUCTURES

Should the scope or location of the Work require the removal of roadside culverts and/or structures (i.e., bridges, pipes), their removal and relaying or replacement shall be included in the cost of the various other pay items at no extra payment. Relaying roadside pipe culverts, replacing broken pipe, setting driveway bridges, or replacing bridges shall be equal to or better than that which existed before the work. Replacements of broken pipe or bridges may be with used materials.

1.06 PROTECTION OF WORK

Until the acceptance of the work by the Engineer as evidenced in writing, said work shall be under the charge and care of the Contractor. The Contractor shall take every necessary precaution against damages to any part thereof by the elements or from any other cause. The Contractor shall rebuild, restore, repair, and make good, at his own expense, all injuries or damages to any portion of the work occasioned by any of the above causes before its completion and acceptance.

1.07 INCLEMENT WEATHER PREPAREDNESS PLAN

A. Within thirty (30) days of the date of Notice to Proceed, the Contractor shall submit to the Engineer an Inclement Weather Preparedness Plan. The plan shall outline the necessary measures which the Contractor will perform in case of the occurrence of storm conditions and/or hurricanes.

B. In the event of inclement weather, or whenever Engineer shall direct, Contractor and Subcontractors will protect carefully the Work and materials against damage or injury from the weather, including sudden rises in sewer flows due to storms outside the immediate construction zones. Damaged Work and materials shall be removed and replaced. If, in the opinion of the Engineer, any portion of Work or materials shall have been damaged or injured by reason of failure on the part of the Contractor or Subcontractors to so protect the Work, no additional time for removal and replacement will be given by the Owner.

1.08 WATERTIGHTNESS

A. Special precautions shall be taken in the curing of concrete to reduce concrete cracking as called for in Section 03300. Each water-retaining structure (those which are intended to

hold a liquid) shall be filled and tested for leaks by the Contractor with clean water prior to surface coating or painting. Leaks shall be repaired by the Contractor. The procedure and manner in which leaks are repaired shall meet the approval of the Engineer. All costs associated with the testing and repair of leaks shall be at the expense of the Contractor. Prior to the beginning of the leakage test, the structure shall be filled to the highest working water level (to grade level in pump stations) and allowed to stand for a period of 24 hours to allow for absorption.

B. Leakage limitations shall be as follows:
   1. All water visibly flowing through a concrete wall shall constitute a leak and shall be repaired by pumping and sealing the crack with a two-part water intensive epoxy.
   2. Damp areas not exceeding one percent of the total wall wetted area and not having visible seepage shall be conditionally acceptable subject to all said dampness being eliminated by application of the water side surface treatment as may be specified. In the absence of a specified water side surface treatment or where said treatment does not eliminate wall dampness, the water side of the wall shall be prepared in accordance with the manufacturer's instructions and an approved epoxy concrete surface coating applied.
   3. All leakage testing shall be performed prior to tank backfill.
   4. To check for leakage through the tank bottoms, the fall in surface water level during tank testing shall be measured and shall not exceed 0.5 inch in a 24 hour period, providing allowance for evaporation at a rate approved by the Engineer. Visual leaks, either flowing or damp areas, observed during the filling, absorption, or test periods shall be marked and locations recorded and repaired.

1.09 SALVAGE

The Owner may desire to salvage certain items of existing equipment which are to be dismantled and removed during the course of construction. Prior to removal of any existing equipment from the site of the work, the Contractor shall ascertain from the Engineer whether or not the particular item or items are to be salvaged. Items to be salvaged shall be stockpiled on site in a location as directed by the Engineer. All other items of equipment shall be disposed of off-site by the Contractor at his own expense.

1.10 PUBLIC NUISANCE

A. The Contractor shall not create a public nuisance, including, but not limited to, encroachment on adjacent lands, flooding of adjacent lands, or excessive noise.

B. Sound levels from Contractor operations shall not exceed 45 dBA 7 P.M. to 7 A.M. or 55 dBA 7 A.M. to 7 P.M. This sound level to be measured at the exterior of the nearest exterior wall of the nearest residence. Levels at operating equipment shall not exceed 85 dBA at the equipment at any time. Sound levels in excess of these values are sufficient cause to have the work halted until equipment can be quieted to these levels. If requirements of the local noise ordinance are more restrictive than the above limits, then

the Ordinance shall have precedence over the above requirements. Work stoppage by the Engineer for excessive noise shall not relieve the Contractor of any obligations under the Contract, including, but not limited to, performance of the work at the contract time and contract price.

C. No extra payment will be made for time lost due to work stoppage resulting from the creation of a public nuisance.

1.11 UNFAVORABLE CONSTRUCTION CONDITIONS

A. The Contractor shall confine his operations to Work which will not be affected adversely by unfavorable weather, wet ground, or other unsuitable construction conditions. No portion of the work shall proceed under conditions which would affect adversely the quality or efficiency of the work, unless suitable special precautions or countermeasures are taken by the Contractor.

B. During suspension of the work from any cause, the work shall be suitably covered and protected so as to preserve it from injury by the weather.

C. If the Contractors work may be damaged or rendered inferior by unfavorable weather conditions, the Engineer may issue an order to suspend work. Compensation for additional Contract Time under other sections of this Specification will be awarded for suspended work as a result of unfavorable weather conditions. The authority of the Engineer to issue such an order shall not be interpreted as a requirement to do so.

D. Any work constructed during unfavorable weather conditions and found to be damaged or of inferior quality shall be removed and replaced at no additional costs to the Owner or Engineer.

1.12 RELOCATIONS

The Contractor shall be responsible for the relocation of structures, including but not limited to, light poles, signs, sign poles, fences, piping, conduits and drains that interfere with the positioning of the work as set out on the Drawings. The cost of all such relocations shall be included in the costs of work.

1.13 SUBSURFACE AND SURFACE OBSTRUCTIONS

In the event unforeseen subsurface or surface obstructions occur in the progression of work, the Contractor shall confer with the Engineer and obtain his written consent before undertaking any deviations from the plans. At the direction of the Engineer, the Contractor may be permitted to delete construction in the obstruction area temporarily; however, the Contractor shall make no claim for damage by this delay.

SECTION 01100 - SPECIAL PROJECT PROCEDURES

1.14 PUMPING

A. The Contractor with his own equipment shall do all pumping necessary to prevent flotation of any part of the structures during construction operations.

B. The Contractor shall, for the duration of the contract and with his own equipment, pump out water and wastewater which may seep or leak into the excavations or structures at the work sites which shall be kept dry at all times.

1.15 HAZARDOUS LOCATIONS

A. The existing wet wells, manholes, sewers, force mains, pipes, and other related areas are hazardous locations in that explosive concentrations of sewage gas may be present. The Contractor is cautioned that the above areas, especially the wet well, may be deficient in oxygen. Checks shall be made by the Contractor whenever personnel are working in these areas to insure that adequate ventilation has been provided.

B. In his operations in hazardous locations, the Contractor shall use spark-proof tools and explosion-proof temporary lighting and shall not use electric power tools, open flame devices, electric welding or any device or methods which might conceivably cause ignition or explosion.

C. If a working area atmosphere is unsafe, the Contractor shall furnish, install, operate, and later remove such temporary auxiliary ventilating facilities as are necessary to provide a safe atmosphere.

D. The Contractor shall also instruct and caution his employees and the employees of his subcontractors to avoid smoking while in the hazardous areas. Suitable prominent "No Smoking" signs shall be placed at locations where sewage gas could be present.

1.16 OPERATING REQUIREMENTS FOR EXISTING PUMPING AND COLLECTION SYSTEMS

During construction of the new facilities and rehabilitation of existing facilities the Owner’s operators will be responsible for operators will be responsible for operating and maintaining the existing pumping and collection system. The Contractor shall provide access to Owner at all times and not interfere with normal operation and maintenance of existing facilities.

1.17 NOTIFICATION OF WORK ON EXISTING FACILITIES

Before commencing work on any of the existing structures or equipment, the Contractor shall notify the Engineer in writing at least ten (10) calendar days in advance of the date he proposes to commence such work.

SECTION 01100 - SPECIAL PROJECT PROCEDURES

PART - II PRODUCTS

(NOT USED)

PART - III EXECUTION

(NOT USED)

END OF SECTION

TECHNICAL SPECIFICATIONS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01150 - MEASUREMENT AND PAYMENT

PART - I GENERAL

1.01 Scope of Work

A. The scope of this section defines the items included in each bid item. Payment will be made based on the specified items included in the description in this section for each bid item.

B. All contract prices included in the bid form will be full compensation for all labor, materials, tools, equipment and incidentals necessary to complete the construction as shown on the Plans and/or as described in the Specifications to be performed under this contract. Actual quantities of each item bid on a unit price basis will be determined upon completion of the construction. Payment for all items in the bid form will constitute full compensation for all work to be performed under this Contract. Any item appearing in this Measurement and Payment Section which is not listed in the proposal form shall be included in the cost of other items listed in the Proposal Form.

C. The Contractor is advised that other items of work (for which no specific payment items have been established) may be necessary to complete the Project in accordance with the Contract Documents. No payment or claim for payment shall be made for these items of work and their cost shall be included in items for which payment items have been established.

1.02 Service Pipe

A. Measurement - Measurement of work for payment of this item shall be the actual measure per linear footage of HDPE service pipe-in-place and complete within the limits shown on the Plans or as directed by the Project Engineer for all depths and grades, measured along the top centerline of the pipe from beginning installation point (connection to HDPE water line) to ending installation point (meter) for new HDPE directionally drilled water mains.

B. Payment - Payment for Service Pipe will be made at the contract unit price bid, measured as provided above, which price and payment shall be full compensation for furnishing all labor, materials, equipment and incidentals required to load, haul, unload, removal and capping of existing service line in the vicinity of the water meter to allow for connection of

HDPE service line from new HDPE mater main to meter (unless otherwise directed by Project Engineer), place, lay, joint, bed, cover, etc. the Service Pipe and complete the item in accordance with the Contract Documents. Service pipes to new PVC water lines are to be paid for under a different item; this particular item includes HDPE service pipes to new HDPE lines all the way from the meter to the new HDPE water main. Payment shall be according to the following items:

¾" HDPE Service Pipe (Connection to HDPE Water Line)	**LF**
2" HDPE Service Pipe (Connection to HDPE Water Line)	**LF**

1.03 Removal of Structures and Obstructions

A. Measurement – Measurement of work for payment of this item shall be on a lump sum basis. Removal and disposal of piping shall be on a linear footage basis, while abandonment with flowable fill and abandonment with plugging shall be on a per each basis.

B. Payment – Payment for Removal of Structures and Obstructions will be made at the contract unit price bid, and shall be full compensation for furnishing all labor, equipment and incidentals required to load, haul, excavate, backfill, compact, grade, dispose, etc., the Removal of Structures and Obstructions and complete the item in accordance with the contract documents. It shall also include full compensation for furnishing all labor, equipment, and incidentals associated with plugging and abandoning any force mains noted on the Plans and abandoning any force mains with flowable fill. Payment shall be according to the following items:

Removal and Disposal of 4" PVC	**LF**
Removal and Disposal of 8" PVC	**LF**
Removal and Disposal of 10" PVC	**LF**
Removal and Disposal of 12" PVC	**LF**
Abandon 8" Force Main w/ Flowable Fill	**EA**
Abandon 10" Force Main w/ Flowable Fill	**EA**
Abandon 12" Force Main w/ Flowable Fill	**EA**
Plug and Abandon 4" Force Main (grout each end)	**EA**
Plug and Abandon 8" Force Main (grout each end)	**EA**
Plug and Abandon 10" Force Main (grout each end)	**EA**
Plug and Abandon 12" Force Main (grout each end)	**EA**

1.04 Water Main, Open Cut Installation

A. Measurement - Measurement of work for payment of this item shall be the actual measure per linear footage of Water Main, Open Cut Installation and complete within the limits shown on the Plans or as directed by the Project Engineer for all depths and grades, measured along the top centerline of the pipe from beginning installation point to ending installation point.

B. Payment - Payment for (Water) Main, Open Cut Installation will be made at the contract unit price bid, measured as provided above, which price and payment shall be full compensation for furnishing all labor, materials, equipment and incidentals required to load, haul, unload, excavate, place, lay, joint, bed, cover, test, sterilize, etc., the Water Main, Open Cut Installation and complete the item in accordance with the Contract Documents. Payment shall be according to the following items:

4" Water Main Open Cut Installation	**LF**
8" Water Main Open Cut Installation	**LF**
12" Water Main Open Cut Installation	**LF**

1.05 Restrained Joint Water Main, Open Cut Installation

A. Measurement - Measurement of work for payment of this item shall be the actual measure per linear foot of Restrained Joint Water Main, Open Cut Installation complete, tested and sterilized and accepted without deduction for space occupied by valves or fittings and as approved by the Project Engineer.

B. Payment - Payment for Restrained Joint Water Main, Open Cut Installation will be made at the contract unit price bid, measured as provided above, which price and payment shall be full compensation for furnishing all labor, materials, equipment and incidentals required to load, haul, unload, excavate, place, lay, joint, bed, backfill, cover, compact, grade, test, sterilize, etc., the Restrained Joint Water Main, Open Cut Installation and complete the item in accordance with the contract documents. Payment shall be according to the following items:

4" Restrained Joint PVC Water Main Open Cut Installation	**LF**
4" Restrained Joint DI Water Main Open Cut Installation	**LF**
8" Restrained Joint PVC Water Main Open Cut Installation	**LF**

8" Restrained Joint DI Water Main Open Cut Installation	**LF**
10" Restrained Joint PVC Water Main Open Cut Installation	**LF**
10" Restrained Joint DI Water Main Open Cut Installation	**LF**
12" Restrained Joint PVC Water Main Open Cut Installation	**LF**
12" Restrained Joint DI Water Main Open Cut Installation	**LF**

1.06 HDPE Water Main Installation

A. Measurement - Measurement of work for payment of this item shall be the measure per linear foot from horizontal station to horizontal station of HDPE water main installation, complete, tested and sterilized and accepted without deduction for space occupied by valves or fittings and as approved by the Project Engineer. There will be two types of installations under this item which include direct bore installation with excavated pits allowing for installation to miss utilities and a traditional horizontal directional drill installed from aboveground.

B. Payment - Payment for HDPE Water Main Installation will be made at the contract unit price bid, measured as provided above. The price and payment for direct bore installations shall be full compensation for furnishing all labor, materials, equipment and incidentals required to load, haul, unload, lay, fuse and test joints, excavate for direct bore pits, install piping, bed, backfill, cover, compact, grade, test, sterilize, etc., the HDPE direct bore water main installation and complete the item in accordance with the contract documents. The price and payment for horizontal directional drill installations shall be full compensation for furnishing all labor, materials, equipment and incidentals required to load, haul, unload, lay, fuse and test joints, excavate for tie-in points, install piping, bed, backfill, cover, compact, grade, test, sterilize, etc., the HDPE directional drill water main installation and complete the item in accordance with the contract documents. Payment shall be according to the following items:

6" HDPE DR 11 Horizontal Directional Drill	**LF**
10" HDPE DR 11 Direct Bore Installation	**LF**
12" HDPE DR 11 Direct Bore Installation	**LF**
14" HDPE DR 11 Horizontal Directional Drill	**LF**

1.07 Ductile Iron Fittings

A. Measurement - Iron fittings for pipe size three inches (3") and larger will be measured by an actual count in units of U.S. short tons of fittings and payment for mechanical joint and

flanged joint fittings shall be made on the basis of published body weight for ANSI/ AWWA C153 for compact ductile iron (not grey iron) mechanical joint and flanged fittings and ANSI/AWWA C110 for flanged fittings, exclusive of weight for mortar linings, gasket, gland, bolts, and packaging. This same basis of measurement shall be used for ductile iron fittings used on ductile iron pipe, asbestos cement pipe, PVC pressure class pipe, or G.F.R. pipe. No measurement will be made for fittings on pipe smaller than three inches (3") or for steel or concrete fittings or PVC or GFR pressure rated plastic fittings and, where allowed, their payment will be included in the pay item for the pipe.

B. Where special fittings for crosses or special pattern fittings are required, they will be measured as standard fittings as herein provided and any extra cost shall be included in the measurement and payment for the respective special type valve or appurtenance.

C. When flanged or mechanical joint ductile iron fittings are required for the construction of a lump sum payment item such as a pump station, the cost of the fittings shall be included in the lump sum and will not be measured under this pay item.

D. Ductile Iron Sleeves are considered to be incidental for the contractor's convenience or are to be included in the cost for tie-ins when indicated in the Bid Form and will not be measured for payment under this item.

E. Payment - The total quantity of Ductile Iron Fittings, placed and accepted, measured as provided above, will be paid for at the contract unit price per ton for iron fittings, which price and payment shall constitute full compensation for furnishing, hauling, installing complete, testing and disinfecting, for excavation, preparation of bed and backfilling, concrete thrust blocks or other restraint, and for the furnishing of all equipment, tools, labor and incidentals necessary to complete the item in accordance with the Drawings and Specifications. Payment shall be according to the following items:

Ductile Iron Water Main Fittings **TON**

1.08 Isolation and Check Valves

A. Measurement - Measurement of work for payment of these items shall be the actual count (each) of valves installed as specified and as shown on the Drawings.

B. Payment - Payment of the amount bid for this item shall be full compensation for furnishing all labor, materials, equipment, and incidentals required to furnish and install valves, complete as specified and as shown on the Drawings. The actual count (each) of valves installed, measured as provided above, will be paid for at the respective unit price bid for the respective type and size of valve. No additional payment will be made for excavation, sheeting, and bracing, backfill and compaction, testing, and removal of excess earth. No direct payment may be made for dewatering, including all pumping, well pointing, and other necessary operations. Payment shall include full compensation for furnishing, bedding and supporting, setting, joining, cleaning, sealing, and testing of the valves and all incidental work required in the installation of valves. Payment shall be according to the following items:

4" Gate Valve	**EA**
4" Inserta Valve	**EA**
8" Gate Valve	**EA**
8" Inserta Valve	**EA**
10" Gate Valve	**EA**
12" Gate Valve	**EA**
12" Inserta Valve	**EA**

1.09 Fire Hydrant Assembly (Including 6-Inch Isolation Valve and Associated 6-Inch Piping)

A. Measurement - Measurement of work for payment of this item shall be the actual count (each) of Fire Hydrant Assembly (Including 6-Inch Isolation Valve and Associated 6-Inch Piping) installed and accepted as approved by the Project Engineer.

B. Payment - Payment for fire hydrant assemblies will be made at the contract unit price bid, measured as provided above, which price and payment shall be full compensation for furnishing all labor, materials, equipment and incidentals required to load, haul, unload, place, set, block, brace, backfill, compact, test, sterilize, and tie-in the Fire Hydrant Assembly (Including 6-Inch Isolation Valve and Associated 6-Inch Piping) complete in accordance with the contract documents. The 6-inch piping shall include all necessary length of piping necessary to tie the entire fire hydrant assembly and valve into the main water line from which it is offset. The payment for this item shall only include relocation of existing fire hydrant the cost for a new fire hydrant will not be included in this item.

Fire Hydrant Assembly (Including 6" Isolation Valve and Associated 6" Piping) EA

1.10 Tie to Existing Water Main

A. Measurement - Measurement of work for payment of this item shall be the actual count (each) to Tie to Existing Water Main as approved by the Project Engineer.

B. Payment - Payment to Tie to Existing Water Main will be made at the contract unit price bid, measured as provided above, which price and payment shall be full compensation for furnishing all labor, materials (including, but not limited to, all necessary fittings, tees, adapters, couplings, sleeves, etc.), equipment, and incidentals required to load, haul, unload, excavate, place, set, block (both wood and concrete), brace, backfill, compact, test sterilize, etc., Tie to Existing Water Main, and complete the item in accordance with the contract documents. Hot tap tie-ins are to be paid for under a different item; this item includes all tie-ins where hot taps and tapping sleeves are not required. Payment shall be according to the following items:

Tie Into Existing 4" Water Main	**EA**
Tie Into Existing 8" Water Main	**EA**
Tie Into Existing 12" Water Main	**EA**

1.11 Hot Tap on Existing Water Main

A. Measurement - Measurement of work for payment of this item shall be the actual count (each) to Hot Tap on Existing Water Main as approved by the Project Engineer.

B. Payment - Payment to Hot Tap on Existing Water Main will be made at the contract unit price bid, measured as provided above, which price and payment shall be full compensation for furnishing all labor, materials (including tapping tee, full port tapping sleeve and appurtenances), equipment and incidentals required to load, haul, unload, place, set, block, brace, backfill, compact, test and sterilize, etc., to Hot Tap on Existing Water Main, and complete the item in accordance with the contract documents. Payment shall be according to the following items:

4" Hot Tap on 6" HDPE Water Main (Including Tapping Sleeve)	**EA**
6" Hot Tap of Existing 8" Water Main (Including Tapping Sleeve)	**EA**

1.12 Water Sampling Station for Chlorination and Pressure Tests

A. Measurement - Measurement of work for payment of this item shall be the actual count for each Water Sampling Station as approved by the Project Engineer.

B. Payment - Payment for each Water Sampling Station will be made at the contract unit price bid, measured as provided above, which price and payment shall be full compensation for performing all work shown on the Water Sampling Station details at the locations to be specified by the Engineer, including furnishing all labor, materials (including the meter vault , the flow meter, valves, pipe, fittings, and appurtenances), equipment, and incidentals required to load, haul, unload, place, set, block, brace, backfill, compact, test and sterilize, etc., for the Water Sampling Station for Chlorination and Pressure Tests and complete the item in accordance with the contract documents. Payment shall be according to the following items:

Water Sampling Station EA

1.13 Service Tap (Including Tapping Saddle, Corporation Stop and Curb Stop)

A. Measurement - Measurement of work for payment of this item shall be the actual count (each) of 3/4-inch and 2-inch Service Taps (Including Tapping Saddle, Corporation Stop and Curb Stop) installed and accepted as approved by the Engineer.

B. Payment - Payment for 3/4-inch and 2-inch Service Taps (Including Tapping Saddle, Corporation Stop and Curb Stop) will be at the contract unit price bid measured as provided above, which price and payment shall be full compensation for furnishing all labor, materials, equipment and incidentals to complete the installation of this service tap in accordance with the Contract Documents. Payment for actual linear footage of service pipe is not included in this item; it shall be included in the separate bid item for service pipe. Payment for service taps shall be according to the following items:

¾" Service Tap EA
2" Service Tap EA

1.14 Recover and Connect to Existing Service Line

A. Measurement - Measurement of work for payment of this item shall be the actual count (each) of Existing Service Lines recovered and connected to the newly installed PVC water main and accepted as approved by the Engineer.

B. Payment - Payment for Recover and Connect to Existing Service Line will be at the contract unit price bid measured as provided above, which price and payment shall be full compensation for furnishing all labor, materials, equipment, and incidentals required to Recover and Connect to Existing Service Lines including probing and excavations necessary to complete the item in accordance with the Contract Documents and Drawings. Payment shall include full compensation for removal and disposal of pavement and any necessary fittings, adapters, couplings, reducers, etc. to achieve tie-in between existing service lines and new HDPE service lines utilized for connection to new PVC water mains, and any other materials, equipment, and incidentals integral to the completion of this work. Payment for this item shall be according to the following items:

Recover and Connect to Existing Service Line EA

1.15 Saw Cut Concrete Surfaces

A. Measurement - Concrete surfaces (streets, driveways, sidewalks, etc.) to be sawed will be measured by the actual linear footage sawed as required by the Specifications and Drawings at specified depths, or as directed by the Engineer.

B. Payment - Concrete surfaces (streets, driveways, sidewalks, etc.) sawed, approved and accepted, measured as provided above, will be paid for at the contract unit price per lineal foot for this item, which price and payment shall constitute full compensation for furnishing all equipment, tools, labor and incidentals necessary to complete the item in accordance with the Specifications and Drawings.

Saw Cut Concrete Surfaces LF

1.16 Saw Cut Asphalt Surfaces

A. Measurement - Asphalt surfaces (streets, driveways, sidewalks, etc.) to be sawed will be measured by the actual lineal foot sawed as required by the Specifications and Drawings or as directed by the Engineer.

B. Payment - Asphalt surfaces (streets, driveways, sidewalks, etc.) sawed, approved and accepted, measured as provided above, will be paid for at the contract unit price per lineal foot for this item, which price and payment shall constitute full compensation for furnishing all equipment, tools, labor and incidentals necessary to complete the item in accordance with Specifications and Drawings, including sawing of surface underlying the asphalt, such as but not limited to soil cement base course or concrete pavement underlying the asphalt.

Full Depth Saw Cut Asphalt Surfaces (14” Min.)	**LF**

1.17 Removal and Replacement of Concrete Walks and Driveways

A. Measurement - Measurement of work for payment of this item shall be the actual number of square yards removed as determined by the product of the actual width and length as determined by field measurements and as approved by the Engineer.

B. Payment - Payment of the amount for this item shall be full compensation for furnishing all labor, materials, equipment, and incidentals required to complete the removal and replacement of concrete walks and driveways, completed as specified as shown on the Drawings. Payment shall include full compensation for removal and replacement of concrete walks and driveways.

Removal and Replacement 6” Concrete Walks	**SQ YD**
Removal and Replacement 10” Concrete Driveway	**SQ YD**
Removal and Replacement 12” Concrete Driveway	**SQ YD**

1.18 Temporary Granular Surface (Item No.34)

A. Measurement - Measurement of work for payment of this item shall be the actual net section in cubic yards measured in place. The net section shall be based on the depth,

width of pipe trench, and length as shown on the Drawings and as approved by the Engineer.

B. Payment - Payment of the amount bid for this item shall be full compensation for furnishing all labor, materials, equipment, and incidentals required to temporarily restore the surface with granular surface material, completed as specified and as shown on the Drawings. Payment shall include full compensation for the furnishing of all material, loading, hauling, unloading, spreading, shaping, maintaining the finished surface until acceptance, and all incidental work required in the temporary restoration of surface with granular surface material.

Temporary Granular Surface CU YD

1.19 Limestone

A. Measurement - Measurement of work for payment of this item shall be the actual net section in cubic yards measured in place. The net section shall be based on the depth, width, and length as shown on the Drawings and/or as approved by the Engineer.

B. Payment - Payment of the amount bid for this item shall be full compensation for furnishing all labor, materials, equipment, and incidentals required to restore driveway and other surfaces designated by Project Engineer with limestone, completed as specified and as shown on the Drawings. Payment shall include full compensation for the furnishing of all material, loading, hauling, unloading, spreading, shaping, maintaining the finished surface until acceptance, and all incidental work required in the restoration of surface with limestone.

Limestone CU YD

1.20 Remove and Replace Fence

A. Measurement – Measurement for payment of this item shall be the actual footage of existing fence that is removed and replaced as required to perform the Work on this project.

B. Payment- Payment for the Work under this item shall be full compensation for equipment, materials, labor and incidentals required for the removal and disposal of the existing fence

material and construction of new fence in like or better kind than previously existing, including but not limited to, removal of existing fence, loading the existing fence materials for transport to the disposal site, disposal of the fence material in an approved landfill, installation of new line and brace posts, installation of new wire, and cleanup of the site to remove and replace fence in accordance with the Contract Documents and as instructed by the Engineer.

Remove and Replace Chain Link Fence (5-Foot High w/Barbed Wire) LF
Remove and Replace Chain Link Fence (6-Foot High w/Barbed Wire) LF

1.21 Clearing and Grubbing

A. Measurement – Measurement of work for payment of this item shall be per acreage as approved by the Project Engineer.

B. Payment – Payment for clearing and grubbing will be made at the contract unit price and shall be full compensation for work completed.

Clearing and Grubbing **Lump Sum**

1.22 Hydro-Mulch of Disturbed Areas

A. Measurement and Payment of the quantity established in the Bid for this item shall be full compensation for furnishing all materials, labor, equipment, and incidentals required to complete the construction complete as specified and as shown on the Drawings and/or specified herein.

B. Measurement and Payment shall also include full compensation for providing and installing hydro-mulch on all disturbed grass areas on this project in full accordance with the Specifications. This includes any grass areas disturbed that were directly within the path of construction alignment, any affected due to construction traffic moving around the project, any affected by parking of vehicles, any affected by spillage of construction materials (such as asphalt) that may affect growth, and/or any that was affected by material or equipment storage.

C. Measurement and Payment shall also include preparation of seed bed, selection and application of grass seed (based on time of year) at the required application rate, sowing in

the grass seed, protecting seed from erosion and/or traffic, fertilizer application, water management gel, tackifier, and any other incidentals required to carry out these tasks.

D. Payment for this particular item shall be on the following basis:

Hydro-Mulch of Disturbed Areas – LUMP SUM

1.23 Exploratory Excavation

A. Measurement - Measurement of this work shall include all labor, equipment, materials, incidentals (such as temporary sheet piling if standard side slopes not used and dewatering pumps if groundwater encountered) and qualified personnel to perform exploratory excavation with dimensions of up to 20 feet long by 10 feet wide by 10 feet deep, in those areas identified on the Plans or when requested by the Project Engineer or his representative, for other areas where underground utility locations are not well defined. The operation includes all necessary equipment, materials, incidentals, and labor for excavation, as well as all such work, equipment, materials, incidentals and labor for the additional work of filling the holes and voids created by construction operations as per Section 02105, Exploratory Excavation, of the Specifications. It shall also include the work, equipment, incidentals, and personnel necessary to determine the elevations of conflicting utilities.

B. Payment - Beyond those areas designated on the Plans for exploratory excavation, payment will only be given for this item when directed to perform such exploratory excavation by the Project Engineer. Payment shall be on an each basis according to the following item:

Exploratory Excavation EA.

1.24 Restore Asphalt Pavement and Base

A. Measurement - Measurement of work for payment of this item shall be the actual count in units of U.S. short tons required to install both the 2” Wearing Course and the Asphalt Patch (14” depth) as determined by the product of the actual width and length as determined by field measurements and/or as approved by the Engineer. For both Asphalt Patching (14” depth) and 2” Wearing Course the measurement of tonnage should not include both items together. In addition, Contractor will not be given additional quantity for this item for saw cutting beyond the trench limits specified on the Drawing.

B. Payment - Payment of the amount for this item shall be full compensation for furnishing all labor, materials, equipment, disposal, and incidentals required to remove and restore asphalt streets and drives, complete as specified and as shown on the Drawings. Payment shall include full compensation for furnishing and placing all required materials, including base course, to complete pavement, including rolling, compaction and grading, cleaning the surface upon which the asphalt is placed, providing headers, prime coats and tack coats, and all incidental work required in the restoring of asphalt streets.

2" Wearing Course	**TON**
Asphalt Patch (14" depth)	**TON**

1.25 Relocation of Infrastructure

A. Measurement - Measurement of work for payment of this item shall be on a lump sum basis.

B. Payment - Payment for Relocation of Infrastructure Items will be made at the contract lump sum price bid and shall be full compensation for the actual cost of relocating, repairing, replacing or removing any unforeseen utilities or structures; such as but not limited to, water and subsurface drainage systems that are in conflict with the items to be installed in this project. Such relocations shall not be undertaken by the Contractor unless specifically approved by the Project Engineer prior to such work. Any deviation from this policy will result in lack of payment to the Contractor for such relocation work. Any remaining money in the designated unit price at the end of the Project will not be paid to the Contractor, but instead credited to the Owner in the final project closeout.

C. Payment for this particular item shall be on the following basis:

Relocation of Infrastructure – LUMP SUM

1.26 Mobilization

A. Measurement - Measurement of work for payment of this item shall be on a lump sum basis.

B. Payment - Payment for Mobilization will be made at the contract lump sum price bid and shall be full compensation for all preparatory work 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 the work on the project, the cost of bonds and any required insurance, and other pre-construction expenses necessary for start of work, excluding the cost of construction materials.

C. Payment of lump sum fee for mobilization shall be subject to the following provisions:

1. Partial payment 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 this Contract.

2. Contractor shall present a breakdown of costs under this payment item in accordance with the requirements for preparing a Schedule of Values to show costs for 1) Bonds, 2) Insurance, 3) Audio/Video Survey, and 4) other costs under this pay item. Upon presentation of invoices with the first payment application for the Bonds the Insurance and the Audio/Video Survey items, payment will be made for the cost of these items and the remaining cost under this pay item shall be made by the following schedule.

PERCENT OF TOTAL CONTRACT AMOUNT EARNED	ALLOWABLE PERCENT OF LUMP SUM PRICE FOR THE ITEM
1st Partial Estimate	25
10	50
25	75
50	100

PART - II PRODUCTS - (NOT USED)

PART - III EXECUTION - (NOT USED)

END OF SECTION

TECHNICAL SPECIFICATIONS
DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01200 - PROJECT MEETINGS

PART - I GENERAL

1.01 REQUIREMENTS INCLUDED

A. The Engineer shall schedule and administer a preconstruction conference at the Engineer's office. Construction progress meetings and specially called meetings throughout the progress of the work will be held in the field office or at another prearranged location, when no field office is provided under the project requirements. The Engineer will:

1. Prepare agenda for meetings.
2. Make arrangements for meetings.
3. Preside at meetings.
4. Record the minutes; include significant proceedings and decisions.
5. Reproduce and distribute copies of minutes.

B. The Contractor and representatives of, where appropriate, subcontractors and suppliers shall attend meetings. The representative shall be qualified and authorized to act on behalf of the entity each represents.

C. The Contractor shall attend and identify at the meetings the actual status of the Contract Work and, when the Work is not being performed consistently with the Contract Documents and construction schedules, shall identify at the meetings the steps he is taking to resolve the inconsistency.

1.02 PRE-CONSTRUCTION CONFERENCE

A. The Contractor shall participate in a preconstruction conference to be held after the effective date of the Agreement and/or on the date of Notice to Proceed.

B. The following are expected to be in attendance:

1. Owner's Representative and other staff as appropriate.
2. Engineer and his professional consultants as appropriate.
3. Engineer's Resident Project Representative.
4. Contractor's Representative and Construction Superintendent.
5. Subcontractors as appropriate.
6. Utility representative as appropriate.
7. Others as appropriate.

C. The purpose of the conference is to designate responsible personnel and establish a working relationship. Matters requiring coordination will be discussed and procedures for handling such matters established. The agenda will include:

SECTION 01200 - PROJECT MEETINGS

1. Description of all parties including contract representatives, phone numbers, and addresses.
2. Responsibilities of Owner.
3. Responsibilities of authorities of the Engineer.
4. Responsibilities of the Contractor.
5. Responsibilities and Authorities of Resident Project Representative.
6. Responsibilities and Authorities of Testing Laboratory.
7. General Project Status and Information.
8. Location of Items.
9. Regulatory Requirements.
10. Site Conditions.
11. Labor Requirements.
12. Submittals required by Contractor.
13. Payment to Contractor.
14. Project Closeout.

1.03 CONSTRUCTION PROGRESS MEETING

A. Construction progress meetings will be held monthly with the first meeting within 30 days after the date of Notice to Proceed.

B. Special construction progress meetings will be held as required by progress of the Work.

C. The following are expected to be in attendance:

1. Owner Representative and other staff as appropriate.
2. The Engineer and his professional consultants as appropriate.
3. Contractor's Representative and/or Construction Superintendent.
4. Subcontractors as appropriate.
5. Suppliers as appropriate.
6. Others as appropriate.

D. The following matters are expected to be addressed:

1. Review and approve minutes of previous meeting.
2. Review of work progress.
3. Field observations, problems, conflicts.
4. Problems which impede Construction Schedule.
5. Review of off-site fabrication, delivery schedules.
6. Corrective measures and procedures to regain Construction Schedule.
7. Revisions to Construction Schedule.
8. Progress and schedule during succeeding work period.
9. Payment applications and processing.
10. Submittals.
11. Maintenance of quality standards.
12. Changes, substitutions, and change orders.

13. Review proposed changes for:
    a. Effect on Construction Schedule and completion date.
    b. Effect on other contracts of the Project.
14. Other matters as appropriate.
15. Record drawings.

E. The Contractor shall be prepared to discuss the above topics and to make commitments for resolving deficiencies.

F. The Engineer shall provide a current submittal log at each progress meeting in accordance with the Section of the Specifications entitled "Progress Schedules".

PART - II PRODUCTS

(NOT USED)

PART - III EXECUTION

(NOT USED)

END OF SECTION

TECHNICAL SPECIFICATIONS
DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01300 - SUBMITTALS

PART - I GENERAL

1.01 DESCRIPTION

This section refers to the general procedures and requirements for submittals. Specific requirements for submittals are included in other sections of these specifications.

1.02 DEFINITION

The term "submittal" as used herein shall be understood to include detail design calculations, shop drawings, fabrication and installation drawings, erection drawings, lists, graphs, operation instructions, catalog sheets, data sheets, product data, samples, and similar items.

1.03 LIST OF SUBMITTALS

A. The following is a list of submittals and the times required for approval in accordance with the Contract Documents. Submittals should be made in advance of the milestones that allows adequate time for completion of the approval process.

	ITEM	TIME
1.	Schedule of Progress	Pre-Construction Conference*
2.	Schedule of Payments	Pre-Construction Conference*
3.	Schedule of Values	Pre-Construction Conference*
4.	List of Manufacturers and Associated Products	Prior to Start of Work
5.	Substitute Material or Equipment	Prior to Start of Work
6.	Manufacturer’s Certificate of Compliances	Prior to Start of Work
7.	Change Orders	Within 15 days of occurrence
8.	Layout and Shop Drawings of Fabricated Items	Prior to Installation
9.	Shop Drawings	Prior to placement of final order or prior to installation
10.	Operation & Maintenance Manuals	Prior to startup
11.	Spare Parts	Completion of Project
12.	Tabulation of Equipment w/Data	Completion of Project
13.	Certificate of Gradation of Aggregate	Prior to Installation
14.	Concrete Mix Design	Prior to Installation

SECTION 01300 - SUBMITTALS

* If no Pre-Construction Conference is held, the submittal shall be made prior to First Payment.

B. The Engineer may require submittals not listed above to expedite the work. Contractor shall comply to all submittal requests made by Engineer.

PART - II PRODUCTS

(NOT USED)

PART - III EXECUTION

(NOT USED)

END OF SECTION

TECHNICAL SPECIFICATIONS
DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01310 - PROGRESS SCHEDULES

PART - I GENERAL

1.01 GENERAL

Provide Construction Schedules for Work included in this Contract in accordance with the requirements in this Section. Create a critical path type Construction Schedule depicted on a Gantt Chart (Bar Chart) format.

1.02 SUBMITTALS

A. Submit Construction Schedule for review by the Engineer in accordance with the requirements for submittals stated elsewhere in the Contract Documents.

B. Provide the Contractor’s proposed construction schedule charts and activity listings at the preconstruction conference. The Engineer will provide review of the samples within 7 days of the submittal.

1. Within 21 days of the receipt of approval of the Contractor's format submit a final Construction Schedule for review.

2. Construction Schedule Submittals shall include:

a. Printed bar charts that meet the criteria outlined in this Section.
b. Activity listings that meet the criteria outlined in this Section.

C. The Contractor must receive approval of the Engineer for the Construction Schedule prior to the first monthly Application for Payment. No payment will be made until the Construction Schedule is accepted.

D. If the Contractor desires to make changes in his method of operating and scheduling, after approval of the original planned operations or schedule has been given by the Engineer, the Contractor shall notify the Engineer in writing, stating the reasons for the change. If the Engineer considers these changes to be of significant nature, the Contractor may be required to revise and resubmit for approval all or the affected portion of the Contractor's Construction Schedule to show the effect on the entire Work.

E. Upon written request from the Engineer, the Contractor shall revise and submit for approval all or any part of the Construction Schedule Submittal to reflect changed conditions in the Work or deviations made from the original plan and schedule.

F. The Contractor's Construction Schedule shall thereafter be updated with the Actual Start and Actual Finish Dates, Percent Complete, and Remaining Duration of each Activity and submitted monthly. The updated Construction Schedule shall coincide with the dates used in the monthly

Application for Payment. This monthly update of the schedule shall be required before the monthly Application for Payment will be processed for payment.

G. Bar charts and activity listings may be printed or plotted on 8.5" x 11", 8.5" x 14" or 11" x 17" sheet sizes. Over-size plots are not acceptable.

1.03 ANALYSIS OF CONTRACT TIME

A. Changes in Contract Time shall be analyzed on the basis of whether the change is due to conditions beyond the control of the Contractor as is defined elsewhere in the Contract Documents. Only those events that are judged to be beyond the control of the Contractor will be approved for analysis in determining an adjustment to the Contract Time.

B. The adjustment of Contract time will be evaluated as the change in Contract Time relates to the critical path of the Contract as established by the approved Construction Schedule as defined by this Section. Adjustment(s) to Contract time will be made on the basis of the following:

1. Float shall be determined as the number of contract days that are available between the scheduled completion date as shown on the approved Construction Schedule and the date when an activity, if not completed, would affect the critical path for the project.

2. All float shall be considered in the evaluation of Contract Time. Float will be used prior to issuance of any adjustment in contract time, including time for excess adverse weather, irrespective of the reason for the analysis of a time adjustment. The Owner reserves the right to issue changes in the Work, utilizing available float for completion of additional work and, thereby, not affecting either of the Contractual Completion Dates.

3. Should the approved change in time, irrespective of whether the change is initiated by the Owner or other event that is beyond the control of the Contractor, affect the critical path for completion of the contract by extending the completion of the contract beyond either the Contractual Substantial Completion Date or the Contractual Final Completion Date, an adjustment in the Contract Time will be granted by the Owner as provided by the Contract Documents.

4. Should the approved change in time, irrespective of whether the change is initiated by the Owner or other event that is beyond the control of the Contractor, affect the time line of any task, but not affect the critical path, the change in time will be taken from the available float and a Contractual Time adjustment will not be granted.

5. Should the approved change in time, irrespective of whether the change is initiated by the Owner or other event that is beyond the control of the Contractor, affect the time line of any task not on the critical path, but the change in time causes the non-critical task to become the critical path, a portion of the change in time will be taken from the available float and the remainder will be granted in a Contractual Time adjustment by the Owner as provided by the Contract Documents.

SECTION 01310 - PROGRESS SCHEDULES

PART - II PRODUCTS - Not Used

PART - III EXECUTION

3.01 The Construction Schedule Submittal shall be based on activities that accurately depict the work that is to be performed.

3.02 The level of detail and number of activities required in the schedule is dependent on the project type. The work shall be categorized by work type in the schedule.

A. Project schedules shall include at least one activity for each unique combination of work type.

B. Schedules for Sanitary Sewer Pump Station Rehabilitation Projects shall contain a sufficient number of activities, depending on the work types involved in the project, to adequately describe the complexity of the tasks to be performed. As a minimum, tasks shall be broken down into the following tasks:

1. Preparatory
2. Application for and Connection of Temporary Electrical Service
3. Setup Bypass Pumping as Necessary
4. Removal of Existing Equipment
5. Cleaning and Repair of Existing Structures
6. Installation of New Equipment
7. Application for and Connection of Permanent Electric Service
8. Startup of New Equipment
9. Demolition of Existing Structures to be Abandoned
10. Cleanup, Dressing of Excavated Areas, Re-establishment of Vegetative Cover, Etc.

C. Pipe Laying or Rehabilitation work shall include as a minimum the following tasks:

1. Preparatory (Mobilization to each specific site, clearing and grubbing as required, stripping topsoil as required, etc.)
2. Trench Excavation and Laying/Rehabilitation of Pipe
3. Backfill of Trenches
4. Initial Dressing of Excavated Areas
5. Testing of Pipes
6. Final Dressing of Excavated Area and Restoration of Surfaces and Vegetative Cover

D. Earthwork and/or dredging work shall include as a minimum the following tasks:

1. Preparatory (Mobilization to each specific site, clearing and grubbing as required, stripping topsoil as required, etc.)

SECTION 01310 - PROGRESS SCHEDULES

2. Excavation, Hauling and Construction of Embankment/Spoil Berm Operations
3. Initial Dressing of Areas Disturbed by all Earthwork Operations
4. Quality Control Measurements
5. Final Dressing of Disturbed Areas and Restoration of Surfaces and Vegetative Cover

E. Plant or facility work shall be broken down into the following tasks:

1. Preparatory, including securing necessary permits and mobilization of personnel and equipment.
2. Application for and Connection of Temporary Electric Service
3. Excavation
4. Civil
5. Coordination of Various Disciplines for Installation of New Equipment
   a. Mechanical
   b. Electrical
   c. Instrumentation
6. Application for and Connection of Permanent Electric Service
7. Startup of New Equipment
8. Final Cleanup and Installation of Landscaping

F. For projects with work at different physical locations or different facilities within a project, each location or facility shall be indicated separately within the schedule.

G. For projects with multiple crafts or significant subcontractor components, these elements shall be indicated separately within the schedule.

H. For projects with multiple types of tasks within the scope, these types of work shall be indicated separately within the schedule. For projects with multiple service areas, the Contractor may be required to separate work by service area.

I. For projects with significant major equipment items or materials work over 30 percent of the Total Contract Price, the schedule shall indicate dates when these items are to be purchased, when they are to be delivered, and when installed.

J. For projects where operating facilities are involved, each period of work that will require the shut down of any process or operation shall be identified in the Schedule and must be agreed to by the Engineer and facility operations personnel prior to starting work in the area.

END OF SECTION

TECHNICAL SPECIFICATIONS
DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01340 - SHOP DRAWINGS, PROJECT DATA, AND SAMPLES

PART - I GENERAL

1.01 REQUIREMENTS INCLUDED

A. The Contractor shall submit to the Engineer for review and exception, if any, such working drawings, shop drawings, test reports and data on materials and equipment (hereinafter in this article called data), and material samples (hereinafter in this article called samples) as are required for the proper control of work, including but not limited to those working drawings, shop drawings, data and samples for materials and equipment specified elsewhere in the Specifications and on the Contract Drawings.

B. Within fifteen (15) calendar days after the Effective Date of the Agreement, the Contractor shall submit to the Engineer a complete list of preliminary data on items for which shop drawings are to be submitted. Included in this list shall be the names of all proposed manufacturers furnishing specified items. Review of this list by the Engineer shall in no way relieve the Contractor from submitting complete shop drawings, data, and samples in accordance with the Specifications. This procedure is required in order to expedite final review of shop drawings.

C. The Contractor is to maintain an accurate updated submittal log and will bring this log to each scheduled progress meeting. This log should include the following items:

1. Submittal Description and Number assigned.
2. Date to Engineer.
3. Date returned to Contractor (from Engineer).
4. Status of Submittal (Approved, Approved as Noted, Revise and Resubmit, Not Approved).
5. Date of Resubmittal and Return (as applicable).
6. Date material released (for fabrication).
7. Projected date of fabrication.
8. Projected date of delivery to site.
9. Status of O&M Manuals submitted.

1.02 CONTRACTOR'S RESPONSIBILITY

A. It is the duty of the Contractor to check all Drawings, data and samples prepared by or for him before submitting them to the Engineer for review. Each and every copy of the Drawings and data shall bear Contractor's stamp showing that they have been so checked. Submittals submitted to the Engineer without the Contractor's stamp or submittals showing evidence that the Contractor has not performed the required review will be returned to the Contractor for conformance with this requirement. Submittals shall indicate any deviations from requirements of the Contract Documents.

B. Determine and verify:

1. Field measurements.
2. Field construction criteria.
3. Catalog numbers and similar data.
4. Conformance with Specifications and indicate all variances from the Specifications with an explanation as to the reasons for the variance and a statement detailing how the variance meets the intent of the specified requirement.

C. All shop drawings or other submittals shall be accompanied by the Engineer's standard submittal transmittal form. A sample of this form is attached at the end of this Specification. This form may be obtained in quantity from the Engineer at reproduction cost or will be transmitted electronically, if requested by the Contractor. Any submittal not accompanied by such a form, or where all applicable items on the form are not completed, will be returned for resubmittal. A separate transmittal form shall accompany each shop drawing, product data, or sample.

D. The Contractor shall be solely responsible for the accuracy and completeness of the shop drawing. All communications concerning shop drawings or the project in general shall be directed through the Contractor. Contractor shall coordinate between subcontractor, suppliers, and manufacturers all shop drawings to ensure that the total work including all interconnections, timers, control, etc., or the system confers to the design criteria specified. In no case shall a subcontractor or supplier submit shop drawings directly to the Engineer unless the Engineer receives approval from the Contractor for this deviation in protocol. If this approval is delivered verbally, the Contractor shall follow up with the approval in writing, by letter or email, prior to the Engineer proceeding with the shop drawing review.

E. No products, equipment, or material shall be delivered or fabricated until the shop drawings, product data, or sample have been submitted and checked by the Engineer for its conformance to the drawings and specifications and given final approval for fabrication or erection by the Engineer. Until final approval of shop drawing or sample is given in writing, Contractor shall not proceed with any work directly or indirectly associated with that item and, should the Contractor proceed and adjustments to the installation are required, this cause shall not be justification for a change in contract price or time.

F. The Contractor shall furnish the Engineer a schedule of shop drawing submittals fixing the respective dates for the submission of shop and working drawings, the beginning of manufacture, testing and installation of materials, supplies and equipment. This schedule shall indicate those that are critical to the progress schedule.

G. The Contractor shall submit to the Engineer all drawings and schedules sufficiently in advance of construction requirements to provide no less than twenty-one (21) calendar days for checking and appropriate action from the time the Engineer receives them.

H. All shop drawings shall be clearly marked and labeled as to their intended use. Any submittal which causes the Engineer to ponder or guess at the intended use shall be rejected.

I. The Contractor shall submit seven copies of shop drawings that do not require electrical or structural review and descriptive or product data to complement shop drawings to the Engineer which will be retained for his use. Eight copies of shop drawings requiring structural or electrical review shall be submitted to allow the subconsultant to retain a copy of the reviewed shop drawing for future reference. The Contractor shall submit extra sets as required for his subcontractors, his suppliers, and his own use.

J. The Contractor shall be responsible for and bear all cost of damages which may result from the ordering of any material or from proceeding with any part of work prior to the completion of the review by Engineer of the necessary shop drawings.

K. The Contractor shall utilize a Sequential Numbering System for submittals (1-999). Resubmittals or confirming material shall be assigned a letter next to the submittal number, i.e., A=second submittal, B=third submittal, etc.

L. Submittals shall include a certified statement of compliance to the requirements detailed in the specifications in addition to other submittal requirements. This certification shall be prepared by the manufacturer and not the local supplier. Validity of the authority and position of the person signing the certification shall be verified by a Notary Public. The statement of compliance shall address each point of conformance contained in the governing specifications with definitive comments of either compliance or non-compliance. Statements of non-compliance with points of conformance shall be accompanied by a statement of justification as to the reason for non-compliance and why the non-complying feature is considered to be equal to the specified feature. The Engineer will use the certified statement of compliance in his evaluation of the submittal rendering a judgement as to equality to the specified product and issuing a statement as to whether the product is acceptable for or rejected from incorporation into the work.

M. If Drawings show variations from Contract requirements because of standard shop practice or for other reasons, the Contractor shall describe such variations in his certification statement. If acceptable, proper adjustments in the Contract shall be implemented where appropriate. If the Contractor fails to describe such variations, he shall not be relieved of the responsibility for executing the work in accordance with the Contract, even though such Drawings have been reviewed.

N. Should the Contractor provide a submittal that would require modification to a structure, hydraulic piping, electrical components, layout, controls, or other previously designed aspects of the project, he shall submit with his transmittal, additional design calculations and details of the modification. Any cost incurred by the Engineer for review of these modifications and the direct affect on other designed portions of the project and the implementation of alternate designs shall be borne by the Contractor. No additional costs will be incurred by the Owner or Engineer for modifications or deviations from the

original drawings and specifications as submitted by shop drawings, product data, or samples.

O. Shop drawings shall be prepared by a qualified detailer indicating all dimensions, weights, tolerances, clearances, space required, and structures. The manufacturer or supplier of equipment or materials shall certify as to the correctness of the dimensions. Contractor shall verify all drawings submitted as to their completeness with respect to field measurements, field construction criteria, catalog numbers, and similar data. Any drawing submitted through the Contractor not bearing the Contractors approval, data, and checker's name will be returned to the Contractor.

1.03 ENGINEER'S REVIEW OF SHOP DRAWINGS

A. The Engineer's review of Drawings, data and samples submitted by the Contractor will cover only general conformity to the Specifications; external connections, and dimensions which affect the installation are the sole responsibility of the Contractor.

B. The review of Drawings and schedules will be general, and shall not be construed:

1. as permitting any departure from the Contract requirements;

2. as relieving the Contractor of responsibility for any errors, including details, dimensions, and materials;

3. as approving departures from details furnished by the Engineer, except as otherwise provided herein.

C. When reviewed by the Engineer, each of the shop drawings will be identified as having received such review being so stamped and dated.

1. If the copies received are marked "Approved", those documents are to be used as guidelines for installation.

2. If the copies received are marked "Approved As Noted", the Contractor shall make the appropriate corrections to the material and/or product and incorporate the revised material and/or product into the project.

3. If the copies received are marked "Revise and Resubmit", the material or product may be acceptable; however, substantial corrections require the Engineer to review the material or product after the revisions have been made. A formal resubmittal of the revised material and/or product is required using a separate transmittal form. Copies of the revised resubmittal as stated previously are required.

4. If the copies received are marked "Not Approved", the material and/or product cannot be incorporated into the project. Another product approved by the Contract

Documents shall be submitted with a new transmittal form accompanied by seven (7) copies of shop drawings, product data, or samples.

D. If the drawings or schedules as submitted describe variations as described elsewhere in this Section and show a departure from the Contract requirements which Engineer finds to be in the interest of the Owner and to be so minor as not to involve a change in Contract Price or Time, the Engineer may return the reviewed Drawings without noting any exception.

E. Resubmittals will be handled in the same manner as first submittals. The Contractor shall direct specific attention to revisions other than the corrections requested by the Engineer on previous submissions by written details or markings on the resubmitted Shop Drawings. The Contractor shall make any corrections required by the Engineer.

F. Upon review of the shop drawing, product data, or sample by the Engineer, the Engineer will distribute the submittals as follows:

No. Required	To Whom	For Use
1	Engineer	Office
1	Structural or Electrical Subconsultant	Office
2	Owner	Office, Operations
1	Resident Project Representative	Field
3	Contractor	Field
		Office
		Vendor

G. If the Contractor considers any correction indicated on the Drawings to constitute a change to the Contract Drawings or Specifications, the Contractor shall give written notice thereof to the Engineer.

H. The Engineer will review a submittal/resubmittal a maximum of two times after which cost of review will be borne by the Contractor. The cost of engineering shall be equal to the Engineer's charges to the Owner under the terms of the Engineer's agreement with the Owner.

I. When the shop drawings have been completed to the satisfaction of the Engineer, the Contractor shall carry out the construction in accordance therewith and shall make no further changes therein except upon written instructions or approval from the Engineer.

1.04 SHOP DRAWINGS

A. Shop Drawings shall be complete and detailed.

B. Drawings and schedules shall be checked and coordinated with the work of all trades involved, before they are submitted for review by the Engineer and shall bear the Contractor's stamp of approval as evidence of such checking and coordination. Drawings

or schedules submitted without this stamp of approval shall be returned to the Contractor for his review and resubmission.

C. Each shop drawing shall have a blank area 3 1/2 inches by 3 1/2 inches, located adjacent to the title block for placement of the Engineer's review stamp. The title block shall display the following:

1. Number and title of the drawing.
2. Date of drawing or revision.
3. Name of project building or facility.
4. Name of Contractor and Subcontractor submitting drawings.
5. Clear identification of contents and location of the work.
6. Specification number and title.

D. Data on materials and equipment include, without limitation, materials and equipment lists, catalog data sheets, cuts, performance curves, diagrams, materials of construction and similar descriptive material as required. Materials and equipment lists shall give for each item thereon the name and location of the supplier or manufacturer, trade name, catalog reference, size, finish and all other pertinent data.

E. The Contractor shall provide a list including the equipment name, address and telephone number of the manufacturer's representative and service company so that service and/or spare parts can be readily obtained for all mechanical and electrical equipment furnished.

F. All manufacturers or equipment suppliers who proposed to furnish equipment or products shall submit an installation list to the Engineer along with the required Shop Drawings. The installation list shall include at least five installations where identical equipment has been installed and has been in operation for a period of at least one (1) year.

G. Only the Engineer will utilize the color "red" in marking Shop Drawing submittals.

1.05 WORKING DRAWINGS

A. Working drawings shall be considered to mean the Contractor's plans for temporary structures.

B. Copies of working drawings shall be submitted to the Engineer where required by the Contract Documents or requested by the Engineer, and shall be submitted at least thirty (30) calendar days (unless otherwise specified by the Engineer) in advance of their being required for work.

C. The Engineer will not review working drawings but shall use them as information to monitor the work performed by the Contractor.

SECTION 01340 - SHOP DRAWINGS, PROJECT DATA, AND SAMPLES

1.06 SAMPLES

A. The Contractor shall furnish for the review of the Engineer samples required by the Contract Documents or requested by the Engineer. Samples shall be delivered to the Engineer as specified or directed and the Contractor shall prepay all shipping charges. Materials or equipment for which samples are required shall not be used in work until reviewed by the Engineer.

B. Samples shall be of sufficient size and quantity to clearly illustrate:

1. Functional characteristics of the product, with integrally related parts and attachment devices.
2. Full range of color, texture, and pattern.

C. Each sample shall have a label indicating:

1. Name of Project.
2. Name of Contractor and Subcontractor.
3. Material or Equipment represented.
4. Place of origin.
5. Name of Producer and Brand (if any).
6. Location in Project.

D. Samples of finished materials shall have additional marking that will identify them under the finished schedules.

E. The Contractor shall prepare a transmittal letter in triplicate for each shipment of samples. He shall enclose a copy of this letter with the shipment and send a copy of this letter to the Engineer and the remaining copy shall be for the Contractor's records. Review of a sample shall be only for the characteristics or use named and shall not be construed to change or modify any Contract requirements.

F. Reviewed samples not destroyed in testing shall be sent to the Engineer or stored at the site of the work. Reviewed 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 reviewed samples. Samples which failed testing or were rejected will be returned to the Contractor at his expense, if so requested at time of submission.

PART - II PRODUCTS

(NOT USED)

PART - III EXECUTION

(NOT USED)

SECTION 01340 - SHOP DRAWINGS, PROJECT DATA, AND SAMPLES

TRANSMITTAL FOR SHOP DRAWINGS, PRODUCT DATA, OR SAMPLES

TO: _____ DATE: _____
PROJECT NO. _____
FROM: _____ PROJECT: _____

☐ SHOP DRAWING ☐ PRODUCT DATA ☐ SAMPLE ENGINEER SUBMITTAL NO. _____

CONTRACTOR HAS REVIEWED AND APPROVED SUBMITTAL: CONTRACTOR SUBMITTAL NO. _____
BY: _____ DATE: _____

GENTLEMEN: WE ARE SUBMITTING THE FOLLOWING SHOP DRAWINGS, PRODUCT DATA OR SAMPLES:

QTY	SPECIFICATION DIVISION AND SECTION	DRAWING NUMBER	MANUFACTURER	DESCRIPTION

THERE ARE ☐ NO DEVIATIONS WHATSOEVER FROM DRAWINGS AND SPECIFICATIONS
☐ DEVIATIONS FROM DRAWINGS AND SPECIFICATIONS, EXPLANATION ON BACK OF SHEET

ENGINEER'S REVIEW STATEMENT

DEPARTMENT	Approved As Noted*	Revise and Resubmit	Not Approved	Approved	CHECKED BY
STRUCTURAL					_____
MECHANICAL					_____
CIVIL					_____
ELECTRICAL					_____

* SUBMIT 7 CORRECTED RECORD COPIES

ENGINEER'S FINAL STATEMENT

APPROVED ☐
APPROVED AS NOTED* ☐
REVISE AND RESUBMIT ☐
NOT APPROVED ☐

ENGINEER'S REVIEW AND APPROVAL OF THIS SUBMITTAL ARE EXPRESSLY LIMITED AS PROVIDED IN THE CONTRACT DOCUMENT AND ARE ONLY TO DETERMINE COMPLIANCE WITH INFORMATION GIVEN IN CONTRACT DOCUMENTS AND CONFORMANCE WITH DESIGN CONCEPT OF COMPLETED PROJECT AS A FUNCTIONING WHOLE. CONTRACTOR IS, AND ENGINEER IS NOT, RESPONSIBLE FOR ALL MATTERS RELATING TO FABRICATION, SHIPPING, HANDLING, STORAGE, ASSEMBLY, INSTALLATION AND CONSTRUCTION FOR ALL SAFETY ASPECTS OF PERFORMING THE WORK AND FOR COORDINATING THE WORK.

END OF SECTION

SECTION 01370 - SCHEDULE OF VALUES

PART 1 – GENERAL

1.01 REQUIREMENTS INCLUDED

A. Submit to the Engineer a Preliminary Schedule of Values in accordance with the General Conditions.

B. Upon request of the Engineer, support the values with data that will substantiate their correctness.

C. Refine the Schedule of Values to reflect the requirements of the General Conditions. The final Schedule of Values shall be used only as the basis for the Contractor's Applications for Payments.

1.02.1 FORM AND CONTENT OF SCHEDULES OF VALUES

A. Type schedule on 8 1/2" x 11" or 8 1/2" x 14" white paper. Contractor's standard forms and automated printout will be considered for approval by the Engineer upon Contractor's request. Identify schedule with:

1. Title of Contract and location.
2. Engineer and Contract numbers.
3. Name and Address of Contractor.
4. Contract designation.
5. Date of submission.

B. Schedule shall list the installed value of the component parts of the Work in sufficient detail to serve as a basis for computing values for progress payments during construction.

C. Identify each line item with the number and title of the respective major section of the specifications.

D. For each major line item, list sub-values of major products or operations under the item.

E. For the various portions of the Work:

1. Each item shall include a directly proportional amount of the Contractor's overhead and profit.
2. For items on which progress payments will be requested for stored materials, break down the value into:
   a. The cost of the materials, delivered and unloaded, with taxes paid. Paid invoices are required for materials upon request by the Engineer.
   b. The total installed value.

F. Follow the Bid Form Schedule of Prices as the format for listing component items for unit price project, however, large lump sum items will require detailed breakdown of costs.

G. The sum of all values listed in the schedule shall equal the total Contract Sum of all lump sum and extended unit price items in the Bid Form.

PART 2 – PRODUCTS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

END OF SECTION

TECHNICAL SPECIFICATIONS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01380 - CONSTRUCTION PHOTOGRAPHS

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

A. Contractor shall provide the preconstruction audio-video survey and digital still photography as specified herein.

1.02 PHOTOGRAPHY REQUIRED

A. Audio-Video Survey as specified herein (preconstruction).

B. Provide ten digital format still photographs preconstruction of each site specific portion of the work such a pump stations, water wells, water storage tanks, intersections, major drainage structure installation sites,, etc.

C. When piping is required within a plant site, additional photos will be required showing location of all piping, valves, and fittings with relationship to other objects or structures. Contractor shall include in photograph a colored yard stick so as to allow viewer of photo to make measurement on photograph.

1.03 COSTS OF PHOTOGRAPHY

A. Contractor shall pay costs for specified videotaping and digital photography.

PART II -PRODUCTS

2.01 AUDIO-VIDEO SURVEY

A. Specifications for Audio-Video Survey

1. Prior to the start of construction on the contract, the Contractor shall furnish to the Engineer, the survey of the construction areas on the specified audio-video media.

SECTION 01380 - CONSTRUCTION PHOTOGRAPHS

2. The survey shall be reviewed by the Engineer and approved, rejected or additional coverage will be required to fully show the physical conditions of the work areas. The Contractor shall have the additional coverage photography performed and shall not begin work, including moving equipment and/or material on the project site, until the audio-video survey has been approved by the Engineer.

3. After approval, the Contractor shall supply two (2) copies of the audio-video survey to the Engineer.

    a. One copy of the video will remain available for viewing by the Contractor and may be reviewed by him for any assistance that the tapes may provide in resolving disputes which arise with the property owners claiming improper restoration of their properties. That copy of the tapes will also be used as a guide by the Engineer, prior to issuance of final payments, in determining the adequacy of restoration and the extent of damages attributable to the Contractor's work.

    b. The remaining copy of the tapes will be delivered to the Owner's representative.

B. Technical Requirements

1. The total audio-video recording system and the procedures employed in its use shall be such as to produce a finished product that will fulfill the technical requirements of the project, as well as those more subjective requirements of high-quality audio and video production.

2. The video portion of the recording shall reproduce bright, sharp, clear pictures with accurate colors and shall be free from distortion, tearing, rolls or any other form of picture imperfection.

3. The audio portion of the recording shall reproduce precise and concise explanatory notes by the camera operator with proper volume, clarity and freedom from distortion.

C. Camera and Recorder - The camera and recorder shall be an industrial grade device (Commercial grade recorders shall not be acceptable). The video images along with the accompanying audio description shall be recorded on an optically readable disk and shall be standard DVD format (MPEG-2). The recorder shall record the color signal to the DVD disk with a minimum horizontal resolution of 750 lines at the center of the screen.

Should the videographer's equipment record to the DVD using a format other than the standard DVD format, such as MPEG-3, decoding software for installation on the Owner's and Engineer's PCs shall be provided at no additional cost to either the Owner or Engineer.

D. Character Printout - All video recordings must, by electronic means, display continuously and simultaneously, generated digital information to include (1) the date of the recording, (2) the engineering stationing corresponding to the stationing on the plans, or as directed by the Engineer, (3) the name of the street, servitude, easement, or building being documented, and (4) the direction of travel and (5) the viewing side when applicable. The date shall appear linearly in the bottom left hand corner (e.g. 02-21-92). Plan stationing shall be expressed in engineering symbols and shall appear directly beneath the date information (e.g., 87+03). The remainder of the printed information shall appear at the bottom of the viewing screen (e.g., N on First St. V/E). To maximize viewing area no more than twenty-four (24) rasters shall be used to express the digital information.

2.02 STILL PHOTOGRAPHY

A. Camera – The digital camera shall be rated 3 megapixels, minimum.

B. Technical Requirements – Individual photographs shall be taken with the camera set on the highest resolution setting.

C. Video imagery meeting the requirements for coverage of views as stated in subsequent paragraphs may be substituted for still photographs, provided the video imagery is submitted on a DVD disk providing the capability of printing still images from the video meeting the requirements for still photography.

D. Submittal Media – Photography shall be submitted on standard camera storage card, CD or DVD

PART III – EXECUTION

SECTION 01380 - CONSTRUCTION PHOTOGRAPHS

3.01 TECHNIQUE FOR STILL PHOTOGRAPHS

A. Factual presentation.

B. Correct exposure and focus.

1. High resolution and sharpness.
2. Maximum depth-of-field.
3. Minimum distortion.

3.02 VIEWS REQUIRED FOR STILL PHOTOGRAPHS

A. Contractor shall take a minimum of 10 photographs from locations to adequately illustrate the preconstruction conditions of not only the site, but surrounding conditions, especially houses or other buildings, landscaping, sidewalks, driveways, etc. One photograph shall be taken at each major compass point and each of the four primary minor compass points. These photographs shall be oriented such that the construction site is in the foreground and the condition of the adjacent areas is shown clearly in the background.

B. The same sites and views shall be photographed at the completion of construction.

C. The Contractor shall also inspect and photograph any structure within 100 feet of each construction site prior to beginning of work. Photographs of any existing damaged areas shall be taken.

3.03 TECHNIQUE AND VIEWS REQUIRED FOR VIDEO TAPING

A. At the start of production, and at the beginning of a new street, servitude, or easement, an identification summary shall be read into the record while, at the same time, a wide-angle view with numeric displays shall be provided for a visual record. This summary will include (1) tape number, (2) job title, (3) job location, (4) positional location at job start, (5) date and time, (6) weather and (7) any other notable conditions.

B. Recording Schedule - The recording shall be performed prior to the placement of any construction materials or equipment on the proposed construction site, but not more than seven weeks prior to the placement of materials or equipment.

C. Tape Indexing - All video tapes and their storage cases shall be properly identified by video tape index number, project title and general project location. Displayed on the

storage case of each video tape shall be a log of that tape's contents. That log shall describe 1) the various segments contained on that tape in terms of the names and the sides of the streets, servitudes, or easements, 2) coverage start, direction and endpoints, with corresponding video tape player counter numbers. A cumulative index correlating the various segments of coverage to their corresponding tapes shall be typed and supplied to the Owner.

D. Coverage

1. The recording shall include coverage of all surface features located within the construction zone-of-influence. This zone shall be defined as (1) the area within the permanent and temporary servitudes, easements and areas adjacent to these servitudes or easements which may be affected by routine construction operations, (2) road right-of-way, (3) areas directed by the Owner.

2. The surface features within the construction zone shall include, but not be limited to, all roadways, pavements, curbs, driveways, sidewalks, culverts, headwalls, retaining walls, buildings, landscaping, shrubbery and fences. Of particular concern shall be the existence, or non-existence, of any faults, fractures or defects.

3. The coverage shall be continuous (i.e., the camera shall not be turned off once photography has begun) to the greatest extent practicably possible. If the camera must be turned off, then a verbal message shall be inserted stating that the camera will be turned off and the reason for discontinuing coverage.

E. Visibility - No recording shall be done during periods of significant precipitation, mist or fog. The recording shall only be done when sufficient sunlight is present to properly illuminate the subjects of recording.

F. Rate of Travel

1. The vehicle's rate of travel shall be indirectly proportional to the number, size and value of the surface features within that construction area's zone-of-influence.

2. The average rate of travel shall not exceed forty-four feet per minute (0.5 mph).

3. Forward motion shall be halted when viewing objects or structures outside the limits of the street, servitude, or easement being documented.

4. Conversely, only the street, servitude, or easement being documented shall be viewed while the camera is being moved forward.

G. Camera Elevation - To ensure property perspective and to capture optimal detail, the distance from the camera lens to the ground shall not be less than twelve feet when conventional wheeled vehicles are employed.

H. Experience - The operator in charge must have had previous experience video documenting a minimum of fifty miles of pre-construction work. Any apprentice operators must be continuously supervised by an above-described experienced operator.

I. Unacceptable Documentation - The Owner shall have the authority to reject all or any portion of the video tape documentation not conforming to the specifications. Those rejected portions shall be retaped at no additional cost to the Owner.

J. Specification Deviations - Any deviation from these specifications must have the written approval of the Owner/Engineer.

3.04 DELIVERY OF MEDIA

A. After approval of the audio-video survey, deliver two record copies to Engineer on the specified media.

B. Pre-construction photographs shall be delivered to the Engineer prior to the beginning of construction on each pump station site.

C. Deliver progress prints to Engineer to accompany each Application for Payment.

END OF SECTION

TECHNICAL SPECIFICATIONS
DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01400 - QUALITY CONTROL

PART – I GENERAL

1.01 DESCRIPTION

A. This section includes general quality control procedures and requirements that are applicable to other sections.

1.02 TESTING LABORATORY

A. If desired by the Owner, a qualified testing laboratory will make field visits to sample such items as Portland cement concrete, hot or cold-mix asphalt, earthwork fill and compaction, aggregate, welding, etc. The frequency of testing will be at the discretion of the Owner and the recommendations of the Engineer to the Owner.

B. Refer to the Section titled "Testing Laboratory Services" for a detailed description of testing laboratory services.

1.03 INSPECTION SERVICES

A. The Owner may employ the services of a Resident Project Representative (RPR) to review field operations, provide daily reports, and act as a liaison between the Engineer and Contractor.

B. Refer to the Section titled "Inspection Services" for a detailed description of the Resident Project Representative's responsibilities.

1.04 CONFORMANCE STANDARDS

A. The manufacturer of equipment shall issue a manufacturer's conformance certificate indicating the product was assembled or constructed in accordance with specific standards and that the product performs under specific parameters.

B. Submit conformance certificates in accordance with the requirements of the Section titled "Shop Drawings, Project Data, and Samples".

1.05 CERTIFIED TEST REPORTS

A. Test reports performed in the field or in the shop shall be certified by the manufacturer of the product.

B. Submit certified test reports in accordance with the requirements of the Section titled "Shop Drawings, Project Data, and Samples".

SECTION 01400 - QUALITY CONTROL

PART - II PRODUCTS - NOT USED

PART - III EXECUTION - NOT USED

END OF SECTION

TECHNICAL SPECIFICATIONS
DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01410 - TESTING LABORATORY SERVICES

PART - I GENERAL

1.01 REQUIREMENTS INCLUDED

A. Owner will employ and pay for the services of an Independent Testing Laboratory to perform testing specifically indicated in the Contract Documents and may at any other time elect to have materials and equipment tested for conformity with the Contract Documents.

B. Contractor shall cooperate with the laboratory to facilitate the execution of its required services.

C. Employment of the laboratory shall in no way relieve Contractor's obligations to perform the Work of the Contract.

D. Various portions of the work identify specific tests of a specialty nature which are to be performed by an entity other than the Owner’s independent testing laboratory. These specialty tests shall be provided by the Contractor as an integral part of the work on the project and at no additional cost to the Owner.

1.02 LIMITATIONS OF AUTHORITY OF TESTING LABORATORY

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.

1.03 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 to be used and which require testing.

C. Provide to the laboratory the preliminary design mix proposed to be used for concrete, and other material mixes which require control by the testing 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 specifications 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 Owner 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 laboratory at least 24 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 Owner for laboratory personnel and travel expenses incurred due to Contractor's negligence.

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 and as approved by the Engineer.

H. If the test results indicate the material or equipment complies with the Contract Documents, the Owner shall pay for the cost of the testing laboratory. If the tests and any subsequent retests indicate the materials and equipment fail to meet the requirements of the Contract Documents, the Contractor may pay for the laboratory costs directly to the testing firm or the total of such costs shall be deducted from any payments due the Contractor.

PART - II PRODUCTS - NOT USED

PART - III EXECUTION

3.01 REPORTS

Testing Laboratories are required to provide a minimum of four (4) copies of each testing report. Copies shall be distributed by the testing laboratory to 1) Owner, 2) Engineer, 3) Contractor, and 4) Resident Project Representative.

END OF SECTION

TECHNICAL SPECIFICATIONS
DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01420 - INSPECTION SERVICES

PART - I GENERAL

1.01 REQUIREMENTS INCLUDED

A. The Owner will employ the services of a Resident Project Representative (RPR) in an effort to protect the Owner against defects and deficiencies in the work.

B. The RPR will:

1. act as the Engineer's agent at the site,
2. act as directed by and under the supervision of the Engineer and
3. will confer with the Engineer regarding the RPR's actions.

C. RPR's dealings in matters pertaining to the on-site work shall in general be with Engineer and Contractor keeping Owner advised as necessary. RPR's dealings with subcontractors shall only be through or with the full knowledge and approval of Contractor. RPR shall generally communicate with Owner with the knowledge of and under the direction of Engineer.

1.02 DUTIES AND RESPONSIBILITIES OF RPR

A. Schedules - Review the progress schedule, schedule of Shop Drawing submittals and schedule of values prepared by Contractor and consult with Engineer concerning acceptability.

B. Conferences and Meetings - Attend meetings with Contractor, such as pre-construction conferences, progress meetings, job conferences, and other project-related meetings, and prepare and circulate copies of minutes thereof.

C. Liaison -

1. Serve as Engineer's liaison with Contractor, working principally through Contractor's superintendent and assist in understanding the intent of the Contract Documents; and assist Engineer in serving as Owner's liaison with Contractor when Contractor's operations affect Owner's on-site operations.
2. Assist in obtaining from Owner additional details or information, when required for proper execution of the Work.

D. Shop Drawings and Samples -

1. Record date of receipt of Shop Drawings and samples.
2. Receive samples which are furnished at the site by Contractor, and notify Engineer of availability of samples for examination.
3. Advise Engineer and Contractor of the commencement of any Work requiring a Shop Drawing or sample if the submittal has not been approved by Engineer.

SECTION 01420 - INSPECTION SERVICES

E. Review of Work, Rejection of Defective Work, Inspections and Tests -

1. Conduct on-site observations of the Work in progress to assist Engineer in determining if the Work is in general proceeding in accordance with the Contract Documents.
2. Report to Engineer whenever RPR believes that any Work is unsatisfactory, faulty or defective or does not conform to the Contract Documents, or has been damaged, or does not meet the requirements of any inspection, test or approval required to be made; and advise Engineer of Work that RPR believes should be corrected or rejected or should be uncovered for observation, or requires special testing, inspection or approval.
3. Verify that tests, equipment and systems startup and operating and maintenance training are conducted in the presence of appropriate personnel, and that Contractor maintains adequate records thereof; and observe, record and report to Engineer appropriate details relative to the test procedures and startup.
4. Accompany visiting inspectors representing public or other agencies having jurisdiction over the Project, record the results of these inspections and report to Engineer.

F. Interpretation of Contract Documents - Report to Engineer when clarifications and interpretations of the Contract Documents are needed and transmit to Contractor clarifications and interpretations as issued by Engineer.

G. Modifications - Consider and evaluate Contractor's suggestions for modifications in Drawings or Specifications and report with RPR's recommendations to Engineer. Transmit to Contractor decisions as issued by Engineer.

H. Records -

1. Maintain at the job site orderly files for correspondence, reports of job conferences, Shop Drawings and samples, reproductions of original Contract Documents including all Work Directive Changes, Addenda, Change Orders, Field Orders, additional Drawings issued subsequent to the execution of the Contract, Engineer's clarifications and interpretations of the Contract Documents, progress reports, and other Project related documents.
2. Keep a diary or log book, recording Contractor hours on the job site, weather conditions, data relative to questions of Work Directive Changes, Change Orders or changed conditions, list of job site visitors, daily activities, decisions, observations in general, and specific observations in more detail as in the case of observing test procedures; and send copies to Engineer.
3. Records names, addresses and telephone numbers of all Contractors, subcontractors, and major suppliers of materials and equipment.

SECTION 01420 - INSPECTION SERVICES

I. Reports -

1. Furnish Engineer periodic reports as required of progress of the Work and of Contractor's compliance with the progress schedule and schedule of Shop Drawing and sample submittals.
2. Consult with Engineer in advance of scheduled major tests, inspections or start of important phases of the Work.
3. Draft proposed Change Orders and Work Directive Changes, obtaining backup material from Contractor and recommend to Engineer Change Orders, Work Directive Changes, and Field Orders.
4. Report immediately to Engineer and Owner upon the occurrence of any accident.

J. Payment Requests - Review applications for payment with Contractor for compliance with the established procedure for their submission and forward with recommendations to Engineer, noting particularly the relationship of the payment requested to the schedule of values, Work completed and materials and equipment delivered at the site but not incorporated in the Work.

K. Certificates, Operation and Maintenance Manuals - During the course of the Work, verify that certificates, operation and maintenance manuals and other data required to be assembled and furnished by Contractor are applicable to the items actually installed and in accordance with the Contract Documents, and have this material delivered to Engineer for review and forwarding to Owner prior to final payment for the Work.

L. Completion -

1. Before Engineer issues a Certificate of Substantial Completion, submit to Contractor a list of observed items requiring completion or correction.
2. Conduct final inspection in the company of Engineer, Owner and Contractor and prepare a final list of items to be completed or corrected.
3. Observe that all items on final list have been completed or corrected and make recommendations to Engineer concerning acceptance.

1.03 LIMITATION OF AUTHORITY OF RPR

A. The Resident Project Representative:

1. Shall not authorize any deviation from the Contract Documents or substitution of materials or equipment, unless authorized by Engineer.
2. Shall not exceed limitations of Engineer's authority as set forth in the Contract Documents.
3. Shall not undertake any of the responsibilities of Contractor, subcontractors or Contractor's superintendent.
4. Shall not advise on, issue directions relative to or assume control over any aspect of the means, methods, techniques, sequences or procedures of construction unless such advice or directions are specifically required by the Contract Documents.

SECTION 01420 - INSPECTION SERVICES

5. Shall not advise on, issue directions regarding or assume control over safety precautions and programs in connection with the Work.
6. Shall not accept Shop Drawing or sample submittals from anyone other than Contractor.
7. Shall not authorize Owner to occupy the Project in whole or in part.
8. Shall not participate in specialized field or laboratory tests or inspections conducted by others except as specifically authorized by Engineer.

PART - II PRODUCTS - NOT USED

PART - III EXECUTION - NOT USED

END OF SECTION

TECHNICAL SPECIFICATIONS
DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01505 - MOBILIZATION

PART - I GENERAL

1.01 DEFINITION

Mobilization shall include the obtaining of all permits, insurance, and bonds; moving onto the site of all plant and equipment; furnishing and erecting plants, temporary building, and other construction facilities; all as required for the proper performance and completion of the work. Mobilization shall include but not be limited to the following principal items:

1. Audio-Video Survey.
2. Moving on to the site of all Contractor's plant and equipment required for first month operation.
3. Installing temporary construction power and wiring.
4. Establishing fire protection system.
5. Developing construction water supply.
6. Providing field office trailers for the Contractor and the Engineer (when required by the Work), complete with all specified furnishings and utility services including telephones.
7. Providing on-site sanitary facilities and potable water facilities as specified.
8. Arranging for and erection of Contractor's work and storage yard.
9. Submittal of all required subcontractor insurance certificates and bonds.
10. Obtaining all required permits.
11. Posting all OSHA required notices and establishment of safety programs.
12. Have the Contractor's superintendent at the jobsite full time.
13. Have provided a detailed schedule acceptable to the Owner for project use as specified.
14. Installation of project sign (when required by the work).

1.02 PAYMENT FOR MOBILIZATION

A. Requirements other than those listed below are included in the Section of the Specifications entitled "Measurement and Payment."

B. The Contractor's attention is directed to the condition that no payment for mobilization, or any part thereof will be approved for payment under the contract until all mobilization items listed above have been completed as specified.

C. If the project is a unit price contract and a line item is designated "mobilization", all costs incurred for the above work shall be placed under that item. If no item is listed for "mobilization", the costs for the above described work shall be placed in other items, and in this case, no direct payment will be made for mobilization.

D. For lump sum projects, the costs for this work shall be included in the overall costs of the project and shown as a separate item in the Schedule of Values.

PART - II PRODUCTS - NOT USED
PART - III EXECUTION - NOT USED

END OF SECTION

TECHNICAL SPECIFICATIONS
DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01510 - TEMPORARY UTILITIES

PART I - GENERAL

1.01 REQUIREMENTS INCLUDED

Furnish, install and maintain temporary utilities required for field offices and construction and remove on completion of the Work.

1.02 REQUIREMENTS OF REGULATORY AGENCIES

A. Comply with National Electric Code.

B. Comply with Federal, State and local codes and regulations and with utility company requirements.

PART II - PRODUCTS

2.01 MATERIALS, GENERAL

Materials may be new or used, but must be adequate in capacity for the required usage, must not create unsafe conditions, and must not violate requirements of applicable codes and standards.

2.02 TEMPORARY ELECTRICITY AND LIGHTING

A. Arrange with utility company and Owner to provide service required for power and lighting, and pay all costs for service and for power used in the construction, testing and trial operation prior to final acceptance of the work by the Owner as stipulated by the Engineer.

B. Provide adequate artificial lighting for all areas of work when natural light is not adequate for work, and for areas accessible to the public.

2.03 TEMPORARY HEAT AND VENTILATION

A. Provide temporary heat and ventilation as required to maintain adequate environmental conditions to facilitate progress of the Work.

B. Provide adequate forced ventilation of enclosed areas for curing of installed materials, to disperse humidity, and to prevent hazardous accumulations of dust, fumes, vapors or gases.

C. Portable heaters shall be standard approved units complete with controls.

D. Pay all costs of installation, maintenance, operation and removal, and fuel consumed.

E. Provide connections to existing facilities or extend and supplement the existing facilities with temporary units as required to comply with requirements. Pay all costs of installation, maintenance, operation and removal.

2.04 TEMPORARY TELEPHONE SERVICE

A. Arrange with local telephone service company, provide direct line telephone service, as stipulated in Section 01590, including an external bell at the construction site for the use of personnel and employees.

Service required:
1. One direct line instrument in Field Office of Engineer for the Owner.
2. Other instruments at the option of the Contractor, or as required by regulations.

2.05 TEMPORARY WATER

A. Contractor shall provide and pay for all water required for construction or consumptive purposes on this project. Water provided by the Owner shall be charged to Contractor at the prevailing commercial rates.

B. Water provided by the Owner shall be metered by the Owner. Contractor shall coordinate installation and removal of meter with the Owner. Contractor shall install and remove backflow preventer at each meter location meeting the requirements of AWWA C510, latest version.

C. The hours and duration of water usage shall be determined by the Owner.

2.06 TEMPORARY SANITARY FACILITIES

A. Provide sanitary facilities in compliance with laws and regulations.

B. Service, clean and maintain facilities and enclosures.

PART III - EXECUTION

3.01 GENERAL

A. Comply with applicable requirements specified in Division 2 - Site Work, Division 15 - Mechanical, and Division 16 - Electrical.

B. Maintain and operate systems to assure continuous service.

SECTION 01510 - TEMPORARY UTILITIES

C. Modify and extend systems as work progress requires.

3.02 REMOVAL

A. Completely remove temporary materials and equipment when their use is no longer required as determined by the Engineer.

B. Clean and repair damage caused by temporary installations or use of temporary facilities.

END OF SECTION

TECHNICAL SPECIFICATIONS
DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01570 - TRAFFIC REGULATION

PART - I GENERAL

1.01 REQUIREMENTS INCLUDED

A. The Contractor shall be responsible for providing safe and expeditious movement of traffic through or around construction zones. A construction zone is defined as the immediate areas of actual construction and all abutting areas which are used by the Contractor and which interfere with the driving or walking public.

B. Remove temporary equipment and facilities when no longer required and restore grounds to original and/or, or to specified conditions.

1.02 TRAFFIC CONTROL

A. The necessary precautions shall include, but not be limited to, such items as proper construction warning signs, signals, lighting devices, markings, barricades, channelization, and hand signaling devices. The Contractor shall be responsible for installation and maintenance of all devices and requirements for the duration of the construction period. Contractor to check traffic control devices on a daily basis as a minimum when beginning and ending the work day, and on weekends at a minimum of once per day.

B. Any additional traffic control devices which may be required at time of construction by the Engineer and/or Owner shall be provided by the Contractor at no additional contract cost.

C. The Contractor shall provide at least five (5) working days notification to the Engineer of the necessity to close any portion of a roadway carrying vehicles or pedestrians so that the final approval of such closing can be obtained from the roadway owner at least 48 hours in advance. With any such closing adequate provision shall be made for the safe and expeditious movement of traffic and pedestrians.

D. The Contractor shall also be responsible for notifying Police, Fire and Ambulance Departments whenever roads are impassable.

E. The Contractor shall be responsible for removal, relocation, or replacement of any traffic control device in the construction area that exists as part of the normal traffic control scheme prior to construction. Any such actions shall be performed by the Contractor under the supervision, and in accordance with the Specifications, of the Owner, unless otherwise specified. Construction signing and activities shall not block existing traffic control signing, unless construction signing supersedes such signing.

F. All traffic control devices not applying to an appropriate situation shall be covered or removed. No traffic control device conduit or inductive loops shall be disturbed without prior notification. Contractor shall take all precautions to avoid damage to traffic boxes,

conduits, loops and supply lines. Should any of the above need to be relocated, the Contractor shall coordinate with roadway owner.

G. The Contractor shall immediately notify the Engineer of any vehicular or pedestrian safety or deficiency problems incurred as a result of the construction of the project.

H. Vehicular access to commercial and residential driveways shall be maintained except when necessary construction precludes such access. When such conditions arise that ingress or egress to the property is to be temporarily terminated, the Contractor shall notify the affected property owner at least 24 hours in advance of such construction.

I. The Contractor shall also cooperate with the various parties involved in the delivery of mail and the collection and removal of trash and garbage to maintain existing schedules of these services.

J. Traffic directors shall be trained flaggers of at least average intelligence, good physical condition, including sight and hearing, having mental alertness, a courteous but firm manner, neat appearance, and a sense of responsibility for the safety of the public. Traffic directors shall wear an orange or fluorescent orange garment such as a shirt, jacket, or vest. This garment shall be reflectorized for nighttime operations. When controlling traffic, traffic directors shall be equipped with a sign and a 24" x 24" red flag. At night, flagmen shall use a red light. They shall follow the procedures stipulated for flaggers in the Louisiana Manual on Uniform Traffic Control Devices.

K. Flagging operations are most likely required, but not limited to, the following traffic control situations:

1. When one lane is alternately used for both directions of travel;
2. When the roadway is closed for a short period of time to allow equipment movements, blasting operations, etc.;
3. When workers are close to a travel lane without a positive barrier;
4. When traffic speeds must be reduced and traffic control devices alone will not get the job done;
5. When public relations and publicity functions need to be handled at the worksite, such as explaining the situation, alerting motorists to changing conditions, and passing out handouts;
6. When installing and removing traffic control devices;
7. Other situations where variable conditions require responsive traffic control.

L. Construction signing, detours, and traffic control devices shall be in accordance with roadway owner's regulations and with the Louisiana Manual of Uniform Traffic Control Devices.

PART - II PRODUCTS - NOT USED
PART - III EXECUTION - NOT USED

END OF SECTION

TECHNICAL SPECIFICATIONS
DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01580 - PROJECT IDENTIFICATION AND SIGNS

PART - I GENERAL

1.01 REQUIREMENTS INCLUDED

A. Furnish, install, and maintain the project identification signs.

B. Remove signs on completion of construction.

C. Allow no other signs to be displayed.

1.02 PROJECT IDENTIFICATION SIGN

A. Project identification sign shall be as shown in the Drawings.

B. If no project identification sign is shown in the drawings, the sign shall have the following characteristics:

1. One painted sign, of not less than 64 square feet area, with painted graphic content to include:
   a. Title of Project
   b. Name of Owner
   c. Names and titles of authorities as per directed by the Owner.
   d. Names and title of:
      i. Program Manager
      ii. Engineer
      iii. Professional Consultants
   e. Prime Contractor
   f. Major Subcontractors
   g. Telephone Number
   h. Value of Project
2. Graphic design, style of lettering, and color shall be approved by Engineer.

C. Signs shall conform to requirements of funding agency.

D. Erect on the site at a lighted location of high public visibility, as approved by the Engineer and the Owner.

1.03 QUALITY ASSURANCE

A. Sign Painter: Professional experience in type of work required.

B. Finishes, Painting: Adequate to resist weathering.

PART - II PRODUCTS

SECTION 01580 - PROJECT IDENTIFICATION AND SIGNS

2.01 SIGN MATERIALS

A. Structure and Framing: May be new or used, wood or metal, in sound condition structurally adequate to work and suitable for specified finish.

B. Sign Surfaces: Exterior softwood plywood with medium density overlay, standard large sizes to minimize joints or as otherwise required. Thickness: As required by standards to span framing members, to provide even, smooth surface without waves or buckles.

C. Rough Hardware: Galvanized

D. Paint: Exterior quality.

PART - III EXECUTION

3.01 PROJECT IDENTIFICATION SIGNS

A. Paint exposed surface of supports, framing and surface material shall be per manufacturer's recommendation.

B. Paint graphics in styles, sizes and colors selected.

3.02 MAINTENANCE

Maintain signs and supports in a neat, clean condition; repair damages to structures, framing or sign.

3.03 REMOVAL

Remove signs, framing, supports, and foundations at completion of project.

END OF SECTION

TECHNICAL SPECIFICATIONS
DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01600 - MATERIAL AND EQUIPMENT

PART - I GENERAL

1.01 REQUIREMENTS INCLUDED

A. Material and equipment incorporated into the Work shall:

1. Conform to applicable specifications and standards.
2. Comply with size, make, type, and quality specified to the greatest extent possible, detailing all aspects and providing explicit reasons for parameters not in compliance and specifically approved in writing by the Engineer.
3. Manufactured and Fabricated Products:
   a. Design, fabricate, and assemble in accord with the best engineering and standard shop practice.
   b. Manufacture like parts of duplicate units to standard sizes and gauges, to be interchangeable.
   c. Two or more items of the same kind shall be produced, by the same manufacturer.
   d. Products shall be suitable for service conditions.
   e. Equipment capacities, sizes and dimensions shown or specified shall be adhered to unless variations are specifically approved in writing.
4. Do not use material or equipment for any purpose other than that for which it is designed or is specified.

B. The term "Product" shall refer to material and/or equipment when used in these specifications or visa versa.

C. When material or equipment requires pre-qualification as described elsewhere in the Specifications, only those materials and equipment approved prior to the bid or by addendum will be incorporated into the project.

1.02 SUBSTITUTE MATERIAL AND EQUIPMENT AND APPROVAL

Review and approval of substitute materials shall be in accordance with the requirements detailed elsewhere in the Specifications.

1.03 MANUFACTURER'S INSTRUCTIONS FOR INSTALLATION

A. When Contract Documents require that installation of the Work shall comply with manufacturer's printed instructions, obtain and distribute copies of such instructions to parties involved in the installation, including copies to the Engineer. One complete set of the installation instructions shall be available for use on the job site during and through completion of the Work.

B. Handle, install, connect, clean, condition and adjust products as required by the manufacturer's instructions and in conformity with specified requirements.

1. Should the specified requirements conflict with the manufacturer's instructions, the manufacturer's instructions shall have priority unless changes are authorized in writing by the manufacturer.
2. Should job conditions conflict with the manufacturer's instructions, consult with the manufacturer for clarification.
3. Clarifications of installation instructions shall be issued only by the manufacturer, shall be in writing, and shall be distributed to all parties involved in the installation as stated above and prior to alteration of the installation procedures.
4. Do not proceed with the Work without clear instructions concerning the specific installation procedures.

C. Do not omit any preparatory step or installation procedure unless specifically modified or exempted by the manufacturer.

1.04 SERVICES OF MANUFACTURER'S REPRESENTATIVE

A. From each company manufacturing or supplying equipment, the Contractor shall provide as outlined below the services of a qualified factory service representative. Equipment furnished under Divisions 11, 13, 15 and 16 shall include the costs of these services. A service representative shall be a full-time factory-trained service employee with a minimum of two (2) years field service experience. Manufacturer's sales representatives or sales agents, subcontractors to manufacturers, or similar personnel will not qualify. The service rendered by these representatives shall be at the work site for an eight (8) hour work day for each piece of equipment. The number of trips and days required for each piece of equipment stated below is as follows:

1. Phase I - Installation

   The factory service representative shall direct the contractor in the proper unloading, setting, installation, erection, storage and connection to adjacent units for their respective equipment. These services shall be for a period of not less than one day. Some equipment may require additional time for the installation of major units of equipment. In this case a longer period may be mutually agreed to by the Contractor and Manufacturer. These services during the installation phase may be omitted if the installation of the equipment is not complicated. Permission for deletion of these services shall be made in writing to the Engineer prior to the delivery of the equipment with the appropriate reasons why these services are not needed for this equipment. Only after written approval has been granted by the Engineer will these services be voided. In any case, the manufacturer is responsible for the correct installation of the equipment in accordance with the manufacturer's recommended practices.

2. Phase II - Testing

   a. After the equipment has been properly installed by the Contractor and readied for operation, each unit of equipment together with piping, power, and controls shall

be tested by a factory service representative for its intended use as outlined in the technical specifications and drawings. These services shall be a separate one (1) day minimum visit to inspect and test the unit to verify that the installation is in accordance with the recommended practice of the manufacturer.

b. Any calibrations, adjustments, or coordination of controls with other equipment shall be made at this time. The services of a factory service representative will be required on a consecutive day basis until the equipment has been properly tested to perform in accordance with the Contract Documents. If the equipment is not tested as required, the cost for additional visits will be at no additional cost to the Owner or Engineer.

c. In the presence of the Owner's representative, the Resident Project Representative and/or Engineer, the operation, testing, and adjustments shall be performed to demonstrate the equipment operates as intended.

d. After the site visit during this phase, the manufacturer or the supplier shall certify in a written report (in triplicate) to the Engineer of the results of the inspection, operation and condition of the equipment. This report shall include a detailed description of tests performed and the actual performance of the equipment. Any results which would require precautions to be taken to ensure proper maintenance of the equipment shall be included in the report. Finally, the report shall include a certification that the equipment conforms to the requirements of the Contract Documents and is ready for permanent operation. Furthermore, the certification shall include a statement stating nothing in the installation or testing operations will void the manufacturer's warranty. All manufacturer's are required to provide the services outlined in this phase without exception.

3. Phase III - Start-Up, Operation and Training

a. Once all equipment has been satisfactorily tested and the facility is substantially complete, the Contractor shall coordinate the concurrent start-up of all units of equipment. This coordination shall include the simultaneous attendance of the Owner's representative, the Engineer, and the factory service representative of each unit of equipment.

b. The factory service representative will provide for a minimum of one (1) day instruction and training for the Owner's representative in the proper operation, adjustment and maintenance of the equipment. At this item the service representative shall provide operation and maintenance manuals to the Engineer unless provided for otherwise.

B. For equipment or products furnished under other divisions, the Contractor, unless otherwise specified, shall furnish the services of authorized representatives of the manufacturers only when some evident installation or operation problem makes such services necessary in the opinion of the Engineer.

C. Manufacturer's Operating and Maintenance Manuals shall be delivered to the Engineer in accordance with the requirements of the Section in the Specifications entitled "Operating and Maintenance Data ."

1.05 TRANSPORTATION AND HANDLING

A. Arrange deliveries of Products as required by the currently approved construction schedule, coordinating each delivery to avoid conflict with other work and conditions at the site.

1. Deliver products in an undamaged condition, in the manufacturer's original containers or packaging and with identifying labels intact and legible.
2. Prior to accepting delivery, inspect shipments to assure compliance with approved submittals, and that the products have been properly protected and are undamaged.

B. Provide equipment and personnel to handle products preventing soiling or damage to the products or their protective packaging.

1.06 STORAGE AND PROTECTION

A. Store Products in accordance with manufacturer's instructions, with seals and labels intact and legible.

1. Store products subject to damage by the elements in weathertight enclosures.
2. Maintain temperature and humidity within the ranges required by manufacturer's instructions.
3. Store fabricated products above the ground on blocking or skids to prevent soiling, staining or corrosion. Cover products that are subject to deterioration with impervious sheet coverings and provide adequate ventilation to avoid condensation.
4. Store loose granular materials in a well-drained area on solid surfaces to prevent mixing with foreign matter.

B. All materials and equipment to be incorporated in the Work shall be handled and stored in a manner to prevent warping, twisting, bending, breaking, chipping, rusting, and other injury, theft or damage.

C. Cement and lime shall be stored under a roof and off the ground and shall be kept completely dry at all times. All miscellaneous steel, structural steel and reinforcing steel shall be stored off the ground, kept free of accumulations of dirt and grease, and in areas free of standing water to minimize rusting. Precast concrete sections shall be handled and stored in a manner to prevent staining, chipping or cracking. Brick, block and similar masonry products shall be handled and stored in a manner to reduce staining, breaking, chipping, cracking, and spalling.

D. All materials which, in the opinion of the Engineer, have become so damaged as to be unfit for the use intended, including aesthetics, shall be promptly removed from the site of the work.

E. Arrange storage in a manner to provide easy access for inspection. Make periodic inspections and exercise or rotate moving parts of stored products as required by the manufacturer to assure that products are maintained under specified conditions and free from damage or deterioration.

F. Provide substantial coverings as necessary to protect installed products from damage caused by traffic and subsequent construction operations. Remove the protective covering when no longer needed.

G. The Contractor shall be responsible for all material, equipment, and supplies sold and delivered to the Owner under this Contract until final inspection of the Work and acceptance thereof by the Owner. In the event any such material, equipment, and supplies are lost, stolen, damaged, or destroyed prior to final inspection and acceptance they shall be replaced by the Contractor.

H. Should the Contractor fail to take proper action to properly store and handle equipment supplied under this Contract, the Owner retains the right to notify the Contractor in writing of the deficiencies, to correct all deficiencies and deduct the cost associated with these corrections from the Contractor's Contract. These costs may be comprised of expenditures for labor, equipment usage, administration, clerical, engineering and any other costs associated with making the necessary corrections.

1.07 OFF-SITE STORAGE AND PROTECTION

Offsite storage shall be in accordance with the provisions detailed elsewhere in the Specifications.

1.08 PRODUCT TESTING

A. All work installed in accordance with the plans and specifications, shall have post installation tests performed to check the system conformance to the specified operation. The Contractor shall file with the Engineer a standard form written report detailing the field operation of the product. The standard form reports will be furnished by the Engineer and completed by the Contractor and the Resident Project Representative.

B. Report forms shall be listed and shown in the Appendix.

1.09 SPECIAL TOOLS

Manufacturers of equipment and machinery shall furnish any special tools (including grease guns or other lubricating devices) required for normal adjustment, operations and maintenance, together with instructions for their use. The Contractor shall preserve and

deliver to the Owner these tools and instructions in good order no later than upon completion of the Contract.

1.10 WARRANTY

For all major pieces of equipment, submit a warranty from the equipment manufacturer as specified in the Section entitled "Operating and Maintenance Data." The manufacturer's warranty period shall be concurrent with the Contractor's as stipulated in the specifications for each piece of equipment.

1.11 SPARE PARTS

Spare parts for certain equipment provided under Divisions 11, 13, 15 and 16 have been specified in the pertinent sections of the Specifications. The Contractor shall collect and store all spare parts so required in an area to be designated by the Engineer. In addition, the Contractor shall furnish to the Engineer an inventory listing all spare parts, the equipment they are associated with, the name and address of the supplier, and the delivered cost of each item. Copies of actual invoices for each item shall be furnished with the inventory to substantiate the delivered cost.

1.12 GREASE, OIL AND FUEL

A. All grease, oil, and fuel required for testing of equipment shall be furnished with the respective equipment. The Owner shall be furnished with a year's supply of required lubricants including grease and oil of the type recommended by the manufacturer with each item of equipment supplied.

B. The Contractor shall be responsible for changing the oil in all drives and intermediate drives of each mechanical equipment after initial break-in of the equipment, which in no event shall be any longer than three weeks of operation.

PART - II PRODUCTS - NOT USED

PART - III EXECUTION - NOT USED

END OF SECTION

TECHNICAL SPECIFICATIONS
DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01700 - CONTRACT CLOSEOUT

PART - I GENERAL

1.01 REQUIREMENTS INCLUDED

A. The Contractor shall comply with the requirements stated in the General Conditions and in the Specifications for administrative procedures in closing out the work.

B. The following is a list of items required to complete the project.

1. Owner may request use of substantially completed portions of the work without such use constituting acceptance. Provision should be made for consent or notification of the survey and the insurers for the project;
2. Contractor to request Substantial Completion inspection of the project or a portion thereof when construction is sufficiently complete to be utilized for the purposes intended;
3. Engineer, Contractor, and Resident Project Representative to make substantial completion inspection. A list of incomplete items will be prepared by the Engineer.
4. Engineer will issue a Substantial Completion Certificate (E.J.C.D.C. Form 1910-8D) with a date of substantial completion with the attached list of uncompleted items. Certificate will be filed by the Owner for a prescribed period of time. Besides listing the uncompleted items, the substantial completion shall designate the responsibilities for utilities, maintenance and insurance; and any exceptions to guarantees or warranties.
5. Contractor shall complete list of uncompleted items. Upon the completion of work, he shall request a final inspection.
6. Final Inspection shall be made by Owner, Contractor, Engineer, Resident Project Representative, Regulatory Agencies, Funding Agency and any other agency involved in this project.
7. Contractor shall make final request for payment with the appropriate data; i.e., clear-lien certificate, release from surety, etc., all as required by State Law.
8. Engineer to process final payment request and present request to Owner.

1.02 SUBSTANTIAL COMPLETION

A. When the Contractor considers the Work is substantially complete, he shall submit to the Engineer:

1. A written notice that the Work or designated portion thereof is substantially complete.
2. A list of items to be completed or corrected.

B. Within five (5) working days after receipt of such notice, the Engineer will make an inspection to determine the status of completion. The Engineer's opinion as to the status of completion shall be based on completion of the following as applicable:

1. Installation of all piping, valves, mains, and/or service lines, including pressure, leakage or other required tests.
2. Installation of all equipment including, but not limited to, fans, blowers, aerators, dehumidifiers, and surge suppressors.
3. Installation or construction of structures including all required protective or aesthetic coatings or devices including required tests.
4. Installation of electrical conduits, wiring, load centers, controls, and all other electrical elements as required including tests, inspections, and approval by local agencies for compliance with ordinances and codes.
5. Backfill and compaction of backfill as indicated by required tests for all structures, pipelines, conduits, and other subterranean installations.
6. Installation or restoration of pavements including required tests for subbase, base and pavement materials, and approval by the local municipality, where required. Pavements shall not be individually considered and shall be considered only with other portions of the Work requiring the installation or restoration of pavement.
7. All painting required by the Contract Documents except for touch-up.
8. Topsoiling, final grading, fertilizing, seeding, sodding, or landscaping except for growth of vegetation and watering to establish the required ground cover of vegetative growth.
9. Release of all permits whether or not the permit was acquired by the Contractor.
10. Installation of all doors, windows, louvers, and other building appurtenances including painting, finish hardware, glazing, locks, and other required devices to secure the Work.
11. All required instructions for the Owner's operation and maintenance personnel including a minimum of one approved copy of the required operation and maintenance manual for use by the Owner's personnel.

C. Should the Engineer determine that the Work is not substantially complete:

1. The Engineer will promptly notify the Contractor in writing, giving the reasons therefore in accordance with the General and Supplemental Conditions.
2. Contractor shall remedy the deficiencies in the Work, and send a second written notice of substantial completion to the Engineer.
3. The Engineer will reinspect the Work.

D. When the Engineer finds that the Work is substantially complete, he will:

1. Prepare and deliver to Owner a tentative Certificate of Substantial Completion with a tentative list of items to be completed or corrected before final payment in accordance with the General and Supplementary Conditions.
2. After consideration of any objections made by the Owner as provided in the General and Supplemental Conditions of the Contract, and when the Engineer considers the Work substantially complete, he will execute and deliver to the Owner and the Contractor a definite Certificate of Substantial Completion with a revised tentative list of items to be completed or corrected.

SECTION 01700 - CONTRACT CLOSEOUT

1.03 FINAL INSPECTION

A. When Contractor considers the Work is complete, he shall submit written certification that:

1. Contract Documents have been reviewed.
2. Work has been inspected for compliance with Contract Documents.
3. Work has been completed in accordance with Contract Documents.
4. Equipment and systems have been tested in the presence of the Engineer and Owner's representative and are operational.
5. Work is completed and ready for final inspection.

B. The Engineer will make an inspection to verify the status of completion with five working days after receipt of such certification.

C. Should the Engineer consider that the work is incomplete or defective:

1. The Engineer will promptly notify the Contractor in writing, listing the incomplete or defective work.
2. Contractor shall take immediate steps to remedy the stated deficiencies, and send a second written certification to the Engineer that the Work is complete.
3. The Engineer will reinspect the Work.

D. When the Engineer finds that the Work is acceptable under the Contract Documents, he shall request the Contractor to make closeout submittals.

1.04 REINSPECTION FEES

A. Should the Engineer perform reinspections due to failure of the Work to comply with the claims of status of completion made by the Contractor:

B. Owner will compensate the Engineer for such additional services.

C. Owner will deduct the amount of such compensation from the final payment to the Contractor.

1.05 CONTRACTOR'S CLOSEOUT SUBMITTALS TO ENGINEER

A. Evidence of compliance with requirements of governing authorities.

B. Project Record Documents.

C. Manufacturer's Certificates of Installation.

D. Warranties and Bonds.

E. Keys and Keying Schedule.

F. Spare Parts and Maintenance Materials.

G. Certificate of Insurance for Products and Completed Operations.

1.06 FINAL ADJUSTMENT OF ACCOUNTS

A. Submit a final statement of accounting to the Engineer.

B. Statement shall reflect all adjustments to the Contract Sum:
   1. The original Contract Sum.
   2. Additions and deductions resulting from:
      a. Previous Change Orders
      b. Unit Prices
      c. Deductions for uncorrected Work
      d. Penalties and Bonuses
      e. Deductions for liquidated damages
      f. Deductions for reinspection payments
      g. Other adjustments
   3. Total Contract Sum, as adjusted.
   4. Previous Payments.
   5. Sum remaining due.

C. Engineer will prepare a final Change Order reflecting approved adjustments to the Contract Sum which were not previously made by Change Orders.

D. In accordance with the requirements of Section 01035 - Modification Procedures, the Engineer will submit the final Change Order and a recommendation for acceptance of the Work to the Owner for approval.

1.07 APPLICATION FOR PAYMENT

Upon receipt of approval of the final Change Order, the Contractor shall submit an Application for Payment in accordance with procedures and requirements stated in the General Conditions.

1.08 CONTRACT CLEAR LIEN CERTIFICATE AND PAYMENT OF RETAINAGE

A. Upon receipt of the Owner's acceptance of the work, the Contractor shall make filings with the Recorder of Mortgages as required by Louisiana State Public Contract Statute.

B. In accordance with the Louisiana State Public Contract Statute, the Recorder of Mortgages shall issue a Clean Lien and Privilege Certificate upon expiration of a period of not less than forty-five (45) days, provided no liens are recorded against the Project.

SECTION 01700 - CONTRACT CLOSEOUT

C. Upon receipt of the Clear Lien and Privilege Certificate, the Contractor shall submit a Final Application for Payment to the Engineer requesting the release of the project retainage with the certificate attached as evidence of authority for the Owner to pay the retainage.

D. The Engineer shall review the Final Application for Payment and if in order shall transmit the application to the Owner for payment of the retainage.

E. In accordance with the General Conditions, the Owner shall release the retainage and make payment to the Contractor the legal sum of the retainage for which the Contractor is entitled.

PART - II PRODUCTS - NOT USED

PART - III EXECUTION - NOT USED

END OF SECTION

TECHNICAL SPECIFICATIONS
DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01710 - CLEANING

PART I - GENERAL

1.01 REQUIREMENTS INCLUDED

Cleaning shall include daily "policing" of the work and surrounding areas to clear general debris, waste paper, wood scraps, broken concrete, and other objectionable material along with the final cleanup of site(s) required for project acceptance.

1.02 DISPOSAL REQUIREMENTS

Conduct cleaning and disposal operations to comply with codes, ordinances, regulations, and anti-pollution laws.

PART II - PRODUCTS - NOT USED

PART III - EXECUTION

3.01 DURING CONSTRUCTION

A. Execute daily 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 onsite containers for the collection of waste materials, debris and rubbish. All waste materials including containers, food debris and other miscellaneous materials must be disposed of daily in onsite containers.

C. Remove waste materials, debris and rubbish from the site periodically and dispose of at legal disposal areas away from the site.

3.02 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 Owner occupancy, Contractor shall conduct an inspection of sight-exposed interior and exterior surfaces and all work areas to verify that the entire Work is clean.

SECTION 01710 - CLEANING

E. Apply a finished paint coat per Section 09900 to all equipment incorporated into the project. Final finish coat of paint shall be applied after equipment has been installed.

3.03 FUELING

A. Upon servicing all equipment, all fuel storage tanks shall be filled to completion.

END OF SECTION

TECHNICAL SPECIFICATIONS
DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01720 - PROJECT RECORD DOCUMENTS

PART - I GENERAL

1.01 REQUIREMENTS INCLUDED

Maintain at the site for the Owner one record copy of:

1. Conformed Drawings.
2. Conformed Specifications.
3. Change Orders and other Modifications to the Contract.
4. Engineer's Field Orders or written instructions.
5. Approved Shop Drawings, Working Drawings and Samples.
6. Field Test records.
7. Construction photographs.
8. Latest, Approved Progress Schedule.

1.02 MAINTENANCE OF DOCUMENTS AND SAMPLES

A. Store documents and samples in Contractor's field office apart from documents used for construction.

1. Provide files and racks for storage of documents.
2. Provide locked cabinet or secure storage space for storage of samples.

B. File documents and samples in accordance with Specification Section numbers.

C. Maintain documents in a clean, dry, legible, condition and in good order. Do not use record documents for construction purposes.

D. Make documents and samples available at all times for inspection by the Engineer.

E. As a pre-requisite for monthly progress payments, the Contractor is to exhibit the currently updated "record documents" for review by the Engineer and Owner. Should the "record documents" be found in a condition that is not up-to-date, the Owner may withhold progress payments until the Contractor updates the "record documents" to a condition showing the current status of the Work.

1.03 MARKING DEVICES

Provide felt tip marking pens for recording information in the color code designated by the Engineer.

1.04 RECORDING

A. Label each document "PROJECT RECORD" with rubber stamp.

SECTION 01720 - PROJECT RECORD DOCUMENTS

B. Record information concurrently with construction progress and do not conceal any work until required information is recorded.

C. Legibly mark drawings to record actual construction:

1. The Contractor shall use the following color code in marking Record Drawings.
   a. Yellow for no change.
   b. Red to indicate additions, deletions and changes.
2. Elevations of various structure elements in relation to elevation datum.
   a. Elevations referenced to control points established by the Owner's agent.
   b. Specifically, elevations of drainage culvert inverts, building slabs, top of roadway and driveway curbs, bridges, etc.
3. All underground piping with elevations and dimensions, changes to piping location, horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements, actual installed pipe material, class, etc.
   a. Elevations of constructed underground piping at 100 ft. increments and points where changes occur in either the slope or horizontal direction.
   b. Three swing ties from referenced permanent surface improvements to the pipe centerline at 500 ft. increments and the center of each manhole cover, valve, wye branch, vent, end of service connection at the property line, other fittings and appurtenances.
   c. Identify existing utilities which parallel the proposed construction, including size and offset distance horizontally and vertically, when exposed by the construction activity.
   d. Identify existing utilities including size, material type, vertical clearance over or under, intersecting station, and angle of intersection crossing proposed construction.
4. Location of internal utilities and appurtenances concealed in the construction by referencing to visible and accesible features of the structure.
5. Field changes of dimension and detail.
6. Changes made by Field Order or by Change Order.
7. Details not on original contract drawings.
8. Equipment and piping relocations.
9. Identify the actual motor installed by manufacturer's name, nameplate horsepower and serial number.
10. Identify the actual pump installed by manufacturer's name, model number, impeller size, rated capacity and serial number.
11. Major architectural and structural changes including relocation of doors, windows, etc.

D. Specifications and Addenda; Legibly mark each Section to record:

1. Manufacturer, trade name, catalog number, and supplier of each Product and item of equipment actually installed.
2. Changes made by Field Order or by Change Order.

SECTION 01720 - PROJECT RECORD DOCUMENTS

E. Shop Drawings (after final review):

One set of record drawings for each process equipment, piping, electrical system and instrumentation system.

F. Certified site survey and line elevations and stationing at 100 ft. increments and all points of change of direction of pipelines per the requirements of thei Section by a registered land surveyor.

1.05 SUBMITTAL

A. At Contract close-out, deliver Record Documents to the Engineer for the Owner.

B. Accompany submittal with transmittal letter in duplicate containing:

1. Date.
2. Project title and number.
3. Contractor's name and address.
4. Title and number of each Record Document.
5. Signature of Contractor or his authorized representative.

PART - II PRODUCTS - NOT USED

PART - III EXECUTION - NOT USED

END OF SECTION

TECHNICAL SPECIFICATIONS
DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01730 - OPERATING AND MAINTENANCE DATA

PART - I GENERAL

1.01 REQUIREMENTS INCLUDED

A. Compile product data and related information appropriate for Owner's maintenance and operation of equipment furnished under Contract.

1. Prepare operating and maintenance data as specified herein and as referenced in other pertinent Sections of the Specifications.
2. Submit operating and maintenance manuals as specified herein.

B. Instruct Owner's personnel in maintenance of products and in operation of equipment and systems.

1.02 QUALITY ASSURANCE

Preparation of data shall be done by personnel:

1. Trained and experienced in maintenance and operation of described products.
2. Familiar with requirements of this Section.
3. Skilled in technical writing to the extent required to communicate essential data.
4. Skilled as draftsman competent to prepare required drawings.

1.03 FORM OF SUBMITTALS

A. Prepare data in form of an operating and maintenance manual for use by Owner's personnel.

B. Format:

1. Size: 8 1/2 inches x 11 inches, punched and reinforced for insertion into the binders.
2. Paper: 20 pound minimum white, for typed pages.
3. Text: Manufacturer's printed data, or neatly typewritten.
4. Drawings:
   a. Provide reinforced punched binder tabs, bind in with text.
   b. Reduce larger drawings and fold to size of text pages but not larger than 11 inches x 17 inches.
5. Provide fly-leaf for each separate product, or each piece of operating equipment.
   a. Provide typed description of product, and major component parts of equipment.
   b. Provide indexed tabs.
6. Cover: Identify each volume with typed or printed title "OPERATING AND MAINTENANCE INSTRUCTIONS" List:
   a. Title of Project.
   b. Identity of each separate structure as applicable.
   c. Identity of general subject matter covered in the manual.

C. Binders:

1. Commercial quality three-post binders with durable and cleanable plastic covers.
2. Maximum post width: 2-inches, D-ring.
3. When multiple binders are used, correlate the data into related consistent groupings.

1.04 CONTENT OF OPERATING AND MAINTENANCE MANUAL

A. A complete neatly typewritten table of contents listing documents in all volumes shall be included and arranged in systematic order.

1. Contractor, name of responsible principal, address and telephone number.
2. A list of each product required to be included, indexed to content of the volume.
3. List, with each product, name, address and telephone number of:
   a. Subcontractor or installer.
   b. Maintenance contractor, as appropriate.
   c. Identify area of responsibility of each.
   d. Local source of supply for parts and replacement.
4. Identify each product by product name and other identifying symbols as set forth in Contract Documents.

B. Product Data:

1. Include only those sheets that are pertinent to the specific product.
2. Annotate each sheet to:
   a. Clearly identify specific product or part installed.
   b. Clearly identify data applicable to installation.
   c. Delete references to inapplicable information.

C. Drawings:

1. Supplement product data with drawings as necessary to clearly illustrate:
   a. Relations of component parts of equipment and systems.
   b. Control and flow diagrams.
2. Coordinate drawings with information in Project Record Documents to assure correct illustration of completed installation.
3. Do not use Project Record Documents as maintenance drawings.

D. Written text, as required to supplement product data for the particular installation:

1. Organize in consistent format under separate headings for different procedures.
2. Provide logical sequence of instructions of each procedure.

E. Copy of each warranty, bond and service contract issued and provide information sheet for Owner's personnel, giving proper procedures in the event of failure and instances that might affect the validity of warranties or bonds. The warranty, bond and/or service contract shall be placed behind immediately behind the fly leaf of the equipment section.

F. Provide for each unit of equipment and system, as appropriate:

1. Description of unit and component parts.
   a. Function, normal operating characteristics, and limiting conditions.
   b. Performance curves, engineering data and tests.
   c. Complete nomenclature number of replaceable parts including standard or manufacturer's part.
2. Operating procedures:
   a. Start-up, break-in, routine and normal operating instructions.
   b. Regulation, control, stopping, shutdown and emergency instructions.
   c. Summer and winter operating instructions.
   d. Special operating instructions.
3. Maintenance Procedures:
   a. Routine operations.
   b. Guide to "troubleshooting".
   c. Disassembly, repair, and reassembly.
   d. Alignment, adjusting and checking.
4. Servicing and lubrication schedule including a list of lubricants required.
5. Manufacturer's printed operating and maintenance instructions.
6. Description of sequence of operation by control manufacturer.
7. Original manufacturer's parts list, illustrations, assembly drawings and diagrams required for maintenance including the following:
   a. Predicted life of parts subject to wear.
   b. Items recommended to be stocked as spare parts.
8. As-installed control diagrams by controls manufacturer.
9. Each contractor's coordination drawings including as-installed color coded piping diagrams.
10. Charts of valve tag numbers, with location and function of each valve.
11. Cataloged list of manufacturer's spare parts supplied with the equipment or system, manufacturer's current prices, and recommended quantities to be maintained in storage.
12. Other data as required under pertinent sections of Specifications.

G. Content, for each electric and electronic system, as appropriate:

1. Description of system and component parts.
   a. Function, normal operating characteristics, and limiting conditions.
   b. Performance curves, engineering data and tests.
   c. Complete nomenclature including standard or manufacturer's part number of replaceable parts.
2. Circuit directories of panelboards.
   a. Electrical service.
   b. Controls.
   c. Communications.
3. As-installed color coded wiring diagrams.
4. Operating procedures:

a. Routine and normal operating instructions.
b. Sequences required.
c. Special operating instructions.

5. Maintenance procedures:
   a. Routine operations including recalibration procedures.
   b. Guide to "troubleshooting".
   c. Disassembly, repair and reassembly.
   d. Adjustment and checking.
6. Manufacturer's printed operating and maintenance instructions.
7. List of original manufacturer's spare parts, manufacturer's current prices, and recommended quantities to be maintained in storage.
8. Other data as required under pertinent sections of specifications.

H. Prepare and include additional data when the need for such data becomes apparent during instruction of Owner's personnel.

I. Additional requirements for operating and maintenance data as required by the respective sections of the Specifications.

1.05 SUBMITTAL SCHEDULE AND REQUIREMENTS

A. Submit two (2) copies of preliminary draft of proposed formats and outlines of contents of Operating and Maintenance Manual within thirty (30) days of first Engineer review of shop drawings for each equipment item. The Engineer will review the preliminary draft and return one copy with comments.

B. Submit five (5) copies of the final manual to the Engineer within thirty (30) calendar days of product shipment to the project site and preferably within thirty (30) days after the reviewed copy is received.

C. Submit five (5) copies of any addenda to the Operating and Maintenance Manual as applicable with certificates as specified in the Section entitled "Material and Equipment" within thirty (30) days after final inspection and start-up.

1.06 INSTRUCTION OF OWNER'S PERSONNEL

A. Prior to initial start-up inspection or request for substantial completion, fully instruct Owner's designated operating and maintenance personnel in operation, adjustment and maintenance of products, equipment and systems.

B. Operating and maintenance manual shall constitute the basis of instruction and shall review comments of manual with personnel in full detail to explain all aspects of operation and maintenance.

PART - II PRODUCTS - NOT USED
PART - III EXECUTION - NOT USED

END OF SECTION

TECHNICAL SPECIFICATIONS
DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01740 - WARRANTIES AND BONDS

PART - I GENERAL

1.01 REQUIREMENTS INCLUDED

A. Compile specified warranties and bonds required by the General Conditions and other portions of the Specifications.

B. Co-execute submittals when so specified.

C. Review submittals to verify compliance with Contract Documents.

D. Submit to the Engineer for review and transmittal to Owner.

1.02 SUBMITTAL REQUIREMENTS

A. Assemble and include warranties, bonds and service and maintenance contracts, executed by each of the respective manufacturers, suppliers, and subcontractors including effective dates as required by the Section entitled "Operating and Maintenance Data" in the required operation and maintenance manuals.

B. Number of original signed copies required: Two each.

C. Additional copies of the original: One in each copy of the Operating and Maintenance Manual.

D. Table of Contents: Neatly typed in orderly sequence. Provide complete information for each item.

1. Product or work item.
2. Manufacturer with principal address and telephone number.
3. Scope of the warranty, bond or service and maintenance contract.
4. Date of beginning warranty, bond or service and maintenance contract.
5. Duration of warranty, bond or service maintenance contract.
6. Provide information for Owner's personnel:
   a. Proper procedure in case of failure.
   b. Instances which might affect the validity of warranty or bond.
7. Contractor, name of responsible principal, address and telephone number.

1.03 FORM OF SUBMITTALS

A. Prepare in packets as required for submittal.

B. Format:
1. Size: 8 1/2 inches x 11 inches, punch sheets for standard 3-post binder.
2. Fold larger sheets to fit into binder.

3. Cover: Identify each packet with typed or printed title "WARRANTIES AND BONDS" List:
   a. Title of Project.
   b. Name of Contractor.

C. Binders - Commercial quality three-post binders with durable and cleanable plastic covers and maximum post width: 2-inches, D-ring.

1.04 WARRANTY SUBMITTAL REQUIREMENTS

A. For all major pieces of equipment, unless stated otherwise in the specifications for each individual item of equipment, submit a written warranty from the equipment manufacturer to replace promptly any equipment or component thereof which, in the sole opinion of the Engineer, has defects in design, workmanship, materials, or performance within a one year period following the date of acceptance for operation (Substantial Completion) by the Owner. The manufacturer's warranty period shall be concurrent with the Contractor's standard one year warranty, unless otherwise specified, commencing at the time of acceptance for operation (Substantial Completion) by the Owner and shall be administered in conjunction with the Contractor's warranty. Both the Contractor's and the Manufacturer's warranties shall operate together to provide for replacement of defective equipment and restoration of proper operation. The Contractor shall be solely responsible for the administration of both warranties.

B. The Contractor shall obtain manufacturer's warranties for all equipment which has 1 HP motor or larger and/or which has a retail list cost of more than $1,000.00. The Engineer reserves the right to request warranties for equipment not so classified. The Contractor shall warrant all equipment in the Contract one-year warranty period even though manufacturer's warranties may not be required.

C. In the event that the Contractor is unable to obtain the above required one-year warranty from an equipment manufacturer, the Contractor shall provide, prior to acceptance for operation of the equipment by the Owner, a bank letter of credit in favor of the Owner in the amount of two-hundred percent (200%) of the purchase price of the equipment for a period of 18 months from the beginning of the warranty period on which the Owner may draw for replacement of defective equipment (materials and labor).

PART - II PRODUCTS - NOT USED

PART - III EXECUTION - NOT USED

END OF SECTION

TECHNICAL SPECIFICATIONS
DIVISION 02 - SITEWORK

SECTION 02010 - EXCAVATING, FILLING, AND GRADING

PART 1 - GENERAL

1.01 SCOPE OF WORK

Excavating, filling and grading for this Work includes, but is not necessarily limited to:

A. Stripping site of all organic and harmful, noxious, and/or unsuitable materials within the limits of the proposed excavations.

B. Excavating for footings and foundations to attain indicated grades.

C. Filling and backfilling to attain indicated grades.

D. Trenching and trench backfilling.

E. Furnishing and installing structural fills and backfills under and around all pavements, foundations, and other structures.

F. Rough and finish grading of the site.

1.02 JOB CONDITIONS

A. Dust Control: Contractor shall use all means necessary to control dust on and near the Work and on and near all off-site borrow areas if such dust is caused by the Contractor's operations during performance of the Work or if it is a result of the condition in which the Contractor leaves the site.

B. Contractor shall thoroughly moisten all surfaces as required to prevent dust being a nuisance to the public, neighbors, and concurrent performance of other work on the site.

PART 2 - PRODUCTS

2.01 MATERIALS

A. General - For the purpose of these Specifications all fills are classified as structural fills. All fill materials shall be subject to approval of the Engineer.

SECTION 02010 - EXCAVATING, FILLING, AND GRADING

For approval of fill material, Contractor shall notify the Engineer at least five (5) working days in advance of intention to import material, designate the proposed borrow area, and permit the Engineer to sample as necessary from the borrow area for the purpose of making acceptance tests to prove the quality of the material.

B. Soil Fill Material:

1. On-Site - Excavated site soils, free from organic matter and other harmful, noxious, and/or unsuitable substances, may be used as fill and backfill material with the approval of the Soils Engineer, where indicated on the Drawings or as directed by the Soils Engineer.

2. Imported - All imported fill material used for structural fill shall be clean, select fill, free from excess silt, clay balls or other deleterious matter, and having a plasticity index between 15 and 20 and a maximum liquid limit of 45.

C. Aggregate Fill Material

1. Beneath Floor Slabs - Where indicated on the drawings gravel fill beneath the floor slabs of buildings shall conform to the following gradation:

U.S. Sieve	Percent Passing (By Weight)
3/4"	100
5/8"	95-100
4	0.7

2. Beneath Roadway & Parking Slabs - Where indicated on the drawings crushed limestone subbase shall be limestone road base aggregate conforming to the size gradation as follows:

U.S. Sieve	Percent Passing (By Weight)
1 1/2"	100
1"	90-100
3/4"	70- 95
3/8"	50- 80
4	35- 65
10	25- 50
40	10- 26
200	4- 12

Crushed limestone sub base shall be placed and compacted in accordance with subsection 8 of these Specifications.

2.02 Protection: Contractor shall use all means necessary to protect all materials of this Section before, during, and after installation and to protect all objects designated to remain.

In the event of damage, Contractor shall immediately make all repairs and replacements necessary to the approval of the Engineer and at no additional cost to the Owner.

PART 3 – EXECUTION

3.01 GENERAL

A. Familiarization - Prior to all work of this section, Contractor shall become thoroughly familiar with the site, the site conditions, and all portions of the work falling within this Section.

B. Backfilling Prior to Approvals - The Contractor shall not allow or cause any of the Work performed or installed to be covered up or enclosed by work of this Section prior to all required inspections, tests, and approvals by the Engineer, Soils Engineer, Testing Laboratory and/or Owner.

Should any of the Work be so enclosed or covered up before it has been approved, Contractor shall uncover all such Work at no additional cost to the Owner, at the Contractor's expense.

After the Work has been completely tested, inspected, and approved, the Contractor shall make all repairs and replacements necessary to restore the Work to the condition in which it was found at the time of uncovering, all at no additional cost to the Owner.

C. Finish Elevations and Lines - For setting and establishing finish elevations, and lines, Contractor shall secure the services of a registered civil engineer or land surveyor acceptable to the Owner. The Contractor shall carefully preserve all data and monuments set by the civil engineer and /or surveyor, and if displaced or lost, immediately replace to the approval of the Owner and at no additional cost to the Owner.

SECTION 02010 - EXCAVATING, FILLING, AND GRADING

3.02 GENERAL EXCAVATION REQUIREMENTS

A. Sitework Preparation - The extent of this excavation shall be to firm native soils, as directed by the Engineer. Subject to the approval of the Engineer, the excavated soils shall be suitable for use as general site fill, when free of organics and other harmful, noxious, and/or unsuitable material and when placed and compacted as specified in accordance with these Specifications. The resulting excavations shall be filled with structural or general fills depending on the area, as indicated on the Drawings and as specified herein.

Where depressions result from, or have resulted from, the removal of surface or subsurface obstructions, depressions shall be opened to equipment working width and all debris and other harmful, noxious, and/or unsuitable material shall be removed as directed by the Engineer.

B. Common Excavation - Material shall be excavated to conform to lines, grades and dimensions shown on the Drawings. Where excavation grades are not shown on the Drawings, excavation shall be as required to accommodate installation of the proposed structures, including structural fill as described in these Specifications.

Where proposed subgrades are found to be unsuitable for foundations, unsuitable materials shall be removed and replaced with crushed stone or sand as directed by the Engineer. Payment for this additional work shall be made in accordance with the unit prices included in the Bid Proposal. If no unit price exists in the bid proposal, a negotiated price shall be determined based on the provisions set forth in the General Conditions and the quantity of work to be performed.

C. Classification of Material - Excavation under this contract shall be unclassified; that is, no separate payments will be made for earth or rock excavation. The cost of excavating to the lines and grades necessary to construct the facilities in accordance with the Drawings and these Specifications shall be included in the lump sum price bid for all the construction work. The Contractor shall perform all required excavation regardless of the type or condition of materials encountered. Additional compensation will be made in accordance with the prices established in the Bid Form for earth and rock excavation over and above that required by the Drawings and Specification if such excavation is directed by the Engineer.

D. Rock Excavation - Rock excavation shall mean removal of boulders, pieces of concrete or masonry exceeding one-half cubic yard in volume and solid ledge rock which, in the opinion of the Engineer, requires drilling and blasting, wedging, sledging, barring or breaking up with a power-operated hand tool for its removal. No soft or disintegrated rock which can be removed with a hand pick or power-operated excavator or shovel; no loose, shaken or previously blasted rock or broken stone in rock fillings or elsewhere; no

street pavements or sidewalks, and no rock exterior to the established limits of excavation will be measured or allowed. Payment for extra rock excavation shall be made in accordance with the unit prices included in the Bid Proposal.

E. Blasting - No blasting will be permitted.

F. Limits of Excavation - Where excavation for structures and/or trenches is carried below the proper elevation, the Contractor shall backfill with material approved by the Engineer.

This material shall be compacted to provide a firm and unyielding subgrade and/or foundation to the approval of the Engineer at no additional cost to the Owner.

G. Sheeting and Bracing - Open-cut trenches and excavations shall be sheeted and braced as required by any governing State laws and Municipal ordinances, and as may be required, it shall be driven to prevent adjacent soil from entering the trench either below or through such sheeting. Sheeting and bracing which have been ordered left in place by the Engineer for the protection of the work or existing foundations, buildings or other structures must be removed for a distance of three (3) feet below the established finished grade or the existing grade, whichever is lower.

Bracing except that which must be left in place, may be removed when the backfilling has reached the respective levels of such bracing. Sheeting, may be removed after the backfilling has been completed or has been brought up to an elevation which will permit its safe removal. All sheeting and bracing shall be removed in such manner as will insure the proper protection of the completed work and adjacent ground and underground structures and prevent the disturbance of adjacent ground.

H. Grading and Stockpiling Excavated Material - Contractor shall control the stockpiling of excavated material in a manner to prevent water running into the excavations. Contractor shall not obstruct surface drainage, but provide means whereby storm waters are diverted into existing gutters, other surface drains, or temporary drains.

3.03 PREPARATION OF SUBGRADE

A. Scarifying - After the site has been cleared, stripped and excavated to within 4 inches of the specified depths for recompaction, the Contractor shall scarify the exposed surface to a minimum depth of 6 inches, thoroughly moisture condition, and compact to the requirements specified for fill hereinafter (refer to Subsection 8).

B. Leveling - Contractor shall remove all ruts, hummocks, and other uneven surfaces by

surface grading prior to placement of fill.

C. Benching - Existing slopes to receive fill shall be benched prior to placement of fill on them. Benches shall be constructed to whatever width is necessary to maintain a surface ready for filling at a slope of 1 vertical to 12 horizontal or shallower.

3.04 EXCESS WATER CONTROL

Contractor shall abide by the following requirements:

A. Unfavorable Weather - Do not place, spread, or roll any fill material during unfavorable weather conditions. Do not resume operations until moisture content and fill density are satisfactory to the Engineer.

B. Freezing - No frozen soil shall be used as fill or backfill. Frozen subgrades shall be excavated to unfrozen soil prior to placing structures or additional fill. These Soils may be stockpiled until thawed. Once thawed they may be used in accordance with these Specifications.

C. Flooding - Provide berms or channels to prevent flooding of subgrade. Promptly remove all water collecting in depressions.

D. Softened Subgrade - Where soil has been softened or eroded by flooding or placement during unfavorable weather, remove all damaged areas and recompact as specified for fill and compaction below (refer to Subsection 8), at no additional cost to the Owner.

E. Dewatering - Contractor shall provide and maintain at all times during construction, ample means and devices with which to remove promptly and dispose of all water from every source entering the excavations or other parts of the Work.

Dewatering shall be by means which will insure dry excavations and the preservation of the final lines and grades of bottoms of excavations.

F. Trench and Structural Backfills

1. On-Site Fill Material - All on-site fill material used for trench and structural backfill shall be approved by the Engineer and shall meet the requirements stated in the Products Subdivision of this specification. Approved on-site fill material may be used where indicated on the Drawings or as directed by the Engineer.

2. Imported Cohesionless Material - All imported cohesionless material used for trench and structural backfill shall be free from organic substances and other harmful, noxious, and/or unsuitable matter and shall be of particle size grading as specified herein, subject to the approval of the Engineer. Crushed stone trench and structural backfill materials shall be placed and compacted in accordance with Subsections 8 and 9 of the Specifications. Unless otherwise directed by the Engineer, the materials shall meet the gradation requirements indicated in the following table.

GRADATION REQUIREMENTS FOR TRENCH AND STRUCTURAL BACKFILL

	Percent Passing (By Weight)	
U.S. Sieve	Trench Backfill	Structural Backfill
1 1/2 inch	-	100
1 inch	-	80 - 100
3/4 inch	-	70 - 90
1/2 inch	100	55 - 80
3/8 inch	75 - 95	- - - - -
No. 4	5 - 20	35 - 60
No. 8	0 - 5	25 - 50
No. 30	-	12 - 30
No. 200	0 - 3	5 - 10

G. Filter Fabric Material - Where indicated on the Drawings, approved filter fabric shall be furnished and installed as shown or directed. Filter fabric provided shall be Typar as manufactured by Dupont, Inc. or an approved equal.

H. Other Materials: All other materials, not specifically described, but required for a complete and proper installation, shall be selected by the Contractor subject to the approval of the Engineer.

3.05 FILL AND COMPACTION

Contractor shall abide by the following requirements:

A. General - No fill or backfill shall be placed around concrete structures until the concrete has cured sufficiently to enable it to carry backfill loads.

B. Filling - After subgrade compaction has been approved by the Engineer, spread approved fill material in layers not exceeding 8 inches in uncompacted thickness.

C. Moisture Conditioning - Water or aerate the fill material as necessary, and thoroughly mix to obtain a moisture content which will permit proper compaction within the following range, -1 to +3 percent of optimum water content as determined by Modified Proctor Compaction Testing.

D. Compaction, General - Compact each soil layer to at least the specified minimum degree. Repeat compaction process until plan grade is attained.

E. Degree of Compaction Requirements:

1. Structural Fill:

a. Crushed Stone structural fill (refer to Subsection 7) shall be densified to a minimum degree of compaction of 82 percent of the stones' theoretical solid volume density, as determined by "Bulk Specific Gravity".

b. Densify all crushed stone structural backfill adjacent to structural walls (refer to Subsection 7) to a compaction of 90 percent of maximum density determined by Modified Proctor Compaction Testing (ASTM D 1557).

c. Densify all general structural soil fill, including recompacted existing fill and backfill, to a minimum degree of compaction of 90 percent of maximum density determined by Modified Proctor Compaction Testing (ASTM D 1557).

2. Pavement Areas

Subgrade - Compact the upper 12 inches of soil in pavement areas to a minimum degree of compaction of 90 percent of maximum density determined by Modified Proctor Compaction Testing (ASTM D 1557). Refer to Subsection 10 of these Specifications for compaction requirements for crushed stone pavements.

Subbase - Compact crush limestone aggregate subbase material to 90% of the modified Proctor Density Testing (ASTM D 1557).

Soil Fill - Compact to 95% of maximum density determined by Modified Proctor Compaction Testing (ASTM D 1557).

3. Trench Backfills - Compact all approved cohesionless and cohesive trench backfill materials to a minimum degree of compaction of 90 percent of maximum density determined by Modified Proctor Compaction Testing (ASTM D 1557).

4. Site Grading - Compact to a density of existing surrounding ground.

F. Water Jetting - Water jetting will not be permitted for compaction unless written approval is obtained from the Engineer.

3.06 GRADING

A. General - Except as otherwise directed by the Engineer, Contractor shall perform all rough and finish grading required to attain the elevations shown on the Drawings.

B. Preparation of Subgrade - After the site has been cleared, stripped, and excavated to within 4 inches of the specified depths for recompaction, the Contractor shall scarify the exposed surface to a minimum depth of 6 inches, thoroughly moisture condition, and compact to the requirements specified for fill below (refer to Subsection 8).

Contractor shall remove all ruts, hummocks, and other uneven surfaces by surface grading prior to placement of fill.

Existing slopes to receive fill shall be benched prior to placement of fill on them. Benches shall be constructed to whatever width is necessary to maintain a surface ready for filling at a slope of 1 vertical to 12 horizontal, or shallower.

C. Grading Tolerances

1. Rough Grade -
   a. Building and pavement areas: plus or minus 0.1 foot.

2. Finish Grade -
   a. Pavement areas - plus or minus 0.1 foot.
   b. Landscaping areas - plus or minus 0.1 foot.

D. Treatment After Completion of Grading - After grading is completed and the Engineer has finished his inspection, the Contractor shall permit no further excavating, filling, or grading except with the approval of and inspection of the Engineer.

Contractor shall use all means necessary to prevent erosion of freshly graded areas during construction and until such time as permanent drainage and erosion control measures have been installed.

3.07 CRUSHED STONE SUB BASE COURSE FOR PAVEMENTS

A. Preparation - The surface to receive crushed stone paving subbase course shall be clean, free of frost and free of free water. Rutting shall be scarified and recompacted to the compaction required by Subsection 8.-E. After the subgrade has been prepared, the area to receive limestone subbase shall be covered with filter fabric material installed in accordance with the manufacturer's directions.

B. Execution - Areas to receive 8 inches or less total compacted crushed stone thickness shall be placed in one (1) lift and compacted to at least 95 percent of Standard Proctor (ASTM D 698) maximum dry density.

Areas to receive more than 8 inches but less than 16 inches total compacted crushed stone thickness shall be placed in two (2) equal lifts, each lift compacted to at least 90 percent of Standard Proctor maximum dry density (ASTM D 1557).

3.08 RESTORATION OF GROUND SURFACES AND CLEANUP

All ground surfaces in public rights-of-way, easements and on the Owner's property that have been damaged or destroyed by the Contractor's operations shall be restored in accordance with these specifications. All surplus material, rock, trees, shrubs, pipe, asphalt, concrete pavements, crushed stone, etc., not to be used in the Contractor's restoration operations shall be removed from the side and disposed of in an acceptable manner.

Before final acceptance of the work, the Contractor shall satisfactorily clean all areas within the limits of his operations including the road surfaces, walks, gutters, fences, lawns, and structures, leaving them in as neat, clean, and usable condition as originally found. He shall remove all machinery, tools, surplus materials, temporary buildings, and other structures from the site of work. He shall also remove all organic matter and materials containing organic matter from all areas and places used by him during construction. All sewers, manholes, inlets, etc., shall be cleared of all scaffolding, sedimentation, debris, rubbish, and dirt.

3.09 TRENCHING

A. General - Contractor shall perform all trenching required for the installation of all pipes

and structures, as indicated on the Drawings, and as described in these Specifications.

B. Trench Width - Pipe trenches shall be sufficiently true in alignment to permit the pipe to be laid in the approximate center of the trench while providing sufficient width to provide adequate working space on both sides of the trench and around installed pipes. The trench width shall not exceed two times the nominal pipe diameter except for pipe smaller than 10 inches where the maximum trench width shall be 24 inches. Banks of trenches shall be as close to vertical as possible.

Where sheeting or bracing is utilized, the maximum allowable width of the trench shall be measured between the closest interior faces of the sheeting or bracing as placed.

In the event the Contractor is required to excavate the trench to a width greater than that specified above due to slides, caves, obstructions or by reason of the nature of the material encountered, any cavities so caused shall be refilled and compacted with suitable and satisfactory material, of a type, and in a manner satisfactory to the Engineer, at no additional cost to the Owner.

C. Trench Depth - Trench depth shall be as required to provide the elevations shown on the Drawings. Where elevations are not shown on the Drawings, Contractor shall trench to sufficient depth to give a minimum of 30 inches of fill above the top of process and drainage pipes, measured from the adjacent finished grade, unless otherwise specified or noted in the Drawings.

D. Correction of Faulty Grades - Where trench excavation is inadvertently carried below proper elevations, Contractor shall backfill with material approved by the Engineer, and then compact to provide a firm and unyielding subgrade and/or foundation to the approval of the Engineer and at no additional cost to the Owner.

3.10 FOUNDATION FOR PIPES

A. General - The trench bottoms shall be graded to provide a smooth firm and stable foundation free from rock points throughout the length of the pipe.

B. Foundation Material - Contractor shall place a minimum of 6 inches or the specified cohesionless material in the bottom of the trench below the bottom of the pipe barrel, and compact as specified in Subsection 8.

C. Subsurface Conditions - In areas where soft, unstable materials are encountered at the surface upon which cohesionless material is to be placed, Contractor shall remove the unstable material and replace it with compacted material approved by the Engineer.

Provide sufficient depth to develop a firm foundation for the item being installed. Payment for this work will be made on the basis of unit prices for excavation and backfill contained in the Bid Proposal or in the case of lump sum contract, included in the lump sum price.

If the need for such over-excavation has been occasioned by an act or failure to act on the part of the Contractor, the Contractor shall make the over excavation and replacement at no additional cost to the Owner.

D. Shaping - At each joint in the pipe, the bottom of the trench shall be recessed as required into the firm foundation in such a manner as to relieve the bell of the pipe of all load and to insure continuous bearing of the pipe barrel on the firm foundation.

All pipe subgrades shall be accurately shaped and the bottom of the trench shall fit to the pipe shape. A drag template shaped to conform to the outer surface of the pipe shall be used if other methods do not produce satisfactory results.

3.11 BEDDING FOR PIPES

A. General - Specified cohesionless material shall be placed in the trench, simultaneously on each side of the pipe for the full width of the trench. Pipes shall be bedded to a minimum depth of 1 foot above the top of the pipe barrel. Bedding material shall comply with Subsection 7-E and the standard drawings.

B. Densification - The bedding material shall be densified after placing by hand or mechanical tamping to the specified density (Subsection 8).

Special care shall be taken to provide firm bedding support on the underside of the pipe and fittings for the full length of the pipe.

C. Alternate Bedding - Other bedding procedures and materials may be used only if prior written approval has been obtained from the Engineer.

3.12 BACKFILL FOR PIPES

Contractor shall abide by the following:

A. Using On-Site Materials - After the pipe has been thoroughly bedded and covered, spread approved on-site material in uniform lifts of not more than 8 inches in uncompacted thickness, and then compact as previously specified. Repeat the spreading and compacting procedure until adjacent grade level is attained.

B. Using Imported Cohesionless Material - After the pipe has been thoroughly bedded and covered, fill the remaining portion of the trench with the specified cohesionless material in 8 inch uncompacted thickness layers and densify as previously specified (refer to Subsection 8).

3.13 TESTING

A. Compaction Specifications - Compaction testing shall be done by any of the following methods, ASTM D 1557, D 2166, D 2922, and/or D 2937.

B. Compaction Testing Frequency - Compaction testing shall be done at a frequency sufficient to verify field conditions, but in no case less than the following frequencies.

1. Site Filling or Backfilling With Cohesive Soils - One test per 1000 square yards per one (1) foot lift.

2. Structural Filling With Crushed Stone Fill - One test per 740 square yards per one (1) foot lift.

3. Trench Backfillings - One test per 100 linear feet of trench per one (1) foot lift.

3.14 TUNNELLING

Where indicated on the Drawings or as otherwise required, tunnel excavations shall be made of sufficient size, height and width to permit the installation of the pipe and/or conduits, to permit proper bracing of the tunnel section and to permit ample room for the prosecution of the work and safety of the workmen.

All tunnels shall be lined with full circle metal liner plates of sufficient strength to meet the loading conditions. Loading for highway and pavement tunnels shall be based upon continuous load carrying structures for the height of cover under H-20 loading and loading for railroad tunnels shall be based upon continuous load carrying structures for the height of cover under Cooper E-70 loading. Liner plates for railroad tunnels shall be galvanized and bituminous coated.

All work performed beneath existing structures, across railroad right-of-ways, and under pavements, shall be performed in accordance with the requirements of the parties or agencies having jurisdiction over these locations. The Contractor shall contact the parties or agencies prior to starting work and shall meet all requirements of the parties or agencies in regard to methods of construction and the safety precautions to be taken in

performing the tunnel work. All costs involved in meeting these requirements shall be paid for by the Contractor and no additional compensation will be allowed.

3.15 BORING AND JACKING

Where indicated on the Drawings, or as otherwise required, boring and/or jacking methods shall be used for pipeline installation. Unless otherwise directed by the Engineer, all such installations shall comply with details shown on the Drawings and the specifications contained herein.

All work performed beneath existing structures, across railroad right-of-ways, and under pavements, shall be performed in accordance with the requirements of the parties or agencies having jurisdiction over these locations. The Contractor shall contact the parties or agencies prior to starting work and shall meet all requirements of the parties or agencies in regard to methods of construction and the safety precautions to be taken in performing the work. All costs involved in meeting these requirements shall be paid for by the Contractor and no additional compensation will be allowed.

In general, minimum clearances above top of casing pipe shall be as follows:

Minimum Clearance

Pavement Surfaces	4'-0"
Highway Drainage Ditches	2'-0"
Base of Railroad Rail	5'-6"
Other Railroad Right-of-Way	3'-0"

Casing pipes shall as a minimum extend 15 feet beyond the center of any railroad track and shall extend from ditch line to ditch line in the case of paved highways and roads.

In all cases, carrier pipe placed in a casing pipe shall be Class 52 Ductile Iron with mechanical joints, unless otherwise directed by the Engineer.

END OF SECTION

TECHNICAL SPECIFICATIONS
DIVISION 02 - SITEWORK

SECTION 02015 - PROTECTION AND RESTORATION OF EXISTING FACILITIES

PART 1 – GENERAL

1.01 General -

A. The Contractor shall protect all existing utilities and improvements not designated for removal and shall restore damaged or temporarily relocated utilities and improvements to conditions equal to or better than they were prior to such damage or temporary relocation, all in accordance with requirements specified herein, and in accordance with the requirements of the Contract Documents.

B. The Contractor shall determine the exact locations and depths of all utilities indicated on the drawings where a utility conflict is expected. In addition to those indicated, the Contractor shall make exploratory excavation of all utilities. All such exploratory excavations shall be performed as soon as practical after award of contract and, in any event, a sufficient time in advance of construction to avoid possible delays to the Contractor's work. When such exploratory excavations show the utility location as indicated on the drawings to be in error, the Contractor shall notify the Engineer.

C. The suggested number of exploratory excavations required is indicated on plans. Should any additional excavation be required Contractor shall submit requested locations for prior approval by Project Engineer. Project Engineer must approve any additional excavation.

1.02 Protection of Street or Roadway Markers - The Contractor shall not destroy, remove, or otherwise disturb any existing survey markers or other existing street or roadway markers without proper authorization. No pavement breaking or excavation shall be started until all survey or other permanent marker points that will be disturbed by the construction operations have been properly referenced for easy and accurate restoration. It shall be the contractor's responsibility to notify the proper representatives of the Owner of the time and location that work will be done. Such notification shall be sufficiently in advance of construction so that there will be no delay due to waiting for survey points to be satisfactorily referenced for restoration. All survey markers or points disturbed, without proper authorization by the Engineer, will be accurately restored by the Owner at the Contractor's expense after all street or roadway resurfacing has been completed.

1.03 Restoration of Pavement -

A. General - All paved areas including asphalt concrete berms cut or damaged during construction shall be replaced with similar materials and of equal thickness to match the existing adjacent undisturbed areas, except where specific resurfacing requirements have been called for in the Contract Documents or in the requirements of the agency issuing the permit. All temporary and permanent pavement shall conform to the requirements of the affected pavement owner. All pavements which are subject to partial removal shall be neatly saw cut in straight lines.

B. Temporary Resurfacing - Wherever required by the public authorities having jurisdiction, the Contractor shall place temporary surfacing promptly after backfilling and shall maintain such surfacing for the period of time fixed by said authorities before proceeding with the final restoration of improvements. Temporary resurfacing shall be constructed in accordance with the following requirements:

1. Prior to placing the temporary resurfacing, the foundation material underlying the areas to receive surfacing shall be identified to the degree specified in the Technical Provisions.

2. The subgrade shall be uniformly watered sufficiently to eliminate all dust, but not to such extent as to form mud or pools of water. The street and surrounding area shall be cleared of rubbish and debris. The street shall be swept and the surrounding area shall be cleaned thoroughly.

3. The temporary resurfacing shall then be spread over the prepared foundation material and rolled with a tandem roller in such a manner that after rolling the temporary resurfacing shall present a smooth surface for traffic, shall not be less than one inch in compacted thickness and shall be maintained free from bumps and depressions until permanent resurfacing is placed. The finished surface of said temporary resurfacing shall be flush with the adjoining pavement grade.

4. The Contractor shall stockpile enough temporary resurfacing material on the job to insure a ready supply at all times for necessary repairs to the temporary resurfacing already placed.

5. The temporary resurfacing shall be left in place until permanent resurfacing is constructed.

6. No separate payment will be allowed for temporary resurfacing and all costs therefor shall be included in the Contractor's bid price.

C. Permanent Resurfacing - In order to obtain a satisfactory junction with adjacent surfaces, the Contractor shall saw cut back and trim the edge so as to provide a clean, sound, vertical joint before permanent placement of an excavated or damaged portion of pavement. Damaged edges of pavement along excavations and elsewhere shall be trimmed back by saw cutting in straight lines. All pavement restoration and other facilities restoration shall be constructed to finish grades compatible with adjacent undisturbed pavement.

D. Restoration of Sidewalks or Private Driveways - Wherever sidewalks or private roads have been removed for purposes of construction, the Contractor shall place suitable temporary sidewalks or roadways promptly after backfilling and shall maintain them in

satisfactory condition for the period of time fixed by the authorities having jurisdiction over the affected portions before proceeding with the final restoration or, if no such period of time is so fixed, the Contractor shall maintain said temporary sidewalks or roadways until the final restoration thereof has been made.

1.04 Existing Utilities and Improvements -

A. General - The Contractor shall protect all utilities and other improvements which may be impaired during construction operations. It shall be the Contractor's responsibility to ascertain the actual location of all existing utilities and other improvements indicated on the drawings that will be encountered in his construction operations, and to see that such utilities or other improvements are adequately protected from damage due to such operations. The Contractor shall take all possible precautions for the protection of unforeseen utility lines to provide for uninterrupted service and to provide such special protection as may be directed by the Engineer.

B. Utilities to be Moved - In case it shall be necessary to move the property of any public utility or franchise holder, such utility company or franchise holder will, upon proper application by the Contractor, be notified by the Engineer to move such property within a specified reasonable time, and the Contractor shall not interfere with said property until after the expiration of the time stipulated.

C. Owner's Right of Access - The right is reserved to the Owner and the owners of public utilities and franchises to enter at any time upon any public street, alley, right-of-way, or easement for the purpose of making changes in their property made necessary by the work of this contract.

D. Known Utilities - Existing utility lines that are shown on the drawings or the locations of which are made known to the Contractor prior to excavation and that are to be retained, and all utility lines that are constructed using excavation operations shall be protected from damage during excavation and backfilling and, if damaged, shall be immediately repaired by the Contractor at his expense.

E. Unknown Utilities - In the event that the Contractor damages any existing utility lines that are not shown on the drawings or the locations of which are not made known to the Contractor prior to excavation, a written report thereof shall be made immediately to the Engineer. If directed by the Engineer, repairs shall be made by the Contractor under the provisions for changes and extra work.

F. Utilities to be Removed - When utility lines that are to be removed are encountered within the area of operations, the Contractor shall notify the Engineer a sufficient time in advance for the necessary measures to be taken to prevent interruption of the service.

G. Approval of Repairs - All repairs to a damaged improvement shall be inspected and approved by an authorized representative of the improvement owner before being concealed by backfill or other work.

H. Relocation of Utilities - Where the proper completion of the work requires the temporary or permanent removal and/or relocation of an existing utility or other improvement which is shown on the drawings, the Contractor shall at his own expense, remove and without unnecessary delay, temporarily replace or relocate such utility or improvement in a manner satisfactory to the Engineer and the owner of the facility. In all cases of such temporary removal or relocation, restoration to former location shall be accomplished by the Contractor in a manner that will restore or replace the utility or improvement as nearly as possible to its former locations and to as good or better condition than found prior to removal.

I. Maintaining in Service - All oil and gasoline pipelines, power and telephone or other communication cable ducts, gas and water main, irrigation lines, sewer lines, storm drain lines, poles, and overhead power and communication wires and cables encountered along the line of the work shall be maintained continuously in service during all operations under the contract, unless other arrangements satisfactory to the Engineer are made with the owner of said pipelines, duct, main, irrigation line, sewer, storm drain, pole, or wire or cable. The Contractor shall be responsible for and shall make good all damage due to his operations, and the provisions of this Section shall not be abated even in the event such damage occurs after backfilling or is not discovered until after completion of the backfilling.

1.05 Subsurface Obstructions - The Contractor shall field determine the depth and location of existing utilities before pipeline trench and associated excavations are begun. Utility locations indicated on the plans were obtained from the records available, but have not been field verified, nor have depths been measured or observed. The Contractor shall submit descriptions, depths and locations of subsurface obstructions to the Engineer for review.

In excavation, backfilling and in laying pipe, care shall be taken not to remove, disturb, or injure existing pipes, conduits, or structures. If necessary, the Contractor at his own expense shall sling, shore-up, and maintain such structures in operation.

The Contractor shall obtain the permission of and give sufficient notice to the proper authorities of their intentions to remove or disturb any pipe, conduit, etc., and shall abide by their regulations governing such work.

In the event that subsurface structures are broken or damaged in the prosecution of the work, the Contractor shall immediately notify the proper authorities, and at the option of said authority, either repair the damage at once, at his own expense, or pay the proper charges for repairing said damage. Repairs shall be made to the satisfaction of the

Engineer. The Contractor shall be responsible for any damage to persons or property caused by such breaks or due to his own neglect in reporting and/or repairing such damages.

The Owner or Engineer will not be liable for any claims made by the Contractor based on underground obstructions being different than that indicated on the Plans. The contractor shall uncover subsurface obstructions in advance of construction so that the method of avoiding same may be determined before the work reaches the obstruction.

1.06 Conflicts with other Utilities - At various locations along the project, the proposed pipeline closely parallels or crosses existing gas lines, buried telephone cables or ducts or other utilities.

It shall be the Contractor's responsibility to give the appropriate utility company sufficient advance notice so that their representatives may verify the utility location on the jobsite when trenching operations begin. The Contractor shall coordinate and cooperate with these utilities to insure that no damages occur which would cause interruption of their service.

All temporary support, or minor adjustment which does not require replacement or direct by-pass connections to existing services (such as all direct-buried telephone cables or two-inch and smaller gas lines) will be the responsibility of the Contractor.

Where, in the opinion of the Engineer, it may be necessary to relocate gas mains or telephone ducts (defined here as gas lines larger than 2 1/2 inches and telephone cables with ductwork) to allow construction of the new force main, or where major relocation of small services requires replacement or performing connections to the existing lines, all such relocation work is the responsibility of and must be performed by the respective utility companies. The Contractor shall immediately notify the proper utility company and the Engineer in writing of the occurrence and location of such required relocations.

The Owner will not be responsible for any delay or inconvenience to the Contractor resulting from the existence, removal or adjustment of any public utility. Additional costs incurred as a result thereof shall be the expense of the Contractor, and considered as included in the contract unit prices bid for the various pay items.

Relocation or realignment of storm drains or sewer lines which may interfere with the construction of the new pipe line shall be the responsibility of the contractor. Where there is not specific unit price for such work provided in the Proposal Form, the cost of the work shall be included in the unit price bid for the new pipe line.

Where storm drains or sewer lines are removed by the Contractor to facilitate pipe line construction, and replaced in their original positions, there shall be no direct payment

made and all related costs shall be included in the unit price bid for the new pipe line involved.

1.07 Pole Relocation and Protection - The Contractor shall take notice of a number of power, telephone and traffic signal support poles along the length of the project; several are in proximity to, or direct conflict with, the alignment of the proposed new pipe lines. The relocation of all poles on the plans noted as to be relocated shall be the responsibility of and must be performed by the respective utility companies. The Contractor shall immediately notify the proper utility company and the Engineer in writing of the occurrences and location of such required relocations.

For all poles without such notations, it is intended that they shall be supported with mud jacks or by other means of bracing as required to maintain them in a stable condition. The temporary support and subsequent stability of these poles will be the Contractor's responsibility.

1.08 Existing Fence lines - At various locations along the length of the project, existing fences might conflict with, or impair, construction operations for the installation of the new pipe line. The contractor shall protect these fences in place where they do not conflict with construction operations. Where a fence may conflict with the backswing of machinery or otherwise impede construction, the Contractor shall contact the Owner and arrange for the temporary removal or relocation of the fence. Any fence removed or temporarily relocated shall be restored to its original condition and location unless otherwise arranged with the owner of the fence. Where it is impossible to salvage the existing materials to reconstruct the fence, the fence shall be replaced "in kind".

All cost for such temporary removal and replacement, or "in kind" replacement, shall be included in the unit price bid for the pipe. No direct payment will be made for fence replacement unless specifically noted otherwise.

1.09 Trees within Street Rights-of-Way and Project Limits -

A. General - The Contractor shall exercise all necessary precautions so as not to damage or destroy any trees or shrubs, including those lying within street rights-of-way and project limits, and shall not trim or remove any trees unless such trees have been approved for trimming or removal by the Engineer and the jurisdictional agency or Owner.

All existing trees and shrubs which are damaged during construction shall be trimmed or replaced by the Contractor or a certified tree company under permit from the jurisdictional Owner and to the satisfaction of said agency and/or the Owner. Tree trimming and replacement shall be accomplished in accordance with the following requirements:

SECTION 02015 - PROTECTION AND RESTORATION OF EXISTING FACILITIES

1. Trimming - Symmetry of the tree shall be preserved; no stubs or splits or torn branches left; clean cuts shall be made close to trunk or large branch. Spikes shall not be used for climbing live trees. All cuts over 1 1/2 inches in diameter shall be coated with an asphaltic emulsion material.

2. Replacement - The Contractor shall immediately notify the jurisdictional agency and/or Owner if any tree is damaged by his operations. If, in the opinion of said agency or the Owner, the damage is such that replacement is necessary, the Contractor shall replace the tree at his own expense. The tree shall be of a like size and variety as the tree damaged, or , if of a smaller size, the Contractor shall pay to the Owner of said tree a compensatory payment acceptable to the tree owner, subject to the approval of the Engineer and the jurisdictional owner.

1.10 Notification by the Contractor - Prior to any excavation in the vicinity of any existing underground facilities, including all water, sewer, storm drain, gas, petroleum products, or other pipelines; all buried electric power, communications, or television cables; all traffic signal and street lighting facilities; and all roadway and state highway rights-of-way the Contractor shall notify DOTTIE and/or the respective authorities representing the owners or agencies responsible for such facilities not less than 3 working days nor more than 5 working days prior to excavation so that a representative of said owners or agencies can be present during such work if they so desire.

PART 2 – PRODUCTS – NOT USED

PART 3 – EXECUTION – NOT USED

END OF SECTION

TECHNICAL SPECIFICATIONS
DIVISION 02 - SITEWORK

SECTION 02055 – PIPE GROUTING

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

This work consists of furnishing and placing pipe grout material composed of Portland cement, fly ash, sand, water and other additives.

PART 2 - PRODUCTS

2.01 MATERIALS

Materials shall conform to the following LA DOTD Specifications:

Portland Cement	1001.01
Fly Ash	1018.15
Fine Aggregate (Sand)	1003.02
Water	1018.01
Admixtures	1011.02

PART 3 - EXECUTION

3.01 PROPORTIONING

Materials shall be combined in the following approximate proportions:

Portland Cement	100 lb.
Fly Ash	300 lb.
Fine Aggregate (Sand)	2800 lb.
Water	50 lb.
Air-Entrainment	3-10% by volume
Other Additives	As Needed

Proportioning of sand and water shall be adjusted as required to provide the proper consistency for placement. Grout to be pumped shall be proportioned to provide a mixture suitable for pumping through a 2” hose for at least 300 feet.

3.02 CONSTRUCTION

Material in pipes shall be placed as to completely fill to the top of the pipe. Also, grouting should be started at the far end of the pipe section to be grouted, slowly backing the pump nozzle out of the pipe.

Mixing and hauling equipment shall conform to LA DOTD Specifications Section 901.09.

END OF SECTION

TECHNICAL SPECIFICATIONS
DIVISION 02 - SITEWORK

SECTION 02062 - HYDROMULCH

PART 1 - GENERAL

1.01 Scope of Work – Work consists of furnishing and spreading a hydromulch mixture all areas not covered by sidewalks or roads that have been disturbed by mobilization, excavation, spoil placement and construction activities to establish vegetative cover.

PART 2 - PRODUCTS

2.01 Seed for Hydromulch –

A. Shall conform to all requirements, rules and regulations of the Louisiana revised statutes 3:1431, et seq. and 1992 Louisiana DOTD Standard Specification 1018.18. The minimum percentage of pure live seed and the maximum percentage of weed seed to be as follows:

Variety	Min. % of Pure Live Seed	Max. % of Weed Seed
Hulled Bermuda	83	1
Pensacola Bahai	81	2
Dixie Crimson Clover	78	1
Kentucky 31 Fescue	80	1
Unhulled Bermuda	80	1
Balled Clover	80	1
Vetch (Common)	80	1
Lespedeza	80	1

B. Seed will be furnished from previous season's crop (the last crop year for the seed type in question) and the date of analysis shown on each tag to be within five months (excluding the month in which the test is completed) of the time of delivery to the project.

C. Limit noxious weed seed as prescribed in the regulation, but in no case shall they exceed 500 per pound.

D. Furnish and deliver each variety of seed in separate sealed bags or containers.

E. Each bag or container will be labeled with an analysis tag that will be arranged as outlined in Louisiana DOTD Standard Specification 1018.18.

SECTION 02062 - HYDROMULCH

2.02 Fertilizer for Hydromulch-

A. Fertilizer will be an approved brand conforming to the requirements of the Louisiana Department of Agriculture. Unless otherwise directed use pellet or granular fertilizer with analysis of either 8-8-8, 12-12-12, or 13-13-13 and shall be applied at the following rates:

Type	Pounds per Acre
8-8-8	1000
12-12-12	667
13-13-13	615

Container labels to show chemical analysis. Powered or caked fertilizer will not be acceptable.

2.03 Hydromulch –

A. Material shall be a 100% stranded fiber, whole wood product such as "Conwed 2000". Manufactured by Conwed, Inc. or "Mat Fiber Plus', manufactured by Mat, Inc., or approved equal containing a minimum 3% tackifier. Tackifier shall be a 100% natural, non-toxic Gum Guar which is completely biodegradable and environmentally safe such as "Mat Super Tack" or "Finn Stick-Plus" or approved equal.

PART 3 – EXECUTION

3.01 Hydromulch Application –

A. Hydromulch fibers will be applied at a rate of **2500 lbs./acre** (dry weight).

B. Dry hydromulch wood fiber, seed, tackifier, fertilizer and water should be mixed well to a slurry in one application. Slurry will be spray-applied utilizing standard hydraulic seeding equipment in successive layers as to achieve 100% coverage of all exposed soil.

C. Slurry mixture will be applied with a seed - fertilizer combination as follows:

1. March through September

Hulled Bermuda 40 lbs/acre

SECTION 02062 - HYDROMULCH

Fertilizer (13-13-13)	615 lbs/acre
or	
Hulled Bermuda	40 lbs/acre
Pensacola Bahia	25 lbs/acre
Fertilizer (13-13-13)	615 lbs/acre

2. September through March

Gulf Annual Rye Grass	20 lbs/acre
Unhulled Bermuda	30 lbs/acre
Fertilizer (13-13-13)	615 lbs/acre
or	
Gulf Annual Rye Grass	20 lbs/acre
Unhulled Bermuda	30 lbs/acre
Kentucky 31 Fescue	25 lbs/acre
Fertilizer (13-13-13)	615 lbs/acre

D. Additional tackifier will be added to the hydromulch slurry and applied at a rate of 40 lbs/acre.

E. Hydromulch slurry must be applied within fifteen (15) days of completion of dredging and spoil shaping.

F. The hydromulch will not be applied immediately before, during or after rainfall such that the matrix will have 24 hours to dry. If applied hydromulch is damaged or washed away by rainfall before vegetation is established, contractor will reapply at the specified rate.

G. Maintenance shall include reapplication of hydromulch to all bare spots and all reasonable efforts to ensure a healthy cover. *DO NOT* drive tracked or heavy equipment over hydromulched areas after installation. No Mowing will be required.

END OF SECTION

TECHNICAL SPECIFICATIONS
DIVISION 02 - SITEWORK

SECTION 02065 – CONSTRUCTION LAYOUT

PART 1 - GENERAL

1.01 SCOPE OF WORK

The work consists of performing all survey work necessary to properly layout the proposed project to the lines, grades and elevations shown on the plans or as directed by the Engineer. All work shall be approved by the Project Engineer or his authorized representative prior to construction.

1.02 SURVEY WORK

The Contractor shall employ sufficient qualified engineering/survey personnel experienced in layout and construction to correctly establish and keep complete and comprehensive field book records of all lines and grades and cross-sections necessary from initial layout to final acceptance. All layout work shall be certified by a registered Professional Land Surveyor by sealing and signing the field books. The Contractor will be liable for the accuracy of the initial layout and all subsequent alignment and elevations and shall, no additional expense to the Owner, 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 notify the Project Engineer immediately of any apparent errors in the plans.

Numbered notebooks for recording all lines and grades and cross-sections will be provided by the Contractor and shall be properly indexed and cross-referenced by the Contractor before submitting to the Project Engineer for submittal with the final estimate. The numbered notebooks shall become the property of the Owner.

The Project Engineer may, at his option, make either spot or complete checks on all work. However, these checks will not relieve the Contractor of his responsibility for constructing the work in the positions and to the elevations shown on the plans or approved revisions hereto. Calculations and any additional measurements for determination of quantities will be made by the Owner.

No changes in the lump sum contract amount for construction layout will be made for minor additions or deletions to the scope of work.

1.03 CONSTRUCTION LAYOUT REQUIREMENT

1. Prior to beginning any construction on the project, all horizontal and vertical control points shall be confirmed for accuracy by a licensed surveyor hired by the Contractor.

2. A minimum number of “hardshots” on existing project features shall be taken to confirm control point accuracy with existing terrain features. The “hardshots” shall be determined by the Design Engineer and Contractor. Data shall be shown on construction drawings for layout clarification.

SECTION 02065 – CONSTRUCTION LAYOUT

1.04 SUBMITTAL

A. Contractor shall submit to Project Engineer all data stamped by a licensed surveyor certifying control points and existing terrain accuracy.

1.05 MEASUREMENT AND PAYMENT

Construction layout will be paid for at the contract lump sum price in accordance with the following schedule.

Percent of Total Contract Amount Earned	Allowable Percent of Lump Sum Price for Construction Layout
Accuracy Certification	25
25	50
50	80
75	95
100	100

END OF SECTION

TECHNICAL SPECIFICATIONS
DIVISION 02 - SITEWORK

SECTION 02070 - AGGREGATE SURFACE COURSE

PART 1 - GENERAL

1.01 Description - This work consists of furnishing and constructing either permanent or temporary aggregate surface courses for roadways, shoulders, drives or other facilities in accordance with the requirements stated herein and Section 401 of the LADOTD Standard Specifications for Roads and Bridges (Standard Specifications), and in conformity with the lines, grades, thicknesses and typical sections shown on the Plans or established by the Engineer.

1.02 Materials - The Contractor has the option of furnishing any one of the following types of aggregate surface course materials (except Untreated Sand Clay Gravel) conforming to the indicated Subsections of the Standard Specifications. Untreated Sand Clay Gravel shall be furnished only when specified.

Stone	1003.04(a)
Sand Clay Gravel	1003.04(b)
Lime Treated Sand Clay Gravel	1003.04(b), 1018.03
Asphalt Treated Sand Clay Gravel	1003.04(b), 1002.01
Shell	1003.04(c)

Crushed limestone or florolite materials shall NOT be used. Unless otherwise approved in writing, the same type material shall be used throughout the Project.

1.03 Equipment - Equipment necessary to produce a finished product meeting Specifications requirements shall be furnished and maintained by the Contractor.

1.04 Subgrade - The subgrade shall be prepared as provided herein and shall be approved before surfacing material is placed. On existing shoulders, all vegetation shall be removed and the shoulders shaped and compacted to the satisfaction of the Engineer prior to placing aggregate surfacing. Material removed from shoulders shall be uniformly spread on adjacent slopes. Preparation of existing shoulders will not be measured for payment.

1.05 Placing Materials - The Engineer or Testing Laboratory shall be provided with a legible weighmaster's certificate (delivery ticket) from each vehicle as material is delivered to the site and prior to unloading, which shall contain the following information: Name of Vendor; Name of Contractor; Type of Material: Weight or Quantity of Material in Vehicle; and the Date.

The material shall be deposited directly on the subgrade from hauling vehicles or spreading equipment. No surface course shall be placed on a muddy or rutted subgrade.

Aggregate surfacing material shall not be placed or spread on Portland cement concrete or asphaltic concrete pavements, and aggregate surfacing operations shall be conducted in

such manner that pavement surfaces, edges and joints are not damaged. Any damage to existing surfaces shall be properly repaired by the contractor at no cost to the Owner.

1.06 Mixing - Mixing shall be in accordance with Subsection 401.06 of the DOTD Standard Specifications.

1.07 Shaping and Compacting - The material shall be shaped by suitable means while being compacted. Any ruts formed shall be filled by blading as often as necessary to prevent breaking through the surfacing material into the subgrade. Holes, waves and deficiencies in thickness which develop an dare not filled by blading shall be filled by adding more material. Shaping and compacting shall continue until the surface reasonably conforms to the required sections and is free from ruts and waves. Aggregate surfacing shall be initially compacted to the satisfaction of the Engineer with a 5,000 pound sheepsfoot roller with a single 3 to 4 foot diameter drum or other approved method of compaction. On narrow shoulders, drives, etc., the surfacing shall be initially compacted with a small vibratory roller or other approved compaction equipment in lieu of a sheepsfoot roller. Upon completion of initial compaction, the surface shall be wetted as necessary and rolled with a pneumatic-tire roller or steel-wheel roller to a tight, uniform surface.

A. Lime Treatment: Final compaction and finishing of lime treated materials shall be completed within 12 hours after initial mixing with lime.

B. Asphaltic Treatment: Final compaction and finishing of asphalt treated materials shall be performed after curing of the asphalt (usually 48 hours after application) and shall be completed with 72 hours after initial mixing with asphalt.

1.08 Method of Measurement -

A. Net Section: The quantities of aggregate surface course for payment will be as specified in Section 01025, Paragraph 1.16.

9. Basis of Payment - Payment shall in accordance with the Bid Schedule.

PART 2 – PRODUCTS – NOT USED

PART 3 – EXECUTION – NOT USED

END OF SECTION

TECHNICAL SPECIFICATIONS
DIVISION 02 - SITEWORK

SECTION 02071 - REMOVAL OF STRUCTURES AND OBSTRUCTIONS

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

This Section of the Specifications details requirements of work and materials to be used in connection with the removal and satisfactory disposal of culverts, structures, trees, pavements, old piping and all necessary grouting of ends of old piping to be abandoned for the construction of new water line in accordance with the items of work specified and as shown on the plans. It shall also include salvaging of materials and backfilling resulting trenches, holes, and pits.

1.02 REFERENCED STANDARDS

All work in this Section shall be in accordance with "Louisiana Standard Specifications for Roads and Bridges", latest Edition as revised and/or amended by supplementation. This standard specification will hereinafter be referred to as "LA DOTD Standards". When the term department is used in this specification, it shall mean Engineer.

PART 2 - PRODUCTS - NOT USED

PART 3 – EXECUTION

3.01 GENERAL

All work necessary to remove, dispose, or salvage the items called for in the Specifications and/or as shown on the Plans shall conform with the applicable Sections and Subsections of LA DOTD Standards including but not necessarily limited to the following:

Removal of Structures and Obstructions 202.02 through 202.05

3.02 REMOVAL OF MATERIALS

A. Unless otherwise provided, all material shall be carefully removed and every precaution taken to avoid breaking or damaging the material. The Contractor will be required to replace material damaged by negligence or by use of improper methods. Material considered usable shall be salvaged, cleaned of soils or other materials, stored or removed and stacked as directed by the Engineer.

B. Salvageable material removed on the project shall belong to the Owner. The Contractor shall dispose of the material that is not claimed by Owner, beyond the limits of the project, as directed by the Engineer. If claimed by the Owner the Contractor shall stack the material on the site as directed or deliver the material as directed by the Engineer.

END OF SECTION

TECHNICAL SPECIFICATIONS
DIVISION 02 - SITEWORK

SECTION 02080 - FENCING

PART 1 - GENERAL

1.01 Shop drawings shall be submitted prior to fabrication of materials. Shop drawings shall show complete details of components and installation.

1.02 Fence height shall be 6 feet of chain link fabric. When specified as a security fence or as otherwise shown on the Drawings, extension at top of fence shall be 12 inches high with three strands of barbed wire.

PART 2 - PRODUCTS

2.01 Fabric shall be chain link, 2 inch mesh, No. 9 gauge wire, hot-dip galvanized after weaving. Top and bottom selvages shall have a twisted and barbed finish, barbing to be done by cutting wire on a bias.

2.02 Line posts shall be hot-dip galvanized 2 3/8 inch pipe weighing 3.65 pounds per lineal foot.

2.03 Terminal posts for end, corner and pull posts shall be 3 1/2 inch hot-dip galvanized steel pipe weighing 7.58 pounds per lineal foot. Gate posts shall be sized in accordance with the specifications of the fencing manufacturer for the various size gates used.

2.04 Top rail, bottom rail and braces shall be hot-dip galvanized 1-5/8 inch pipe weighing 2.27 pounds per lineal foot. Provide outside sleeves or insert sleeve type couplings.

2.05 Fittings shall be malleable cast iron or pressed steel, hot-dip galvanized.

2.06 Gates shall be framed with 1-5/8 inch hot-dip galvanized pipe weighing 2.72 pounds per lineal foot or 2-inch square steel tubing. Corner fittings shall be heavy pressed steel or malleable castings. Fabric shall be the same as fence. Gates shall be complete with malleable iron ball and socket hinges, catch, stops and center rest. Hinges shall permit gate to swing back against fence. All gates shall have provision for padlocking (locks by Owner). Gates shall have devices for holding gates open.

2.07 Galvanizing. All fence fabric, line posts, terminal posts, rails, braces and fittings shall have a pure zinc coating of not less than 1.2 ounces per square foot.

2.08 Barbed wire. Three lines of four-point barbed wire, each composed of two 12-1/2 gauge wires. Galvanize after weaving.

PART 3 - EXECUTION

3.01 Installation shall be completely erected in accordance with drawings, placed true to line and plumb in each direction, and in accordance with the following.

SECTION 02080 - FENCING

3.02 All posts and braces to ground shall be set in concrete piers, as specified below. Line posts shall be spaced as shown or required, and in no case shall posts be spaced more than 10 feet on centers. Posts shall be of sufficient length to set into concrete the distances tabulated below. Pier tops shall be finished smooth and beveled to 2 inches above finished grade. Provide concrete piers of the following sizes:

POST TYPES	MINIMUM POST LENGTH SET IN CONCRETE (Inches)	MINIMUM CONCRETE DIAMETER (Inches)	SIZE OF PIERS DEPTH (Inches)
Line Posts	36	10	39
Corner, angle, pull and terminal posts	42	15	48
Gate posts – single gates 6 ft. wide and under and pairs of gates 12 ft. wide and under	42	15	48
Gate posts – single gates over 6 ft. wide and pairs of gates over 12 ft. wide.	48	24	54

3.03 All post holes shall be neatly dug so that center of post when lined and spaced will be not more than 2 inches from center of concrete pier.

3.04 Line or gate posts set in concrete curbs or walls shall be embedded a minimum depth of 15 inches or installed in 15 inch long galvanized Schedule 40 pipe sleeves if designated as removable.

3.05 Fencing fabric shall be stretched tightly to eliminate sags and buckles. Secure fencing to terminal posts by the manufacturer's standard brace rails and tensioning bars. Fasten to line posts and horizontal rails with fabric bands spaced a maximum of 14 inches on posts and 18 inches apart on the rails.

END OF SECTION

TECHNICAL SPECIFICATIONS
DIVISION 02 - SITEWORK

SECTION 02100 - EXCAVATING, FILLING AND GRADING

PART - I GENERAL

1.01 General: Excavating, filling and grading for this Work includes, but is not necessarily limited to:

A. Stripping site of all organic and harmful, noxious, and/or unsuitable materials within the limits of the proposed excavations.

B. Excavating for footings and foundations to attain indicated grades.

C. Filling and backfilling to attain indicated grades.

D. Trenching and trench backfilling.

E. Furnishing and installing structural fills and backfills under and around all pavements, foundations, and other structures.

F. Rough and finish grading of the site.

1.02 Job Conditions:

A. Dust Control: Contractor shall use all means necessary to control dust on and near the Work and on and near all off-site borrow areas if such dust is caused by the Contractor's operations during performance of the Work or if it is a result of the condition in which the Contractor leaves the site.

B. Contractor shall thoroughly moisten all surfaces as required to prevent dust being a nuisance to the public, neighbors, and concurrent performance of other work on the site.

PART - II PRODUCTS

2.01 Protection: Contractor shall use all means necessary to protect all materials of this Section before, during, and after installation and to protect all objects designated to remain.

2.02 In the event of damage, Contractor shall immediately make all repairs and replacements necessary to the approval of the Engineer and at no additional cost to the Owner.

PART - III EXECUTION

3.01 General:

A. Familiarization: Prior to all work of this section, Contractor shall become thoroughly familiar with the site, the site conditions, and all portions of the work falling within this Section.

B. Backfilling Prior to Approvals:

1. The Contractor shall not allow or cause any of the Work performed or installed to be covered up or enclosed by work of this Section prior to all required inspections, tests, and approvals by the Engineer, Soils Engineer, Testing Laboratory and/or Owner. Should any of the Work be so enclosed or covered up before it has been approved, Contractor shall uncover all such Work at no additional cost to the Owner.
2. After the Work has been completely tested, inspected, and approved, the Contractor shall make all repairs and replacements necessary to restore the Work to the condition in which it was found at the time of uncovering, all at no additional cost to the Owner.

C. Finish Elevations and Lines: For setting and establishing finish elevations, and lines, Contractor shall secure the services of a registered civil engineer or land surveyor acceptable to the Owner. The Contractor shall carefully preserve all data and monuments set by the civil engineer and /or surveyor, and if displaced or lost, immediately replace to the approval of the Owner and at no additional cost to the Owner.

3.02 General Excavation Requirements:

A. Sitework Preparation:

1. The extent of this excavation shall be to firm native soils, as directed by the Engineer. Subject to the approval of the Engineer, the excavated soils shall be suitable for use as general site fill, when free of organics and other harmful, noxious, and/or unsuitable material and when placed and compacted as specified in accordance with these Specifications. The resulting excavations shall be filled with structural or general fills depending on the area, as indicated on the Drawings and as specified herein.
2. Where depressions result from, or have resulted from, the removal of surface or subsurface obstructions, depressions shall be opened to equipment working width and all debris and other harmful, noxious, and/or unsuitable material shall be removed as directed by the Engineer.

SECTION 02100 - EXCAVATING, FILLING AND GRADING

B. Common Excavation:

1. Material shall be excavated to conform to lines, grades and dimensions shown on the Drawings. Where excavation grades are not shown on the Drawings, excavation shall be as required to accommodate installation of the proposed structures, including structural fill as described in these Specifications.
2. Where proposed subgrades are found to be unsuitable for foundations, unsuitable materials shall be removed and replaced with crushed stone or sand as directed by the Engineer. Payment for this additional work shall be made in accordance with the unit prices included in the Bid Proposal. If no unit price exists in the bid proposal, a negotiated price shall be determined based on the provisions set forth in the General Conditions and the quantity of work to be performed.

C. Classification of Material: Excavation under this contract shall be unclassified; that is, no separate payments will be made for earth or rock excavation. The cost of excavating to the lines and grades necessary to construct the facilities in accordance with the Drawings and these Specifications shall be included in the lump sum price bid for all the construction work. The Contractor shall perform all required excavation regardless of the type or condition of materials encountered. Additional compensation will be made in accordance with the prices established in the Bid Form for earth and rock excavation over and above that required by the Drawings and Specification if such excavation is directed by the Engineer.

D. Rock Excavation: Rock excavation shall mean removal of boulders, pieces of concrete or masonry exceeding one-half cubic yard in volume and solid ledge rock which, in the opinion of the Engineer, requires wedging, sledging, barring or breaking up with a power operated hand tool for its removal. No soft or disintegrated rock which can be removed with a hand pick or power-operated excavator or shovel; no loose, shaken or previously blasted rock or broken stone in rock fillings or elsewhere; no street pavements or sidewalks, and no rock exterior to the established limits of excavation will be measured or allowed. Payment for extra rock excavation shall be made in accordance with the unit prices included in the Bid Proposal.

E. Blasting: No blasting will be permitted.

F. Limits of Excavation: Where excavation for structures and/or trenches is carried below the proper elevation, the Contractor shall backfill with material approved by the Engineer. This material shall be compacted to provide a firm and unyielding subgrade and/or foundation to the approval of the Engineer at no additional cost to the Owner.

G. Sheeting and Bracing: Open-cut trenches and excavations shall be sheeted and braced as required by any governing State laws and Municipal ordinances, and as may be required, it shall be driven to prevent adjacent soil from entering the trench either below or through such sheeting. Sheeting and bracing which have been ordered left in place by the Engineer for the protection of the work or existing foundations, buildings or other structures must be removed for a distance of three (3) feet below the established finished

grade or the existing grade, whichever is lower. Bracing except that which must be left in place, may be removed when the backfilling has reached the respective levels of such bracing. Sheeting, may be removed after the backfilling has been completed or has been brought up to an elevation which will permit its safe removal. All sheeting and bracing shall be removed in such manner as will insure the proper protection of the completed work and adjacent ground and underground structures and prevent the disturbance of adjacent ground.

H. Grading and Stockpiling Excavated Material: Contractor shall control the stockpiling of excavated material in a manner to prevent water running into the excavations. Contractor shall not obstruct surface drainage, but provide means whereby storm waters are diverted into existing gutters, other surface drains, or temporary drains.

3.03 Preparation of Subgrade

A. Scarifying: After the site has been cleared, stripped and excavated to within 4 inches of the specified depths for recompaction, the Contractor shall scarify the exposed surface to a minimum depth of 6 inches, thoroughly moisture condition, and compact to the requirements specified for fill hereinafter.

B. Leveling: Contractor shall remove all ruts, hummocks, and other uneven surfaces by surface grading prior to placement of fill.

C. Benching: Existing slopes to receive fill shall be benched prior to placement of fill on them. Benches shall be constructed to whatever width is necessary to maintain a surface ready for filling at a slope of 1 vertical to 12 horizontal or shallower.

3.04 Excess Water Control: Contractor shall abide by the following requirements:

A. Unfavorable Weather: Do not place, spread, or roll any fill material during unfavorable weather conditions. Do not resume operations until moisture content and fill density are satisfactory to the Engineer.

B. Freezing: No frozen soil shall be used as fill or backfill. Frozen subgrades shall be excavated to unfrozen soil prior to placing structures or additional fill. These Soils may be stockpiled until thawed. Once thawed they may be used in accordance with these Specifications.

C. Flooding: Provide berms or channels to prevent flooding of subgrade. Promptly remove all water collecting in depressions.

D. Softened Subgrade: Where soil has been softened or eroded by flooding or placement during unfavorable weather, remove all damaged areas and recompact as specified for fill and compaction as described in this Section at no additional cost to the Owner.

E. Dewatering: Contractor shall provide and maintain at all times during construction, ample means and devices with which to remove promptly and dispose of all water from every

source entering the excavations or other parts of the Work. Dewatering shall be by means which will insure dry excavations and the preservation of the final lines and grades of bottoms of excavations.

3.05 Fill Materials

A. General:

1. For the purpose of these Specifications all fills are classified as structural fills. All fill materials shall be subject to approval of the Engineer.
2. For approval of fill material, Contractor shall notify the Engineer at least five (5) working days in advance of intention to import material, designate the proposed borrow area, and permit the Engineer to sample as necessary from the borrow area for the purpose of making acceptance tests to prove the quality of the material.

B. Soil Fill Material:

1. On-Site: Excavated site soils, free from organic matter and other harmful, noxious, and/or unsuitable substances, may be used as fill and backfill material with the approval of the Soils Engineer, where indicated on the Drawings or as directed by the Soils Engineer.
2. Imported: All imported fill material used for structural fill shall be clean, select fill, free from excess silt, clay balls or other deleterious matter, and having a plasticity index between 15 and 20 and a maximum liquid limit of 45.

C. Aggregate Fill Material:

1. Beneath Floor Slabs: Where indicated on the drawings gravel fill beneath the floor slabs of buildings shall conform to the following gradation:

U.S. Sieve	Percent Passing (By Weight)
3/4"	100
5/8"	95-100
4	0.7

2. Beneath Roadway & Parking Slabs: Where indicated on the drawings crushed limestone subbase shall be limestone road base aggregate conforming to the size gradation as follows:

U.S. Sieve	Percent Passing (By Weight)
1 1/2"	100
1"	90-100
3/4"	70-95
3/8"	50-80
4	35-65

10	25-50
40	10-26
200	4-12

Crushed limestone sub base shall be placed and compacted in accordance with the requirements in this Section.

Table 02100-1
GRADATION REQUIREMENTS FOR TRENCH AND STRUCTURAL BACKFILL

U.S. Sieve	Percent Passing (By Weight)	
	Trench Backfill	Structural Backfill
1 1/2 Inch	-	100
1 Inch	-	80 - 100
3/4 Inch	-	70 - 90
1/2 Inch	100	55 - 80
3/8 Inch	75 - 95	-
No. 4	5 - 20	35 - 60
No. 8	0 - 5	25 - 50
No. 30	-	12 - 30
No. 200	0 - 3	5 - 10

D. Trench and Structural Backfills

1. On-Site Fill Material: All on-site fill material used for trench and structural backfill shall be approved by the Engineer and shall meet the requirements of this Section. Approved on-site fill material may be used where indicated on the Drawings or as directed by the Engineer.
2. Imported Cohesionless Material: All imported cohesionless material used for trench and structural backfill shall be free from organic substances and other harmful, noxious, and/or unsuitable matter and shall be of particle size grading as specified herein, subject to the approval of the Engineer. Crushed stone trench and structural backfill materials shall be placed and compacted in accordance this Section. Unless otherwise directed by the Engineer, the materials shall meet the gradation requirements indicated in the Table 02100-1.

E. Filter Fabric Material: Where indicated on the Drawings, approved filter fabric shall be furnished and installed as shown or directed. Filter fabric provided shall be Typar as manufactured by Dupont, Inc. or an approved equal.

F. Other Materials: All other materials, not specifically described, but required for a complete and proper installation, shall be selected by the Contractor subject to the approval of the Engineer.

3.06 Fill and Compaction: Contractor shall abide by the following requirements:

A. General: No fill or backfill shall be placed around concrete structures until the concrete has cured sufficiently to enable it to carry backfill loads.

B. Filling: After subgrade compaction has been approved by the Engineer, spread approved fill material in layers not exceeding 8 inches in uncompacted thickness.

C. Moisture Conditioning: Water or aerate the fill material as necessary, and thoroughly mix to obtain a moisture content which will permit proper compaction within the following range, -1 to +3 percent of optimum water content as determined by Modified Proctor Compaction Testing.

D. Compaction, General: Compact each soil layer to at least the specified minimum degree. Repeat compaction process until plan grade is attained.

E. Degree of Compaction Requirements:

1. Structural Fill:

   a. Crushed Stone structural fill shall be densified to a minimum degree of compaction of 82 percent of the stones' theoretical solid volume density, as determined by "Bulk Specific Gravity".
   b. Densify all crushed stone structural backfill adjacent to structural walls to a compaction of 90 percent of maximum density determined by Modified Proctor Compaction Testing (ASTM D 1557).
   c. Densify all general structural soil fill, including recompacted existing fill and backfill, to a minimum degree of compaction of 90 percent of maximum density determined by Modified Proctor Compaction Testing (ASTM D 1557).

2. Pavement Areas:

   a. Subgrade: Compact the upper 12 inches of soil in pavement areas to a minimum degree of compaction of 90 percent of maximum density determined by Modified Proctor Compaction Testing (ASTM D 1557).
   b. Subbase: Compact crush limestone aggregate subbase material to 90% of the modified Proctor Density Testing (ASTM D 1557).

c. Soil Fill: Compact to 95% of maximum density determined by Modified Proctor Compaction Testing (ASTM D 1557).

3. Trench Backfills: Compact all approved cohesionless and cohesive trench backfill materials to in situ soil density of existing surrounding ground.
4. Site Grading: Compact to a density of existing surrounding ground.

F. Water Jetting: Water jetting will not be permitted for compaction unless written approval is obtained from the Engineer.

3.07 Crushed Stone Sub Base Course For Pavements:

A. Preparation: The surface to receive crushed stone paving subbase course shall be clean, free of frost and free of free water. Rutting shall be scarified and recompacted as specified herein. After the subgrade has been prepared, the area to receive limestone subbase shall be covered with filter fabric material installed in accordance with the manufacturers directions.

B. Execution:

1. Areas to receive 8 inches or less total compacted crushed stone thickness shall be placed in one lift and compacted to at least 95 percent of Standard Proctor (ASTM D 698) maximum dry density.
2. Areas to receive more than 8 inches but less than 16 inches total compacted crushed stone thickness shall be placed in two equal lifts, each lift compacted to at least 90 percent of Standard Proctor maximum dry density (ASTM D 1557).

3.08 Restoration of Ground Surfaces and Cleanup:

A. All ground surfaces in public rights-of-way, easements and on the Owner's property that have been damaged or destroyed by the Contractor's operations shall be restored in accordance with these specifications. All surplus material, rock, trees, shrubs, pipe, asphalt, concrete pavements, crushed stone, etc., not to be used in the Contractor's restoration operations shall be removed from the side and disposed of in an acceptable manner.

B. Before final acceptance of the work, the Contractor shall satisfactorily clean all areas within the limits of his operations including the road surfaces, walks, gutters, fences, lawns, and structures, leaving them in as neat, clean, and usable condition as originally found. He shall remove all machinery, tools, surplus materials, temporary buildings, and other structures from the site of work. He shall also remove all organic matter and materials containing organic matter from all areas and places used by him during construction. All sewers, manholes, inlets, etc., shall be cleared of all scaffolding, sedimentation, debris, rubbish, and dirt.

3.09 Trenching:

A. General: Contractor shall perform all trenching required for the installation of all pipes and structures, as indicated on the Drawings, and as described in these Specifications.

B. Trench Width:

1. Pipe trenches shall be sufficiently true in alignment to permit the pipe to be laid in the approximate center of the trench while providing sufficient width to provide adequate working space on both sides of the trench and around installed pipes. The trench width shall not exceed two times the nominal pipe diameter except for pipe smaller than 10 inches where the maximum trench width shall be 24 inches. Banks of trenches shall be as close to vertical as possible.
2. Where sheeting or bracing is utilized, the maximum allowable width of the trench shall be measured between the closest interior faces of the sheeting or bracing as placed.
3. In the event the Contractor is required to excavate the trench to a width greater than that specified above due to slides, caves, obstructions or by reason of the nature of the material encountered, any cavities so caused shall be refilled and compacted with suitable and satisfactory material, of a type, and in a manner satisfactory to the Engineer, at no additional cost to the Owner.

C. Trench Depth: Trench depth shall be as required to provide the elevations shown on the Drawings. Where elevations are not shown on the Drawings, Contractor shall trench to sufficient depth to give a minimum of 30 inches of fill above the top of process and drainage pipes, measured from the adjacent finished grade, unless otherwise specified or noted in the Drawings.

D. Correction of Faulty Grades: Where trench excavation is inadvertently carried below properelevations, Contractor shall backfill with material approved by the Engineer, and then compact to provide a firm and unyielding subgrade and/or foundation to the approval of the Engineer and at no additional cost to the Owner.

3.10 Foundation For Pipes:

A. General: The trench bottoms shall be graded to provide a smooth firm and stable foundation free from rock points throughout the length of the pipe.

B. Foundation Material: Contractor shall place a minimum of 6 inches or the specified cohesionless material in the bottom of the trench below the bottom of the pipe barrel, and compact as specified herein.

C. Subsurface Conditions:

1. In areas where soft, unstable materials are encountered at the surface upon which cohesionless material is to be placed, Contractor shall remove the unstable material

and replace it with compacted material approved by the Engineer. Provide sufficient depth to develop a firm foundation for the item being installed. Payment for this work will be made on the basis of unit prices for excavation and backfill contained in the Bid Proposal or in the case of lump sum contract, included in the lump sum price.

2. If the need for such over-excavation has been occasioned by an act or failure to act on the part of the Contractor, the Contractor shall make the over excavation and replacement at no additional cost to the Owner.

D. Shaping:

1. At each joint in the pipe, the bottom of the trench shall be recessed as required into the firm foundation in such a manner as to relieve the bell of the pipe of all load and to insure continuous bearing of the pipe barrel on the firm foundation.
2. All pipe subgrades shall be accurately shaped and the bottom of the trench shall fit to the pipe shape. A drag template shaped to conform to the outer surface of the pipe shall be used if other methods do not produce satisfactory results.

3.11 Bedding For Pipes:

A. General: Specified cohesionless material shall be placed in the trench, simultaneously on each side of the pipe for the full width of the trench. Pipes shall be bedded to a minimum depth of 1 foot above the top of the pipe barrel. Bedding material shall comply with the requirements herein and the Drawings.

B. Densification:

1. The bedding material shall be densified after placing by hand or mechanical tamping to the specified density.
2. Special care shall be taken to provide firm bedding support on the underside of the pipe and fittings for the full length of the pipe.

C. Alternate Bedding: Other bedding procedures and materials may be used only if prior written approval has been obtained from the Engineer.

3.12 Backfill For Pipes: Contractor shall abide by the following:

A. Using On-Site Materials: After the pipe has been thoroughly bedded and covered, spread approved on-site material in uniform lifts of not more than 8 inches in uncompacted thickness, and then compact as previously specified. Repeat the spreading and compacting procedure until adjacent grade level is attained.

B. Using Imported Cohesionless Material: After the pipe has been thoroughly bedded and covered, fill the remaining portion of the trench with the specified cohesionless material in 8 inch uncompacted thickness layers and densify as previously specified.

3.13 Testing:

A. Compaction Specifications: Compaction testing shall be done by any of the following methods, ASTM D 1557, D 2166, D 2922, and/or D 2937.

B. Compaction Testing Frequency: Compaction testing shall be done at a frequency sufficient to verify field conditions, but in no case less than the following frequencies.

1. Site Filling or Backfilling With Cohesive Soils: One test per 1000 square yards per one (1) foot lift.
2. Structural Filling With Crushed Stone Fill: One test per 740 square yards per one (1) foot lift.
3. Trench Backfillings: One test per 100 linear feet of trench per one (1) foot lift.

3.14 Tunneling:

A. Where indicated on the Drawings or as otherwise required, tunnel excavations shall be made of sufficient size, height and width to permit the installation of the pipe and/or conduits, to permit proper bracing of the tunnel section and to permit ample room for the prosecution of the work and safety of the workmen.

B. All tunnels shall be lined with full circle metal liner plates of sufficient strength to meet the loading conditions. Loading for highway and pavement tunnels shall be based upon continuous load carrying structures for the height of cover under H-20 loading and loading for railroad tunnels shall be based upon continuous load carrying structures for the height of cover under Cooper E-70 loading. Liner plates for railroad tunnels shall be galvanized and bituminous coated.

C. All work performed beneath existing structures, across railroad right-of-ways, and under pavements, shall be performed in accordance with the requirements of the parties or agencies having jurisdiction over these locations. The Contractor shall contact the parties or agencies prior to starting work and shall meet all requirements of the parties or agencies in regard to methods of construction and the safety precautions to be taken in performing the tunnel work. All costs involved in meeting these requirements shall be paid for by the Contractor and no additional compensation will be allowed.

3.15 Boring and Jacking:

A. Where indicated on the Drawings, or as otherwise required, boring and/or jacking methods shall be used for pipeline installation. Unless otherwise directed by the Engineer, all such installations shall comply with details shown on the Drawings and the specifications contained herein.

B. All work performed beneath existing structures, across railroad right-of-ways, and under pavements, shall be performed in accordance with the requirements of the parties or agencies having jurisdiction over these locations. The Contractor shall contact the parties

or agencies prior to starting work and shall meet all requirements of the parties or agencies in regard to methods of construction and the safety precautions to be taken in performing the work. All costs involved in meeting these requirements shall be paid for by the Contractor and no additional compensation will be allowed. Subsurface operations resulting in damage to tracks or pavement shall be the responsibility of the Contractor and shall be repaired at no cost to the Owner.

C. In general, minimum clearances above top of casing pipe shall be as follows:

	Minimum Clearance
Pavement Surfaces	4'-0"
Highway Drainage Ditches	2'-0"
Base of Railroad Rail	5'-6"
Other Railroad Right-of-Way	3'-0"

D. Casing pipes shall as a minimum extend 15 feet beyond the center of any railroad track and shall extend from ditch line to ditch line in the case of paved highways and roads. Where the ends of casing pipe are below ground, the ends shall be sealed.

E. In all cases, carrier pipe placed in a casing pipe shall be Class 52 Ductile Iron with mechanical joints, unless otherwise shown on the plans or as directed by the Engineer. The barrel of the carrier pipe shall be supported within the casing. Supports or carrier runners shall be spaced as recommended by the manufacturer, or as directed by the Engineer.

END OF SECTION

SECTION 02105

EXPLORATORY EXCAVATION

PART 1 - GENERAL

1.01 SCOPE OF WORK

Furnish all labor, equipment, materials, and qualified personnel to perform exploratory excavation where designated on the Plans and/or at the request of the Project Engineer or his representative in those areas where underground utility locations are not well defined. The operation includes all necessary equipment, materials, and labor for excavation, as well as all such work, equipment, materials, and labor for the additional work of filling the holes and voids created by the operations specified herein. It shall also include the work, equipment, and personnel necessary to determine the elevations of conflicting utilities.

1.02 GENERAL

The work consists of excavating at points of potential conflict with proposed improvements throughout the limits of the project, to determine the exact location of existing public and/or private utilities. When exploratory excavations are required, the Contractor shall perform such work prior to the start of work in an area to allow ample time for the Project Engineer to resolve any field conflicts. Approval to proceed shall be obtained from the Engineer for each location.

Additional exploratory excavations not shown on the Plans may be necessary. The Engineer will make these determinations based on information gathered in the field. Any excavation in the area of an existing pavement shall be temporarily patched with limestone until such time that the pavement can be properly repaired.

It shall be the responsibility of the Contractor during excavation activities to ensure that no damage is done to “known” utilities. “Known” utilities are those that have been designated on the Plans, located by Waterworks personnel, and/or located by Louisiana One Call. The Contractor will be responsible for damage done to any and all of these “known” utilities during excavation.

PART 2 – PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 EXCAVATION

A. Exploratory excavation will only be conducted for those particular areas designated on the Plans and when directed by the Project Engineer or his representative. No payment will be given to the Contractor should the

exploratory excavation be performed without first having obtained prior approval from the Project Engineer.

B. Exploratory excavation shall include, if necessary, clearing, which may consist of the complete removal above the ground surface of all trees, downed timber, snags, brush, stumps, vegetation, old piping, abandoned structures, fencing, trash, and similar debris.

3.02 FILLING

Upon completion of exploratory excavation activities, the Contractor is responsible for re-filling all holes and voids created by these operations. This includes proper fill techniques of layering and compaction. The areas where exploratory excavation occurs should be returned to their original condition in terms of compaction, grade, and cleanliness.

3.03 DISPOSAL OF DEBRIS

Any debris resulting from exploratory operations shall be removed from the site and disposed of by the Contractor at locations approved by law and approved for such use. This removal and disposal shall be at no additional cost to the Owner. All disposal locations shall be suitable to the Owner.

3.04 MEASUREMENT AND PAYMENT

Payment will be made at the contract price for each excavated area up to 20 feet long by 10 feet wide and up to 10 feet deep. It may be possible to locate several utilities within one excavated area, which the Engineer will specify when approving each location. Payment will be made under “Exploratory Excavation” in Section 00300, Bid Form, at a pay unit of each. See Section 01150, Measurement and Payment, of these Specifications for further details.

END OF SECTION

TECHNICAL SPECIFICATIONS
DIVISION 02 - SITEWORKS

SECTION 02200 - CONCRETE WALLS AND WALKS

PART - I GENERAL

1.01 General:

Concrete roads, parking areas and walks shall be constructed to conform with the lines and grades as indicated on the Drawings. All work shall be in accordance with the Contract Drawings and these Specifications.

1.02 Related Work Described Elsewhere:

All work shall conform to applicable provisions of Division 3 - "Concrete" of these Specifications.

PART - II PRODUCTS

2.01 Subbase:

The subbase material shall be crushed limestone.

2.02 Concrete Materials:

All materials shall conform to specifications for Class *M* concrete with a minimum 28 day compressive strength of 4000 psi in accordance with the *1992 State of Louisiana Standards.*

2.03 Joint Fillers:

Joint fillers shall be bituminous performed expansion joint filler conforming to ASTM D994.

2.04 Joint Sealant:

Joint sealant shall be Green Streak No. 610 6-seal or approved equal and installed according to manufacturer's requirements.

PART - III EXECUTION

3.01 Excavation:

Excavations shall be made to the depth required for installation of subbase as indicated on the Drawings. Excavation width shall be as required for proper installation and bracing of forms. The subgrade shall be shaped and compacted to a firm, even surface

suitable for proper placement of subbase or concrete. Unsuitable materials shall be removed and replaced with approved material at no additional cost to the Owner.

3.02 Subbase:

The subbase shall placed to the dimensions indicated on the Drawings. The subbase material shall be as called for and shall be thoroughly compacted in accordance with the requirements of these Specifications. Subbases shall be thoroughly wetted prior to placing of concrete.

3.03 Joints:

Location of joints, types and details are shown on the Contract Drawings. Joint types used are as follows:

A. Control Joints (C.J.):

Control joints are used to control shrinkage cracking and are spaced at approximately 20 ft. centers, max. as shown on the Drawings.

B. Expansion Joints (E.J.):

Expansion joints are used to control expansion of the concrete due to temperature changes. Expansion joints are to be located as shown on the Drawings.

3.04 Placing Concrete:

A. Concrete shall be placed on the prepared subgrade or subbase and struck off or screeded to the required thickness as detailed on the Drawings. It shall be tamped sufficiently to bring mortar to the surface.

B. Surfaces shall be finished with a wood float or steel trowel and finally brushed to leave a slightly rough finish. All joints and edges shall be rounded with an edging tool.

3.05 Curing:

A. Concrete shall be protected from rainstorms with paper, burlap, canvas, or similar materials. In warm weather they shall be made wet daily for a minimum of five days. Cold weather curing and placement shall be done in accordance with Division 3 "Concrete" of these Specifications.

B. Membrane curing compounds shall meet the requirements of ASTM C309 and shall be of the non-discoloring type applied according to the manufacturer's recommendations.

SECTION 02200 - CONCRETE WALLS AND WALKS

3.06 Abrasive Blasting:

A. When abrasive blasting is required as part of the Work, Contractor shall submit 24”x48”x4” thick concrete panel with sample sand blasting technique for engineer’s prior approval.

B. Aggregate shall be ½” to ¾” and shall be approved by engineer.

C. Contractor shall sandblast surface in a safe manner using OSHA guidelines.

D. Sandblasted material shall be removed off site.

E. All walls shall be sandblasted on all exposed surfaces in a consistent and even manner.

END OF SECTION

TECHNICAL SPECIFICATIONS
DIVISION 02 - SITEWORK

SECTION 02212 – SITE CLEARING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

The general provisions of the contract, including General and Supplementary Conditions and other general requirements sections, apply to work specified in this section.

1.02 DESCRIPTION OF WORK

This work consists of required clearing, grubbing, removing and disposing of all brush, vegetation and debris within the site shown on the contract drawings.

PART 2 – PRODUCTS – NOT USED

PART 3 - EXECUTION

3.01 GENERAL

Clearing and grubbing consists of cutting timber, logs, brush, stumps and debris; excavation and removal of all vegetation, stumps, roots, logs, and other perishable and objectionable material; and disposing of removed material and cleaning up the area to be cleared.

3.02 REQUIREMENTS

A. Where building slabs and foundations will be constructed (if applicable), a minimum of twelve (12) inches of soil shall be removed from the areas to a minimum of three (3) feet outside the edges of buildings.

B. Trees, stumps, roots and other protruding objects not designated to remain or to be removed in accordance with other sections of these Specifications shall be cleared and grubbed to a depth of one foot below the finished grade, unless on account of geological or other special conditions, a lesser depth may be permitted by the Engineer.

C. Trees shall be cut and stumps completely removed. Holes remaining after the removal of stumps, roots, or logs shall be filled and compacted in eight inch layers to match the contours of the surrounding ground.

SECTION 02212 – SITE CLEARING

D. Unless salvaged or as otherwise specified, all debris resulting from clearing and grubbing shall be properly disposed of by the Contractor to an approved municipal landfill site.

END OF SECTION

TECHNICAL SPECIFICATIONS
DIVISION 02 - SITEWORK

SECTION 02213 – SITE GRADING

PART 1 - GENERAL

1.01 SCOPE

A. Work under this section of the Specifications includes the furnishing of all labor, materials, tools, equipment, and incidentals, and in performing all operations incidental to rough and final grading, placement and compaction of material for final construction.

B. The field soils materials shall be graded, shaped, and compacted in accordance with these Specifications, and in conformity with the lines, grades, thickness and sections shown on the Drawings for the finished grades.

PART 2 – PRODUCTS

2.01 FILL MATERIAL

A. The final top surface layer shall be suitable for seeding or sodding of turf. The finished subgrade and surface shall have a smooth, uniform, closely-knit surface, free from ridges, waves, laminations or loose material.

B. The finished and final grading shall be done after the soil layer has been thoroughly "wetted-in". Additional cohesionless fill may be required to achieve the final grading at no additional pay.

C. Select fill for skinned infield shall consist of a mixture of low plasticity (P.I. 15 to 20) "red clay" and a specialized sports field conditioner equal to TURFACE MVP, ATC Diamond Pro or approved equal. This conditioner shall be mixed into the red clay base to a depth of four inches and at a rate of 25% of field conditioner to soil by volume.

D. The final topping shall consist of a ¼ inch layer of the sports conditioner surfacing material. Preparation of base materials, application and finishing shall be in accordance with the manufacturer's recommendations.

E. Submit samples of the proposed fill material to the testing laboratory sufficiently in advance of the work to allow the laboratory to determine compliance with the Specifications and optimum moisture content for fill compaction. Testing shall be completed and submitted to the Engineer for approval prior to beginning of placement and compaction.

SECTION 02213 – SITE GRADING

PART 3 - EXECUTION

3.01 FINISH ELEVATION AND LINES

A. Finish elevations and lines indicated shall be accurately related to the control lines and benchmarks shown by qualified technical personnel employed by the Contractor.

B. Finished grades for the field surface shall be within a 0.1-foot tolerance of the elevations as shown on the Drawings.

C. Preserve and maintain sufficient line and grade reference points near the work during its execution to attain the finish lines and grades shown.

3.02 PREPARATION OF SUBGRADE

A. After the site has been cleared and stripped, and excavated to proper subgrade elevations where required by finished elevations, the entire area shall be proof rolled sufficiently to detect any soft spots in the subgrade. Soft spots shall be removed completed to the satisfaction of the Engineer. Excavated areas resulting from soft spots shall be backfilled with select cohesionless fill.

B. Remove all ruts, depressions, or other uneven subgrade surfaces by grading prior to placement of fill.

C. Do not place, spread, or roll any fill material during unfavorable weather conditions.

D. Do not resume operations until moisture content and fill density are satisfactory to the Engineer.

E. Provide berms of channels to prevent flooding of subgrade; promptly remove all water collecting in depressions.

F. Where soil has been softened or eroded by flooding by placement during unfavorable weather, remove all damaged areas and recompact as specified for fill and compaction.

G. Provide and maintain at all times during construction, ample means and devices with which to promptly remove and dispose of all water from every source entering the excavations or other parts of the work.

SECTION 02213 – SITE GRADING

3.03 CLEANING UP

Upon completion of the work, immediately remove all debris and excess materials from the site.

3.04 MAINTENANCE

The Contractor shall protect the graded subgrade and surface from damage due to either public traffic or the Contractor's operations. Any damaged shall be repaired by the Contractor at his expense. If repairs are required, in addition to removing all damaged or unsound material, the Contractor shall remove a sufficient width and depth of material to ensure satisfactory placement of new material. All patching or other repair of the subgrade shall be made in such a manner as to restore a uniform surface.

END OF SECTION

TECHNICAL SPECIFICATIONS
DIVISION 02 - SITEWORK

SECTION 02220 - EXCAVATION, BACKFILLING AND COMPACTION

PART - I GENERAL

1.01 SCOPE OF WORK

The Contractor shall furnish all labor, materials, equipment, and incidentals necessary to perform all excavation, backfill, grading, and wall protection required to complete the structure and piping work shown on the Drawings and specified herein. The work shall include, but not necessarily be limited to excavation, filling and grading under and around precast and cast in place structures to attain the subgrades and grades indicated on the Drawings, trenching operations to install pipe, manholes, vaults, electrical duct conduit, pump station wet wells and valve pits, and other structures, including all backfilling, grading, disposal of surplus and unsuitable materials, and all related work such as sheeting, bracing and water handling.

1.02 QUALITY ASSURANCE

A. The Contractor shall perform excavation work in compliance with applicable requirement codes and standards of governing authorities having jurisdiction.

B. The Owner will engage and pay for soil testing and inspection services for quality control testing during earthwork operations as provided in the Contract Documents.

1.03 JOB CONDITIONS

A. The Contractor shall examine the site and review the available test borings or undertake his own soil borings prior to submitting his bid, taking into consideration all conditions that may affect his work. The Owner and Engineer will not assume responsibility for variations of subsoil quality or conditions at locations other than places shown and at the time the investigation was made. Boring log data are available for review or purchase at the office of the Engineer.

B. Existing Utilities: Locate existing underground utilities in the areas of work. If utilities are to remain in place, provide adequate means of protection during earthwork operations.

1. The location of all pipes, ducts, or underground structures is not warranted to be exact, nor is it warranted that all underground pipes, ducts, or structures are shown on the Drawings. The Contractor shall contact DOTTIE or the appropriate utility company for location of their underground service a minimum of 48 hours prior to beginning construction in each area.

2. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner or make the site available to the utility owner for his work crews to make the necessary repairs at no additional cost to the Owner.

3. Demolish and completely remove from site existing underground utilities indicated on the Drawings to be removed.

4. Examine the areas and conditions under which excavating, filling, and grading are to be performed. Do not proceed with the work until unsatisfactory conditions have been corrected.

5. Examine existing grade of walks, pavements, and steps prior to commencement of work and report to Engineer if elevations of existing subgrade vary from elevations shown on the Drawings.

6. If it is determined that existing utilities are to be relocated by owner of those utilities, the Contractor shall be responsible for that coordination. The Contractor shall notify the utility owner in sufficient time as to avoid any delays to the Contractor's schedule. The Contractor is solely responsible for this coordination, and no delay or extension of time will be allowed as a result of or the cause of inaction by the Contractor or utility owner.

1.04 PROTECTION

A. Slope sides of excavations to comply with OSHA regulation and any applicable local codes and ordinances. Shore and brace where sloping is not possible because of space restrictions or stability of the in-situ trench wall. Maintain sides and slopes of excavations in a safe condition until completion of backfilling.

B. Sheeting and Bracing in Excavations:

1. In connection with construction of below grade structures and piping, the Contractor shall construct, brace, and maintain cofferdams consisting of sheeting and bracing as required to support the sides of excavations, to prevent any movement which could in any way diminish the width of the excavation below that necessary for proper construction, and to protect adjacent structures, existing yard piping and/or foundation material from disturbance, undermining, or other damage. Care shall be taken to prevent voids outside of the sheeting, but if voids are formed they shall be immediately filled and tamped.

2. Trench sheeting for pipes is not to be withdrawn when driven below mid-diameter of any pipe, and no wood sheeting shall be cut off at a level lower than one (1) foot above the top of any pipe unless otherwise directed by the Engineer. If during the progress of the work the Engineer decides that additional wood sheeting should be left in place, he may direct the Contractor in writing and the Contractor shall be reimbursed in accordance with the contract documents. If steel sheeting is used for trench sheeting, removal shall be as specified above, unless written approval is given for an alternate method of removal.

3. All sheeting and bracing not left in place shall be carefully removed in such a manner as not to endanger the construction or other structures, existing utilities, existing piping, or personnel and property. Unless otherwise approved or indicated on the Drawings or in the Specifications, all sheeting and bracing may be carefully removed after completion of the substructure. Care shall be taken not to disturb or otherwise injure any finished masonry. All voids left or caused by withdrawal of sheeting shall be immediately refilled with sand by ramming with tools especially adapted to that purpose, by hydraulic compaction or otherwise as may be directed.

4. The right of the Engineer to order sheeting and bracing left in place shall not be construed as creating any obligation on his part to issue such orders. The Engineer's failure to exercise his right to do so shall not relieve the Contractor from liability for damages to persons or property occurring from or on the work occasioned by negligence or other cause, growing out of a failure on the part of the Contractor to leave in place sufficient sheeting and bracing to prevent any caving or moving of the ground.

5. The Contractor may construct the cofferdams and sheeting outside the neat lines of the foundation for pipes and manholes, unless indicated otherwise, to the extent he deems it desirable for his method of operation. Sheeting shall be plumb and securely braced and tied in position. Sheeting, bracing, and cofferdams shall be adequate to withstand all pressures to which the existing or new structure will be subjected. Pumping, bracing, and other work within the cofferdam shall be done in a manner to avoid disturbing any completed construction or personnel injury. Any movement or bulging, which may occur, shall be corrected by the Contractor so as to provide the necessary clearances and dimensions.

6. The Contractor is fully responsible for any sheeting, bracing and cofferdams that are required to perform any of the work under the contract.

7. As part of his submittal of schedules and other data indicating his planning of the Work, the Contractor shall provide drawings of the planned supporting system, not for review by the Engineer, but for informational purposes only, and use by the Engineering in tracking the progress of the Work. Such drawings shall be of sufficient detail to adequately disclose the method of operation that the Contractor plans to use for each of the various stages of construction. The Work shall not be started until such drawings are received.

8. Establish requirements for trench shoring and bracing to comply with OSHA regulations and any applicable local codes and ordinances.

9. Maintain shoring and bracing in excavations regardless of time period excavations will be open. Carry down shoring and bracing as excavation progresses.

10. As an alternate to sheeting, the Contractor may be authorized to utilize a mechanical trench box, the size and construction of which shall be submitted to the Engineer for review. The Engineer will review the site conditions and the need for protection of utilities and structures adjacent to the excavation and, then, determine the acceptability of the use of the proposed mechanical trench box. Should the Engineer determine that use of the proposed mechanical trench box does not provide the required protection to adjacent utilities and structures, the Engineer may judge that alterations to the procedure are warranted or may judge that the trench be stabilized with sheeting. In either case, the judgment of the Engineer shall be final and, whichever method of trench stabilization is judged appropriate by the Engineer, his decision shall be implemented at no additional cost to the Owner.

C. Dewatering, Drainage and Flotation:

1. The Contractor shall furnish all materials and equipment and perform all work required to install and maintain the drainage systems he proposes for handling groundwater and surface water encountered during construction of structures, pipelines, and compacted fills.

2. The Contractor shall construct and place all pipelines, concrete work, structural fill, bedding, and base course, in-the-dry. In addition, the Contractor shall make the final 24-inches of excavation for this work in-the-dry, and not until the water level is a minimum of twelve (12) inches below proposed bottom of excavation. For the purposes of this specification, “in-the-dry” is defined as saturated, surface dry soil with a small amount of groundwater seepage, which can be controlled as specified below, but does not have the presence of any source of free-flowing ground water at the level of the excavation.

3. The Contractor shall, at all times during construction, provide and maintain proper equipment and facilities to promptly remove and dispose of all water entering excavations and keep such excavations dry so as to obtain a satisfactory undisturbed subgrade foundation condition. This procedure shall be continued until the fill, structure, or pipes to be built thereon have been completed to such extent that they will not be floated or otherwise damaged by allowing water levels to return to natural elevations.

4. Dewatering shall at all times be conducted in such a manner as to preserve the natural undisturbed bearing capacity of the subgrade soils at proposed bottom of excavation.

5. Wellpoints may be required for predrainage of the soils prior to final excavation for some of the deeper below ground structures or piping, and for maintaining the lowered groundwater level, until construction has been completed to such an extent that the structure, pipeline, or fill will not be floated or otherwise damaged. Wellpoints shall be surrounded by suitable filter sand and no fines shall be removed by pumping. Pumping from wellpoints shall be continuous and standby pumps shall be provided.

6. If requested by the Engineer, the Contractor's proposed method of dewatering shall include a minimum of two (2) 4-inch, Schedule 40, operating groundwater observation wells at each structure to be used to determine the water level during construction of the structure. Locations of the observation wells shall be at structures and along pipelines as approved by the Engineer prior to their installation.

7. Prior to excavation, the Contractor shall submit his proposed method of dewatering and maintaining dry conditions to the Engineer. The Contractor shall be responsible for the satisfactory performance of the system. The Contractor shall be responsible for correcting any disturbance of the natural bearing capacity of the supporting soils or damage to structures caused by an inadequate dewatering system or by interruption of the continuous operation of the system as specified.

8. As part of the submittal of his dewatering system, the Contractor may be required to demonstrate the adequacy of the proposed system and wellpoint filter sand by means of a test installation. Discharge water shall be clear, with no visible soil particles in a one-quart sample.

9. During backfilling and construction, water levels shall be measured in observation wells located as directed by the Engineer.

10. Continuous pumping will be required as long as water levels are required to be below natural levels.

11. While dewatering for new construction in the vicinity of existing structures, depletion of the groundwater level underneath these existing structures may cause settlement. To avoid this settlement, the groundwater level under these structures shall be maintained by appropriate methods of construction.

D. Protection of Persons and Property:

1. Barricade open excavations occurring as part of this work and post with warning lights in accordance with local requirements. Operate warning lights as recommended by authorities having jurisdiction.

2. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.

PART - II PRODUCTS

2.01 SOIL MATERIALS

SECTION 02220 - EXCAVATION, BACKFILLING AND COMPACTION

A. Definitions:

1. Select Materials - Select fill shall conform to Louisiana DOTD designation TR 423 Classes A-1-a, A-1-b, A-3, A-2-4, A-2-6, A-4 or A-6 having a maximum liquid limit of 35 and a maximum plasticity index of 15. This material is referred to as "selected soils" in the DOTD Specifications. Based on an approved geotechnical engineering report, particularly A-6 soils, a higher plasticity index of up to 25 will be considered. These materials can be used for backfill in over-excavated areas, for backfill from 12 inches above the top of the pipe to the top of the subgrade and as structural fill/backfill.

2. Bedding Materials - Bedding materials shall conform to Louisiana DOTD Specifications 1003.08. These materials shall be used for placement under the pipes in the trench and as a bedding material as defined on the Drawings and shall have a minimum thickness of 6 inches. These materials shall also be used for backfill in over-excavated trench areas and may be used for backfill from above the top of the pipe to the top of subgrade and as structural fill/backfill.

3. Stabilization Materials - Stabilization material shall be a blended, manufactured aggregate conforming to the requirements for concrete aggregate as stated in ASTM C33 except for gradation which shall be between sizes 57 and 78 (inclusive) as specified in ASTM D448.

4. Granular Material - Granular material shall conform to Louisiana DOTD Specifications 1003.07. This material shall be used for backfilling around the pipes from the bedding material up to at least 12 inches above the top of the pipes or to subgrade and in confined areas around structures; these materials may also be used as structural fill/backfill.

5. Coarse Granular Material – Where required on the Drawings, Coarse Granular Material shall be a clean coarse sand or fine gravel with 100 percent of the material passing the 1/2-inch sieve and less than 5 percent passing the NO. 200 sieve.

6. Usable Excavated Soils - Usable excavated soils, referred to as "usable soils" in Louisiana DOTD Specifications, shall conform to classes 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, A-7-5, and/or A-7-6, except that soils in classes A-5, A-6, A-7-5 and A-7-6 which are considered unusable by the Engineer and any soil with a plasticity index exceeding 60 will not be accepted in accordance with paragraph 203.06 in the Louisiana DOTD Specifications. These materials can be used for backfill from 12 inches above the top of the pipe up to the surface in unimproved areas.

7. Soil classifications used herein are to be in accordance with the AASHTO table for "Classification of Soils and Soil-Aggregate Mixtures (with Suggested Subgroups)" as shown on Louisiana DOTD designation TR423.

B. General:

1. Materials for use as fill and backfill shall be as described above. The Contractor shall notify the Engineer of the source of each material and shall furnish to the Engineer for testing and approval, a representative sample of each material weighing approximately 50 pounds, at least ten (10) calendar days prior to the date of anticipated use of such material.

2. Additional materials shall be furnished as required from off-site sources and hauled to the site.

3. Disposal of unsuitable material shall be as specified in this Section.

C. Structural Fill:

1. Structural fill shall be used below spread footing foundations, slab-on-grade floors, and other structures and as backfill within three (3) feet of the below grade portions of structures, except that, when stabilization material shall be placed and compacted over the structural fill material in accordance with the requirements for the structural fill.

2. Material falling within the above specification, encountered during the excavation, may be stored in segregated stockpiles for reuse. All material, which in the opinion of the Engineer is not suitable for reuse, shall be spoiled as specified herein for disposal of unsuitable materials.

D. Common Fill:

1. Placement of common fill shall include the work to construct general embankment below structural or other specialized fill, general embankment for site grading, backfill of trenches in unimproved areas. Material for common fill may be any of the above listed materials, except as modified below.

2. Common fill, which is to be a base fill for structural fill or roadway embankment, shall be constructed of material classified as select material or better, except that material classified as A-6, material having a plasticity index greater than 15, or material exhibiting expansion properties as indicated by an expansion index (EI) greater than 50, when determined in accordance with ASTM D4829, shall not be acceptable.

SECTION 02220 - EXCAVATION, BACKFILLING AND COMPACTION

PART - III EXECUTION

3.01 EXCAVATION

A. General:

Excavation consists of removal and disposal of material encountered when establishing required grade elevations and in accordance with the Drawings.

B. Excavation Classification:

The following classifications of excavation will be made when unclassified excavation is encountered in the work. Do not perform such work until material to be excavated has been cross-sectioned and classified by Engineer or specialized geotechnical consultant.

1. Authorized earth excavation includes removal and disposal of soil, pavements and other obstructions visible on ground surface, underground structures and utilities, and other materials encountered that are not classified or unauthorized excavation.

2. Unauthorized excavation consists of removal of material beyond the limits needed to establish required grade and subgrade elevations without specific direction of Engineer. Unauthorized excavation, as well as remedial work directed by the Engineer, shall be at no additional expense to the Owner. Backfill and compact unauthorized excavations as specified for authorized excavations, except that bedding material as specified above shall be used for backfill under pipes, footings, foundations bases, or retaining walls unless otherwise directed by the Engineer. If acceptable to the Engineer or specialized geotechnical consultant and soil conditions allow the extra loading, the Engineer may approve the use of lean concrete fill, reinforced or unreinforced as required by the site conditions and as required by the Engineer.

C. Additional Structural Excavation:

When excavation has reached required subgrade elevations, notify the Engineer who will contact a specialized geotechnical consultant and make an inspection of conditions.

1. If unsuitable, unsatisfactory bearing materials are encountered at the required subgrade elevation, carry excavation deeper and replace the excavated material as directed by the Engineer.

2. Removal of unsuitable material and its replacement as directed beyond the authorized limits will be paid on the basis of contract conditions relative to changes in the Work as provided in the General Conditions.

D. Excavation for Structures:

Conform to elevations and dimensions shown within a tolerance of plus or minus 0.10 feet, and extending a sufficient distance from footings and foundations to permit placing and removal of concrete framework, installation of services, other construction, and for inspection, or as shown on the Drawings.

1. When excavating for footings and foundations, take care not to disturb bottom of excavation. Excavate by hand to final grade just before concrete reinforcement is placed. Trim bottoms to required lines and grades to leave solid base to receive any required stabilization material or concrete.

2. In the event that excavations subsequent to the placement of the fill are performed by the Contractor to install piping, conduit, or other appurtenances, any fill placed above the level of the planned excavation shall be fully compacted in accordance with the requirements of this specification prior to beginning the excavation.

3.02 FILL PLACEMENT

A. General:

1. Material placed in fill areas under and around structures within the pipe trench limits shall be deposited within the lines and to the grades shown on the Drawings or as directed by the Engineer, making due allowance for settlement of the material. Fill shall be placed only on properly prepared surfaces which have been inspected and approved by the Engineer. If sufficient fill material is not available from excavation on site, the Contractor shall provide borrows as may be required.

2. Ground Surface Preparation: Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of fills. Plow strip, or break-up sloped surfaces steeper than 1 vertical to 4 horizontal so that fill material will bond with existing surface.

3. Fill shall be brought up in substantially level lifts throughout the site, starting in the deepest portion of the fill. The entire surface of the work shall be maintained free from ruts, and in such condition that construction equipment can readily travel over any section. Fill shall not be placed against concrete structures until they have attained sufficient strength.

4. Fill shall be dumped and spread in layers by a bulldozer or other approved method. During the process of dumping and spreading, all roots, debris, and other objectionable material shall be removed from the fill areas, and the Contractor shall assign a sufficient number of men to this work to insure satisfactory compliance with these requirements.

5. If the compacted surface of any layer of material is determined to be too smooth to bond properly with the succeeding layer, it shall be loosened by harrowing or by another approved method before the succeeding layer is placed.

6. All fill materials shall be placed and compacted at a moisture content which is within five percent of the optimum moisture content as determined by either ASTM D1557 or D4253, as appropriate for the material. The Contractor shall dewater excavated areas and is required to perform the work in such manner as to preserve the undisturbed state of the in-situ soils.

B. Thickness Requirements:

1. Structural Fill: Structural fill shall be placed in layers such that the compacted thickness of each layer is no greater than six inches.

2. Pipe Bedding and Granular Material: Pipe bedding and granular material shall be placed in layers such that the compacted thickness of each layer is no greater than six inches.

3. Stabilization Material: Stabilization material shall be placed in layers such that the compacted thickness of each layer is no greater than six inches.

4. Common fill which is to be a base fill for structural fill or roadway embankment, shall be placed in layers which do not exceed eight inches in thickness after compaction. All other common fill shall be placed in layers which do not exceed twelve inches in compacted thickness.

3.03 COMPACTION

A. General:

1. Contractor shall control soil compaction during construction and obtain the minimum required percentage of the total maximum dry densities as specified herein and as shown on the structural or civil drawings. The Contractor shall maintain the backfill for a period of one (1) year after final acceptance and shall restore any backfill that fails and repair any pavement or other structures which may be damaged as a result of backfill failure. It shall be the Contractor's responsibility to notify the Engineer in writing that compaction tests of the nuclear gauge, sand-cone, or other method as required can be performed.

2. The frequency for density tests will be a minimum of one (1) test per lift per 1,000 linear feet under pavements, within street and highway rights-of-way, and under building slabs and one (1) randomly selected test per 2,500 linear feet for open areas (testing of each lift in open areas is not required). If the density tests indicate that the Work does not meet specified density requirements, the Engineer may require additional density tests to determine the extent of the deficient Work. The Contractor

will not be allowed an extension of contract time as a result of any density testing or correction of work that does not meet the specified density requirements.

3. It is the Contractor's responsibility to provide equipment and labor as needed to achieve the required compaction as specified herein. Should the rates of compaction fall below the values specified herein, the Engineer has the right to instruct the Contractor to alter his work to assure that the required backfill quality is consistently achieved.

4. Any decision by the Engineer to forgo such instructions shall in no way relieve the Contractor of his responsibility to provide backfill of the specified quality.

B. Percentage of Maximum Density Requirements:

Compact soil to not less than the following percentages of maximum dry density as determined in accordance with AASHTO T-180 (ASTM D1557) or seventy-five percent (75%) relative density as calculated from the maximum and minimum index densities as determined by ASTMD4253 and D4254, respectively, as applicable.

1. Structures and 5-feet-0-inches around Perimeter of Building: Compact top 36-inches of subgrade and each layer of backfill or fill material to a minimum of ninety-five percent (95%) of the maximum dry density.

2. Building Slabs: Compact top 12-inches of subgrade and each layer of backfill or fill material to a minimum of ninety-five percent (95%) of the maximum dry density.

3. Compaction of Backfill near Highways or Streets: Where the trench limit falls under the roadway pavement or within two (2) feet of the edge of pavement, requiring granular backfill and in other areas designated on the plans where future roadways are to be constructed, backfill for the balance of the trench above a point one (1) foot above the top of the pipe shall be placed in layers of not more than 6-inch compacted thickness and compacted with mechanical tampers or by any satisfactory method or methods that will obtain the density hereinafter specified. The density of the compacted material in each layer of backfill shall not be less than ninety-five percent of the maximum dry density.

4. Walkways: Compact top 6-inches of subgrade to a minimum of ninety-five percent (95%) of the maximum dry density.

5. Pavements and Steps: Compact top 24-inches of subgrade to a minimum of ninety-five percent (95%) of the maximum dry density.

6. Bedding Material: Shall be compacted to a minimum of ninety-two percent (92%) of the maximum dry density.

7. Compaction of all other Backfill: Where a trench is in open ground and the backfill is not influenced by the loading conditions as described in the other listed backfilling requirements, the balance of the trench above a point one (1) foot above the top of the pipe shall be filled and compacted in layers of not more than 12 inches to obtain a minimum density of the measured in-situ condition prior to excavation. If the Contractor has to dry the excavated soil to a moisture content below the insitu moisture content in order to achieve the required rate of compaction, he shall do so at no additional expense to the Owner. The final surface shall be left in a condition equal to that originally found at the start of the work.

C. Moisture Control: Condition subgrade or layer material correcting moisture content:

1. When the material is too dry to be compacted efficiently, the Contractor shall uniformly apply water to surface of subgrade or layer of soil material and thoroughly mix the soil to achieve a moisture content near the optimum level to facilitate compaction.

2. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.

3. Soil material that has been removed because it is too wet to permit compaction but is otherwise satisfactory may be stockpiled or spread and allowed to dry. The Contractor may assist the drying process by disc harrowing or pulverizing to reduce the moisture content to a satisfactory value.

D. Structural fill and base course in open areas shall be placed in layers not to exceed the thicknesses previously specified. Each layer shall be compacted to the minimum dry density as stated herein. Incidental compaction due to traffic by construction equipment will not be credited toward the required minimum compaction as required for any material.

E. All other fill shall be placed and compacted in a manner similar to that described above for structural fill, except that dike or levee fill required below water level in peat excavation areas, may be placed as one lift, in-the-wet, to an elevation one (1) foot above the water level at the time of filling.

F. Areas adjacent to structures and other confined areas inaccessible to roller type equipment shall be compacted with approved hand guided mechanical compaction equipment. The Contractor shall also conform to additional backfilling requirements at structures as specified in these specifications. Compaction of the fill by such means shall be to the same degree of compaction as obtained by roller type equipment and the Engineer may make the necessary tests to determine the amount of compactive effort necessary to obtain compaction. Unless such tests indicate that modifications may be made, the fill compacted by mechanical compactors shall be placed in 6-inch layers and thoroughly tamped over the entire surface. Compaction equipment is subject to approval by the Engineer.

3.04 PIPE EXCAVATION AND BACKFILLING

A. Excavation for all trenches required for the installation of pipes and electrical ducts shall be made to the depths indicated on the Drawings and in such manner and to such widths as will give suitable room for laying the pipe or installing the ducts within the trenches, for bracing and supporting and for pumping and drainage facilities. The bottom of the excavations shall be firm and dry, and in all respects acceptable to the Engineer.

B. Where pipes or ducts are to be laid in bedding or encased in concrete, the trench may be excavated by machinery to or just below the designated subgrade provided that the material remaining in the bottom of the trench is no more than slightly disturbed.

C. Where the pipes or ducts are to be laid directly on the trench bottom, the lower part of the trenches shall be excavated to grade by machinery. The excavation work shall be performed so that the resulting excavated surface will be a flat bottomed trench, true to grade, so that pipe or duct can be evenly supported on undisturbed material. Bell holes shall be hand excavated as required to assure that the pipe and backfill overburden is supported on the entire length of the barrel of each piece of pipe.

D. Backfilling over pipes shall begin as soon as practicable after the pipe has been laid, jointed, and inspected and the trench filled with suitable compacted bedding material up to a level even with six-tenths of the outside diameter of the pipe or as otherwise required on the Drawings. Care shall be taken during placement and compaction of the bedding material by “shovel slicing” to assure that the haunch areas on each side of the pipe are uniformly supported by well compacted bedding material.

E. Backfilling over ducts shall begin not less than three days after placing concrete encasement.

F. All backfilling shall be prosecuted expeditiously and as detailed on the Drawings.

G. Any space remaining between the pipe and sides of the trench shall be packed full with bedding material by hand shoveling and thoroughly compacted with a tamper as fast as placed in lifts no greater than 6-inches in thickness, up to a level even with six-tenths of the outside diameter of the pipe.

H. The backfilling shall be carried up evenly on both sides of the pipe with at least one man tamping for each man shoveling material into the trench.

I. Granular material shall then be placed and compacted from the top of the bedding material to a minimum depth of one (1) foot above the top of the pipe.

J. The remainder of the trench above the compacted granular material as just described above shall be filled and thoroughly compacted to the required density by rolling, ramming, or puddling, as is appropriate for the nature of the backfill material, to prevent subsequent settling.

3.05 BACKFILLING AROUND STRUCTURES

A. Fill shall be placed in layers having a maximum thickness of eight (8) inches in loose state and shall be compacted sufficiently to prevent settlement. If compaction is by rolling or ramming, material shall be at or near the material's optimum compaction moisture as previously required. Where material can be suitably compacted by flooding, the Contractor may use this method.

B. Backfilling shall be carried up evenly on all walls of an individual structure simultaneously. A longitudinal variation of two (2) feet and a horizontal variation of three (3) inches in elevation will be the maximum allowable. No backfill shall be allowed against walls until the walls and their supporting slabs, if applicable, have attained sufficient strength. Backfilling shall be subjected to approval of the Engineer.

C. In locations where pipes pass through building walls, the Contractor shall take the following precautions to consolidate the backfilling up to an elevation of at least one (1) foot above the bottom of the pipes:

1. Place structural fill in such areas for a distance of not less than three (3) feet either side of the center line of the pipe in level layers not exceeding 6-inches in thickness.

2. Wet each layer to the extent directed by the Engineer and thoroughly compact each layer with a power tamper to the satisfaction of the Engineer.

D. The final finished surface of filled areas shall be graded to smooth true lines, strictly conforming to grades indicated on the grading plan, and no soft spots or uncompacted areas will be allowed in the Work.

E. Temporary bracing shall be provided as required during construction of all structures to protect partially completed structures against all construction loads, hydraulic pressure, and earth pressure. The bracing shall be capable of resisting all loads applied to the walls as a result of backfilling.

3.06 GRADING

A. General: Uniformly grade areas within limits of grading under this Section, including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations are shown, or between such points and existing grades as are required or shown on the Drawings.

B. Grading Outside Building Lines: Grade areas adjacent to building lines, as shown on the Drawings, to drain away from structures and to prevent ponding. Finish surface free from irregular surface changes, and as follows:

1. Lawn or Unpaved Areas: Finish areas to within not more than 0.10 feet above or below the required elevation.

2. Walks: Shape surface of areas under walks to line, grade and cross-section, with finish surface not more than 0.01 feet above or below the required subgrade.

C. Grading Surface of Fill Under Building Slabs: Grade smooth and even, free of voids, compacted as specified, and to required elevation. Provide final grades within a tolerance of 1/2-inch when tested with a 10-foot straightedge.

D. Compaction: After grading, compact subgrade surfaces to the depth and percentage of maximum dry density for each area classification.

E. Grading shall be performed at such places as are indicated on the Drawings, to the lines, grades, and elevations shown or as directed by the Engineer and shall be made in such a manner that the requirements for formation of embankments can be followed. All unacceptable material encountered, of whatever nature within the limits indicated, shall be removed and disposed of in accordance with this specification. During the process of excavation, the grade shall be maintained in such condition that it will be well drained at all times. When directed, temporary drains and drainage ditches shall be installed to intercept or divert surface water that may affect the prosecution or condition of the work.

F. If at the time of excavation it is not possible to place any material in its proper section of the permanent structure, it shall be stockpiled in approved areas for later use. No extras will be considered for the stockpiling or double handling of excavated material.

G. The right is reserved to make adjustments or revisions in lines or grades if found necessary as the work progresses, due to discrepancies on the Drawings or in order to obtain satisfactory construction.

H. All fill slopes shall be uniformly dressed to the slope, cross section and alignment shown on the Drawings, or as directed by the Engineer.

I. In cuts, all unstable material on the back slopes shall be barred loose or otherwise removed to line or finished grade of slope. All cut and fill slopes shall be uniformly dressed to the slope, cross section and alignment shown on the Drawings or as directed by the Engineer.

J. No grading is to be done in areas where there are existing pipelines that may be uncovered or damaged until such lines, which must be maintained, are relocated, or where lines are to be abandoned, all required valves are closed and drains plugged at manholes.

3.07 DISPOSAL OF UNSUITABLE AND SURPLUS MATERIAL

A. Unsuitable and surplus excavated materials, unless specified otherwise below, and pavement shall become the property of the Contractor to be removed and disposed of by the Contractor off the project site.

B. Usable, excavated material may be used for fill or backfill if it meets the specifications and is approved by the Engineer. Excavated material so approved may be neatly stockpiled at the site where designated by the Engineer provided there is an area available that will not interfere with the Owner's access nor inconvenience traffic or adjoining property owners.

C. Surplus suitable excavated material shall be used to fill depressions as the Engineer may direct.

D. In instances where the Owner can use surplus excavated materials and so desires to retain possession of the material, the Contractor will be directed in the Special Provisions to transport the material to a specific soil storage area and either stockpile or spread the material. Broken pavement shall not be hauled to the Owner's storage area.

3.08 SPECIAL FOUNDATIONS

A. The Contractor shall furnish and install a special foundation for gravity sewer pipe and manholes or other pipes (i.e., force mains, water mains, etc.) as shown on the Drawings.

B. All gravity sewer lines and laterals shall be installed on the special bedding foundation and the prices for laying gravity sewer lines shall include this cost. This bedding shall be as previously specified and placed in the trench to the proposed elevation prior to any pipe laying. This bedding shall not be used under any circumstances as a drain for groundwater. The Contractor shall take all precautions necessary to maintain the bedding in a compacted state and to prevent washing, erosion or loosening of the pipe bedding.

3.09 MAINTENANCE

A. Protection of Graded Areas: Protect newly graded areas from traffic and erosion. Keep areas free of trash and debris and repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.

B. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape and compact to required density prior to further construction.

END OF SECTION

TECHNICAL SPECIFICATIONS
DIVISION 02 - SITEWORK

SECTION 02300 - CHAIN LINK SECURITY FENCE

PART 1 - GENERAL

1.01 General: The fencing shall be of the chain link type with top rail and single extension arms carrying three strands of barbed wire. The fence fabric shall be six (6) feet in height and the overall fence height shall be seven (7) feet, including the barbed wire, unless otherwise specified by Project Engineer. All fabric and metal parts of the fence shall be similar to USS Cyclone "Invincible" type fence or equal.

PART 2 – PRODUCTS

2.01 Materials:

A. Hot Dipped Galvanized Steel Wire Fabric: Steel wire fabric shall be chain link No. 9 Gauge woven in a 2 inch diamond mesh, top and bottom selvage to have a twisted and barbed finish. Steel wire shall be galvanized after fabrication and shall conform to the requirements of ASTM A392 with Class 2 coating.

B. Line Posts: Line posts shall be 2-1/2 inch O.D. steel pipe weighing 3.65 pounds per foot or H column weighing 4.1 pounds per foot. Posts shall be hot dip galvanized. The use of 2.25 x 1.70 roll-formed C-sections shall also be acceptable.

C. Top Rail: Top rail shall be 1-1/4 inch O.D. steel pipe and weighing 2.27 pounds per foot provided with 7 inch couplings every twenty feet. The use of a 1.625 x 1.25 roll-formed C-section shall also be acceptable.

D. Braces: Braces shall be 1-1/4 inch O.D. steel pipe weighing 2.27 pounds per foot to be installed midway between the top rail and the ground.

E. Terminal Posts: All end, corner and pull posts shall be 3 inch O.D. steel pipe weighing 5.79 pounds per foot.

F. Fittings: All fittings used in fence assembly shall be malleable cast iron or pressed steel.

G. Post Tops: All posts shall be equipped with tops designed to hold the top rail and to exclude moisture.

H. Extension Arm: Extension arms to hold the barbed wire shall extend at a 45 degree angle with lock wire for securely fastening the barbed wire equally spaced with the top strand located twelve inches above the fabric and twelve inches out from the fence line.

I. Barbed Wire: Barbed wire to be of the four point pattern composed of two

strands of 12-1/2 inch gauge line steel wires with a minimum aluminum coating of 0.30 oz. per square foot of wire surface.

J. Wire Fabric Connections: The fabric shall be attached to the posts with an approved type fastener standard with the manufacturer.

PART 3 – EXECUTION

3.01 Installation Requirements: Finished fencing shall be in proper alignment with posts plumb and all wire work taut. Care shall be exercised to equalize the tension or pull on each side of the posts. All corner, end, angle, pull and gate posts shall be braced. All hardware shall be thoroughly secured, properly adjusted and left in perfect working order.

A. Concrete Bases: Concrete bases for metal posts shall conform to the applicable requirements of Division 3 "Concrete" of these Specifications.

B. Posts: Post spacing shall be a maximum of 10 feet on centers. Line posts shall be set in concrete 3'-4" x 12" diameter to a depth of 3 feet below finished grade. Terminal and gate posts shall be set in concrete 3'-4" x 16" diameter to a depth of 3 feet below finished grade. Top of concrete base to carry 1 inch cone. Fencing shall not be applied to posts until the concrete base is at least 7 days old.

C. Fabric: Chain link fabric shall be stretched taut and clipped to line posts with wire ties on approximately 12 inch centers. Fabric selvage shall be attached to the top rail with tie clips at intervals not exceeding 2 feet.

D. Barbed Wire: Each strand shall be pulled taut and securely fastened to the extension arms by pins, ties, or other approved mechanical means.

E. Grading: Ground surface along the fence line shall be graded as necessary to maintain adequate clearance, but to eliminate openings.

3.02 Utilization of Existing Fence Materials: The Contractor may utilize to the maximum extent possible any existing fence fabric and gates which are to be removed during the course of construction unless otherwise directed by the Engineer. Where these materials are to be reused, new fence posts, fittings, braces, barbed wire and connections shall be provided.

END OF SECTION

TECHNICAL SPECIFICATIONS
DIVISION 02 - SITEWORK

SECTION 02411 – STEEL SHEET PILING

PART 1 – GENERAL

1.01 SCOPE

The work covered by this section consists of furnishing all plant, equipment, labor and materials and performing all operations in connection with the installation of Contractor furnished steel sheet piling in accordance with these specifications and applicable drawings.

1.02 REFERENCES

The following standards of the issues listed below and referred to thereafter by basic designation only from a part of this specification to the extent indicated by the references thereto:

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)
STANDARDS

ASTM A 36	(1994) Carbon Structural Steel
ASTM A 328	(1993a) Steel Sheet Piling
ASTM A 572	(1994c) High-Strength Low-Alloy Columbian-Vanadium Of Structural Quality

1.03 QUALITY CONTROL

The Contractor shall establish and maintain quality control for pile driving operations to assure compliance with contract specifications and maintain records of its quality control for all construction operations including, but not limited to, the following:

1. Accurate location, alignment and plumbness of piling.
2. Full and proper engagement of interlocks.
3. Driving (pile hammer and rate of operation).
4. Final position; depth of penetration; tip and cut-off elevations.
5. Location and elevation of any obstruction encountered and action directed by Project Engineer.
6. Pulled piles and redriving.
7. Cutting and splicing (welding).
8. Removal and disposal of damaged piles.

SECTION 02411 – STEEL SHEET PILING

PART 2 -PRODUCTS

2.01 STEEL SHEET PILING

Steel for sheet piling shall conform to the requirements of ASTM A 572. Sheet piling shall be of the type and dimensions indicated on the drawings, and be of a design such that when in place they will be continuously interlocked throughout their entire length. All sheet piling shall be provided with standard pulling holes located approximately 4-inches below the top of the pile, unless otherwise shown or directed.

2.02 Z-TYPE PILING, ASTM A 572

New Z-type steel sheet piling conforming to ASTM A 572 Grade 50, with a minimum material thickness of .335-inches, a maximum overall width of 27-inches and minimum section modules of 16.8in^3/foot of wall for PZ-22.

2.03 SHEET PILING LENGTHS

All new sheet piling shall be provided in full lengths.

PART 3 - EXECUTION

3.01 PLACING AND DRIVING

A. Placing – Any excavation required within the area where sheet pilings are to be installed shall be completed prior to placing sheet pilings. Pilings shall be carefully located as shown on the drawings or directed by the Project Engineer. Pilings shall be placed as true to line as possible. Suitable temporary wales, templates, or guide structures shall be provided to insure that the piles are placed and driven to the correct alignment. Piles shall be placed in a plumb position with each pile interlocked with adjoining piles for its entire length, so as to form a continuous diaphragm throughout the length of each run of piling wall. Interlocks shall be properly engaged.

B. Driving – All piles shall be driven to the depths shown on the drawings and shall extend to the cut-off elevation indicated. A tolerance of 1.5 inches above or below the indicated cut-off elevation will be permitted. Pilings shall be driven by approved methods so as not to subject the pilings to damage and to insure proper interlocking throughout their lengths. Pile hammers shall be maintained in proper alignment during driving operations by use of leads or guides attached to the hammer. A protecting cap shall be employed in driving, when required, to prevent damage to the tops of pilings. Pilings damaged during driving or driven out of interlock shall be removed and replaced. All piles shall be driven without

the aid of a water jet, unless otherwise authorized. Adequate precautions shall be taken to insure that piles are driven plumb. Sheet piling shall not be driven more than 0.25-inches per foot out of plumb in the plane of the wall nor more than 0.125-inch per foot out of plumb perpendicular to the plane of the wall. If at any time the forward or leading edge of the piling wall is found to be out-of-plumb more than 0.25-inch per foot in the plane of the wall or 0.125-inch per foot perpendicular to the plane of the wall, the assembled piling shall be driven to the required depth and tapered pilings shall be provided and driven to interlock with the out-of-plumb leading edge or other approved corrective measures shall be taken to insure the plumbness of succeeding pilings. The maximum permissible taper for any tapered piling shall be 1.25-inch per foot of length. Unless specifically indicated otherwise, each run of piling wall shall be driven to grade progressively from the start and pilings in each run shall be driven alternately in increments of depth to the required depth or elevation. On each day of sheetpile driving, the Contractor shall stab only the number of piles that can be driven to grade by the end of the day, and all piling stabbed shall be driven to grade by the end of each working day except that the last two piles may remain tapered up to receive the next day piles. No pile shall be driven to a lower elevation than those behind it in the same run except when the piles behind it cannot be driven deeper or in areas where there will be wall penetrations or obstructions are encountered. In this case, piling will be allowed to remain above final grade until the obstruction is removed or the penetration is completed. Alternately, if it is determined that an obstruction cannot be removed, the Contractor shall make such changes in design alignment of the pile structure as may be deemed necessary by the Project Engineer to insure the adequacy and stability of the structure. Payment for the additional labor and materials necessitated by such changes will be made at the applicable contract prices. If the piling next to the one being driven tends to follow below final grade, it may be pinned to the next adjacent piling. The Contractor is advised that buried stumps or similar debris may be encountered periodically on the sheet pile wall alignment and appropriate consideration should be given to hard driving conditions, should they occur.

3.02 EMERGENCY LOCKING SYSTEM ON PILE DRIVING HEAD

All pile driving equipment shall be equipped so as to prevent piles from falling when a single or multiple power failure occurs after the pile driving head is attached to the pile. The jaws of vibratory hammers shall be equipped with devices such that upon loss of hydraulic pressure, the jaws will not release the pile.

3.03 CUTTING OFF AND SPLICING

Piles extending above grade in excess of the specified tolerance, and which cannot be driven deeper, shall be cut off to the required grade. The Contractor shall also trim the tops of piles excessively battered during driving, when directed to do so, at no cost to the

Owner. Cut-offs shall become property of the Contractor and shall be removed from the worksite. Piles driven below the elevations indicated for the top of piles and piles which, because of damaged heads, have been cut off to permit further driving and are then too short to reach the required top elevation, shall be extended to the required top elevation by welding an additional length, when directed, without cost to the Owner. Should splicing of additional lengths be necessary, the splice shall consist of an approved butt joint with a weld that fully penetrates the web. Welded extensions shall be a minimum of 6-inches in length. Piles adjoining spliced piles shall be full length unless otherwise approved. When piles are to be driven in sections and spliced together, they shall be delivered on site in full lengths and cut for splicing only after delivery. Only those portions of the originally uncut pile shall be spliced together to form the final in-place full-length pile. Splices for these piles shall conform to the details shown on the drawings. Ends of pilings to be spliced together shall be squared before splicing to eliminate dips or camber. Pilings shall be spliced together with concentric alignment of the interlocks so that there are no discontinuities, dips or camber at the abutting interlocks. Spliced pilings shall be free sliding and able to obtain the maximum swing with continuous pilings.

3.04 PAINTING

A. Paint Formulations – Formula C-200a, Coal Tar-Epoxy (Black) Paint shall conform to SSPC Paint 16 manufactured with Type 1 pitch.

B. Cleaning and Preparation of Surfaces to be Painted – Surfaces to be painted shall be cleaned before applying paint or surface treatments. Solvent cleaning shall be accomplished with mineral spirits or other low toxicity solvents having a flash point above 100 degrees F. Clean cloths and clean fluids shall be used to avoid leaving a thin film of greasy residue on the surfaces being cleaned. Items not to be prepared or coated shall be protected from damage by the surface preparation methods. Cleaning and painting shall be so programmed that dust or other contaminants from the cleaning process do not fall on wet, newly painted surfaces, and surfaces not intended to be painted shall be suitably protected from the effects of cleaning and painting operations. Welding of, or in the vicinity of, previously painted surfaces shall be conducted in a manner to prevent weld spatter from striking the paint and to otherwise reduce coating damage to a minimum; paint damaged by welding operations shall be restored to original condition. Surfaces to be painted that will be inaccessible after construction, erection, or installation operations are completed, shall be painted before they become inaccessible.

C. Paint Application – Application of coating shall be in strict accordance with the manufacturer's recommendations. The finished coating shall be free from holidays, pinholes, bubbles, runs, drops, ridges, waves, laps, excessive or unsightly brush marks, and variations in color, texture, and gloss. Each paint coat

shall be applied in a manner that will produce an even, continuous film of uniform thickness.

D. Drying Time Prior to Immersion – Minimum drying periods after final coat prior to immersion shall be at least 7 days. Minimum drying periods shall be increased twofold if the drying temperature is below 65 degrees F and/or if the immersion exposure involves considerable abrasion.

E. Protection of Painted Surfaces – Items that have been painted shall not be handled, worked on, or otherwise disturbed until the paint coat is fully dry and hard. All metalwork coated in the shop or field prior to final erection shall be stored out of contact with the ground in a manner and location that will minimize the formation of water-holding pockets; soiling, contamination, and deterioration of the paint film, and damaged areas of paint on such metalwork from welding or erection shall be cleaned and touched up without delay. The first field coat of paint shall be applied within a reasonable period of time after the shop coat and in any event before weathering of the shop coat becomes extensive.

F. Painting Schedules – Items or surfaces to be coated: The top one half of all steel sheet pile (7 ½ feet) and entire C12 x 20.7 top cap.

SURFACE PREPARATION	1ST COAT	2ND COAT	3RD COAT
White metal blast clean	Coal tar-epoxy C-200a (black)	Coal tar-epoxy C-200a (black)	Coal tar-epoxy C-200a (black) (if needed to attain required thickness)

G. Protection of Non-painted Items and Cleanup – All items in the vicinity of the surfaces being painted shall be maintained free of damage by paint or painting activities. Prompt cleanup of any paint spillage and prompt repair of any painting activity damage shall be required.

END OF SECTION

TECHNICAL SPECIFICATIONS
DIVISION 02 - SITEWORK

SECTION 02485 - LAWNS AND GRASS

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. Work to be performed under this section shall be either restoration or establishment of vegetative cover for aesthetic and erosion control purposes and, unless specified otherwise in the Bid Form and Section 01150, Measurement and Payment, this work shall be considered incidental to other work in the contract, including but not limited to pipeline and utility construction. The Contractor shall make investigations of the project to determine types of existing vegetative cover that will require restoration and shall take all measures necessary to restore the vegetative cover in like kind to that which existed prior to the beginning of the Work.

B. Furnish all labor, materials, and equipment necessary to satisfactorily return all construction areas to their original conditions or better.

1.02 REFERENCED STANDARDS

All work in this Section shall be in accordance with "Louisiana Standard Specifications for Roads and Bridges", 1992 Edition as revised or amended by supplementation. This standard specification will hereinafter be referred to as "LA DOTD Standards". When the term department is used in this specification, it shall mean Engineer.

1.03 QUALITY ASSURANCE

Requirements: It is the intent of this specification that the Contractor is obliged to deliver a satisfactory stand of grass as specified. If necessary, the Contractor shall repeat any or all of the work, including grading, fertilizing, watering, and seeding or sodding until a satisfactory stand is obtained.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Fertilizer: Fertilizer shall be in accordance with LA DOTD Specifications, latest revision, Section 718.

SECTION 02485 - LAWNS AND GRASS

B. Seeding:

1. The Contractor shall sow grass seed on all unpaved areas disturbed during construction which do not require sod. All seeding shall be completed in conformance with LA DOTD Specifications latest revision, Section 717. The grassed areas shall be mulched and fertilized in accordance with LA DOTD Specifications.

2. The following grass species may be established by seeding procedures:

   a. Hulled Bermuda
   b. Pensacola Bahia
   c. Kentucky 31 Fescue
   d. Crimson Clover

C. Sodding:

1. Sod shall be provided as required in accordance with LA DOTD Specifications, latest revision, Section 714. The Contractor shall furnish sod equal to and similar in type as that disturbed. Placement and watering requirements shall be in accordance with LA DOTD requirements.

2. The following grass species shall be established by sodding procedures.

   a. Carpet
   b. Saint Augustine
   c. Centipede
   d. All other species not listed under Seeding.

3. The drawings indicate areas to be sodded as the top and side slopes of levees in work areas on the oxidation pond and in selected areas on construction. Other areas within the limits of construction shall be seeded as required.

4. In addition to the above list, the following areas shall have vegetative cover restored by sodding procedures irrespective of the grass species.

   a. Slopes steeper than four (4) horizontal and one (1) vertical.
   b. Locations subject to concentrations of water flow or erosion including but not limited to roadway ditch bottoms and flume areas where storm water runoff is concentrated.
   c. Repair of eroded areas within areas previously seeded.

D. Topsoil: Topsoil stockpiled during excavation may be used. If additional topsoil is required to replace topsoil removed during construction, it shall be obtained offsite and provided by the Contractor. Topsoil shall be fertile, natural surface soil, capable of providing an adequate growing medium for all trees, plants, and grassing specified herein.

E. Water: It is the Contractor's responsibility to supply all water to the site, as required during seeding and sodding operations and through the maintenance period and until the work is accepted.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Finish Grading: Areas to be seeded or sodded shall be finished graded, raked and debris removed. Soft spots and uneven grades shall be eliminated.

B. Time of Seeding and Sodding: When the trench backfill has stabilized sufficiently, the Contractor shall commence work on lawns and grassed areas, including fine grading as required and in accordance with the following:

1. Seed for specific grass species shall be placed in accordance with Table 1 of Section 717 of the LA DOTD Specifications.
2. Sod may be placed during the period of January through October 20, but no sod shall be placed during the period October 21 through December 31.

C. Watering: When necessary, additional water shall be applied to seeded and sodded areas, including those locations where trees, shrubs and other vegetative plantings have been replanted or replaced in accordance with Section 02100, to supplement natural rainfall in accordance with Table A below. Water shall be applied with approved sprinkling equipment that will spread the water evenly and in a manner that will not cause erosion of the soil surface. Application of water shall be suspended during period when temperatures are expected to drop below thirty-five degrees Fahrenheit and shall be resumed when the weather moderates.

3.02 REPAIRS TO LAWN AREAS DISTURBED BY CONTRACTOR'S OPERATIONS

A. Areas damaged by placement of excavated material where existing grass is still living and more than fifty percent (50%) of the existing grass, is left in place shall be repaired by filling depressions and scars created by equipment tires, tracks, or scarification teeth with topsoil, application of fertilizer over the entire area at the rates prescribed, and reseeding as earlier specified.

END OF SECTION

TECHNICAL SPECIFICATION
DIVISION 02 - SITEWORK

SECTION 02500 - PAVING AND SURFACING

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

This Section of the Specifications details requirements of work and materials to be used in connection with all hauling, rolling, compacting, and other operations pertaining thereto for the construction of various roadways, driveways, sidewalks, curbs, and gutters all in accordance with the items of work Specified and shown on the Plans and contained in the Proposal Form.

1.02 REFERENCED STANDARDS

All work in this Section shall be in accordance with "Louisiana Standard Specifications for Roads and Bridges", latest edition as revised, amended and/or supplemented by the State of Louisiana Department of Transportation and Development, Office of Highways pertaining to these items. This standard specification will hereinafter be referred to as "LA DOTD Standards". When the term department is used in this specification, it shall mean Engineer.

PART 2 - PRODUCTS

2.01 ASPHALTIC CONCRETE

Asphaltic Concrete Materials shall conform to the following Sections and Subsections of LA DOTD Standards:

Asphalt Materials and Additives	1002.01 & 1002.02
Aggregates	1003.01 & 1003.06
Hydrated Lime	1018.03(a)
Mix Releasing Agent	1018.25

All Asphaltic Concrete used for pavement in this Contract shall be as defined in Section 501 through 509 of LA DOTD Standards.

SECTION 02500 - PAVING AND SURFACING

2.02 PORTLAND CEMENT CONCRETE PAVEMENT

Portland cement concrete and associated paving materials shall conform to the following Sections and Subsections of LA DOTD Standards:

Portland Cement Concrete	901
Portland Cement	1001.01
Portland-Pozzolan Cement	1001.02
Masonry Cement	1001.03
Aggregates	1003.02
Joint Materials	1005
Reinforcing Steel and Wire Rope	1009
Curing Materials and Admixtures	1011.01 & 1011.02
Water and Fly Ash	1018.01 & 1018.15

All Portland Cement Concrete used for pavement in this Contract shall be pavement type "B" or "C" as defined in Section 901 of LA DOTD Standards.

2.03 PORTLAND CEMENT CONCRETE CURBS AND GUTTERS

Portland Cement Concrete and associated materials for Curbs and Gutters shall conform to the following Sections and Subsections of LA DOTD Standards:

Portland Cement Concrete	901
Portland Cement	1001.01
Portland-Pozzolan Cement	1001.02
Masonry Cement	1001.03
Aggregates	1003.02
Joint Materials	1005
Reinforcing Steel and Wire Rope	1009
Curing Materials and Admixtures	1011.01 & 1011.02
Water and Fly Ash	1018.01 & 1018.15

SECTION 02500 - PAVING AND SURFACING

2.04 PORTLAND CEMENT CONCRETE, CONCRETE WALKS, DRIVES AND INCIDENTAL PAVING

Portland Cement Concrete and associated materials for Walks, Drives and Incidental Paving shall conform to the following Sections and Subsections of LA DOTD Standards:

Portland Cement Concrete	901
Portland Cement	1001.01
Portland-Pozzolan Cement	1001.02
Masonry Cement	1001.03
Aggregates	1003.02
Joint Materials	1005
Reinforcing Steel and Wire Rope	1009
Curing Materials and Admixtures	1011.01 & 1011.02
Water and Fly Ash	1018.01 & 1018.15

2.05 BASE COURSE MATERIALS

Base Course Materials for the various types of base courses shall conform to the following Sections and Subsections of LA DOTD Standards:

Asphaltic Concrete	501
Portland Cement Concrete	901, 303
Hydraulic Cement	1001
Asphalt Materials and Additives	1002
Sand Clay Gravel	1003.01 and 1003.03(A)
Stone	1003.03(d)
Recycled Portland Cement Concrete	1003.03(e)
Crushed Slag	1003.03(f)
Water	1018.01

SECTION 02500 - PAVING AND SURFACING

2.06 AGGREGATE SURFACE

Aggregate Surface Materials for the various types of Surface Courses shall conform to the following Sections and Subsections of LA DOTD Standards:

Stone	1003.04(a)
Sand Clay Gravel	1003.04(b)
Recycled Portland Cement Concrete	1003.04(d)
Crushed Slag	1003.04(f)

Unless otherwise approved in writing, the same type of material shall be used throughout the project.

2.07 LIME TREATMENT

Materials for lime treatment subbase shall conform to the following Sections and Subsections of LA DOTD Standards:

Asphalt Material Additives	1002.02
Water	1018.01
Lime	1018.03

2.08 TEMPORARY PAVEMENT MARKINGS

Materials for Temporary Pavement Markings shall conform to the following Subsection of the Louisiana DOTD Standards:

Temporary Tape	1015.08(a)
Painted Stripe	1015.08(b)

2.09 RAISED PAVEMENT MARKERS

Materials for Raised Pavement Markers shall conform to the following Subsection of the LA DOTD Standards:

Nonreflectorized Markers	1015.09(a)
Reflectorized Markers	1015.09(b)
Adhesive	1015.09(c)

SECTION 02500 - PAVING AND SURFACING

2.10 THERMOPLASTIC PAVEMENT MARKINGS

Materials for Thermoplastic Pavement Markings shall conform to Subsections 1015.10 and 1015.13 of the LA DOTD Standards.

2.11 PREFORMED PLASTIC PAVEMENT MARKINGS

Materials for Performed Plastic Pavement Markings shall conform to Subsection 1015.11 of the LA DOTD Standards.

2.12 TRAFFIC PAINT

Materials for Traffic Paint shall conform to Subsections 1015.12 and 1015.13 of the LA DOTD Standards.

2.13 TOPSOIL SHOULDERS

Topsoil shoulders shall conform to Section 715 of the LA DOTD Standards.

PART 3 - EXECUTION

3.01 BASE AND SUBBASE COURSES

This work consists of furnishing and placing a base course or courses on a prepared surface in accordance with these Specifications, in conformity with the lines, grades, thickness' and typical cross sections shown on the Plans or established by the Engineer. Unless approved in writing or specified otherwise, the same base course material shall be used throughout the project.

Base and subbase courses shall conform to the following Sections of LA DOTD Standards:

Class I Base Course	301
Class II Base Course	302
In-Place Cement Stabilized Base Course	303
Lime Treatment	304
Subgrade Layer	305
Scarifying and Compacting Roadbed	306

All grade courses (roadbeds), base courses, and subbase covers requiring lime stabilization shall be in accordance with type "B" treatment a specified in Section 304. The Owner shall obtain the services of a qualified soils laboratory to recommend the percentage of lime to be incorporated in each type of course to be furnished by the Contractor. In no case shall the required percentage be less than three (3%) percent by weight.

SECTION 02500 - PAVING AND SURFACING

3.02 ASPHALTIC PAVEMENTS

These Specifications are applicable to asphaltic concrete wearing, binder, and base course mixtures of the plant mix type.

This work consists of furnishing and constructing one or more courses of asphaltic concrete mixture applied hot to the prepared and approved foundation in conformance with lines, grades, thickness', and typical cross sections shown on the Plans or established by the Engineer within tolerances specified. The mixture shall consist of aggregates and asphalt with additives, combined in such proportions to meet the requirements as specified in the Sections below.

Asphaltic concrete wearing, binder, and base course mixtures shall conform to the following Sections of LA DOTD Standards:

Asphaltic Concrete Mixtures	501
Asphaltic Concrete Equipment and Processes	503
Asphaltic Tack Coat	504
Asphaltic Prime Coat	505
Asphaltic Curing Membrane	506
Asphaltic Surface Treatment	507
Asphalt Treated Drainage Blanket	508

3.03 PORTLAND CEMENT CONCRETE PAVEMENT

This work consists of constructing portland cement concrete pavements, with or without reinforcement as specified, on a prepared subgrade or base course in accordance with these Specifications in conformity with the lines, grades, thickness' and typical cross sections shown on the Plans or established by the Engineer.

Portland cement concrete pavement shall conform to Section 601 of LA DOTD Standards.

3.04 AGGREGATE SURFACE COURSES

This work consists of furnishing and constructing aggregate surface courses for roadways, shoulders, drives or other facilities in accordance with these Specifications, and in conformity with the lines, grades, thickness' and typical Sections shown on the Plans or established by the Engineer.

Aggregate surface courses shall conform to Section 401 of LA DOTD Standards.

SECTION 02500 - PAVING AND SURFACING

3.05 CURBS AND GUTTERS

This work consists of furnishing and constructing curbs and gutters in accordance with these Specifications and in conformity with lines, grades, dimensions and typical sections shown on the Plans and established by the Engineer.

Curbs and gutters shall conform to Section 707 of LA DOTD Standards.

3.06 CONCRETE WALKS, DRIVES AND INCIDENTAL PAVING

This work consists of furnishing and constructing portland cement concrete walks, drives, and incidental paving slabs in accordance with these Specifications and in conformity with lines and grades shown on the Plans or established by the Engineer.

Concrete walks, drives, and incidental paving shall conform to Section 706 of LA DOTD Standards.

3.07 PAVEMENT PATCHING, WIDENING, AND JOINT REPAIR

This work consists of patching, widening, and joint repair of existing pavements in accordance with these Specifications and in conformity with the lines, grades, and typical cross sections shown on the Plans or as established by the Engineer.

Pavement patching, widening, and joint repair shall conform to Section 724 of LA DOTD Standards.

3.08 COLD PLANING ASPHALTIC PAVEMENT

This work consist of removing asphaltic concrete surfacing in accordance with these specifications and in conformity with the average depth, width, grade, cross-slope and typical sections shown on the plans or established by Engineer.

Cold planing asphaltic pavement shall conform to Section 509 of LA DOTD Standards.

The asphalt aggregate material produced from the cold planing operations shall become the property of the Contractor.

3.09 RAISED PAVEMENT MARKERS

This work consists of furnishing and placing reflectorized and nonreflectorized raised pavement markers at the locations shown on the plans or as directed, and in conformance with the plan details and these specifications.

Raised Pavement Markers shall be in accordance with Section 731 of the Louisiana DOTD Standards.

SECTION 02500 - PAVING AND SURFACING

3.10 PLASTIC PAVEMENT MARKINGS

This work consists of furnishing and placing reflective pavement markings of hot applied plastic at the locations shown on the plans or as directed, and in conformance with plan details and these specifications.

Plastic Pavement Marking shall be in accordance with Section 732 of the Louisiana DOTD Standards.

END OF SECTION

TECHNICAL SPECIFICATIONS
DIVISION 02 - SITEWORK

SECTION 02713 - WATER SYSTEMS

PART 1 - GENERAL

1.01 SCOPE OF WORK -

A. Furnish all labor, materials, equipment and incidentals necessary to completely furnish, install, test, and clean water system piping, joints, fittings, valves, services and appurtenances shown on the drawings and as specified herein.

B. The Work included under this section shall be for all buried potable water piping systems. For the purposes of this specification buried piping shall be all pipe and fittings which are installed beneath the finished ground surface and is encapsulated in a soil or granular trench or bedding. Buried pipe shall be considered to begin at the first joint of a fitting or pipe that lies beneath the finished ground surface.

C. Mechanical joint restraint systems which use set screw or lug type devices or which rely predominately on longitudinal shear forces imposed in or on the wall of the polyethylene pipe to secure the pipe to a standard mechanical joint shall not be considered as an acceptable joint restraint system for HDPE pipe.

1.02 REFERENCE STANDARDS: - The latest revision of the following publications apply to this project

A. American Railroad Engineering Association Manual for Railroad Engineering.

B. American National Standards Institute. - ANSI B16.1, American National Standard for Cast Iron Flanged Fittings and Flanges.

C. American Society for Testing and Materials

1. ASTM D1248, Standard Specification for Polyethylene Plastic Molding and Extrusion Materials.
2. ASTM D1784, Standard Specification for Rigid Poly (Vinyl Chloride) Compounds and Chlorinated Poly (Vinyl Chloride) Compounds.
3. ASTM D2241, Standard Specification for Poly (Vinyl Chloride) (CPVC) Plastic Pipe (SDR-PR).
4. ASTM D2564, Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems.
5. ASTM D2855, Standard Practice for Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings.
6. ASTM F656, Specification for Primers for Use in Solvent Cement Joints of Poly(Vinyl Chloride) (PVC) Plastic Pipe and Fittings.
7. ASTM F1674, Standard Test Method for Joint Restraint Products for Use with PVC Pipe.

SECTION 02713 - WATER SYSTEMS

D. American Water Works Association

1. AWWA C104, Standard for Cement-Mortar Lining for Ductile Iron and Gray-Iron Pipe and Fittings for Water (ANSI A21.4).
2. AWWA C105, Standard for Polyethylene Encasement for Ductile-Iron Piping for Water and Other Liquids (ANSI 21.05)
3. AWWA C110, Standard for Gray-Iron and Ductile Iron Fittings 3" through 48", for Water and Other Liquids (ANSI A21.10).
4. AWWA C115, Standard for Flanged Ductile-Iron Pipe With Ductile-Iron or Gray-Iron Threaded Flanges (ANSI A21.15).
5. AWWA C151, Standard for Ductile Iron Pipe, Centrifugally Cast, for Water or Other Liquids (ANSI A21.51).
6. AWWA C153, Standard for Ductile-Iron Compact Fittings 3" through 16" for Water and Other Liquids (ANSI A21.53).
7. AWWA C200, Standard for Steel Water Pipe, 6 In. and Larger.
8. AWWA C205, Standard for Cement-Mortar Protective Lining and Coating for Steel Water Pipe, 4 In. and Larger.
9. AWWA C206, Standard for Field Welding of Steel Water Pipe.
10. AWWA C207, Standard for Steel Pipe Flanges for Waterworks Service, Sizes 4 In. Through 144 In.
11. AWWA C208, Dimensions for Fabricated Steel Water Pipe Fittings.
12. AWWA C215, Extruded Polyolefin Coatings for the Exterior of Steel Water Pipelines.
13. AWWA C216, Heat-Shrinkable Cross-Linked Polyolefin Coatings for the Exterior of Special Sections, Connections, and Fittings for Steel Water Pipelines.
14. AWWA C500, Standard for Metal Seated Gate Valves for Water Supply Service.
15. AWWA C502, Standard for Dry-Barrel Fire Hydrants.
16. AWWA C504, Standard for Rubber-seated Butterfly Valves.
17. AWWA C509, Standard for Resilient-Seated Gate Valves for Water Supply Service.
18. AWWA C600, Standard for Installation of Ductile-Iron Water Mains and Their Appurtenances.
19. AWWA C605, Standard for Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water.
20. AWWA C651, Standard for Disinfecting Water Mains.
21. AWWA C700, Standard for Cold-Water Meters - Displacement Type, Bronze Main Case.
22. AWWA C800, Standard for Underground Service Line Valves and Fittings.
23. AWWA C900, Standard for Polyvinyl Chloride (PVC) Pressure Pipe, 4 In. Through 12 In., for Water Distribution.

24. AWWA C901, Standard for Polyethylene (PE) Pressure Pipe and Tubing, ½" through 3", for Water.
25. AWWA C905, Standard for Polyvinyl Chloride (PVC) Water Transmission Pipe, Nominal Diameters 14 In. Through 36 In.
26. AWWA C906, Standard for Polyethylene (PE) Pressure Pipe and Fittings, 4 In. Through 63 In., for Water Distribution.
27. AWWA C907, Standard for Polyvinyl Chloride (PVC) Pressure Fittings, for Water, 4 In. Through 12 In.

E. National Fire Protection Association - NFPA No. 194, Standard for Screw Threads and Gasket for Fire Hose Couplings.

F. National Sanitation Foundation

1. NSF Standard No. 14 for Plastic Piping Components and Related Materials.

2. NSF Standard No. 61 for Drinking Water Systems Components – Health Effects.

3. Louisiana Standard Specification for Roads and Bridges.

1.03 RELATED WORK DESCRIBED ELSEWHERE

A. Perform excavating, trenching, and backfilling for all exterior piping in accordance with pertinent provisions of Division 2 of these specifications. Refer to Division 3 of these specifications for additional requirements relating to piping system concrete supports.

B. For all work performed under this Section, comply with all pertinent, applicable specifications, conditions, and provisions presented in Division 1 of these Specifications and any other applicable Contract requirements of the Owner.

C. Non-buried piping is specified in Division 15 of these specifications.

1.04 QUALITY ASSURANCE

A. Standards - Contractor shall comply with standards specified in this Section, and all other applicable sections of these Specifications.

B. All piping system components, including but not limited to pipe, fittings, gasket materials, lubricants, or other components in contact with the water shall be certified to be in compliance with the requirements of NSF 61.

C. Plastic piping and all components coming into contact with potable water shall meet the requirements of NSF 14.

D. Qualifications of Installers - Contractor shall use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.05 SUBMITTALS

A. Product Data – Within 30 calendar days after issuance of the Notice to Proceed, submit to the Engineer for approval:

1) Complete list of all materials and items proposed to be furnished and installed under this Section.
2) Manufacturers' specifications and other data required to demonstrate compliance with the specified requirements.
3) Manufacturers' recommended installation procedures which, when approved by the Engineer, shall become the basis for inspecting and accepting or rejecting actual installation procedures used on the Work.

B. Drawings Required on Contract Work - Before ordering any water, wastewater, or process piping or appurtenances, furnish to the Engineer six (6) copies of fully dimensioned drawings of the proposed work for approval.

C. Mill Certificates - Mill certificates shall be furnished upon request of the Engineer.

1.06 PRODUCT HANDLING

A. Protection - Use all means necessary to protect the materials of this Section before, during, and after installation and to protect the work and materials of all other trades.

B. Protection of Utilities - Protect existing utilities as specified under the General Conditions section of the Contract Documents and Division 1 of these Specifications.

C. Delivery and Storage - All materials shall be delivered to the job site in their original containers with all labels intact and legible at time of use, and shall be stored in strict accordance with the manufacturer's recommendations as approved by the Engineer.

D. Replacements - In the event of damage, immediately make all repairs and replacements necessary to the approval of the Engineer and at no additional cost to the Owner.

E. Care of Pipe Coatings - Pipe shall be handled so that the coating shall not be damaged. Repair of any damage shall be made at no additional cost to the Owner, and shall be made in a manner satisfactory to the Engineer.

PART 2 - PRODUCTS

2.01 Ductile Iron Pipe and Fittings

A. Pipe - Pipe shall be manufactured and tested in accordance with ANSI/AWWA C150/A21.50, latest revision. Pipe shall be of domestic manufacture and, unless otherwise indicated on the Drawings, pipe class shall be Class 51.

B. Ductile Iron Fittings - Fittings shall be ductile-iron and shall conform to either ANSI/AWWA C110/A21.10 or ANSI/AWWA C153/A21.53. Fittings shall be suitable for use under design pipe pressure ratings.

C. Coating and Lining - All pipe and fittings shall be cement mortar lined and seal coated inside in accordance with ANSI/AWWA C104/A21.4. Buried ductile iron pipe and fittings shall be factory coated with the standard asphaltic coating as detailed in AWWA C151 and shall also be protected by installing polyethylene encasement as defined by AWWA C105.

D. Joints - Unless otherwise indicated on the Drawings, buried joints shall be mechanical or "push-on" joints as follows:

1. Mechanical and "Push On" Joints - Mechanical and "Push-On" joints shall meet ANSI Specification A21.11 (AWWA C111), latest revision. Bolts and nuts for mechanical joints shall be "US ALLOY" as manufactured by U.S. Pipe and Foundry Company, equivalent Corten type or equal. Each bolt shall be supplied with a sacrificial zinc anode cap.

2. Restrained Joints – Restrained joints shall be of the type that mechanically prevents the pipe or fitting joint from separating under normally expected operating conditions. Restrained joints shall be either a premium restrained jointing system as designed by each ductile iron pipe manufacturer or specially designed mechanical joint restraint systems.

a. Premium restrained joints shall be the standard restrained jointing system as developed and manufactured by the ductile iron pipe manufacturer. The joint restraining mechanism shall incorporate joint restraining mechanisms that have been designed for the operating pressures and flow velocities for the piping system to be constructed under this contract. Field joints shall be constructed of

mechanically attached devices, which do not require field welding. Acceptable premium restrained jointing systems are Flex-Ring (Pipe diameters of 4 inches through 12 inches) or Lok-Ring (Pipe diameters 14 inches and larger) as manufactured by American Ductile Iron Pipe Company, TR Flex (Pipe diameters of 4 inches through 36 inches) as manufactured Unites States Pipe & Foundry Company, or approved equal.

b. Mechanical joint restraint systems shall be of the type that is specially designed to prevent separation of a standard mechanical joint, while still allowing flexibility and deflection of the joint. Mechanical joint restraint systems shall be constructed of ductile iron and shall not impede the deflection of the mechanical joint after assembly. Mechanical joint restraint devices shall be Mega-Lug Series 1000 as manufactured by EBAA Iron Sales, Inc. or approved equal. Mechanical joint restraint systems shall use tee bolts and magnesium anodes as specified for non-restrained mechanical joints for assembly of the joint.

2.02 STEEL PIPE AND FITTINGS

A. Pipe and Fittings – Steel pipe and fittings shall be allowed only in special applications and only when approved in writing by the Engineer. Steel pipe shall be manufactured in full accordance with ANSI/AWWA C200, latest revision. Fittings shall be fabricated from steel pipe of the same metallurgy as the pipe being provided on the project and shall be in conformance with ANSI/AWWA C208.

B. In addition to the submittal data required previously in this Section, submittal data for steel piping systems shall include an analysis of requirements for cathodic protection of buried steel pipe. Cathodic protection systems for buried steel pipe shall be supplied and installed with the steel piping system at no additional cost to the Owner. Cathodic protection systems shall not be installed in servitude areas, unless such installation is approved by the Owner in writing.

1. Sacrificial anode cathodic protection systems are acceptable, provided that suitably sized anode beds can be installed within property owned in fee title by the Owner.

2. When buried steel piping systems are to be placed in areas adjacent to other piping systems that are protected by a cathodic protection system, the proposed piping system shall be protected by an induced voltage system. The submittal data for induced voltage cathodic protection systems that are proposed in areas where existing piping systems are protected by cathodic

protection systems shall include evidence of coordination with the operators of the other piping systems to assure compatibility of operation of both cathodic protection systems.

3. Monitoring services to ascertain the condition and effectiveness of cathodic protection systems shall be supplied as part of the cost of steel piping systems. Monitoring services shall be provided for a period of not less than five years after final acceptance of the project. The frequency of inspections shall be no less than one inspection per year, including no less than six inspections with an initial inspection just prior to final acceptance and a final inspection at the end of the five year period.

C. Coating and Lining - Unless otherwise indicated on the Contract Drawings or Specifications, pipe and fittings shall be supplied with cement mortar lining in full accordance with ANSI/AWWA C205, latest revision. The exterior of pipe shall be coated with an extruded polyolefin coating system in accordance with ANSI/AWWA C215 and specials, fittings and joints shall be coated with heat shrinkable cross-linked polyolefin coating in accordance with ANSI/AWWA C216.

D. Joints - Joints shall be welded or of the flange type where required to connect to valves or other appurtenances. Field welding of joints shall be performed in full accordance with ANSI/AWWA C206, latest revision. Flanges shall be in accordance with ANSI/AWWA C207 of the class suitable for the operating pressure of the system in which the steel pipe will be installed, except that flanges shall be of at least Class D and shall be either threaded or of the welding neck type. Flanged joints shall be made with full-face gaskets and low carbon steel bolts and nuts as described for ductile-iron flanged joints in Division 15.

2.03 SEAMLESS PIPE AND FITTINGS

A. Seamless Iron Pipe – Pipe supplied under this specification shall be sized four inches and smaller. All pipe shall conform to ASTM A53, Type S Grade A. Pipe shall be Schedule 40 unless otherwise specified or indicated on the Drawings, except that all pipe used for gaseous or liquid dry chlorine shall be Schedule 80 minimum.

B. Iron Fittings - Fittings shall conform to ASTM A-153, latest revision and be equal to Crane standard malleable galvanized iron fittings or approved equal. Fittings shall be the same weight as the pipe unless otherwise specified or indicated on the Drawings.

C. Joints - Joints for buried pipe shall be of the threaded type. Joints for above ground pipe may be either threaded or flanged.

D. Where required on the drawings, pipe and fittings shall be hot dip galvanized. The galvanized coating shall be as required for the pipe as stated in ASTM A53.

2.04 POLYVINYL CHLORIDE (PVC)

A. Pipe and Fittings – PVC pressure pipe and fittings shall be manufactured from PVC compounds having a minimum cell classification of 12454B as defined in ASTM D1784. All PVC piping shall meet the following requirements:

1. Small Pipes (1/2" through 3 1/2") - SDR 26 - Plastic pipe designated as SDR 26 shall be manufactured in accordance with ASTM D2241 with iron pipe size (IPS) outside diameters (OD). The pipe shall be standard sizes ½-inch through 3 ½-inches with a pressure rating of 160 psi (SDR-26).

2. AWWA C900, Plastic pipe designated as C900 shall be made of rigid polyvinyl chloride (PVC) compounds conforming to ASTM D1784 for type 1, Grade 1 (PVC 1120). The pipe shall be standard sizes 4” through 12” in pressure class 150 conforming with the outside diameter (OD of ductile-iron (DI). Standard laying lengths shall be twenty feet (20’).

3. AWWA C905, plastic pipe designated as C905 shall be made of rigid polyvinyl chloride (PVC) compounds conforming to ASTM D1784 for Type 1, Grade 1 (PVC 1120). The pipe shall be the standard sizes 14” through 24” conforming with the outside diameter (OD) for ductile iron (DI) and with the wall thickness of dimension ratio (DR) series 18. Standard laying lengths shall be twenty feet (20’) laying length.

4. Fittings shall be either injection molded PVC or ductile-iron with mechanical joint ends.

   a. Injection molded PVC fittings for pipe sizes 1/2” through 3 1/2” shall be manufactured in accordance with ASTM D2466. Fittings shall have socket ends designed for solvent cementing.

   b. Injection molded PVC fittings for pipe sizes 4-inch through 12-inch shall be in accordance with the requirements of AWWA C907. PCV fittings shall have elastomeric seal joints meeting the requirements of ASTM D3139.

   c. Ductile-iron mechanical joint fittings shall be used for pipe sizes 4-inches in diameter and larger. Mechanical joint fittings shall be as specified previously for ductile-iron pipe.

B. Joints -

1. Small Pipes (1/2" through 3 1/2") - Joints shall be designed for solvent cementing, except at valves or fittings, where flanges or threaded unions shall be required. Joint surface primer for solvent cement joints shall conform to ASTM F656, latest revision. Solvent cement shall conform to ASTM D2564, latest revision. Where threaded joints are used, the joint shall be made using male NPT by socket couplings on the pipe and shall be threaded into a metal female fitting, valve or other appurtenance. Joints made with male metal threaded components into plastic female couplings shall not be allowed.

2. Large Pipes (4" and Larger) - Joints shall be bell and spigot type with elastomeric gaskets. Joints shall meet all requirements of ASTM D3139 and F477.

3. Gaskets and lubricants intended for use with PVC pipe and appurtenances shall be made from materials that are compatible with the plastic material and with each other when used together, but that will not support the growth of bacteria and will not adversely affect the potable quality of the water that is to be transported.

4. Where flanges or unions are required, the flanges or unions shall be configured for solvent cementing to the PVC pipe. Gaskets, bolts and nuts for flanged joints shall be as required for ductile-iron flanged joints.

5. When indicated on the drawings or in lieu of thrust blocking, joint restraining devices may be used. Restraint devices shall be Factory Mutual (FM) or Underwriters Laboratory (UL) third party certified and shall comply with UNI-B-13 (UNI-BELL), and the devices shall be qualified in accordance with ASTM F1674. Restraint devices shall be as manufactured by EBAA Iron, Uni-Flange, or approved equal. An integral PVC pipe restraint system such as Certa-Lock as manufactured by Certain Teed Corporation is considered equal to the above defined mechanical restraining devices.

2.05 POLYETHYLENE PIPE AND FITTINGS

A. Pipe and Fittings -

1. Small Pipes (1/2” through 3”) – Small diameter polyethylene pipe shall be manufactured in accordance with AWWA C901 for outside diameter controlled pipe. Pipe shall be manufactured from high-density polyethylene compound having a cell classification of PE334434C as defined by ASTM D3350. Pipe dimension ratio (DR), if not specifically shown on the Drawings, shall be selected, based on the pressure

requirements of the system into which the pipe is to be installed, except that the DR shall not be greater than 21. Fittings shall be butt fusion type and shall be manufactured in accordance with ASTM D3261 of the same class material as the pipe.

2. Large Pipes (4" - 63") - Pipe and fittings shall be manufactured in accordance with AWWA C906 and shall be Ductile Iron Pipe Size (DIPS) outside diameter. Unless otherwise indicated on the Drawings, pipe and fittings shall be manufactured from PE 3408 polyethylene compound. The pressure class (PC) of the pipe shall be selected to conform to the working and test pressures of the system into which the pipe will be installed, except that the minimum allowable PC shall be 80. Piping shall be

B. Joints -

1) Pipe and fittings shall be joined by thermal butt fusion according to the manufacturer's recommended procedures. Fusion joining of unequal DR's will not be permitted. Transition between pipes with unequal DR's shall be accomplished by flanged joints, mechanical couplings capable of identical pressure ratings or machined polyethylene nipples. Polyethylene nipples shall be fabricated from the thicker wall polyethylene, machining an internal taper to match the thinner companion pipe wall.

2) Polyethylene pipe and fittings shall be connected to other pipe materials, valves or other appurtenances by means of either a polyethylene flange adapter with a metal backup ring as shown in AWWA C906 or a fused-on Harvey Adapter for use with fittings, sleeves, valves, etc. supplied with standard mechanical joints. Harvey adapter couplings shall be supplied with an integral stainless steel internal stiffener.

2.06 CASING PIPE

A. Casing pipe shall be steel having a minimum yield strength of 35,000 psi, conforming to API 5L. Casings shall have the minimum wall thickness as shown in Table 02713-1.

B. Both interior and exterior of the pipe shall have a bituminous coating.

C. Upon written permission of the approving agency (Railroad Company or Highway Department), the Contractor will be permitted to substitute reinforced concrete culvert pipe or bituminous coated corrugated metal pipe for steel casing pipe specified above, provided that the substituted pipe conforms to the approving agency's specifications.

TABLE 02713-1

SIZE (Non. Diam., In.)	THICKNESS (Inches)
Under 12” I.D.	0.250
14 and 16 O.D.	0.281
18 O.D.	0.313
20 O.D.	0.344
24 O.D.	0.375
26 O.D.	0.438
28 and 30 O.D.	0.469
32 O.D.	0.500
34 and 36 O.D.	0.532
38, 40, and 42 O.D.	0.563

D. Joints shall be butt-welded. Coatings shall be continuous at the joints.

E. The carrier pipe shall be supported inside the casing by utilizing three-way to concentric casing cradle as manufactured by T.D. Williamson, Inc., Pipeline Seal and Insulator Company, APS Casing Spacers or equal.

F. Casing seals, which seals the annulus between the casing and carrier pipe, shall be Link Seal as manufactured by Thunderline Corporation, equal by O. Z. Gedney, or other approved equal.

2.07 SERVICE PIPE

A. All piping utilized for service pipe shall be HDPE as outlined below.

B. Polyethylene Pipe - Polyethylene service pipe shall conform to the requirements as stated previously for polyethylene pipe sizes 1/2” through 3”.

C. Service Pipe Connections: When the water main is constructed of HDPE pipe, the service pipe shall be connected to the main by means of a heat butt fused joint fittings. Connection of HDPE pipe to other type water main materials shall only be by compression type couplings with inserts or flared couplings. Hot flared or hose connections are not considered equal and shall not be permitted. The service pipe shall be continuous, with no joints or couplings, from water main to meter.

2.08 VALVES

A. General - All valves and appurtenances shown or listed on the Drawings shall be installed as indicated or detailed on said Drawings or as directed by the Engineer, and shall be as specified in this section of the Specifications.

SECTION 02713 - WATER SYSTEMS

1. Painting - All surfaces of each valve body assembly shall be clean, dry and free from grease before painting. All unmachined surfaces of the valve body assembly shall be wire brushed to clean metal and given two coats of an approved shop primer. Valves for buried service shall, as a minimum, receive two coats of asphalt varnish complying with Federal Specification TT-V 51a shall be applied to all exterior surfaces.

2. Installation and Storage - The valves and appurtenances shall be installed in accordance with the installation manual furnished by the valve manufacturer. Extreme care shall be used in the handling, storage and installation of these valves to prevent damage or distortion of the equipment and to insure proper performance.

3. Spare Parts and Tools - Repair or service parts for one of each type and size of valve used in this Work shall be furnished and stored as directed by the Engineer. The equipment shall include, in general the following items: special tools required for maintenance or operation of valves, gaskets, rings, seals, lubricants, bolts, washers, operation manuals, drawings, etc., required to maintain valves in proper operating service.

4. Flanges - All flanged valves shall be drilled and faced to the Class 125 standard template, and in accordance with ANSI B16.1, unless otherwise noted on the Drawings. Bolts, nuts and gaskets for flanged joints shall be as specified for ductile-iron pipe.

B. Gate Valves Smaller than 3 Inches - Valves shall be 150-pound wedge disc, non-rising stem brass gate valves with threaded or flanged ends. Valves shall be Crane No. 437, or equal. Valves shall be supplied with handwheel operator.

C. Gate Valve 3" and Larger - All gate valves 3" and larger shall conform in all respects to AWWA C509, Resilient Seat Gate Valves, latest revision. (Note: AWWA C509 does not cover 14” and 18” valve sizes. Valves of these sizes, although not covered specifically by AWWA C509, are to be constructed to the standard requirements for 16” and 20” valves.) All valves shall be of the non-rising stem type, with iron body full bronze mounted. Gate valves shall be of such design as to maintain the full area of the pipe through the valve when open. In accordance with AWWA C509, valves 3” through 12” shall be pressure rated at 200 psi and larger valves shall be pressure rated at 150 psi. All exterior bolts shall be type 316L stainless steel.

D. Valves shall open left (counter-clockwise) and shall be supplied with operators as indicated on the Drawings and specified herein.

1. Exposed manually actuated valves shall have handwheel operators unless otherwise indicated on the Drawings. Handwheel operators shall be designed to hold the valve in any intermediate position between fully open and fully closed without creeping or fluttering.

2. Valves installed in overhead pipelines where the centerline of pipe is 6 feet or more above the floor shall be provided complete with geared chain wheel operators. Chain guides shall be provided. Chains shall reach within 4 feet of the floor. Chains shall be galvanized.

3. Buried valves shall have standard AWWA 2-inch square cast iron operating nuts. Operating nut shall be extended to finished grade and shall be supported in the valve box with a centering plate. Each valve shall be supplied with a roadway type cast-iron valve box and valve wrench.

4. Where indicated on the Drawings, valves shall be provided with extension stems and either cast iron floor boxes or floor stands. Floor stands shall be cast iron, medium duty, with indicators. Extension stems shall be cold rolled steel complete with necessary steady bearings and couplings required to complete the installation indicated. Ratio of total stem length to radius shall not exceed 150.

5. All handwheels and chainwheels shall have the direction of opening cast on them.

6. Gate valves installed in buried vertical pipelines or in the horizontal position shall be provided with bevel gears and enclosed gear cases. Gearing shall be in accordance with the valve manufacturer's recommendations as required to permit easy operation of the valve by one man without excessively large handwheel or cranks. Valve boxes and standard AWWA 2” operating nuts in accordance with the requirements for standard, vertically installed valves shall be fitted onto the gear operator.

7. Gate valves above grade or exposed shall be supplied with flanged ends in accordance with ANSI B16.1, Class 125, and shall be of either the OS&Y or non-rising stem type.

8. Buried valves shall be supplied with mechanical joint end connections. Valves shall be as manufactured by Mueller, American Cast Iron Pipe Co., United States Pipe & Foundry, or approved equal.

E. Knife Gate Valves

1. Valves shall be of the bonnetless type with fully flanged connections. Flanges shall be drilled to ANSI 125/150 pound standard. Valve pressure rating shall be 150 psi in sizes 2 inch through 24 inch and 125 psi in sizes 30 inch and 36 inch. Valves shall be by DeZurick or equal.

2. Knife valves shall have resilient seats. Valve bodies shall have wetted parts of type 316 stainless steel. The gate shall have a knife-edge and both sides shall be finish ground. The stem shall be stainless steel.

3. Knife valves shall be supplied with operators as shown on the Contract Drawings.

F. Plug Valves

1. Valves shall be non-lubricated, eccentric type with resilient faced plug, with screwed, flanged or mechanical joint ends as shown on the Drawings. Port areas shall be at least 80% of the full pipe area. Valve body shall be of semi-steel unless otherwise noted on the Drawings. Body seats shall be 90% nickel or resin material. Stem bearings shall be of corrosion resistant material. Bearings shall be sealed or capable of being repacked without removing bonnet from valve. All nuts, bolts, springs, and washers shall be zinc plated. Flanged valves shall be faced and drilled to ANSI Class 125 standard. The valves shall be as manufactured by DeZurik, Val-Matic or approved equal.

2. Plug valves shall be provided with means of operation as indicated on the Drawings and as specified herein.

3. Valves, which are 3 inches and smaller and are installed in other than buried or submerged locations, shall be lever-operated. Lever operators shall be either permanently or semi-permanently attached to each valve.

4. Valves larger than 3 inches that are installed in easily accessible locations, but not in buried or submerged locations, shall be hand-wheel operated unless otherwise indicated or specified.

5. Buried valves shall have 2-inch square operating nuts extended to within 12 inches of finished grade. Each valve shall be supplied with a roadway type valve box and valve wrench.

6. Submerged valves shall be operated by floor stands where indicated or specified. Where gearing is required for proper operation of submerged valves, the gearing shall be located in enclosed gear cases installed on the floor stand. Gearing shall be in accordance with the valve manufacturer's recommendations as required to permit easy operation of the valve by one man

without excessively large handwheel or cranks. Handwheels shall not exceed 30 inches in diameter. Submerged plug valves that are not indicated or specified to be operated from floor stands shall have extension stems, floor boxes, and 2-inch square operating nuts.

7. Extension stems, stem guides, operating levers, and other miscellaneous items required for a complete installation shall be provided in accordance with the requirements and recommendations of the valve manufacturer. Two tee handle, valve operating wrenches shall be provided.

8. Gearing shall be provided where indicated, specified or recommended by the valve manufacturer. All gearing shall be provided in enclosed gear cases.

9. Buried plug valves shall be provided with adjustable cast iron valve boxes in accordance with requirements previously specified for valve boxes in connection with gate valves.

10. Valves installed in overhead pipelines where the centerline of pipe is 6 feet or more above the floor shall be provided complete with geared chainwheel operators. Chain guides shall be provided. Chains shall reach within four feet of the floor. Chains shall be galvanized.

11. All plug valves 4 inches and larger shall be provided with gear actuators.

G. Butterfly Valves

1. Liquid Service Valves - All butterfly valves for liquid service, unless otherwise noted on Drawings or specified, shall be of the tight-closing, rubber seat type with rubber seats that are securely fastened to the valve body. Valves shall provide “bubble-tight” closure at rated pressures with flow in either direction. Valves for exposed service shall have flanged, log type cast iron bodies. All butterfly valves shall meet the requirements of AWWA C504, Class 150B, and shall be as manufactured by Henry Pratt Company, Centerline, or equal.

2. All butterfly valves installed underground shall be mechanical joint end.

3. Air Service Valves - All butterfly valves for air service shall have cast iron bodies designed for air service and for bolting between ANSI Class 125 flanges. Valve disc shall be designed to offer minimum resistance to flow and shall be capable of rotating 90 degrees to achieve full flow from a shut position. Disc shall be securely fastened to shaft. A full circumference rubber seat shall cover the inner surface of the valve body. All bearings of operating

shaft shall be self-lubricating. The valves shall be manufactured by Henry Pratt Company, Centerline, or equal.

4. Valve Operators - Butterfly valves shall be supplied with hand-wheel operators for exposed valves, 2-inch standard AWWA operating nuts for buried valves, or as shown on the Contract Drawings. Operators for valves shall conform to the requirements of AWWA C504, latest revision, and shall be designed to hold the valve in any intermediate position between fully open or fully closed without creeping or fluttering.

H. Ball Valves

1. Ball Valves 6 Inches and Larger - Ball valves shall conform to AWWA C507, latest revision, Class 150, and shall be supplied with ANSI Class 125 flanged joints. The valve body shall be of single-piece construction and shall be ductile-iron with stainless steel trim. The valve seat and all seats shall be TFEE-LOK, or equal.

2. Valves shall be of absolutely leaktight construction, and of the double seal design as manufactured by Henry Pratt Co., Jamesbury Corporation, or approved equal.

3. Valves shall be supplied with operators as indicated on the Contract Drawings and specified in Subsection 2.2 D of the Specifications.

4. Ball Valves Smaller than 2 Inches - All ball valves smaller than 2 inches shall be of all bronze construction, with TFE seals and seat. Valves shall have screwed end connections, and shall be lever operated, unless otherwise specified or shown on the Contract Drawings. Valves shall be Jamesbury Corporation "Clincher," Marpac equivalent or equal.

5. Plastic Ball Valves - Plastic ball valves shall be utilized on chemical feed and chlorine gas lines, and shall be of PVC construction with Teflon seat and Viton O-ring seals. The shaft couplings shall be cadmium-plated steel. Valves less than 3 inches shall be supplied with true union or flanged end connections. Valves 3 inches and greater shall be supplied with Schedule 80 flanges faced and drilled to ANSI Class 125 pattern. Valves shall be as manufactured by Chemtrol, or equal.

6. Ball Check Valves for Air Service - Ball check valves shall be rated for maximum operating pressure of 200 psi, shall be suitable for air line service and shall operate equally effective in either the horizontal or vertical position.

7. Ball check valves shall be of a design to insure free movement of ball and the ball shall be supported in such a manner as to provide full flow with minimum turbulence and chatter. Only inches of head pressure shall be required to seal and open the ball check valves. Ball check valves provided shall be constructed of materials and shall be furnished with threaded joints which are compatible for connection to the air line piping provided.

I. Check Valves

1. Liquid Service Valves 4 Inches and Larger - Check valves 4 inches and larger shall be manufactured in accordance with AWWA C508 and shall be iron body, horizontal swing check valves with outside lever and weight, unless otherwise indicated. Seats, seat rings, pins, bushings, shaft and hinges shall be constructed of bronze. Unless otherwise specified or indicated on the Contract Drawings, check valves shall be supplied with ANSI Class 125 flanges.

2. Valves 12-inches and smaller shall be designed for 175 pound working pressure and larger valves shall be designed for 150 pound working pressure, and shall be as manufactured by Clow, Mueller, or equal.

3. Liquid Service Valves Less than 4 Inches - Check valves less than 4 inches shall be of all bronze construction, and shall be supplied with threaded or flanged end connections. The valves shall be designed for a 150 pound working pressure and shall be of the swing check type as manufactured by Crane, Kennedy, or equal.

4. Air Service Valves - Check valves to be installed on air lines shall be of wafer type construction, with aluminum intervals and silicone seal members. Valves shall be provided with cast iron body, and shall be designed to install between ANSI Class 125 flanges.

5. Valves for air service shall be rated for continuous duty at 300°F, 35 PSIG, and shall be as manufactured by Hoffman Air and Filtration Division of Clarkson Industries, or equal.

6. Flexible Sleeve Check Valves - Flexible sleeve type check valves shall be furnished with cast iron body and flanges conforming to ANSI B16.1, Class 125. Sleeve material shall be neoprene with nylon fabric reinforcement. Valves shall be series 33 by Red Valve or equal.

7. Double Door Check Valves - Valves shall be compact design, with fully tapped and threaded lugs by Valve and Primer Corporation or equal. Doors shall be spring loaded, normally closed, by means of one or more heavy-duty stainless steel torsion springs. Seating shall be resilient and water tight. The

sealing element shall be Bune-N molded to the body. Body shall be of cast iron construction; doors shall be cast steel. Springs and shafts shall be T316 stainless steel.

J. Pinch Valves - Pinch valves shall be utilized only where specifically indicated on the Contract Drawings, and shall be a Series 75 valve as manufactured by Red Valve Company, Inc. The valves shall meet or exceed ANSI B16.10, and shall be provided with a handwheel operator. The valve sleeve shall be Buna-N Rubber, and the valve body shall be cast iron.

K. Mud Valves - Mud valves shall be utilized only where specifically indicated on the Contract Drawings, and shall be the non-rising stem type. The valve body shall be cast iron. Stem, stem nut, disc ring and seat ring shall be bronze.

1. Rising stem bench standard shall be cast iron suitable for mounting on tank walls.
2. Floor stands shall be non-rising stem floor stands equipped with indicators. Floor stands shall be of cast iron with steel extension stem. Handwheels shall not exceed 20-inch diameter.

L. Diaphragm Valves - Valve bodies and bonnets shall be cast iron. Valve bodies shall be lined with neoprene material. Valve bonnets shall be of the indicating type with travel stop, suitable for handwheel manual operators. All diaphragm valves shall be furnished with manual handwheel-type operators. Diaphragm material shall be EPT.

1. Straightway diaphragm valves furnished shall be close-coupled type with flanged ends. Flange drilling shall be in accordance with ANSI B16.5 Standard for Class 150 flanges. All valve joint accessories including gaskets, bolts, and nuts shall be furnished with each diaphragm valve.

2. All straightway diaphragm valves shall be as manufactured by the ITT Grinnell Corporation, Clayton Valve Co., or equal.

M. Solenoid Valves - Solenoid valves shall be fullport, normally closed type with current to open. Valves shall have one-inch screwed connections, explosion proof solenoids with molded epoxy resin coils and NEMA 4 housing, and shall be designed for operation on 12 volt DC current, unless otherwise indicated. Valves shall be bronze body type with renewable discs which can be replaced without removing valve body from piping system.

N. Yard Hydrants - Yard hydrants shall be 1 1/2" - 4' depth of bury, non-freezing type, with aluminum housing, similar to Series 1440-N, as manufactured by Josam Manufacturing Company, an equivalent model by Zurn, or equal.

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O. Liquid Pressure Reducing or pressure Sustaining Valves - Pressure or sustaining reducing valves of sizes ½-inch through 2-inch shall be self-contained type all bronze body with screwed connections and valves larger than 2-inches shall be cast iron body construction with ANSI Class 125 flanged ends. Valves shall be capable of reducing or sustaining pressure on water lines by field adjustments to approximately 5 pounds greater than the shut-off pressure of the pump or the maximum expected operating pressure in the system, which the valve will serve. Range of reduced pressure adjustment shall be 10 to 100 pounds. Pressure reducing or sustaining valves shall be as manufactured by GA Industries, Inc., Bermad Control Valves, or approved equal.

P. Air Pressure Reducing Valves - Valves shall be self contained, internal pilot, piston operated type of cast iron and bronze construction. Valves shall be suitable for intended application in accordance with manufacturer's recommendations, and as per specified equipment requirements. Valves shall be as manufactured by Leslie Company, or equal.

Q. Combination Air Release Valves - Combination valves shall consist of an air and vacuum valve and an air release valve rated for 125 psi, completely piped and assembled together, with one-inch ball valve between. Valve shall be APCO Series 1100A by Valve and Primer Company, or equal.

1. Air and vacuum valve shall be designed to allow large quantities of air to escape out the orifice when filling a pipeline and to close water tight when the liquid enters the valve. The air and vacuum valve shall also permit large quantities of air to enter thru the orifice when the pipeline is being drained to break the vacuum. The discharge orifice area of the air and vacuum body shall be equal or greater than the inlet of the valve; the orifice of the smaller air release body shall be 3/16-inch.

2. The air and vacuum body shall be equal to APCO Series 1100 air and vacuum valve as manufactured by Valve and Primer Co., consisting of a body, isolating butterfly valve, cover, baffle, float and seat. The baffle will be designed to protect the float from direct contact of the rushing air and water to prevent the float from closing prematurely in the valve. The seat shall be fastened into the valve cover, without distortion, and shall be easily removed, if necessary. The float shall be stainless steel designed to withstand a minimum of 200 psi. The float shall be center guided for positive shutoff into the seat.

3. The air release body shall be equal to the APCO Series 200A air release valve, as manufactured by Valve and Primer Co.

4. All materials of construction shall be certified in writing to conform to ASTM Specifications as follows:

Body, Cover & Baffle	Cast Iron	ASTM A48, Class 30
Float	Stainless Steel	ASTM A240
Seat	Buna-N	
Shaft	Stainless Steel	ASTM A582
Exterior Paint	Phenolic Primer Red Oxide	FDA Approved for Potable Water

5. Air release valve shall be designed to release small pockets of trapped air as line fills under pressure. Valve shall be designed to open against internal pressure. Valve shall have cast iron body, stainless steel float, Buna-N seat, and Delrin and bronze linkage. All other internal parts shall be stainless steel or bronze.

R. Air Release Valve - Air release valves, size as indicated on the Drawings, shall be as manufactured by Valve and Primer Company, or equal. Valves shall comply in all respects with Air Release Valve component of the Combination Air Release Valves as specified above.

S. Telescoping Valves - Telescoping valves shall be of the general design indicated on the Drawings. Valves shall be equal to those manufactured by Walker Process Division of CBI, Envirex, or equal. They shall consist of a brass slip pipe that slides in a cast iron enclosing pipe with a gland for seal. Clear travel of the slip pipe shall be as shown. Top of slip pipe shall feature 13-1/2 inch diameter (O.D.) flare. A substantial cast iron or steel operating stand shall support the slip pipe through an extension stem rigidly connected to the slip pipe. The slip pipe shall be positioned by a hand operator and the position of the outlet shall be indicated through a brass pointer on a graduated scale.

2.09 FIRE HYDRANTS

A. Fire hydrants shall be cast iron body, fully bronze mounted, suitable for working pressure of 150 psi and shall meet all requirements of the latest AWWA C502. Each hydrant shall be given a 300 psi hydrostatic test in the shop.

B. Hydrants shall be Mueller Co. Improved AWWA type or equal.

C. The waterways of hydrants shall be as free as possible of obstructions, sharp turns, corners, or other cause for resistance. The base of the hydrant shall have a mechanical joint connection.

D. The hydrants shall have a 6-inch mechanical joint connection to street main with auxiliary gate valve, two 4-1/2 inch pumper nozzles together with caps fastened securely to each hydrant with steel chain and threaded to fit nozzles. The bottom valve of the hydrant shall not be less than 5-1/4 inches in diameter and shall have a 7-inch minimum I.D. riser barrel. Threads for steamer connections shall match existing hydrants and shall be opened by turning in a counter-clockwise direction.

E. The hydrant main valve shall be of the compression type, closing with pressure. The valve shall be faced with rubber, or other approved material.

F. Drain valves shall be automatic and positive acting. When the main valve is closed, drain valves shall automatically open, insuring rapid and complete drainage of the hydrant riser. They shall close automatically when the main valve is opened.

G. Hydrants shall have a safety "break-away" section located above ground line. The distance from the ground line of the hydrant to the top of the hydrant head shall not be less than 30 inches. Hydrants shall come with one shop coat of primer. After installation, skinned or scratched surfaces of hydrants shall be wire brushed and touched up with one coat of primer. Two coats of Sonneborn's Hydrant Enamel shall be applied in the field. Color shall be determined by the Owner with the first coat having lamp black added to distinguish it from the final coat.

H. Hydrants shall be placed with pumper nozzle facing street and shall be located as indicated on Plans. Each hydrant shall be placed on a concrete base and shall be secured against dislocation as shown on Plans. A minimum of 7 cubic feet of clean washed gravel shall be placed around each hydrant base. Backfill above gravel shall be thoroughly tamped. Care shall be taken so as to keep the drain holes clear.

2.10 WARNING/CAUTIONARY TAPE

Warning/cautionary tape will be required for all buried waterlines. The tape shall be constructed of an aluminum film inner layer, which has been printed on both sided with a blue background with white letters stating “Caution Buried Waterline”. The aluminum film shall be sandwiched between layers of translucent Mylar which shall be thermally bonded to the aluminum inner layer.

PART 3 - EXECUTION

3.01 LAYING WATER PIPE

A. General:

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1. All pipe shall be installed in strict accordance with manufacturer's recommendations, drawings and/or specifications and in the best commercial trade practice.

2. All pipe shall be carefully placed and supported at the proper lines and grades, and where possible shall be sloped to permit complete draining.

3. Any special tools required for laying, jointing, cutting, etc., shall be supplied and properly used. All pipe shall be thoroughly cleaned before laying and shall be kept clean until accepted in the completed work and when laid, shall conform accurately to the lines and grades given. At all times during pipe laying operations, the trench shall be kept free of water. Laying and jointing of ductile-iron, cast-iron and steel pressure pipelines shall conform to applicable sections of AWWA C600. Installation of PVC and HDPE pipe shall conform to the applicable sections of AWWA C605.

4. All pipe and fittings shall be delivered in sound condition. Care shall be taken to protect exterior coatings and linings during all phases of the work. Place no material of any kind inside of any piece of pipe or fitting during handling, storage or transit. Pipe and fittings shall be stored in a protected area. Use strap slings for lifting coated pipe and in no case shall pipe be dropped into trenches.

5. Any section of pipe with a damaged end or barrel shall be repaired as directed, if in the opinion of the Engineer a satisfactory repair can be made; otherwise, the damaged section shall be replaced with an undamaged section at no additional expense to the Owner.

6. All piping systems shall be constructed from the materials shown and to the lines, grades and dimensions shown. Where not shown, the pipe shall be adjusted to avoid interference with other features.

7. Bell-and-spigot pipe shall be laid with the bells pointing upstream to the direction of flow. All types of piping shall be laid and be fitted together so that, when completed, the pipe will have a smooth and uniform invert. The interior of each length of pipe laid shall be thoroughly swabbed to remove all foreign material before it is laid. Each pipe shall be inspected for defects before being lowered into the trench.

8. All piping for which no location dimensions are shown shall be installed in a neat and workmanlike manner in accordance with the best trade practice. It shall be the Contractor's responsibility to properly lay out all piping to clear obstructions such as equipment, larger sized pipes, etc.

9. Under no condition, shall the pipe be laid against the wall of a trench, unless direction to do so is specifically shown on the Drawings or is directed by the Engineer in writing. The minimum distance between the outside of the pipe's bell to the trench wall shall be 9 inches. Extra precaution shall be taken to prevent rocks or other large or sharp objects from lodging against the pipe during backfill.

10. When deflecting the pipe from a straight line, either in vertical or horizontal plan or when long radius curves are shown, the amount of deflection allowed shall not exceed 75 percent of the maximum allowable limit which is recommended by the pipe manufacturer.

11. Excavation, pipe bedding and backfill shall be as specified in Section 02220, except that the pipe may be bedded in the excavated material provided that the excavated material meets the requirements for "Useable Excavated Soils" as defined on Section 02220.

12. All laying operations to provide watertight pipe and pipe joints shall be the responsibility of the Contractor. If adjustment of the position of a length of pipe is required after it has been laid, it shall be removed and rejoined as for a new pipe.

13. Buried pressure piping systems shall be sloped uniformly between inverts shown on the Drawings, towards low point drains or blow-offs. Avoid intermediate low points in piping systems.

14. When work is suspended either for the night or for any other reason, open ends of the pipe shall be securely plugged to prevent the entrance of mud, water, or other obstructions.

15. Dead ends of pipe and unused branches of crosses, tees, valves, etc., shall be closed with a plug suitable to the type of pipe used.

16. Proper and suitable tools and appliances for the safe and convenient handling and laying of pipe shall be used, and care shall be taken to prevent damage to pipe coating. If required by the size pipe being used, mechanical pullers (or spreaders) shall be used in conformance with the pipe manufacturer's instructions.

17. While suspended in the sling and before lowering in the trench, the pipe shall be swabbed clean and inspected for defects. Defective, damaged, or unsound pipe shall not be used.

18. Threads, where required, shall be neatly cut with sharp tools and the jointing procedure shall conform to best plumbing practice. Before jointing, all scale shall be removed from the pipe. After cutting, all pipe shall be reamed. All pipe shall be screwed together with an application of an approved joint compound applied to all threads, and after a joint has been screwed tight, it shall not be backed off unless the threads are re-cleaned and new compound applied.

19. Where sanitary sewer, storm sewer, or other subsurface utilities are encountered in trenching for water lines, it will be permitted to lay pipe above the obstruction if a minimum cover, which will allow for the installation of an air release valve, can be obtained while providing clearance between the bottom of the pipe and the top of the obstruction of at least 18-inches for sanitary sewers and storm drains and 6-inches for all other utilities. Otherwise, the obstruction will have to be by-passed or tunneled under. In any case, the requirements of the Louisiana State Health Code and the regulations of the Department of Health shall be strictly applied for control of the installation.

20. Where the proposed water main parallels a sanitary sewer or storm drain, the water main shall be installed with a minimum of 6 feet clearance between the water main and the other utility as required by the Louisiana State Health Code. All regulations of the Department of Health shall be strictly applied for control of the installation.

21. Where the bottom of the trench is rock, water bearing soil, or unstable material, the Resident Project Representative may direct that a foundation of granular material, a concrete cradle, or granular material on timber runners under the pipe bedding material, which shall be paid for as separate items. The pipe shall be bedded as provided above, but in no case shall the bedding provide less than six inch (6”) cushion below the barrel of the pipe.

B. Solvent Cement PVC Joints

1. Buried PVC pipe, which is to be joined by solvent cementing, shall be joined on the surface of the ground and then lowered into the trench, which has been prepared by excavating and installation of the lower 6-inches of the pipe bedding and foundation material, when required.

2. Solvent cemented joints shall be made in conformance with the requirements of ASTM D2855.

3. Joints of pipe, which is 4-inches in diameter or larger, shall be first prepared with primer.

4. Care shall be taken to use the proper viscosity grade of solvent cement for the size and schedule pipe being joined. Proper viscosity grades shall be as required by ASTM D2564.

5. Appropriate set time, in accordance with ASTM D2855, shall be allowed prior to installing the pipe. Prior to applying pressure to the pipe, allow for complete curing of the solvent cement joints as recommended in ASTM D2855.

C. High Density Polyethylene (HDPE) Pipe Installation

1. Polyethylene pipe shall be jointed by the method of thermal butt-fusion as outlined in ASTM D2657. All butt-fusion joining of pipe and fittings shall be performed in accordance with proven procedures and techniques recommended by manufacturer. Thermal butt-fusion of the pipe shall be performed by an experienced technician, certified in the jointing of high-density polyethylene pipe in accordance with Title 49 CFR 192.285. Written certification of the personnel shall be submitted to the Engineer.

2. A minimum of two test joints shall be fused and cut from each pipe size and each SDR prior to beginning joining the pipe system. The test joints shall be visually examined in accordance with Title 49 CFR 192.285. The Engineer reserves the right to request that 10 additional samples be cut from the pipe during the installation process at no additional cost to the Owner, to document the integrity of the fusion process. Should these check samples reveal deficiencies in the joining process, the Engineer may require that additional samples be cut from the previously installed pipe to determine extent of deficient joints in the completed installations. Any excavation, cutting rejoining or other work made necessary to check the quality of the joining process shall be performed at no additional cost to the Owner.

3. All finished butt-fusion welds shall be trimmed to match the inside diameter of joined pipe sections such that the maximum finished bead protrudes no more than 1/8 inch from the inside of the pipe wall at any given point.

4. Polyethylene stub-end flanges, butt fused to the pipe, and then attached to the companion pipe, valve or other appurtenance. Bolts shall be drawn up evenly and in line. During hot weather the thermal expansion of the polyethylene portion of the stub-end flange assembly may result in loosening of the flange bolts after burial, once the flange cools. It may be necessary to either make up the flanged joints in the early morning before sunrise or cool the flanges by packing them in ice prior to making up the flanged joints.

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3.02 JACKING AND BORING PIPE

A. General

Where pipe is to cross beneath railroads, Federal Highways, State Highways, and other selected paved travelways, either the direct bored or bored and jacked casing method of installation will be indicated on the Drawings, and the Contractor shall not be permitted to install the pipe by the open cut method. Where the agency that governs the crossing requires a permit for the crossing, the provisions of the permit will be the basis of control of the installation work. Subsurface operations, which are performed as part of the work to install the casing and the carrier pipe, resulting in damage to the tracks or pavement, shall be the responsibility of the Contractor. Any damage to the facility that is being crossed shall be repaired at no cost to the Owner.

B. Direct Drilling

1. This Construction method involves the controlled horizontal directional drilling (HDD) of a pilot bore-hole, back reaming the bore-hole with concurrent enlargement and pull back of the specified pipe to line and grade as required on the Drawings.

2. Equipment:

   a. The size of the horizontal directional drilling equipment (rig) shall be determined by the Contractor as required for the depth, diameter and length of carrier pipe that is to be placed.
   b. The drill pipe shall be threaded end and of a wall thickness, diameter and strength as determined by the contractor which is required to create the pilot hole, back ream the bore hole and pullback the carrier pipe.
   c. The strength and size of drill bits and reamers shall be determined by the Contractor, and shall be generally based on the depth and size of the carrier pipe, the soil type and other drilling conditions to be encountered.
   d. Drilling fluid mixing tanks, holding tanks, cleaning systems, shall be determined as to size and number as needed for recirculation containment, collection and disposal of cuttings and drilling fluid.

3. Drilling fluids shall be used to augment the pilot hole drilling, back reaming and pullback processes. Drilling fluids shall be formulated as determined by the Contractor of a carrier fluid (usually water) and drilling fluid additives (normally bentonite and/or polymers).

4. Contractor shall be responsible for selecting appropriate pipes and pipe joints to safely carry the loads imposed during construction. Pipe materials shall be selected by Contractor and reviewed by the Engineer. Acceptable materials for installations are Certa-Lok C900/RJ as manufactured by CertainTeed Corporation, P.O. Box 860, Valley Forge, PA 19482, Polyethylene (HDPE) with heat fused joints or approved equal.

5. Pipe shall be round with a smooth, even outer surface, having joints that provide stable connections between pipes. Pipe ends shall be designed so that installation forces are evenly distributed around the entire pipe joint and such that point loads will not occur when the pipe is installed. Pipe used shall be capable of withstanding all forces that will be imposed by the process of installation, as well as the final in-place loading conditions. During installation the exposed ends of the pipe and joints shall be protected against damage.

C. Jacking and Boring Casing Pipe

1. Installing of steel casing pipe shall conform to the AREA Manual for Railway Engineering and Louisiana Standard Specifications for Roads and Bridge, Sections 7 and 8, latest edition. Where the ends of pipe used as casing for other pipe are below ground, the ends shall be sealed.

2. The barrel of the carrier pipe shall be supported within the casing. Supports or carrier runners shall be spaced as recommended by the manufacturer, or as directed by the Engineer, but in no case shall there be fewer spacers than one for every pipe joint which is inside the casing and one at each end of the casing.

D. Bored Driveway Crossings

1. Pipe crossings under paved driveways shall be bored unless otherwise shown on the drawings. Bored driveway crossings shall be made with the minimum size bore hole, allowing passage of the pipe bell or coupling with a maximum of 1-inch annular space.

3. Joints shall not be allowed under driveways, unless the joint is mechanically restrained or is fused. Pipes meeting this requirement are double length segments (40-foot segment length) of the pipe specified for open cut installation, Certa-Lock as manufactured by Certain Teed Corporation, fusible AWWA C900 or C905 PVC pipe, or HDPE.

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3.03 INSTALLATION OF VALVES AND FITTINGS

A. Valves and fittings shall be placed in the location indicated on the Plans and as directed by the Engineer. The location for valves shall be on the street property line extended, unless directed otherwise by the Engineer. Valves and boxes shall preferably be located out of any traffic area. IN cases where conditions dictate placement of valves in street, alleys, or roadways, the valve boxes shall be furnished with a dome type base and shall be set on bricks to prevent the box bearing against the valve or piping.

B. All underground valves sized 12-inches and smaller shall be set vertically, unless shown otherwise on the Drawings. Buried valves sized larger than 12-inches shall be installed horizontally as detailed on the Drawings. Cast-iron valve boxes shall be set with covers flush with the surface of a concrete .maintenance pad as detailed on the Drawings.

C. Before being placed in the trenches, all valves, meters, fittings, etc., shall be carefully examined to see that they are in good working order and are clean.

3.04 INSTALLING FIRE HYDRANTS AND FLUSH HYDRANTS

Each hydrant and flush hydrant shall be installed vertically on a concrete base, and shall be secured against dislocation as detailed on the Drawings. Unless otherwise directed by the Engineer, hydrants shall be placed at or reasonably near the location shown on the Drawings and as follows:

A. Flush hydrants shall be located at high or low points and at the ends of lines in the approximate locations shown on the Drawings. Fire hydrants placed behind curbs shall be set so that no portion of the hydrant or nozzle caps is closer than six (6) nor more than twelve (12) inches from the vertical face of the curb. Hydrants shall not be placed within twenty (20) feet of the intersection of curb lines at street corners.

B. Vertical offsets or hydrant extensions shall be used as required in the hydrant lead so that the bury-line of the hydrant will be flush with the natural ground and the specified cover will be maintained on the main and the hydrant lead.

C. Hydrants shall be secured in place by means of a hydrant valve anchoring tee with hydrant anchoring connection pieces, concrete thrust blocks, or socket clamps and tie rods. Tie rods shall extend from the hydrant base to the tee fitting in main. Clamps shall be of either wrought iron or steel, and not less than two (2) inches wide and three-eighth (3/8) inches thick. Bolts used shall be not less than three-quarter (3/4) inches in diameter, material shall be wrought iron or steel. Wrought iron and steel shall be protected against corrosion by painting with tar, asphaltic,

or other suitable and approved material and shall be installed with suitably sized anode caps.

3.05 CONNECTING EXISTING PIPE LINES TO NEW WATER MAINS

Connections to existing 3" and smaller water mains shall be made each with the required number and size of corporation cocks, goosenecks, and branch connection, which cost shall be included in the cost of the new water main. Valves, cast iron fittings and pipe shall be paid for separately and in addition to this item. Connections to 4" and larger water mains will require that the connection be made with tapping valves and tees, which cost shall be paid as a separate pay item.

3.06 SERVICE TAPS, COUPLINGS AND STRAP CLAMPS

A. All service taps shall be threaded couplings or strap clamps for AWWA threads. Thread couplings for galvanized pipe shall not be permitted. The maximum allowable size of tap of each size of pipe shall be as shown in Table 02713-2.

TABLE 02713-2

MAXIMUM SIZE THREADED COUPLING PERMITTED IN DUCTILE IRON PIPE

Pipe Size	***Tap Size***	***Pipe Size***	***Tap Size***
2"	½"	8"	1 ¼"
3"	½"	10"	1 ½"
4"	¾"	12"	2"
6"	1"		

B. Where it is necessary to provide a service larger than the allowable ductile iron tap size, multiple taps shall be employed by staggering the taps around the pipe and spacing the taps at least twelve (12) inches apart and twelve (12) inches from the end of the pipe length, or service clamps shall be used.

C. Service strap clamps shall be galvanized malleable or ductile iron or bronze with rubber gasket. The maximum allowable size tapped outlet when made with a service clamp shall be as shown in Table 027`13-3. Clamps shall be Smith-Blair, Mueller, Dresser, Nappco or approved equal.

TABLE 02713-3

MAXIMUM SIZE SERVICE CLAMP PERMITTED		
Pipe Size (Inches)	***Size for Ductile Iron Pipe***	***Size for Plastic and Galvanized Pipe***
2”	1”	¾”
2 ½”	1 ¼”	1”
3”	1 ½”	1 ½”
4”	2”	1 ½”
6”	2”	1 ½”
8”	3”	1 ½”
10”	3”	1 ½”
12”	4”	1 ½”

3.07 PIPE TESTING

A. Hydrostatic Testing for Pressure Lines

All pipelines shall be cleaned as specified herein prior to performance of pressure or leakage tests.

1. Leakage Test Requirements

a. After the pipe has been laid and backfilled as specified, all newly laid pipe, or any valved section thereof, shall be subjected to a pressure of 150 pounds per square inch, or 50% in excess of the normal working pressure, whichever is greater, as directed by the engineer.

b. Leakage is defined as the quantity of water to be supplied into the newly laid pipe, or any valved section thereof, necessary to maintain the specified leakage test pressure after the pipe has been filled with water, the air expelled, raised to the proper test pressure and allowed to stabilize..

c. No pipe installation will be accepted until the leakage is less than the number of gallons per hour as determined by the formula:

$L = \frac{SD(P)^{1/2}}{133{,}200}$, for non-plastic pipes; and $L = \frac{ND(P)^{1/2}}{7{,}400}$, for plastic pipes.

In which L is the allowable leakage in gallons per hour; S is the length of pipe tested, in feet; N is the number of joints in the segment of pipe being tested; D is the nominal diameter of the pipe, in inches; and P is

the test pressure during the leakage test, in pounds per square inch gauge.

d. All pipelines located below concrete slabs or foundations shall be pressure tested prior to the installation of concrete slabs or foundations.

e. A hydrostatic pressure and leak test form shall be completed on each segment of line tested.

4. Duration of Test - The duration of the test under pressure shall be four (4) hours.

5. Procedure - Each valved section shall be slowly filled with water, during which time the air shall be expelled. The specified test pressure, based on the elevation of the lowest point of the line or section under test and corrected to the elevation of the test gauge, shall be applied by means of a pump connected to the pipe in a manner satisfactory to the Engineer. The pump, pipe connections, and all necessary apparatus, including gauges, shall be furnished by the Contractor. The Contractor will make all taps into the pipe, and furnish all necessary assistance for conducting the tests.

6. Expelling Air Before Test - Before applying the specified test pressure, all air shall be expelled from the pipe. If air release valves, hydrants or blowoffs are not available at high places, the Contractor shall make the necessary taps at points of highest elevation before the test is made and insert plugs in these taps after the test has been completed. If high points are indicated on drawings, corp stops or air release valve isolation valves shall be installed at designated points.

7. Digression from Permissible Leakage - Should any of pipe laid disclose leakage greater than that specified above, the Contractor shall, at his own expense, locate, repair, and replace the defective joints, pipe or fittings until the leakage is within the specified allowance.

8. Time for Making Test –

a. Ductile-iron pipe with cement mortar lining shall be filled with water a minimum of 24 hours prior to making any leakage tests. All other pipe may be subjected to hydrostatic pressure and inspected and tested for leakage at any convenient time after the trench has been partially backfilled. Note: The Contractor may omit backfilling the pipe joints while performing the leakage test; however, should any damage occur as a result of this procedure, such damage shall be repaired at no additional

cost to the Owner. The leakage allowance for all mains shall be that specified above.

b. Where any section of a main is provided with concrete reaction blocking, the hydrostatic pressure test shall not be made until at least five (5) days have elapsed after the concrete reaction blocking was installed. If high early strength cement is used in the concrete reaction blocking, the hydrostatic pressure test shall not be made until at least two (2) days have elapsed.

B. Pressure Test

It is the intent of these specifications that the previously described leakage test also serve as the pressure test. Therefore, a separate pressure test is not required.

C. Alignment Test for Pressure Lines

1. Prior to backfilling of pressure lines, the joint alignment shall be inspected to assure the maximum deflection present in each joint does not exceed the limit as previously specified.

2. Pressure lines, which are a portion of a pump discharge system, shall be inspected to assure the line is installed at a constant or increasing grade so as to eliminate the possibility for air accumulation at an intermediate high point.

3. Any and all defects shall be corrected by the Contractor at no additional cost to the Owner and to the satisfaction of the Engineer prior to backfilling. This shall be completed before the work shall proceed and before acceptance of and/or payment therefore shall be made.

3.08 CLEANING AND STERILIZATION

A. General - All existing water lines shall be flushed and purged of all loose scale and debris prior to installing or connecting new lines. All air lines or gas lines shall be flushed and purged of all loose scale and debris prior to installing equipment. All yard piping, sewers, and force mains shall be flushed and cleaned of all loose materials and debris prior to acceptance.

B. Sterilization of Potable Water Lines - All water lines noted on the Drawings as potable water lines shall be sterilized prior to acceptance. Sterilization may be performed in conjunction with the leakage test provided that all water added to the pipe during the testing is protected from being contaminated and has been treated with the appropriate amounts of disinfectant and that all equipment used to

perform the leakage test has been properly sterilized prior to performing the test. Prior to sterilization, the lines shall be flushed as thoroughly as possible with the water pressure and outlets available. The sterilization procedure shall be performed before the line is placed in service by filling the pipe system with either a chlorine gas-water mixture or a calcium-hypochlorite-water mixture in accordance with one of the following methods:

1. The following procedure is a modification of the procedures described in AWWA C651. The procedure as described herein may be used or one of the procedures described in AWWA C651 may be used; however, the end result shall be bacteriological tests meeting the requirements as defined in AWWA C651 and as required by the Louisiana State Health Code.

2. Chlorine gas-water mixture shall be applied by means of a solution feed chlorinating device.

3. Calcium hypochlorite shall be comparable to commercial products known as H.T.H., Perchloren, and Maxochlor. A solution consisting of 5% of powder to 95% of water by weight shall be prepared. The calcium hypochlorite and water mixture shall first be made into a paste and then thinned into a slurry. The hypochlorite slurry shall be injected or pumped into the newly laid line under the conditions specified herein.

4. The chlorinating agent shall be applied at the beginning the section adjacent to the feeder connection and shall be injected through a corporation cock, hydrant, or other connection insuring treatment of the entire pipeline. The water shall be fed slowly into new line with chlorine applied in amounts to produce a dosage of 50 ppm. Mains previously filled shall be treated to a concentrated dosage at intervals along the line. A residual of not less than 10 ppm shall be produced in all parts of the line at the end of a 24 hour long treatment period. During the chlorination process, all valves and accessories shall be operated.

5. After chlorination, the water shall be flushed from the line at its extremities until the replacement water tests are equal chemically and bacteriologically to those of the permanent source of supply. All chemical and bacteriological testing shall be done at the expense of the Contractor at a certified laboratory or by the local health authority. In either case the testing shall meet the Louisiana State Health Code requirements.

6. Should the bacteriological tests not meet the Louisiana State Health Code requirements, the pipelines shall be re-disinfected and retested at no additional cost to the Owner until the requirements are met.

7. Valving of new water lines shall be as shown on the Plans. Testing and sterilizing of the new lines shall be done by utilizing existing and new valves and temporarily plugging the line, if necessary. Where no existing services occur on a short length of existing line, the Resident Project Representative may direct that this existing line be tested and sterilized in conjunction with the new line, at no additional cost to the Owner.

3.09 INTERRUPTION OF WATER SERVICE

The attention of the Contractor is directed to the fact that some of the alterations in the water system may require cutting into existing water mains. Water service can be interrupted under the following conditions and subject to all other provisions herein contained:

A. Where interruption of service will be along a main serving not more than fifty (50) customers, who will be affected by said interruption, and where the duration of said interruption is to be four (4) hours or less, interruption will be permitted, provided Contractor has notified the water system customers who will be affected by the interruption, Resident Project Representative and the Owner at least twenty-four (24) hours in advance of the contemplated interruption of service.

B. Where interruption of service will affect more than fifty (50) customers, affect the main business district, be of greater duration than four (4) hours, or a combination of the above conditions, interruption of service will be permitted only after both the Resident Project Representative and the Owner have approved such cases. All water system customers who will be affected by the interruption shall be notified 7-days prior to the interruption with a second notification at least 24-hours prior to the beginning of the interruption. Owner reserves the right to require the Contractor to perform such work between the hours of 11:30 p.m. and 6:00 a.m. Any overtime pay for the Contractor's personnel shall be included in his bid for the items of work involved.

3.10 NEW SERVICE ASSEMBLY WITH METER SETTING

New service assemblies with meter setting where called for on the Drawings or elsewhere in the Contract Documents, shall each include a meter box, service tap and clamps or fittings, curb stop, corporation stop, and the required connectors and service pipe. Water meters shall be furnished by the Contractor, except in the case where it is designated on the Drawings or in the Special Conditions that meters will be purchased by the Owner, and furnished to the Contractor, in which case the Contractor will set the meters. All connectors shall comply with AWWA Standard C800.

A. The service assembly and corresponding service pipe size shall conform to the requirements shown in Table 02713-4.

TABLE 02713-4

SERVICE ASSEMBLY	SERVICE PIPE SIZE
5/8” x ¾” small res. & comm. (up to 2 baths)	¾”
5/8” x ¾” large res. & comm. (more than 2 baths)	1”
¾” or 2 - 5/8” x ¾”	1 ½”
1” or 2 - ¾”	1 ½”
1 ¼” or 2 - ¾”	2”
1 ½” or 2 - 1”	2 ½”
2”	3”
3”	4”

B. Water Meters

Water meters shall be cold water rotating disc type with hermetically sealed and magnetically driven registers as manufactured by Sensus Technology or an approved equal. Meters shall be first line quality of the manufacturer. Meters shall be manufactured in accordance with AWWA C700, except as modified by these Specifications.

1. Main Case: The main case shall be high grade waterworks bronze with hinged single lid cover. Raised characters shall be cast on the main case to indicate the direction of flow, size and model number and the meter serial number shall be permanently stamped on the both the meter main case and the lid. The working pressure shall be 150 psi. Standard, Southern or non-frostproof bottoms shall be furnished unless noted otherwise on the Drawings or the Special Conditions. Non-ferrous strainers shall be provided, which fit tightly against the main case. Meters 1 ½” and larger shall be flanged.

2. Measuring Chamber: The measuring chamber shall be of 85-5-5-5 bronze alloy composition and stainless steel or monel trimmed. The moving unit shall be of hard rubber rotating disc type. The disc shall be preferably the three-piece and the chamber shall be the two-piece type employing a thrust roller and insert.

4. Register: The register shall be straight, reading in gallons. The register assembly shall be completely encased, hermetically sealed, and driven by permanent magnets.

4. Guarantee: Water meters shall be guaranteed for a period of at least 5-years from the data of project acceptance.

SECTION 02713 - WATER SYSTEMS

3.11 TRACERS FOR NON-METALLIC PIPE

A. A plastic bonded 12 gauge copper wire shall be installed along the top of the pipe. The wire shall be continuous along the entire length of the pipe and shall be grounded to gate valves, air release valves, fire hydrants, flush valves, and water meters. See plan sheet for details.

B. Service pipe shall have the same wire laid along the top of the service pipe and project one (1) foot into or along side each meter box.

3.12 WARNING/CAUTIONARY TAPE

The Contractor shall install a warning/cautionary tape over all water mains. The tape shall be placed over the pipe approximately 12" above the top of the pipe. The warning/cautionary tape shall be continuous along the pipeline. Splices shall be formed by overlapping adjacent ends of the tape and then securing with translucent, waterproof adhesive tape of the same width as the warning/cautionary tape.

3.13 ABANDONMENT OF EXISTING LINES

The Contractor shall abandon existing water lines in place as indicated on plans. Abandonment of existing lines shall be coordinated with the Owner and Engineer to assure continuity of service. Contractor shall dig test pits at the designated disconnect points to verify piping configuration, sizes, material type, etc. in order to have available the necessary tools, equipment, materials and manpower to complete the work.

A. Prior to the abandonment of any line, all services shall be disconnected and transferred from the line to be abandoned to the new main line.

B. Abandoned line shall be disconnected from main line and all valves and other appurtenances removed.

C. The active main line from which abandoned line has been disconnected shall be closed with a mechanical joint plug or other repair method suitable for the type of pipe.

D. Ends of abandoned line shall also be plugged with suitable plug where applicable. When not applicable, non-shrink, epoxy grout plug shall be utilized to cap end of abandoned lines.

END OF SECTION

SECTION 03200 – CONCRETE REINFORCEMENT

PART - I GENERAL

1.01 SCOPE OF WORK

Furnish all labor, materials, equipment and incidentals required and install all concrete reinforcement as shown on the Drawings and specified herein.

1.02 SUBMITTALS

A. Submittals shall be in accordance with the submittal requirements specification in Division 01.

B. The following shall be submitted for review prior to the fabrication of reinforcement.

1. Placing drawings for steel reinforcement.
2. Bar bending details.

C. A certified copy of the mill test on each heat number of reinforcing steel used for fabrication showing physical and chemical analysis shall be submitted to the Engineer at the time of shipment.

1.03 PRODUCT DELIVERY AND HANDLING

A. Reinforcing shall be substantially free from mill scale, rust, dirt, grease, or other foreign matter.

B. Reinforcement shall be shipped and stored with bars of the same size and shape fastened in bundles with durable tags, marked in a legible manner with waterproof markings showing the same designations as shown on the submitted placing drawings.

C. Reinforcing steel shall be stored off the ground and shall be protected from moisture and kept free from dirt, oil, or other injurious contaminants.

D. Coated reinforcing steel shall be stored on padded wooden or steel cribbing. Coatings damaged by fabrication, handling or installation shall be repaired to conform to the applicable coating specification.

PART - II PRODUCTS

2.01 MATERIALS

A. Materials shall be new, be of domestic manufacture and shall conform to the following material specifications.

1. Steel reinforcement in concrete shall conform to ACI 318 unless otherwise specified herein.

2. Deformed concrete reinforcing bars: ASTM A 615, Grade 60 or ASTM A 615 Grade 60 supplementary requirement S1 deformed bars as required.
3. Concrete reinforcing bars required on the Drawings to be welded: ASTM A 706.
4. Spiral reinforcement for columns: ASTM A 82 or ASTM A 615, Grade 60.
5. Welded steel wire fabric: ASTM A 185.
6. Welded deformed steel wire fabric: ASTM A 497.
7. Welded plain bar mats: ASTM A 704, Grade 60.
8. Fabricated deformed steel bar mats: ASTM A 184 and ASTM A 615, Grade 60 deformed bars.
9. Galvanized reinforcing bars: ASTM A 767 and ASTM A 615, Grade 60.
10. Plastic protected bar supports: CRSI Bar Support Specifications, Class 1 - Maximum Protection.
11. Stainless steel protected bar supports: CRSI Bar Support Specifications, Class 2 - Moderate Protection.
12. Precast concrete block bar supports: CRSI Bar Support Specifications, precast Blocks with Wires.
13. Tie wires for reinforcement: 16-gauge or heavier, black annealed wire.
14. Ferrous supports and ties for galvanized reinforcing steel shall be zinc coated.

B. The following alternate materials are allowed:

1. ASTM A 616 (Rail-steel), Grade 60 deformed bars for ASTM A 615 (Billet-steel), Grade 60 deformed bars.
2. ASTM A 617 (Axle-steel) Grade 60 deformed bars for ASTM A 615 (Billet-steel), Grade 60 deformed bars.
3. Selected heats of ASTM A 615, Grade 60 including supplementary requirement S1 deformed bars with a carbon equivalency (C.E.) of 0.55 or less for ASTM A 706.

C. Mechanical reinforcing steel butt splices shall be compression-tension positive connecting taper threaded type employing a hexagonal coupler, set screw coupler or molten steel filler medium type couplers. They shall meet all ACI 318-Latest Edition Building Code requirements. Set screw type connectors shall use self torquing, shear head bolts. Bar ends for threaded splices shall be taper threaded with coupler manufacturer's bar threader to ensure proper taper and thread engagement. Bars for set screw and molten steel filler medium type couplers shall meet ERICO standards for deformation height and shall be square cut to fit the required dimension into the couple. Approved connectors are Lenton Standard Couplers (taper thread) or Lock B-Series rebar splices as manufactured by Erico Products, Inc., 31700 Solon Road, Solon, Ohio 44139, (800) 248-2677, Cadweld Mechanical Rebar Splice as manufactured by Erico Products, Inc., or preapproved equal

1. Unless otherwise noted on the drawings, mechanical tension splices shall be designed to produce a splice strength of not less than 150 percent of the ASTM specified minimum yield strength of the reinforcing.

2. Compression type mechanical splices shall provide concentric bearing from one bar to the other bar and shall be capable of developing the ultimate strength of the reinforcement in compression.

2.02 FABRICATION OF REINFORCEMENT

A. Fabrication tolerances shall be in accordance with the CRSI, Code of Standard Practice-Fabrication.

B. Bars shall be cold bent.

C. Bars shall be bent around a revolving collar having a diameter of not less than that recommended by the CRSI, Code of Standard Practice-Detailing. Hooks shall conform to the same Code.

D. Bars that are to be butt spliced, placed through limited diameter holes in metal or have a threaded end shall have the applicable end(s) saw-cut.

PART - III EXECUTION

3.01 INSTALLATION

A. Surface condition, bending, spacing, and tolerances of placement of reinforcement shall conform to the CRSI, Code of Standard Practice-Field Erection.

B. Except as otherwise indicated on the Drawings, the minimum concrete cover of reinforcement shall be as follows:

1. Concrete cast against and permanently exposed to earth; 3-in.
2. Concrete surfaces in contact with soil, water, sewage, sludge or exposed to the weather; 2-in.
3. Concrete surfaces not in contact with soil, water, sewage, sludge or exposed to the weather:

    a. Beams, girders, columns: principal reinforcement, ties, stirrups or spirals - 1-1/2-inches
    b. Walls and bottom steel of slabs - 1-inch
    c. Shells and top steel of slabs - 3/4-inch

C. Reinforcement which is to be exposed for a considerable length of time after being placed shall be painted with a heavy coat of neat cement slurry, if required by the Engineer.

D. No reinforcing bars shall be welded either during fabrication or erection unless specifically called for on the Drawings, specified herein, or approved in writing by the Engineer. All bars that have been welded, including tack welds, without such approval shall be immediately removed from the work. When welding of reinforcement is

approved or called for, it shall conform to the AWS Structural welding Code-Reinforcing Steel, AWS 01.4.

3.02 REINFORCEMENT AROUND OPENINGS

A. Place an equivalent area of steel to that interrupted by an opening, pipe penetration, electrical conduit group or duct penetration around the opening or penetration.

B. The bars shall have sufficient length to develop bond at each end beyond the opening or penetration.

3.03 SPLICING OF REINFORCEMENT

A. Except as otherwise indicated on the Drawings, compression embedment and lap splices shall be 30 diameters, but not less than 12 inches. The lap splice length for column vertical bars shall be based on the smaller bar size.

B. Except as otherwise indicated on the Drawings, tension lap splices shall be in accordance with ACI 318 Latest Edition. Class A splices shall be used when fifty percent (50%) or less of the bars are spliced within the required lap length, otherwise Class B splices shall be used.

C. Splices in reinforcement for tension tie members and hangers shall be welded to develop, in tension, at least one-hundred-twenty-five percent (125%) of the specified yield strength of the bar. Splices in adjacent bars shall be offset the distance of a Class B splice. Splicing of bars in tension tie members and hangers shall be avoided whenever possible.

D. Compression type mechanical connectors may be used for No. 9 or larger reinforcing bars in compression if approved in writing by the Engineer. The splice shall include concentric bearing from one bar to the other bar and shall be capable of developing one hundred twenty five percent (125%) of specified yield strength. Splices in adjacent bars shall be offset at least 30 bar diameters.

E. Splices in welded wire fabric shall be lapped not less than 1-1/2 courses or 12-inches. The spliced fabrics shall be tied together with wire ties at least 24-inches on center.

3.04 PROCEDURES TO REPLACE AND/OR REPAIR EXISTING REINFORCEMENT

A. Clean the walls and/or slabs of the structure via hydroblast and sandblasting to remove any corroded, damaged or loose material.

B. Inspect the condition of the existing reinforcing steel in slabs and walls where the existing steel is corroded or damaged. During the inspection remove any loose or unsound material by chipping or other mechanical means.

C. Install temporary supports for a wet well top or other free spanning slab so that the weight of the slab and equipment are supported during the work to replace damaged

reinforcing steel. Supports shall be designed so that they will remain in place until the entire reinforcing steel repair/replacement is completed

D. Remove any reinforcing steel that has corrosion damage to the extent that it is no longer serviceable as determined by the Engineer, chipping or jack hammering concrete from around the ends of the acceptable portions of the existing reinforcing steel so that new steel bars can be lap spliced with a minimum splice length of 150 percent of the standard tension splice required by ACI 318 or 60 bar diameters, whichever is shorter. Mechanical tension splices will be allowed in lieu of the specified lap splice as long as the mechanical splice will develop a minimum of 150 percent of the reinforcing bar's yield strength.

E. Clean the remaining steel to accept the spliced reinforcement and install drilled and epoxy grouted dowel bars of the same size as the bars to which the dowel will be connected as need to splice reinforcement at the intersection of the top slab and wall,

F. Provide and install standard 90 degree corner bends when necessary to restore continuity of the top slab reinforcement with the vertical wall reinforcement. Unsound areas of the vertical wall shall be removed to the extent that the vertical leg of the bend can be spliced to undamaged, sound vertical reinforcement by chipping away sound concrete to the extent needed to expose the existing reinforcement

G. Install number 3 bar dowels with standard 180 degree hooks into the top slab at 5-foot center-to-center spacing in both length and width directions of the slab to support the top slab reinforcement.

H. Place epoxy grout when necessary to bed the new reinforcement against the existing concrete in the top slab or wall and other work as necessary to restore the structural integrity of slabs and walls.

3.05 ACCESSORIES

A. The Contractor is solely responsible for determining, providing and installing accessories such as chairs, chair bars, and the like in sufficient quantities and strength to adequately support the reinforcement and prevent its displacement during the erection of the steel and the placement of concrete and to provide spacings of bars with adequate cover as shown on the Drawings or specified herein.

B. Precast concrete blocks with wires shall be used where the reinforcing steel is being supported over soil.

C. Stainless steel protected bar supports shall be used to firmly hold vertical reinforcement in position.

D. Alternate methods of supporting top steel in slabs, such as steel channels supported on the bottom steel or vertical reinforcing steel fastened to the bottom and top mats, may be used if accepted by the Engineer.

SECTION 03200 – CONCRETE REINFORCEMENT

3.06 INSPECTION

A. The Engineer shall be given ample prior notice of the availability of set reinforcement for his review.

B. In no case shall any reinforcing steel be covered with concrete until the amount and position of the reinforcement has been observed by the Engineer or the RPR and permission is given to proceed with placement of the concrete.

END OF SECTION

TECHNICAL SPECIFICATIONS
DIVISION 03 - CONCRETE

SECTION 03300 – CAST-IN-PLACE CONCRETE

PART 1- GENERAL

1.01 SCOPE OF WORK

Furnish all labor, materials, equipment and incidentals required to place all cast-in-place concrete, reinforcing steel, forms, waterstops and miscellaneous related items, including sleeves, reglets, anchor bolts, inserts and embedded items, as shown on the Drawings and as specified.

1.02 DESCRIPTION

A. Concrete shall be composed of Portland cement, fine aggregate, coarse aggregate, water and admixtures as specified and shall be ready-mixed concrete produced by a plant acceptable to the Engineer. All constituents, including admixtures, shall be batched at the central batch plant.

B. Reinforced concrete shall comply with ACI Specifications 318.

C. All testing and inspection services required shall be provided by the Owner. The cost of such work, except as specifically stated otherwise, shall be paid for by the Owner. Methods of testing shall comply in detail with the latest applicable ASTM Methods.

D. Samples of constituents and of concrete as placed will be subjected to laboratory tests. All materials incorporated in the Work shall conform to accepted samples.

E. Under special circumstances, the Engineer may allow minor deviations from the material requirements specified, provided that the resulting concrete quality is not adversely affected or that a suitable adjustment in cement content is made to compensate for such deviations

1.03 SUBMITTALS

A. The Contractor shall submit to the Engineer for approval a proposed design mix for each concrete strength and type required by these specifications. Information to be submitted for each type and strength shall include the following items:

1. Sources of concrete mix design components including coarse aggregate, fine aggregate, cement, water, admixtures, and pozzolans where included.

2. Concrete mix design

   a. Constituent quantities per cubic yard.

   b. Water content: gallons/100 pounds cementitious materials.

   c. Cement: type, manufacturer, and chemical analysis.

   d. Mix design slump.

   e. Average laboratory cylinder strength test results at 28-days for concrete mix design (include standard deviation). Provide results of seven and 14 day tests if available.

3. Laboratory sieve analysis and mechanical properties for coarse and fine aggregate.

4. Admixture types and - chemical compositions. (Include certification of compliance with ASTM reference standards and confirmation of any supplementary requirements included in these Specifications.)

B. An additional mix design for each type and strength of concrete to be placed by pumping shall be submitted to the Engineer for approval.

C. Failure to include any item of information noted in Article 1.04 A for a given concrete strength or type shall be cause for requirement of a resubmittal by the Engineer.

D. The Contractor shall submit to the Engineer for acceptance, as provided in Section 01300, shop drawings showing placement of all joints of plywood forms, and rustications.

E. Concrete mix designs including fly ash will not be acceptable.

1.04 QUALITY ASSURANCE

A. The actual acceptance of aggregates and development of mix proportions to produce concrete complying with the specific requirements of this Section shall be determined by means of prior laboratory tests made with the constituents to be used on the Work.

B. Well in advance of placing concrete, the Contractor shall discuss with the Engineer the proposed source of materials and concrete mixture that he proposes to use. He shall furnish samples of aggregate and cement for testing, deliver them to the laboratory designated by the Engineer, and permit ample time for the laboratory to develop a proposed design mix or to modify the design of the mix within the limits of these Specifications.

SECTION 03300 – CAST-IN-PLACE CONCRETE

C. The following limiting strengths, water contents and cement factors shall apply.

Table 03300-1

Minimum Compressive Strength, f'c (psi at 28 days)	Maximum Water Content* (gals./100 lbs.)	Net Minimum Cement Factor** (100 lbs./c.y.)
2500	7.4	4.30
3000	6.2	5.64
4000	5.9	5.64
4000 @ 7 days	4.5	6.58

* Maximum: decrease if possible. This represents total water in mix at time of mixing, including free water on aggregates and water in admixture solutions.

** Minimum: increase as necessary to meet other requirements. These cement factors apply to "controlled" concrete subject to specific inspection.

1. Minimum cement content shall be as shown in Table 03300-1. The Contractor shall increase cement content as required to meet strength requirements.

2. When high early-strength Portland cement is permitted, the same strength requirements shall apply except that the indicated strengths shall be attained at seven days instead of 28 days.

3. Minimum compressive strength at 28 days shall be 2500 psi for sidewalks and non-structural concrete and 4,000 psi for structural concrete.

4. Maximum water/cement ratio for 4,000 psi concrete utilizing water reducing admixture shall be 90 percent of the value shown above for mixes.

D. If, during the progress of the work, it is impossible to secure concrete of the required workability and strength with the materials being furnished, the Engineer may order such changes in proportions or materials, or both, as may be necessary to secure the desired properties. Any changes so ordered shall be made by the Contractor.

E. If, during the progress of the work, the Contractor desires to use materials other than those originally accepted or if the materials from the sources originally accepted change in characteristics, the Contractor shall make new acceptance tests of aggregates and

establish new design mixes. Such testing and design shall be accomplished with the assistance of a testing laboratory acceptable to the Engineer.

F. Consistency of the concrete as measured by the ASTM C 143, shall be as shown in Table 03300-2.

Table 03300-2

Portion of Structure	Slump (inches) Recommended Range	
Pavement and slabs on ground	2	1-3
Plain footings, gravity walls, slabs and beams	2-3	1-4
Heavy reinforced foundation walls and footings	3-4	2-5

Concrete shall be of a consistency which can be readily worked into the corners and angles of the forms and around the reinforcement, inserts, and wall castings without permitting materials to segregate or free water to collect on the surface. Consideration shall be given to the proposed methods of placing and compacting in establishing the consistency of the concrete.

G. Entrained air as measured by ASTM C 231 shall be as indicated in Table 03300-3.

Table 03300-3

Total Air Concrete Placement	Measured at Discharge from Truck (%)
Finished slabs	3.0 maximum
All other	3.5 - 5.0
Sewer Pump Sta Top Slab	Design optimal air entrainment along with other properties to provide maximum sulfate resistance.

If the air entraining agent proposed for use in the mix requires testing methods other than ASTM C 231 to accurately determine air content, make special note of this requirement in the admixture submittal required under Article 1.04.

SECTION 03300 – CAST-IN-PLACE CONCRETE

1.05 ACCEPTANCE TESTS

A. The actual proportioning of cement, aggregates, and water necessary to produce concrete complying with the requirements of Table 03300-1, shall be determined by tests made with representative samples of the materials to be used for the Work. Tests shall be made by a testing laboratory selected by the Owner and approved by the Engineer. Testing shall comply with ASTM C 39.

B. Cement shall be tested to certify compliance with the requirements of this Specification. Methods of testing shall comply with the appropriate Specifications, but the place, time, frequency, and method of sampling will be determined by the Engineer in accordance with the particular need.

C. Samples of fine and coarse aggregates shall be furnished for examination and testing at least three weeks before the Contractor proposes to use them in the work.

D. Water content of the concrete shall be based on a curve showing the relation between water content and seven and 28-day compressive strengths of concrete made using the proposed materials. The curves shall be determined by four or more points, each representing an average value of at least three test specimens at each age, and shall have a range of values sufficient to yield the desired data, including all the compressive strengths called for on the Drawings, without extrapolation. The water content of the concrete to be used, as determined from the curve, shall correspond to the following test strengths of the laboratory trial mixtures:

Table 03300-4

Design strength	Min. Lab. Strength 7 Days*	28 Days**
2500 psi	2000 psi	2900 psi
3000 psi	2500 psi	3400 psi
4000 psi	3500 psi	4600 psi
4000 psi @ 7 days	4000 psi	5600 psi

* May be employed for preliminary designs
** To be used for final designs

E. In no case, however, shall the resulting mix conflict with the limiting values for maximum water content and net minimum cement factor as specified in Table 03300-1.

F. Testing under Section 1.05 to establish conformity of the various concrete mix components and the mix design with the provisions of this Specification shall be at the Contractor's expense.

SECTION 03300 – CAST-IN-PLACE CONCRETE

PART 2- PRODUCTS

2.01 MATERIALS

A. Materials shall comply with these Specifications and any State or local specification requirements.

B. Cement for all cast-in-place concrete shall be domestic Portland cement (ASTM C 150, Type II) or high early strength Portland cement (ASTM C 150, Type III). Cement brands shall be subject to approval by the Engineer.

1. For all hydraulic and below grade structures use Type II cement.

2. High early strength cement shall be used only after obtaining written approval from the Engineer.

3. Use only Portland cement produced at locations approved and listed in the Qualified Products List of LADOTD.

C. Aggregates

1. Fine aggregate shall consist of washed inert natural sand conforming to the requirements of LADOTD Specifications, Section 1003.02, and the following detailed requirements:

a. Gradation:

Sieve (ASTM Specification Ell)	Percentage Passing
3/8 inch	100%
No. 4	95 - 100%
No. 16	45 - 90%
No. 50	7 - 30%
No. 100	0 - 7"
No. 200	0 - 3%
Fineness Modulus	2.60 - 3.00
Organic	See ASTM C 33
Silt	2.0% maximum
Mortar Strength	95% minimum as per ASTM C 87 Section 10
Soundness	8% maximum loss, using magnesiumsulfate, subjected to 5 cycles

2. Coarse aggregate shall consist of well-graded crushed stone or washed gravel conforming to the requirements of LADOTD Specifications Section 1003.02, and the following detailed requirements.

Organic	See ASTM C 33
Silt	1.0% maximum
Soundness	8% maximum loss, using magnesium sulfate, subjected to 5 cycles

3. Maximum coarse aggregate size shall be:

   2-inch for mass concrete
   1-inch for reinforced section l0-inches and over in thickness
   3/4-inch for reinforced sections less than 10-inch thickness

   The "Designated Size" and the corresponding gradations shown represent the end or combined gradation of the coarse aggregate to be used in the final concrete.

D. Water

1. Water shall be clean and free from injurious amounts of oil, acid, alkali, organic matter, or other deleterious substances.

2. Mortar specimens made with the water under examination and normal Portland cement shall have at least one-hundred percent (100%) of the strength of similar specimens made with distilled water when tested for 28-day strength in accordance with ASTM C 87.

3. Potable tap water will normally fulfill the requirements noted. Water from all other sources shall be tested and approved before use and shall not contain impurities in excess of the following limits:

   a. Acidity or alkalinity calculated in terms of calcium carbonate: 0.05%

   b. Total organic solids: 0.05%

   c. Total inorganic solids: 0.08%

   d. Total chlorides as sodium chloride: 0.05%

E. Admixtures

1. A water reducing agent such as Pozzolith, WRDA or approved equal shall be used in all concrete. The admixture shall comply with ASTM Specification C 494, Type A or

Type D, shall contain no chlorides, shall be non-toxic after thirty (30) days, and shall be compatible with the air entraining admixtures. Proportioning and mixing shall be as recommended by the manufacturer.

2. Admixtures causing accelerated setting of cement in concrete shall not be used.

3. Air entraining admixtures compatible with the concrete mix shall be used in moderation along with the water reducing agent to obtain the specified percent air in the resultant concrete.

4. Corrosion resistant admixture shall be used in all wet well top slabs. The admixture shall be Xypex Admix C-1000-T as manufactured by Xypex Chemical Corporation, Richmond, B.C., Canada (distributed by Technical Coatings Services (504) 466-4564) or prior approved equal. The Xypex admix shall be added to the concrete at the time of batching at a dosage rate of 3.5% by weight of cement. The Xypex C-1000T shall contain red dye to ensure detection in the concrete.

F. Non-Shrink Cement Grout: Non-shrink cement grout shall consist of cement, aggregate and additives formulated to meet the following volume change requirements. Early volume change (within 24 hours) as tested by ASTM C 827 shall be limited to zero percent (0%) shrinkage and four percent (4%) maximum expansion. Long term volume change of hardened non-shrink cement grout (after 1 day of cure) shall conform to the Corps of Engineers' Specification for Non-Shrink Grout, CRD-C621-82B. Shrinkage shall be zero percent (0%) and expansion limited to a maximum of 0.4 percent volume change. Cement additives required to meet this specification shall be recommended by the grout manufacturer, but shall be non-staining and non-metallic. Grout shall be equal to "Five Star" products by the U.S. Grout Corporation.

G. Non-Shrink Epoxy Grout: Non-shrink epoxy grout shall meet plastic volume changes within the first four hours of zero percent (0%) shrinkage and four percent (4%) maximum expansion as tested by ASTM C 827. Restrained hardened epoxy grout shall have 0 percent shrinkage as tested by ASTM C 531. Epoxy grout shall have zero percent (0%) expansion in volume change after set under constant temperature conditions. Epoxy grout shall be one-hundred percent (100%) solids formulated with resin, hardener and aggregate as recommended by the manufacturer. Epoxy grout shall be equal to "Five Star" Epoxy products manufactured by the U.S. Grout Corporation.

PART 3 - EXECUTION

3.01 MEASURING MATERIALS

A. Measure materials by weighing except as otherwise specified or where other methods are specifically authorized by the Engineer. The apparatus provided for weighing the aggregates and cement shall be suitably designed and constructed for this purpose. Scales

shall have been certified by the local Sealer of Weights and Measures within one year of use and a copy of the certification shall be delivered to the Engineer prior to beginning of placement of concrete. The accuracy of all weighing devices shall be such that successive quantities can be measured to within one percent (1%) of the desired amount.

B. Cement and each type of aggregate shall be weighed separately. Cement in standard packages (sacks) need not be weighed, but bulk cement and fractional packages shall be weighed.

C. Water shall be measured by volume or by weight. The water-measuring devices shall be capable of control to one-half (½%) percent accuracy. All measuring devices shall be subject to approval by the Engineer.

D. Admixtures shall be dispensed either manually with use of calibrated containers or measuring tanks, or by means of an automatic dispenser approved by the manufacturer of the specific admixture.

3.02 MIXING

A. Concrete shall be ready-mixed concrete by equipment acceptable to the Engineer. No hand-mixing will be permitted. Adding water in controlled amounts during the mixing cycle shall be done only with the express approval of the Engineer and under his direction. The amount of water added shall be shown on each delivery invoice.

B. Ready-mix concrete shall be transported to the site in watertight agitator or mixer trucks loaded not in excess of rated capacities for the respective conditions as stated on the name plate. Discharge at the site shall be within 1-1/2 hours after water was first introduced to the mix.

C. Central plant and rolling stock equipment and methods shall comply with the latest Truck Mixer and Agitator Standards of the Truck Mixer Manufacturers' Bureau of the National Ready-Mixed Concrete Association, as well as ACI Standard 318 Section 5.2, and ASTM C 94.

D. Retempering of concrete or mortar that has partially hardened (that is, mixing with or without additional cement, aggregate, or water) will not be permitted.

E. Attention is called to the importance of dispatching trucks from the batching plant so they arrive at the site of the work just before the concrete is required, thus avoiding excessive mixing of concrete while waiting or delays in placing successive layers of concrete in the forms.

SECTION 03300 – CAST-IN-PLACE CONCRETE

3.03 FIELD TESTS

A. Sets of a minimum of three (3) field control cylinder specimens will be taken at random by the Engineer during the progress of the Work, in compliance with ASTM C 31; the total number of specimens taken on the project shall average one (1) set per 100 cubic yards, and not less than one (1) set of specimens shall be taken on any one day. When average 28-day compressive strength of control cylinders in any set falls below the required compressive strength or below proportional minimum seven-day strengths (where proper relation between seven and 28-day strengths have been established by tests), proportions, water content, or temperature conditions shall be changed to achieve the required strengths.

B. The Contractor shall cooperate in the making of tests by allowing free access to the work for the selection of samples, providing an insulated closed curing box for specimens, affording protection to the specimens against injury or loss through his operations, and furnishing material and labor required for the purpose of taking concrete cylinder samples. All shipping of specimens will be paid for by the Owner. Curing boxes shall be acceptable to the Engineer.

C. Slump tests and concrete cylinders will be made in the field by the Owner's laboratory technician.

D. Air entrainment shall be measured by the Owner's laboratory technician at the time of concrete deposit in compliance with ASTM C 231.

3.04 INSPECTION AND CONTROL

A. The preparation of forms, placing of reinforcing steel, conduits, pipes, and sleeves, batching, mixing, transporting, placing, and ring of concrete shall be all times under the inspection of the Engineer.

B. The Contractor shall advise the Engineer of his readiness to proceed at least 24 hours prior to each concrete placement. The Engineer will inspect the preparations for concreting including the preparation of previously placed concrete, the reinforcing and the alignment and tightness of formwork. No placement shall be made without the inspection and acceptance of the Engineer.

3.05 CONCRETE APPEARANCE

A. Concrete for the Work shall provide a homogeneous structure which, when hardened, will have the required strength, durability and appearance.

B. Formwork, mixtures and workmanship shall be such that concrete surfaces, when exposed, will require no finishing.

C. When concrete forms are stripped, the concrete surface when viewed in good lighting from 10-feet away shall be pleasing in appearance, and at 20-feet shall show no visible defects.

3.06 FORMS

A. Forms shall be used for all cast-in-place concrete, including footings, except for thrust blocks where required. Forms shall be constructed and placed so the resulting hardened concrete will conform to the shape, lines, dimensions, appearance, and elevations indicated on the Drawings. The Engineer shall have the right to approve or reject material for use in the construction or fabrication of formwork.

B. Forms for all exposed exterior and interior concrete walls shall be Type A-C exterior grade plywood with the "A" veneer turned to the casting side. Rustications shall be as located and detailed on the Drawings. Moldings for chamfers and rustications shall be milled and planed smooth.

C. Forms for all other cast-in-place concrete shall be made of wood, metal, or other acceptable material. Wood forms shall be constructed of sound lumber or plywood of suitable dimensions, free from knotholes and loose knots. where used for exposed surfaces, boards shall be dressed and matched. Plywood shall be sanded smooth and fitted with tight joints between panels. Metal forms shall be of an acceptable type for the class of work involved and of the thickness and design required for rigid construction.

D. Edges of all form panels in contact with concrete shall be flush within 1/32-inch and forms for plane surfaces shall be such that the concrete will be plane within 1/16-inch in four (4) feet. Forms shall be tight to prevent the passage of mortar, water and grout.

E. Forms for walls shall have removable panels at the bottom for cleaning, inspecting, and scrubbing-in of bonding paste. Forms for walls of considerable height shall be arranged with tremies and hoppers for placing concrete in a manner that will prevent segregation and accumulation of hardened concrete on the forms or reinforcing above the fresh concrete.

F. Molding or bevels shall be placed to produce a 3/4-inch chamfer on all exposed projecting corners, unless otherwise noted on the Drawings. Provide similar chamfer strips at horizontal and vertical extremities of all wall placements to produce "clean" separation between successive placements as called for on the Drawings.

G. Forms shall be sufficiently rigid to withstand vibration and to prevent displacement or sagging between supports. Forms shall be constructed so that the concrete will not be damaged by their removal. The Contractor shall be entirely responsible for the adequacy of the forming system.

H. Forms, including new pre-oiled forms, shall be oiled before reinforcement is placed, with approved nonstaining oil or liquid form coating not having a paraffin base.

I. Before form material is reused, all surfaces in contact with concrete shall be thoroughly cleaned; all damaged places repaired; all projecting nails withdrawn; and all protrusions smoothed. Wood forms shall be pre-oiled before reuse.

J. Form ties encased in concrete other than those specified in the following paragraph shall be designed so that after removal of the projecting part, no metal shall be within one-inch of the face of the concrete. That part of the tie to be removed shall be at least ½-inch diameter or be provided with a wood or metal cone at least ½-inch diameter and one inch long. Form ties in concrete exposed to view shall be the cone-washer type equal to the Richmond "ILrscru". Throughbolts or common wire shall not be used for form ties.

K. Form ties for exposed exterior and interior walls shall be as specified in the preceding paragraph except that the cones shall be of approved wood or plastic conforming with the preceding dimensions or as otherwise shown on the Drawings.

3.07 PLACING AND COMPACTING

A. Unless otherwise permitted, concrete placement begun on any day shall be completed, including finishing, in daylight of the same day.

B. Place no concrete until reinforcing steel, pipes, conduits, sleeves, hangers, anchors, and other work required to be built into concrete have been inspected and approved by the Engineer. Remove water and foreign matter from forms and excavation. Place no concrete on frozen soil, and provide adequate protection against frost action during freezing weather. All soil preparation below slabs and footings shall be approved by the Engineer before placing concrete.

C. Transport concrete from mixer to place of final deposit as rapidly as possible by methods which prevent separation of ingredients and displacement of reinforcement, and which avoid rehandling. Deposit no partially hardened concrete.

D. "Cold joints" are to be avoided unless called for on the Drawings. If they occur, they are to be treated as bonded construction joints.

E. At construction joints, the surfaces of the concrete already placed, including vertical and inclined surfaces, shall be thoroughly cleaned of foreign materials, laitance, and weak concrete and roughened with suitable tools to expose a fresh face. At least two hours before and again shortly before the new concrete is deposited, the joints shall be saturated with water. After glistening water disappears, the joints shall be given a thorough coating of or an approval bonding agent. The surfaces shall receive a coating 1/8-inch in

thickness or as recommended by the bonding agent manufacuturer, well scrubbed-in by means of stiff bristle brushes whenever possible. New concrete shall be deposited before the neat cement sets.

F. Deposit concrete to maintain a horizontal plastic surface. Vertical lifts shall not exceed 24-inches. Vertical lifts of 18 inches are preferable.

G. Chutes for conveying concrete shall be of U-shaped design sized to insure a continuous flow of concrete. Do not use flat (coal) chutes. Chutes shall be metal or metal-lined and each section shall have approximately the same slope. The slope shall be not less than 25 or more than 45 degrees and shall be such as to prevent the segregation of the ingredients. The discharge end of the chute shall be provided with a baffle plate or spout to prevent segregation. If the discharge end of the chute is more than five (5) feet above the surface of the concrete in the forms, a spout shall be used, and the lower end maintained as near the surface of deposit as practicable. When the operation is intermittent, the chute shall discharge into a hopper. Chutes shall be thoroughly cleaned before and after each delivery or separate, continuous pour. Debris and any water generated by the cleaning of chutes shall be discharged outside the forms. Concrete shall not be allowed to flow horizontally over distances exceeding five (5) feet.

H. Pumping of concrete is an acceptable method of placement. The proposed pumping equipment and concrete mix shall be submitted to the Engineer prior to usage for approval.

I. In thin sections of considerable height, concrete shall be placed using suitable hoppers, spouts with restricted outlets, or other approved methods.

J. Concrete shall be thoroughly compacted during and immediately after placement using suitable tools. Internal type mechanical vibrators shall be employed to produce the required quality of finish. Vibration shall be done by experienced operators under close supervision and shall be of the duration required to produce homogeneity and optimum consolidation without permitting segregation of the solid constituents or "pumping" or migration of air. All vibrators shall be supplemented by proper wooden spades to prevent puddling adjacent to forms and to remove bubbles and honeycomb, especially for the top lifts of walls. All vibrators shall operate at minimum 10,000 RPM. At least one vibrator shall be used for every 10 cubic yards of concrete placed per hour. In addition, one spare vibrator in operating condition shall be on the site.

K. Concrete slabs on the ground shall be well-tamped into place. Foundation materials shall be wet, tamped, and rolled until thoroughly compacted prior to placing concrete.

L. Concrete shall be deposited continuously in layers of such thickness that no concrete will be deposited on concrete that has sufficiently hardened to cause the formation of seams and planes of weakness within the section. If a section cannot be placed continuously,

construction joints may be located at points as provided for in the Drawings or as acceptable to the Engineer.

3.08 CURING AND PROTECTION

A. Protect all concrete work against injury from the elements and defacements of any nature during construction operations.

B. All concrete shall be treated immediately after concrete placing and finishing is completed to provide continuous moist curing above 50°F for at least seven (7) days (fourteen (14) days minimum for water-retaining structures), regardless of the ambient air temperature. Absorptive wood forms remaining in place will not be considered as a satisfactory means of curing. Forms and vertical surfaces shall be covered and kept moist with three layers of continuously saturated burlap, or by other approved means. Horizontal surfaces, slabs, etc. shall be ponded to a depth of ½-inch or kept continuously wet by use of sprinklers. Street pavement, driveways, and sidewalks shall be cured by application of a white-pigmented liquid-membrane-forming compound applied in strict conformance with LADOTD Specifications, Section 601.12. Liquid-membrane forming compounds shall conform to LADOTD Specifications Section 1011.01.

C. Cured surfaces and slabs shall be protected from the direct rays of the sun to prevent checking and crazing until the concrete is 28 days old.

D. Cold Weather Concreting:

1. Concrete placed at air temperature below 40^0F shall have a minimum temperature of 60°F. When the air temperature is below 40^0F or near 40^0F and falling, the water and aggregates shall be heated before mixing. Concrete shall be protected so the temperature at the surface will not fall below 50^0F for at least seven (7) days after placing. No salt, manure, or other chemicals shall be used for protection. Overheating or non-uniformity of heating shall be prevented. The surface temperature of the concrete shall not exceed 95^0F during heating operations.

2. In cold weather, continuous warm curing (with supplementary heat when required) shall provide a total of 350 day-degrees (i.e., 5 days at 70^0F, etc.) of heat.

3. The Contractor shall submit for acceptance by the Engineer a Work Plan describing the methods and procedures he proposes to use for concrete placement and curing during periods with temperatures below 40^0F.

E. Hot Weather Concreting

1. For this Specification, "hot weather" is defined as any combination of high air temperatures, low relative humidity, and wind velocity that produces a rate of

evaporation as estimated by Figure 2.1.5 of ACI 305R approaching or exceeding 0.2 lb/ft/hr.

2. Concrete placed during hot weather shall be batched, delivered, placed, cured and protected in compliance with the recommendations of the latest ACI Committee 305 Report and the additional requirements of this Specification.

   a. Temperature of concrete being placed shall not exceed 90^0F and every effort shall be made to maintain a uniform concrete mix temperature below this level. The temperature of the concrete shall be such that it will cause no difficulties from loss of slump, flash set or cold joints.

   b. All necessary precautions shall be taken to promptly deliver and place the concrete upon its arrival at the job and to provide vibration immediately after placement.

   c. The Engineer may direct the Contractor to immediately cover plastic concrete with polyethylene.

3. The Contractor shall submit for acceptance by the Engineer a work Plan describing the methods and procedures he proposes to use for concrete mixing, including cooling or addition of ice to the aggregates, placement, finishing and curing during hot weather periods.

3.09 REMOVAL OF FORMS

A. Except as otherwise specifically authorized by the Engineer, forms shall not be removed before the concrete has cured as specified above in subparagraph 3.08.C and the concrete has attained a strength of at least 30 percent of the ultimate strength prescribed by the design, and not before reaching the following number of day-degrees (whichever is the longer):

Forms For:	Day Degree*
Beams and slabs (spanning or self supporting)	500
Walls and vertical surfaces (non-water retaining)	100
Walls and vertical surfaces (water retaining)	150
Beams and slabs on grade	50

*Day-Degree : Total number of days times average daily air temperature at surface of concrete. For example, 5 days at a daily weighted average temperature of 60^0 F equal 300 day-degrees. Temperatures below 50^0F not to be included.

B. Shores shall not be removed until the concrete has attained at least seventy-five percent (75%) of the specified strength and also sufficient strength to support safely its own weight and any construction live loads that may be placed upon it.

3.10 FAILURE TO MEET REQUIREMENTS

A. Should the strengths shown by the test specimens made and tested in compliance with the previous provisions fall below the values given in Table 03300-1, the Engineer shall have the right to require changes in proportions outlined to apply on the remainder of the Work. Furthermore, the Engineer shall have the right to require additional curing on those portions of the structure represented by the test specimens that failed. The cost of such additional curing shall be at the Contractor's expense. In the event that such additional curing does not give the strength required, as evidenced by core and/or load tests, the Engineer shall have the right to require strengthening or replacement of those portions of the structure which fail to develop the required strength. The cost of all such core borings and/or load tests and any strengthening or concrete replacement required because strengths of test specimens are below that specified, shall be entirely at the expense of the Contractor. In such cases of failure to meet strength requirements, the Contractor and Engineer shall confer to determine what adjustment, if any, can be made in compliance with Sections 15 and 17 of ASTM C 94.

B. When the tests on control specimens of concrete fall below the required strength, the Engineer will permit check tests for strengths to be made by means of typical cores drilled from the structure in compliance with ASTM C 42 and C 39. In case of failure of the latter, the Engineer, in addition to other recourses, may require, at the Contractor's expense, load tests on any one of the slabs, beams, piles, caps, and columns in which such concrete was used. Test need not be made until concrete has aged 60 days.

C. Slabs or beams, under load test, shall be loaded with their own weights plus a superimposed load of 2 times design live load. The load shall be applied uniformly over portion being tested in an acceptable manner, and left in position for 24 hours. The structure shall be considered satisfactory if deflection "D" in feet, at end of 24-hour period does not exceed value: $D = 0.001\ L/t$ in which "L" is span length in feet, "t" is depth of slab or beam in inches.

D. If deflection exceeds "D" in the above formula, the concrete shall be considered faulty unless within 24 hours after removal of the load, slab or beam under test recovers at least seventy-five percent (75%) of observed deflection.

E. Should the strength of test cylinders fall below sixty percent (60%) of the required minimum 28-day strength, the concrete shall be rejected and shall be removed and replaced.

3.11 PATCHING AND REPAIRS

SECTION 03300 – CAST-IN-PLACE CONCRETE

A. It is the intent of these Specifications to require forms, mixture of concrete and workmanship so concrete surfaces, when exposed, will require no patching.

B. As soon as the forms have been stripped and the concrete surfaces exposed, fins and other projections shall be removed, recesses left by the removal of form ties shall be filled, and surface defects which do not impair structural strength shall be repaired. Clean all exposed concrete surfaces and adjoining work stained by leakage of concrete, to approval of the Engineer.

C. Immediately after removal of forms remove plugs and break off metal ties. Holes are then to be promptly filled upon stripping as follows: Moisten the hole with water, followed by a 1/16-inch brush coat of neat cement slurry mixed to the consistency of a heavy paste. Immediately plug the hole with a 1-1.5 mixture of cement and concrete sand mixed slightly damp to the touch (just short of "balling"). Hammer the grout into the hole until dense, and an excess of paste appears on the surface in the form of a spider web. Trowel smooth with heavy pressure. Avoid burnishing.

D. When patching or repairing exposed surfaces, the same source of cement and sand as used in the parent concrete shall be employed. Adjust color if necessary by addition of proper amounts of white cement. Rub lightly with a fine Carborundum stone at an age of one to five days if necessary to bring the surface down with the parent concrete. Exercise care to avoid damaging or staining the virgin skin of the surrounding parent concrete. Wash thoroughly to remove all rubbed matter.

E. Defective concrete and honeycombed areas as determined by the Engineer shall be chipped down reasonably square and at least 1-inch deep to sound concrete by means of hand chisels or pneumatic chipping hammers. Irregular voids or surface stones need not be removed if they are sound, free of laitance, and firmly embedded in the parent concrete, subject to Engineer's final inspection. If honeycomb exists around reinforcement, chip to provide a clear space at least 3/8-inch wide all around the steel. For areas less than 1-1/2-inch deep, the patch may be made in the same manner as described above for filling form tie holes, care being exercised to use adequately dry (non-trowelable) mixtures and to avoid sagging. Thicker repairs will require build-up in successive 1-1/2-inch layers on successive days, each layer being applied (with slurry, etc.) as described above. To aid strength and bonding of the multiple layer repairs, the Engineer may order the use of non-shrink, non-metallic grout as specified.

F. Non-Shrink Grout

1. For small repairs and patching, the grout shall consist of the following minimum cement/sand proportions plus the manufacturer's recommended additives.

Material	Volumes	Weights

Cement	1.0	1.0
Sand	1.5	1.5

2. For very heavy (generally formed) patches, the Engineer may order the addition of pea gravel to the mixture and the proportions modified as follows: (Non-shrink additives by manufacturer)

Material	Volumes	Weights
Cement	1.0	1.0
Sand	1.0	1.0
Pea Gravel	1.5	1.5

3.12 MODIFICATION AND REPAIR TO EXISTING CONCRETE

A. Cut, repair, reuse, demolish, excavate or otherwise modify parts of the existing structures or appurtenances, as indicated on the Drawings, specified, or necessary to permit completion of the work. Finishes, joints, reinforcements, sealants, etc. are specified in respective sections of Specification. All work shall conform with other requirements of this Section and as shown on the Drawings.

B. Mix proportions of patching or filling grout materials used in the modifications and repair to existing concrete as indicated on the Drawings shall be:

1. When new grout other than non-shrink grout is shown to be connected to existing concrete, add the following cement mixtures depending on the depths called for or shown on the Drawings

a. Equal to or less than 2-inches in depth:

Material	Volume
Cement	1.0
Sand	2.0
Water = 5 gals/200 lbs. cement	

b. Greater than 2-inches to 12-inches in depth:

Material	Volume
Cement	1.0
Pea Gravel	2.5
Sand	2.0
Water = 5 gals/100 lbs. cement	

c. Greater than 12-inch in depth

Material

Concrete as specified under MATERIALS in this Section

2. Non-shrink Cement Grout - As specified in this Section.

3. Epoxy Bonding Agent

a. Epoxy bonding agent shall be a two component epoxy adhesive specifically formulated for bonding old concrete to new (plastic) concrete. Component A shall be an epoxy resin and Component B shall be epoxy hardener. The epoxy bonding agent shall be "Sikdadur 32, Hi-Mod", by Sika Corporation, Lyndhurst, NJ; "Pro Bond 821 or 822" by Protex Industries, Denver CO; "Concresive 1170" by Adhesive Engineering Company, San Carlos, CA; or equal.

b. The mixing ratio shall be as recommended by the manufacturer for the ambient temperature when placed. Furnish manufacturer's specific instruction for specific job application and obtain Engineer's review prior to purchase.

c. Epoxy bonding agent shall conform to ASTM C 881 and corresponding tests for bond strength and shrinkage as specified in ASTM C 882, C 883, and C 884.

d. The properties of the cured material shall meet the following:

Compressive Strength (ASTM D-695)
48 hour - 1000 psi
28 day - 7000 psi

Tensile Strength (ASTM D-638)
7 day - 4000 psi

Bond Strength (ASTM C-882 or C-884) - 1500 psi

e. Approval requirements: The Contractor must furnish notarized certification that the material proposed for use meets all of the above requirements and that the material has been previously used successfully for the purpose described.

4. Non-shrink epoxy grout, when specifically called for on the Drawings, shall be as specified in Article 2.01 F. Proportions of aggregate shall be as recommended by the grout manufacturer for the specific installation.

C. Demolition of Existing Concrete

Concrete shown to be removed on the Drawings shall be done by line drilling at limits followed by jack-hammering in areas where concrete is to be taken out. The Contractor shall be responsible for removing concrete in such a manner that surrounding concrete or existing reinforcing to be left in place and existing in place equipment is not damaged. Saw cutting at limits of concrete to he removed shall be done where indicated on the Drawings.

D. Connection to Existing Concrete

1. Roughen surface of existing concrete to be connected to new materials by sand-blasting, chipping, or scarifying. Thoroughly clean area of concrete to receive new materials of loose particles and dust or other contaminating objects.

2. Existing reinforcing to be left in place as shown on the Drawings shall be wire brushed to remove rust or concrete. The existing reinforcing shall be cut, bent, or lapped to new reinforcing as shown on the Drawings and provided with a minimum of one inch of cover all around and at ends of the bar. The reinforcing shall be thoroughly cleaned of loose particles and dust before incorporating in new materials.

3. Connection Methods

   a. Method A. After existing concrete surface at connection has been roughened and cleaned as specified above, thoroughly saturate and maintain saturation for a period of at least 12 hours. Brush on a 1/8-inch layer of cement and water mixed to the consistency of a heavy paste. Immediately after application of cement paste, place new concrete or group mixture as detailed on the Drawings.

   b. Method B. After existing concrete surface has been roughened and cleaned as specified above, apply epoxy bonding agent at connection surface. The field preparation and application of the epoxy bonding agent shall comply strictly with the manufacturer's recommendations. Place new concrete or non-shrink grout to limits shown on the Drawings within time constraints recommended by the manufacturer.

   c. Method C for Dowels. Drill hole 1-1/2 times the diameter of the dowel. The drilled hole shall first be filled with non-shrink epoxy grout, then dowels shall be inserted by tapping. These holes shall be blown clear of loose particles and dust prior to installing epoxy. Place new epoxy grout mixture to depth shown on the Drawings.

d. Method D for Dowels. Dowels and anchor bolts shall be set in existing concrete by the use of non-shrink cement grout in drilled holes. The diameter of the drilled hole shall be two inches larger than the diameter of the dowel or anchor bolt. The hole shall be thoroughly cleaned and non-shrink cement grout shall be placed in the bottom of hole. The dowel or anchor bolt is then inserted into place and the remaining void is filled by ramming in non-shrink cement grout. The dowel or anchor bolt shall have a minimum of 3/4-inches of grout between it and the drilled side of the hole. If the surface of the grout is to be exposed, the non-shrink grout shall be discontinued ½-inches from the surface and the remaining void filled with mortar matching the existing concrete as near as practical.

e. Method E. Non-expanding polyester resin/aggregate glass capsule anchor system shall be set in existing concrete by drilling holes to the required depth to develop the full tensile and shear strengths of the anchor material being used. The anchor bolts system shall be installed per the manufacturer's recommendation in holes sized as required. The capsule anchor system shall be equal to Molly Parabond two part stud and capsule system by USM Corp, 504 Mt. Laurel, Temple, PA, or the HVA Adhesive Anchoring System by Hilti North America, Tulsa, OK. The capsule shall consist of a sealed glass capsule containing premeasured amounts of a polyester or vinylester resin, quartz sand aggregate, and a hardener contained in a separate vial within the capsule. The anchor stud bolt, rebar or other embedment item shall be tipped with a double 45 degree chamfered point, securely fastened into the chuck of a rotary percussion hammer drill, and drilled into the capsule filled hole. The anchor may be installed in horizontal, vertical and overhead positions.

E. Waterstops Set into Existing Concrete

Where waterstops are required to be set into existing concrete, reglets shall be cut as shown on the Drawings. The surface shall be thoroughly cleaned of all debris. The roughened surface shall be kept wet for at least 12 hours in an acceptable manner before pouring new concrete. All free water shall be removed and a layer of cement and water mixed to the consistency of a heavy paste shall be placed to coat the existing concrete. The waterstop shall be bedded in the reglet with non-shrink cement grout prior to placing the new concrete. Where waterstops are called to be placed laying flat against existing concrete, the concrete surface shall be thoroughly cleaned of all debris and the waterstop bonded to the concrete using the epoxy bonding compound specified in Method B above.

F. Where existing reinforcing is exposed due to saw cutting and removal of existing concrete, a coating or surface treatment of epoxy protectant shall be applied to the entire cut surface. The epoxy manufacturer shall submit to the Engineer for review specifications for the epoxy mortar material to be used. The epoxy protectant shall be formulated for the intended application.

SECTION 03300 – CAST-IN-PLACE CONCRETE

3.13 INSTALLATION SCHEDULE

A. Concrete for structures shall have minimum compressive strength at twenty-eight (28) days of 4,000 psi.

B. Concrete fill and duct encasement shall have a minimum compressive strength at twenty-eight (28) days of 2,500 psi.

END OF SECTION

TECHNICAL SPECIFICATIONS
DIVISION 09 - FINISHES

SECTION 09900 - PAINTING

PART - I GENERAL

1.01 The work described in this Section of the Specifications includes the furnishing of all paint, materials, equipment, and labor to completely paint and finish those surfaces specified in the painting schedule contained herein. Also included is the provision of protective coatings on concrete structures in contact with earth and/or liquids, as specified.

1.02 The Contractor shall familiarize himself with the Specifications of various other trades and all surfaces left unfinished by the requirements of their Specifications shall be painted or finished as part of this Contract with the exception of the following:

1. Aluminum Work, unless specifically indicated
2. Ceiling Tile
3. Primer coat on items specified to be primed at the shop
4. Electrical Panels
5. Stainless Steel items
6. Other non-ferrous metal such as brass, bronze, copper, etc. unless specifically indicated.
7. Galvanized items

1.03 Before starting the work and from time to time as the work progresses, the Contractor shall examine work and materials installed by others insofar as they apply to his work and promptly notify the Engineer in writing if any walls, ceilings, furring or partitions are not square, true, plumb and level and if any other conditions exist that will prevent satisfactory results.

1.04 SUBMITTAL REQUIREMENTS

A. The Contractor shall submit manufacturer’s Product Data on all materials specified herein, manufacturer’s full range color chart and actual painted samples of colors on minimum of two (2’) feet square materials, as directed by the Engineer.

B. The Contractor shall submit sample panels of all paint finishes to the Engineer for approval. Changes shall be made as noted and sample finishes shall be resubmitted, if required, until they are approved. It shall be understood that "color to be selected" shall permit the Engineer to select any color, not necessarily one of the manufacturer’s standard colors. The approved sample finishes shall be accurately followed for formula, texture and color. Each panel shall show the varying shades of all coats; the priming or sealer coat covering seven-eighths (7/8) of the face, and the finish coat covering three-quarters (3/4) of the face, thus leaving portions of the priming and body colors exposed. These samples shall be prepared on close grained plywood panels six (6) by six (6) inches square and labeled on the back with all information concerning the finish, including the brand names of all materials.

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1.05 COLORS

A. Ceilings generally will be painted a different color than walls except that, generally, plaster walls and ceilings in rooms having ceramic tile wainscot will be painted the same color.

B. Exposed piping, generally, will be painted color and texture to match walls or ceilings adjacent to it or as color coded for all process piping and equipment.

C. Hollow metal doors and adjacent trim will generally be painted the same color, but a different color from adjacent walls.

D. The undercoats of paint and enamel shall be of the approximate shade of final coat, but each coat shall be of slightly different tint. Each coat shall be inspected and approved by the Engineer before application of the succeeding coats; otherwise, no credit for coat applied will be given and the Contractor shall recoat the work in question.

E. Standard Colors

1. Wastewater Treatment Plants and Facilities:

Raw sewage piping	Light Gray
Sludge piping	Chipmunk Brown
Gas Piping	Safety Red
Potable water supply piping	Safety Blue
Non-potable water piping	Safety Orange

2. Water Treatment Plants and Facilities:

Raw water piping	Safety Green
Treated water piping	Safety Blue
Chemical feed piping	Safety Orange

3. All Facilities:

Gas or liquid, fuel	Safety Red
Heating piping and ducts	Aluminum
Elect. Equip., and conduits	Slate Gray
Mech. Equip.	
Exposed, interior and exterior	Gray
Submerged or intermittently submerged	Black
Compressed air piping	Cloud
Chlorine Gas or solution piping	Safety Yellow
Plumbing drains and submerged surfaces	Black
Structural steel, interior and exterior	Spring Green, Ice Cream, Safety Blue or as directed
Safety equipment or cabinets	Gulf Green
*Pump room, walls and ceilings	Cloud

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*Masonry, Interior and Exterior	Spring Green, Ice-Cream, Safety Blue or as directed
*Masonry and Concrete Normally Unexposed or Submerged	Black

* Note - interior walls and ceilings (where indicated on drawings) or normally occupied rooms shall be painted. Exterior exposed or submerged concrete shall not be painted unless shown on the Drawings. Normally unexposed concrete walls, floors, and ceilings such as concrete tanks, wet wells, channels, shall not be painted unless shown on the Drawings.

F. Exterior custom textured masonry shall have a clear finish.

PART - II PRODUCTS

2.01 MATERIALS

The protective coatings mentioned in the following specification are set-up as standards of equality. The clause "or equal" shall apply. All paint materials shall be approved by the Engineer and shall be equal in essential respects to those manufactured by TNEMEC Company, Xypex Chemical Corporation, Dampney Company or Chemprobe Technologies.

2.02 Any written request for approval shall include the name of the specified material for which a substitute is being requested, the name and number of the proposed substitute including performance and test data. Substitutions that reduce the number of coats will not be considered. Submittals shall include the following performance data as certified by a qualified testing laboratory:

A. Abrasion - Federal Test Method Std. No. 141, Method 6192, CS-17 Wheel, 1000 grams load.

B. Adhesion - Elcometer Adhesion Tester (ASTM D 4541-85).

C. Exterior Exposure - Exposed at 45 degrees facing ocean (South Florida Marine Exposure).

D. Hardness - ASTM D3363-74.

E. Humidity - ASTM D 4585

F. Salt Spray (FOG) - ASTM B117-73

G. Dialectic Strength - ASTM D149

H. Weathering - ASTM D 4141CEMMAQUA-NTW

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I. QUV - Method - ASTM G 53, FS 40 Bulbs

J. Graffiti Resistance - Federal Test Method TT-C-550-C, 4.4.5.2 and 4.4.5.3

K. Flexibility - ASTM D 522 Mandrel Bend.

L. Epoxy resin vs. coal tar pitch in the coal tar epoxy

M. Pounds of pure zinc dust per gallon of zinc primer

2.03 Paint, varnish, stains and fillers shall be of type and brands hereinafter specified under "Painting Schedule." Painting materials such as linseed oil, shellac, turpentine, etc. shall be of highest quality, and have identifying labels on containers.

2.04 Protective coatings for interior, wet potable water applications must be certified in accordance with NSF International as approved for potable water contact in accordance with ANSI/NSF 61, Section 5 Protective (Barrier) Materials.

2.05 All coating utilized shall be certified “non-lead” (less than 0.06% lead by weight in the dried film) as defined in part 1303 of the consumer Product Safety Act.

2.06 The coating manufacturer shall certify that the zinc dust used in the zinc coatings meets the requirement of ASTM D 520 Type III.

2.07 PAINTING SCHEDULE

Unless otherwise indicated on the finish schedule on the Contract Drawings, the painting and finishing shall include, but not necessarily be limited to, the following items:

1. All new miscellaneous metal work, including stairs, handrails, railings, doors, door frames, etc.
2. All new machinery, equipment, factory finish painted electrical, plumbing and air conditioning materials, duct work, access panels, flashing, caulking, conduits, pipes, pipe hangars, pipe supports, sleeves, wires, supports, anchors, fasteners, straps, u-bolts unistruts and similar items that are exposed..
3. All new piping, valves, and appurtenances.
4. All new concrete block (interior and exterior).
5. All new structures and equipment.
6. All gypsum board walls and ceilings.
7. All interior wood trim, cabinetry, doors, plywood and other exposed interior woodwork.
8. All exterior woodwork, soffits, exterior ceilings plywood, casing and other exposed exterior woodwork.
9. All new and existing brick walls
10. All hardware which is not prefinished and is primed or prepared to receive paint or unprimed

11. All factory painted materials and equipment which have been damaged.

2.08 PAINTING SYSTEMS

A. Steel-Structural Members, Tanks, Pipes and Equipment, Steel Doors and Frames

1. Exterior, Non-Immersion, Severe or Moderate Exposure — D.F.T. (Mills)
   System: Aliphatic Polyurethane
   Surface Preparation: SSPC-SP-6 Commercial Blast Cleaning

1st Coat: Aromatic Urethane Zinc Rich (TNEMEC #90-97)	2.5 - 3.5
2nd Coat: Polyamide Epoxy (TNEMEC's #66)	3.0 - 4.0
3rd Coat: Aliphatic Polyurethane (TNEMEC #1074)	2.5-3.0
	8.0-10.5

2. Exterior, Non-Immersion, Mild to Moderate Exposure — D.F.T. (Mills)
   System: System: Aliphatic Polyurethane
   Surface Preparation: SSPC-SP3 Power Tool Cleaning

1st Coat: Mio-filled Polyurethane (TNEMEC #1)	2.5 - 3.5
2nd Coat: Polyamide Epoxy (TNEMEC's #66)	3.0 - 4.0
3rd Coat: Aliphatic Polyurethane (TNEMEC #1074)	2.5 - 3.0
	8.0-10.5

3. Interior (Immersion – Nonpotable Water) Mild to Moderate Exposure
   System: Epoxy Polyamide — D.F.T. (Mills)
   Surface Preparation: SSPC-SP-10 Near white Blast Cleaning

1st Coat: Coal Tar Epoxy (TNEMEC #46H-413)	16.0-20.0

4. Interior Immersion (Non-potable water- Moderate to Severe Exposure)
   System:Polyamine Epoxy — D.F.T. (Mills)
   Surface Preparation: SSPC-SP5 with 3 mil anchor profile

1st Coat Polyamine Epoxy (Series 435)	10.0-15.0
2nd Coat: Polyamine Epoxy (Series 435)	10.0-15.0
	20.0-30.0

5. Interior (Immersion- Potable Water) — D.F.T. (Mills)
   System: Epoxy Polyamide
   Surface Preparation: SSPC-SP-10 Near white Blast Cleaning

1st Coat: Mio-filled Polyurethane (TNEMEC #1)	2.5 - 3.5
Stripe Coat: Hi-Build Epoxy (TNEMEC's #20)	
2nd Coat: Hi-Build Epoxy (TNEMEC's #20)	4.0 – 6.0
3rd Coat: Hi-Build Epoxy (TNEMEC's #20)	4.0 – 6.0
	10.5-15.5

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6. Interior (Non-Immersion)	D.F.T. (Mills)
System: Epoxy Polyamide	
Surface Preparation: SSPC-SP6 Commercial Blast	
1st Coat: Aromatic Urethane Zinc Rich (TNEMEC #90-97)	2.5 - 3.5
2nd Coat: Hi-Build Epoxy (TNEMEC's #66)	4.0 – 6.0
	6.5 – 9.5

7. High Temperature Surfaces to 500 ° F	D.F.T. (Mills)
Surface Preparation: SSPC-SP-10 Near white Blast Cleaning	
1st Coat: Silicone Copolymer (Dampney 260)	2.0 - 2.5
2nd Coat: Silicone Copolymer (Dampney 260))	2.0 - 2.5
	4.0 – 5.0

8. High Temperature Surfaces 500 °-100º F	D.F.T. (Mills)
Surface Preparation: SSPC-SP-10 Near white Blast Cleaning	
1st Coat: Silicone Copolymer (Dampney 225)	5.0 - 6.0
2nd Coat: Silicone Copolymer (Dampney 230)	1.5 – 2.0
	6.5 – 8.0

9. O.E.M. (Original Equipment Manufacturer's)	D.F.T. (Mills)
Painted Steel	
System: Waterborne Acrylic Epoxy	
Surface Preparation: SSPC-SP-3 Power Tool Clean	
1st Coat: Mio-filled Polyurethane (TNEMEC #1)	2.5 - 3.5
2nd Coat: Aliphatic Polyurethane (TNEMEC #1074)	2.5 - 3.0
	5.0 - 6.5

10. All Exterior Factory Baked Enamel Finish Surfaces

    Touch-up with Factory touch-up paint.

B. Mill Coated Steel Pipe

Exterior or Interior - (Immersion or Non-Immersion)	D.F.T. (Mills)
System: Epoxy-Polyamide	
Surface Preparation: Surface shall be clean and dry	
1st Coat: Hi-Build Epoxy	4.0- 6.0
(TNEMEC #66 or #20 for Potable Water)	
2nd Coat: Hi-Build Epoxy	4.0- 6.0
(TNEMEC #66 or #20 for Potable Water)	
	8.0 12.0
3rd Coat: (As Selected)	

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C. Galvanized Steel - Pipe And Miscellaneous Fabrications

1. Exterior Moderate to Severe Exposure — D.F.T. (Mills)
   System: Aliphatic Polyurethane
   Surface Preparation:
   SSPC-SP-1 Solvent Cleaning, Followed by SSPC-SP-7 Brush-off Blast Cleaning or Treatment with Oakite 747.

1st Coat: Hi-Build Epoxy (TNEMEC #66)	2.0 – 3.0
2nd Coat: Aliphatic Polyurethane (TNEMEC #1074)	2.5 - 3.0
	4.5 - 6.0

2. Exterior, Mild to Moderate Exposure — D.F.T. (Mills)
   System: Aliphatic Polyurethane
   Surface Preparation:
   SSPC-SP1 Solvent Cleaning followed by treatment with Oakite 747. Cleaning.

1st Coat: Hi-Build Epoxy (TNEMEC #66)	2.0 – 3.0
2nd Coat: Aliphatic Polyurethane (TNEMEC #1074)	2.5 - 3.0
	4.5 - 6.0

3. Interior (Non-Immersion) — D.F.T. (Mills)
   System: Epoxy-Polyamide
   Surface Preparation:
   SSPC-SP-1 Solvent Cleaning, Followed by SSPC-SP-7 Brush-off Blast Cleaning or Treatment with Oakite 747.

1st Coat: Hi-Build Epoxy (TNEMEC #66)	2.0 - 3.0
2nd Coat: Hi-Build Epoxy (TNEMEC #66)	2.0 - 3.0
	4.0 – 6.0

4. Immersion-Potable or Non-Potable Water — D.F.T. (Mills)
   System: Epoxy-Polyamide
   Surface Preparation: SSPC-SP-1 Solvent Cleaning, Followed by SSPC-SP-7 Brush-off Blast Cleaning

1st Coat: Hi-Build Epoxy (TNEMEC's 66 or #20 for Potable Water)	2.0- 3.0
2nd Coat: Hi-Build Epoxy (TNEMEC's 66 or #20 for Potable Water)	3.0- 4.0
	5.0 - 7.0

5. Touch-up with Tnemec 90-1k97

D. Concrete that is scheduled for painting by note on the Drawings or in this Specification.

1. Exterior - Masonry - (Non-Immersion) — D.F.T. (Mills)
   System: Elastomeric

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Surface Preparation: Surface shall be clean and dry	
1st Coat: Waterborne Epoxy (TNEMEC #151)	1.0 - 1.5
2nd Coat Modified Waterborne Acrylate (TNEMEC #156)	6.0 - 8.0
3rd Coat: Modified Waterborne Acrylate (TNEMEC #156)	4.0 - 6.0
	11.0-15.5

2. Exterior Masonry — D.F.T. (Mills)
   System: Clear Silicone Waterproofing
   Surface Preparation: Surface shall be clean and dry
   1st Coat: Siloxane (Chemprobe Prime A Pell 200) — Coverage depends on porosity

3. Concrete Immersion -Moderate to Severe Exposure — D.F.T. (Mills)
   System: 100% Polyamine Epoxy
   Surface Preparation: Abrasive blast to remove all laitance, form release agents, curing compounds and other surface contaminants and to achieve a surface profile equivalent to ICRI CSP 5. (Reference SSPC-SP13). Voids and bugholes to be filled with Tnemec Series 218 Motarclad.

   Contractor Option: Contractor to apply either liner system #1 or liner system #2.

   Liner System #1 (Spray applied)
   1st Coat: Polyamine Epoxy (TNEMEC #435)

New Structures	60.0 Min.- 80.0 Avg.
Rehabilitated Structures	80.0 Min.- 100.0 Avg

   Liner System #2 (Trowel-applied)
   1st Coat: Polyamine Epoxy (TNEMEC #434) — 125 mils

   Products approved for this application shall have been tested in accordance with the Severe Accelerated Wastewater Test (65ºC, 536 ppm H2S gas, 4000 ppm NaCl, 10% Sulfuric Acid. Requirement: Initial impedance of log 10 Z (Z in ohms cm^2 @0.1 Hz). No blistering, cracking, checking or loss of adhesion. Final electrical impedance greater than 9 Log Z (Z in ohms cm^2 @0.1 Hz) after 28 days exposure.

   Note: The Polyamine Epoxy coating system is to be used in combination with a concrete containing Xypex admixture. Upon full cure, the installed lining system shall be checked by high voltage spark detection in accordance with NACE RP0188-90 to verify a pinhole-free surface. Voltage shall be set at 11,000 volts. Areas which do not pass the spark detection test shall be corrected at no cost to the Owner and rechecked.

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4. Interior Concrete Floors	D.F.T. (Mills)
System: Epoxy Polyamide/Polyester Polyurethane	
Surface Preparation: Brush Off Blast Cleaning	
1st Coat: Polyamine Epoxy (TNEMEC #280)	4.0 - 6.0
2nd Coat: Aliphatic Polyester Polyurethane (TNEMEC #291)	2.0 - 3.0
	6.0 - 9.0

Incorporate 30-50 silica mesh into the first coat to achieve desired level of skid resistance.

5. Interior Porous Masonry	D.F.T. (Mills)
System: Waterborne Acrylic Epoxy	
Surface Preparation: Surface shall be clean and dry	
1st Coat: Waterborne Cementitious Acrylic (TNEMEC #130)	60-80 sq.ft./gal
2nd Coat: Waterborne Acrylic Epoxy (TNEMEC #113)	4.0 - 6.0
3rd Coat: Waterborne Acrylic Epoxy (TNEMEC #113)	4.0 - 6.0
	8.0-12.0

6. Interior Dense Masonry, Plaster and Wallboard	D.F.T. (Mills)
System: Waterborne Acrylic Epoxy	
Surface Preparation: Surface shall be clean and dry	
1st Coat: Hi-Build Epoxy (TNEMEC #113)	2.0-3.0
2nd Coat: Hi-Build Epoxy (TNEMEC #113)	2.0-3.0
	4.0-6.0
	30.0 - 36.0

E. Wood - Opaque Finish	D.F.T. (Mills)
Exterior or Interior	
System: Waterborne Acrylic Epoxy	
Surface Preparation: Surface shall be clean and dry	
1st Coat: Alkyd Wood Primer (#36-603)	2.5 - 3.5
2nd Coat: Alkyd (#2H)	2.0 – 3.0
3rd Coat: Alkyd (#2H)	2.0 – 3.0
	6.5 - 9.5

F. Wood - Transparent Finish	D.F.T. (Mills)
Interior	
System: Clear Polyurethane Alkyd Resins	
Surface Preparation: Surface shall be clean and dry	

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F. Wood - Transparent Finish (Con't) — D.F.T. (Mills)

1st Coat: Devoe Wonder Wood Stain Interior Alkyd #95XX	Wiped Off
2nd Coat: Devoe Mirrothane Polyurethane Varnish #6600 Stain	1.0
3rd Coat: Devoe Mirrothane Polyurethane Varnish #6600 Stain	1.0
	2.0 Mils

G. Interior Insulation Pipe — D.F.T. (Mills)

System: Acrylic Latex
Surface Preparation: Surface shall be clean and dry

1st Coat: Acrylic Latex (TNEMEC #6)	2.0 - 3.0
2nd Coat: Acrylic Latex (TNEMEC #6)	2.0 - 3.0
	4.0 – 6.0

H. Gypsum Board — D.F.T. (Mills)

System: Waterborne Acrylic Epoxy
Surface Preparation: Clean and dry sanded smooth

1st Coat: Waterborne Polyamide Epoxy (TNEMEC' #151)	1.5 - 2.5
2nd Coat: Waterborne Acrylic Epoxy (TNEMEC #113)	2.0 - 3.0
3rd Coat: Waterborne Acrylic Epoxy (TNEMEC #113)	2.0 - 3.0
	5.5 - 8.5

I. Traffic Markings And Parking Stripes

Continental Coatings 202 Traffic Marking Paint

J. Ductile Iron Pipe

1. System: Immerse/Buried Aggressive Service — D.F.T. (Mills)
Surface Preparation: See requirements in Part III

1st Coat: Tnemec Series 66-1211 H.B. Epoxoline*	5.0-6.0
2nd Coat: Tnemec Series 46H-413 Tnemec-Tar	16.0-20.0
	21.0- 26.0

* 1st Coat shall be sprayed and backrolled to force material in pores.

2. System: Non-Immersed/Above Grade — D.F.T. (Mills)
Surface Preparation: See requirements in Part III

1st Coat: Tnemec Series 66-1211 H.B. Epoxoline*	4.0-6.0
2nd Coat: Tnemec Series 66 H.B. Epoxoline	5.0-6.0
3rd Coat Tnemec Series 1074 Endura-Shield II	2.0-3.0
	1.0-15.0

* 1st Coat shall be sprayed and backrolled to force material in pores.

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PART - III EXECUTION

3.01 Pre-work Inspection:

A. Examine surfaces to be coated and report any conditions that would adversely affect the appearance or performance of the coating system and which cannot be put into an acceptable condition by the preparatory work specified in paragraph 1.06.

B. Do not proceed with surface preparation and application until the surface is acceptable or authorization to proceed is given by the Engineer.

3.02 Surface Preparation

A. General:

1. Dislodge dirt, plaster nibs, mortar spatter and other dry material by scraping or brushing. Remove dust and loose material by brushing, sweeping, vacuuming or blowing with high-pressure air.
2. Remove oil, wax and grease by scraping off heavy deposits and cleaning with mineral spirits or a hot trisodium phosphate solution followed by a water rinse.
3. Verify that surfaces to be coated are dry, clean and free of dust, dirt, oil, wax, grease or other contaminants.

B. Ferrous Metal Surfaces:

All rust and mill scale shall be removed by power tool cleaning or sandblasting in as outlined herein and in accordance with the procedures of the Steel Structures Painting Council and as directed by the Engineer. All weld fluxes shall be power tool cleaned as specified by the Steel Structures Painting Council and washed thoroughly with water to remove all weld flux spatters and alkali contaminants. The shop primer coats that have been ruptured or marred shall be wire brushed to bare metal and reprimed with primer specified in the Painting Schedule. All factory painted metals shall have the gloss removed before priming and finish painting.

C. Galvanized Metal Surfaces: Galvanized surfaces shall be washed thoroughly with mineral spirit and etched with a solution of Oakite 747. Galvanized surfaces that will be submerged shall be brush blasted in accordance with SSPC-SP7. The surface shall be thoroughly dry prior to the application of any paint.

D. Gypsum Wallboard:

1. Remove all burrs, sand all high spots, fill all holes, nicks, depressions and crevices and featheredge all joints.
2. Apply successive coats of compound only on dry preceding coats.
3. Sand joint compound smooth and flush with the surface using fine grit sandpaper.

4. Sand all gypsum board joint and fastener compound to provide a level smooth surface.

E. Plastic Surfaces:

Contractor shall sandpaper to provide rough surface and then dust off to provide satisfactory surface characteristics.

F. Concrete Subject to Immersion Conditions
1. Allow new concrete and masonry to cure a minimum of 28 days prior to coating.
2. Verify dryness by testing for moisture with a "plastic film tape-down test" (Reference ASTM D 4263). If necessary verify moisture limits are within limits of the coating manufacturer using ASTM F 1869.
3. Abrasive blast all surfaces to be coated to remove all laitance, form release agents, curing compounds and other surface contaminants and to achieve a surface profile equivalent to ICRI CSP 5. (Reference SSPC-SP13). Voids and bugholes to be filled with Tnemec Series 218 Motarclad.
4. Surface shall be clean and dry prior to coating.

G. Poured Concrete and Masonry Surfaces not subject to Immersion Conditions:
1. Allow new concrete and masonry to cure a minimum of 28 days prior to coating.
2. .All loose dirt, dust, free lime and other deleterious substances shall be removed by brushing and washing methods approved by the Engineer.
3. Grind down all mortar and concrete fins and excess spills of mortar and concrete on all surfaces.
4. Patch all concrete holes and irregular surfaces with materials that are compatible with topcoats specified in the finish section.
5. Wash and clean all surfaces prior to preparing for painting. .
6. The concrete shall be thoroughly dry prior to the application of any paint.

H. Exposed Tar Coated Pipes and Fittings:

All exposed or nonsubmerged piping and fittings which are tar coated and which are to be painted shall receive two coats of Tnemec Series 66 prior to applying finish coats to prevent bleeding and discoloration.

I. Ductile Iron Pipe

1. Solvent Cleaning

All surfaces shall first be inspected and precleaned with appropriate solvents to remove grease, oil and other soluble contaminants. The preferred methods of precleaning is thorough scrubbing of the surface with stiff bristle brushes soaked in solvent. Prior to evaporation, remove solvent by wiping with clean, lint-free cloth rags. Remove rag residue with dry, oil free compressed air.

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2. Surface Profile:

3. Measure surface profile (anchor profile) in accordance with ASTM D4417, Method C.

   a. If surface profile is less than 1.5 mils, then proceed with brush-off blast cleaning in accordance with instructions below.
   b. If surface profile is 1.5 mils or greater, then proceed with hand or power tool cleaning in accordance with instructions below.

4. Brush-Off Blasting Cleaning:

   Remove all loose annealing oxides, loose rust, dirt, and other foreign matter by compressed air nozzle abrasive blast cleaning. Dust or other contaminants remaining after blasting shall be removed with dry, oil-free compressed air or vacuum cleaning. Recheck surface profile prior to painting. Minimum profile depth of 1.5 mils is required. Maximum surface profile shall be 75% of the primer thickness.

5. Hand or Power Tool Cleaning:

   The removal of all loose annealing oxides, loose rust, dirt and other foreign matter with the use of hand or power tools. Do not use cleaning tools that burnish or smooth the natural use of hand or power tools. Any dust or other contaminants remaining after hand or power tool cleaning shall be removed with dry, oil free compressed air or by vacuum cleaning.

6. Protect From Moisture:

   The cleaned cast iron surfaces shall be protected from conditions of high humidity, rainfall and surface moisture. All surfaces must be dry, clean and at least 5°F above the dew point prior to painting.

J. Shop-Prime Metals:

Hand or power tool clean field connections, welds, burned and abraded areas to remove rust and contaminants and touchup with specified primer before further rusting occurs.

K. Wood and Plywood:

1. Remove surface deposits of sap and pitch by scraping and cleaning with mineral spirits.
2. Seal knots and pitch pockets with shellac reduced with equal parts shellac thinner.
3. Sand rough spots on smooth siding and finish woodwork. Wood shall be sandpapered to a smooth and even surface and then thoroughly dusted or wiped with a tack rag.

4. After prime coat is dry, fill cracks, holes and scratches with suitable wood putty or spackling compound and when dry, sand flush with the surface. Putty shall be colored to match that of the finish, or very slightly darker.
5. Sand lightly between coats.

3.03 Painting Procedures:

A. All materials shall be applied in accordance with the paint manufacturers published technical data by skilled painter, under adequate illumination and ventilation. Where conflict exists between these specifications and the paint manufacturers published data relating to surface preparation, application and curing of paint, the published data shall take precedence. All paint and finish shall be evenly spread.

B. Samples:

Do not proceed with work until all color chips and stains are reviewed by the Engineer and Owner.

C. Match approved color chips, stains, and samples and provide additional samples as requested by Engineer.

D. The finished surface shall be uniform in finish and color and free of brush marks, sagging, corduroy and other imperfections. Should any coat be judged unsatisfactory, the Contractor shall sandpaper or otherwise clean off this coat and apply another.

E. If the undercoating is disturbed, complete refinishing will be required.

F. No interior painting shall be done until the building has been enclosed, ventilated and thoroughly dried out as approved by the Engineer. No exterior painting shall be done in rainy, snowy, damp or frosty weather, nor until surfaces are thoroughly dry. All coatings shall be applied in environmental conditions that are in accordance with written manufacturer's written instructions.

G. All welds seams shall be ground smooth prior to the coating application. All sharp edges, weld seams, etc shall be stripe coated.

H. Edges of paint or finish adjoining other materials or colors shall be sharp and clean without overlapping. Should workmanship be found defective, proper repair work shall be done in accordance with specified requirements. All finish hardware, accessories, fixture and similar items installed prior to painting and not required to be painted, shall be removed or protected during such painting. If removed, the items shall be carefully replaced and adjusted upon completion of the painting.

I. All paint shall be airless spray, roller, or brush applied. Extreme care shall be exercised in spray application that no finished materials are damaged. If this condition should

happen, painter shall repair or replace damaged materials at no additional expense to the Owner.

J. The Contractor shall protect his work and adjacent work by carefully covering with drop cloths. Upon completion of work, he shall remove all paint spots from the floors, glass and other surfaces. He shall remove from the premises all rubbish and accumulated materials. When all other trades are finished, he shall go over the building and touch up all abrasions, scratches, etc. to the satisfaction of the Engineer. It shall be the responsibility of the Contractor to deliver the painting work in a clean and undamaged condition.

K. The contractor shall protect, provide drop cloths and masking, and clean surfaces not requiring painting such as surfaces of concrete sidewalks and drives, factory finished roofing and flashing, carpet, tile, resilient finish floor and bases, wall covering, glass, synthetic plaster, finish hardware, and other items not requiring painting.

L. The contractor shall remove and replace materials and equipment which are not required to be painted, that have paint on them, and the paint cannot be satisfactorily removed.

M. Series 113 and Series 66 are specified at 4.0-6.0 mils per coat. If uniformly spray applied, this millage may be applied in one coat. If brush applied, several coats may be required to achieve the specified millage.

N. The contractor shall not proceed with work until all color chips and stains are reviewed and approved by the Engineer and Owner.

O. Paint both tops and bottoms of all doors and only after the completion of any required trimming of wood doors.

P. Provide specified paint in number of coats specified.

Q. Provide paint free from sags, runs, crawls, brush marks, skips, holidays, and other defects.

R. Paint both tops and bottoms of all doors and after trimming same.

3.04 Pipe and Machinery Coding:

All pumps and mechanical equipment shall be marked to indicate service and number. The pipes and equipment shall be color coded as outlined in previously. All colors shall be approved by the Engineer.

3.05 All paint shall be delivered to site in manufacturer's sealed containers. Each container shall be labeled by the manufacturer. Labels shall give manufacturer's name, type of paint, color of paint and instructions for reducing. Thinning shall be done only in accordance with directions of manufacturer.

SECTION 09900 - PAINTING

3.06 The manner of, and place for storing painting materials at the site shall be approved by the Engineer and only paint or ingredients, which are to be used on this work, shall be so stored. The storage space must be kept clean at all times. Every precaution shall be taken to avoid fire hazards.

3.07 The Contractor shall apply each coat of paint at the rate specified by the manufacturer to achieve the minimum dry mil thickness recommended by manufacturer. The Contractor shall submit to the Engineer, upon request, certification from the manufacturer that minimum dry film thicknesses have been achieved. Deficiencies in film thickness shall be corrected by additional coat(s) of paint.

3.08 Surfaces Requiring Painting

A. Paint all surfaces on the interior and exterior of the buildings and all surfaces of the Work, executed in the Contract which is visible, exposed, and not exposed to weather, unless specifically excluded herein.

B. Paint all miscellaneous architectural, structural, mechanical, plumbing, and electrical materials and equipment such as all exposed ductwork, access panels, flashing, caulking, conduits, pipes, exposed sprinkler system plumbing, (if any), exposed tubes, pipe insulation, pipe hangers, pipe supports, brackets, sleeves, wires, supports, anchors, fasteners, straps, galvanized metal and metal not galvanized, steel members, “Uni-struts”, “U”-Bolts, clamps, and similar items which are exposed to the eye (not totally concealed from human eye) and exposed, and not exposed to the weather, including items above the roof.

C. Paint all items including prime coated and factory finish painted electrical, plumbing and air-conditioning materials and equipment on all portions of the Work executed in this Contract unless specifically excluded herein.

D. Paint and provide touching-up of all primed coats and factory finished painted materials and equipment that have been damaged, unless specifically excluded herein.

E. Paint hardware that is not pre-finished and is primed or prepared to receive paint or unprimed.

F. Paint all of the existing brick walls on the existing building with limits of work area.

G. Paint the existing small concrete block wall at the front and within the limits of the work area.

H. Thoroughly clean all existing surfaces prior to painting.

3.09 Excluded Surfaces Not Requiring Painting:

A. Protect, provide drop cloths and masking, and clean surfaces not requiring painting such as surfaces of concrete sidewalks and drives, factory finished roofing and flashing, carpet,

tile, resilient finish floor and bases, wall covering, glass, synthetic plaster, finish hardware, and other items not requiring painting.

B. Remove and replace materials and equipment which are not required to be painted, that have paint on them, and the paint cannot be satisfactorily removed.

END OF SECTION

SECTION 10100

RELOCATION OF INFRASTRUCTURE ITEMS

GENERAL

The cost for relocating, repairing, replacing or removing any unforeseen privately owned or parish owned utilities or structures; such as, but not limited to, water, sewer, gas, power and subsurface drainage systems, which are in conflict with the items to be installed under this project, shall be paid under item "Relocation of Infrastructure Items" of bid form and shall include all labor, equipment, materials, and incidentals necessary for proper performance of this work. **Such work shall be paid for only when the work is deemed necessary (by Engineer or Owner) for performance of this contract. This work does not include relocation, repair, replacement, or removal of any utilities or structures that are already clearly designated in the Plans; the work outlined herein includes only such items associated with the relocation, repair, replacement, or removal of mechanical utilities (such as utility lines and/or piping), systems, and/or structures that were <u>unforeseen</u>.** Relocation, repair, or removal of any items for the Contractor's convenience will be paid for by the Contractor. When the costs for necessary relocation, repairs, or removal are to be paid for by the Owner, the Contractor shall keep accurate records of all time, materials, and equipment used and shall submit a copy of said record on a daily basis (same day) to the Resident Project Representative for review. The cost for this work included in the bid forms is a projected budget cost. Upon completion of the work, the total contract price shall be adjusted accordingly.

The cost of removal, replacement, or relocation of any other utilities, such as Entergy facilities, telephone company cables, and gas lines, within a Parish R.O.W shall be borne by the respective companies provided the work is required for proper performance of this contract. If any of these utilities are outside the Parish R.O.W. and require removal, repair, replacement and relocation, the Contractor shall inform the respective utility company for performing the work. The cost of such work shall be reimbursed to the utility company (if applicable) by the Contractor, payment for which will be made to the Contractor under item "Relocation of Infrastructure Items", subject to approval by the Engineer. All utilities owned by the Parish requiring relocation due to conflicts shall be performed by the Contractor, and payment for the work will be made under item "Relocation of Infrastructure Items".

Utilities not properly located and subsequently broken or disturbed by the Contractor shall not be considered under this item, "Relocation of Infrastructure Items", for reimbursement. In such a case, it shall be the Contractor's responsibility to remedy the claim with the proper utility company at no cost to the Owner or the Engineer.

The cost for this work that is included in the Section 00300, Bid Form, is a projected budget cost. Upon completion of construction, any portion of this item's projected cost that was not authorized for utilization by the Contractor shall be deducted from the total contract price.

END OF SECTION

TECHNICAL SPECIFICATIONS
DIVISION 15 - MECHANICAL

SECTION 15010 - PIPING

PART - I GENERAL

1.01 Scope

A. The work covered by this Section of the Specifications shall include, in general, furnishing and installation of all interior and exterior piping as indicated on the Drawings, including all fittings, painting, hangers, supports, spacers, sleeves, anchors, base plates, collars, straps and other appurtenances as show on the Drawings or as required to provide the Owner with complete and satisfactory piping systems. Exterior pipe covered by this section shall be limited to all above ground pipe and appurtenances, below ground pipe underneath building and other structural slabs, and transitions from above ground pipe to buried pipe to the first underground fitting. All pipe and materials shall be new. No used pipe or materials shall be approved.

B. The responsibility of providing special coatings, detailed layout drawings, storage areas, testing, reports, cleaning and special anchoring of all piping shall be the responsibility of the Contractor.

1.02 Related Work Described Elsewhere - Contractor shall perform excavating, trenching, and backfilling for all exterior piping in accordance with pertinent provisions of Division 02 of these specifications. Contractor shall also refer to Division 03 of these specifications for additional requirements relating to piping system concrete supports.

1.03 Quality Assurance

A. Standards - Contractor shall comply with standards specified in this Section, and all other applicable sections of these Specifications.

B. Qualifications of Installers - Contractor shall use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.04 Submittals - Within ten (10) calendar days after award of the Contract, the Contractor shall submit the following to the Engineer for approval:

A. Complete list of all materials and items proposed to be furnished and installed under this Section.

B. Manufacturers' specifications and other data required to demonstrate compliance with the specified requirements.

SECTION 15010 - PIPING

C. Manufacturers' recommended installation procedures which, when approved by the Engineer, shall become the basis for inspecting and accepting or rejecting actual installation procedures used on the Work.

D. Drawings Required on Contract Work - Before ordering any water, wastewater, or process piping or appurtenances, the Contractor shall furnish to the Engineer six (6) copies of fully dimensioned drawings of the proposed work for approval.

E. Mill Certificates - Mill certificates shall be furnished upon request of the Engineer.

PART - II PRODUCTS

2.01 Pipe and Fittings Schedule - Unless otherwise indicated on the Contract Drawings or in the Specifications, the following schedule shall apply for piping and fittings:

Application	Pipe Material	Type of End Connection
1. Exterior Yard Piping (except forcemains process water lines, chemical feed lines and gravity sewers).	Ductile Iron	Mechanical Joint
2. Interior Pressure Piping (except process and potable water).	Ductile Iron	Flanged Joint or Victaulic Coupling
3. Floor Drain Lines Interior & Exterior	Cast Iron Soil Pipe or Arc	Neophrene Gaskets
4. Roof Drain Lines Interior	Galvanized Iron, PVC or Steel	Screwed (Galvanized or Steel), Solvent Weld (PVC), Welded or Victaulic Coupling (Steel)
5. Potable Water Lines		
a. Interior - Less than 3” Diameter	Copper - Type L, Galvanized Steel	Solder Joint (Copper) Threaded (Galv. Steel)
3” Diameter or Greater	Ductile Iron	Flanged Joint or Victaulic Coupling
b. Exterior - Less than 3” Diameter	Copper - Type K, or PVC (underground only)	Flared Fitting (Copper) Restrained Bell and Spigot (PVC)
3” Diameter or Greater (Above Ground)	Ductile Iron, Steel	Flanged, Welded
3” Diameter or Greater (Below Ground)	Ductile Iron, PVC	Restrained Bell and Spigot, Mechanical Joint

SECTION 15010 - PIPING

Application	Pipe Material	Type of End Connection
6. Process and Non-Potable Water Lines		
a. Interior - Less than 3" Diameter	Galvanized Iron or Black Steel	Screwed or Victaulic Coupling
3" Diameter or Greater	Ductile Iron	Screwed or Victaulic Coupling
b. Exterior - Less than 3" Diameter	Galvanized Iron, or PVC	Screwed (Galv.), or Solvent Cement (PVC)
3" Diameter or Greater	Ductile Iron	Mechanical Joint
7. Chemical Feed Lines	Rigid PVC (Schedule 80)	Solvent Weld except at fittings and valves where union required on each side of fitting or valve or Victaulic Coupling.
8. Air Lines		
a. Interior - Less than 3" Diameter	Galvanized Steel	Screwed or Victaulic Coupling
3" Diameter or Greater	Ductile Iron, Cast Iron, or Steel	Flanged or Victaulic Coupling
b. Exterior - Less than 3" Diameter	Galvanized Iron or Black Steel	Screwed
3" Diameter or Greater	Ductile Iron	Mechanical Joint
9. Storm Drainage	Reinforced Concrete, or Corrugated Metal	Rubber Gasket (RCP) or Coupling (CMP)
10. Gravity Wastewater Lines		
a. 15" Diameter and Less	PVC Sewer Pipe	Bell and Spigot
b. Greater than 15"	Ductile Iron or PVC Sewer Pipe	Bell and Spigot
11. Force Mains		
a. Interior and Exterior above ground	Ductile Iron	Flanged or Restrained Mechanical Joint
b. Exterior below ground	Ductile Iron, PVC Pressure Pipe, HDPE	Bell and Spigot w/Mechanical Joint for Fittings; heat fusion

2.02 Pipe and Fittings - Unless otherwise indicated on the Contract Drawings or in the specifications, the following applies to pipe, fittings, coatings and lining, and joints.

A. Ductile Iron Pipe and Fittings

1. Pipe - Pipe shall be designed and tested in accordance with ANSI/AWWA C150/ A21.50. Pipe shall be of domestic manufacture in accordance with ANSI/ AWWA C150/A21.50. Unless otherwise indicated on the Drawings, pipe class shall be Class 53.
2. Ductile Iron Fittings - Fittings shall conform to ANSI/AWWA C110/A21.10. Fittings shall be suitable for use under design pipe pressure ratings.

SECTION 15010 - PIPING

3. Coating and Lining

   a. All pipe and fittings shall be cement lined and seal coated inside and coated outside in full accordance with ANSI/ AWWA C104/A21.4.
   b. Ductile-iron pipe that is to be used in either sanitary sewer gravity flow or force main shall have a sprayed on polyurethane or modified polyurethane liner meeting the following requirements:

      i. The inner surface of the ductile-iron pipe shall be prepared by blasting in accordance with SSPC-SP10, near-white metal blast cleaning.
      ii. The inner surface of the pipe, the pipe ends and the joint area shall be primed/coated with a polyamide epoxy applied to a minimum dry film thickness (DFT) of 6 mils and a maximum thickness of 10 mils DFT.
      iii. After the primer coat has cured, but within the coating manufacturers recommended recoating time, the polyurethane liner shall be applied by means of a plural component, centrifugal lance spray application system. The minimum thickness of the polyurethane liner shall be 40 mils DFT.
      iv. Upon completion of curing, the liner shall be holiday tested with a device that develops a minimum 2,500-volt potential. If holidays are revealed in the liner, the entire pipe segment shall receive an additional liner coat as previously described. The pipe shall be retested for holidays in the liner. If any holidays are found in the recoated pipe, the pipe shall be blasted back to bare metal and the primer/liner shall be reinstalled and tested as described above.

4. Joints - Unless otherwise indicated on the Drawings, interior and above ground joints shall be flanged or victaulic couplings, and buried joints shall be mechanical or "push-on" joints as follows:

   a. Flanged Joints - Gaskets shall be full face and shall be cut in a neat and workmanlike manner and bolts tightened uniformly to distribute the bolt stress evenly and bring the pipe into alignment. The flanges shall be joined utilizing Type 316 stainless steel machine bolts with heavy hexagon heads and nuts conforming to ANSI B18.21.
   b. Victaulic Coupling Joints - Couplings shall be of malleable cast iron in full accordance with Federal Specification QQ-1-666C. Gaskets shall be of molded synthetic rubber, and comply in all respects to ASTM A183. Joints shall be assembled in accordance with the manufacturer's recommendations.
   c. Mechanical and "Push On" Joints - Mechanical and "Push-On" joints shall meet ANSI/ AWWA C111/A21.11. Bolts and nuts for mechanical joints shall be "US ALLOY" as manufactured by U.S. Pipe and Foundry Company, equivalent Corten type or equal.
   d. Mechanical joint restraint systems shall be of the type that is specially designed to prevent separation of a standard mechanical joint, while still allowing flexibility and deflection of the joint. Mechanical joint restraint systems shall be constructed

of ductile iron and shall not impede the deflection of the mechanical joint after assembly. Mechanical joint restraint devices shall be Mega-Lug Series 1100TDM as manufactured by EBAA Iron Sales, Inc. or approved equal. Mechanical joint restraint systems for underground applications shall conform to ANSI/AWWA C111/ A21.11. The bolts and nuts shall be corrosion resistant high strength alloy steel ("COR-TEN"). Each bolt shall be supplied with a sacrificial zinc anode cap for assembly of the joint.

B. Black Steel Pipe and Fittings

1. Black Steel Pipe - All pipe shall conform to ASTM A53, Grade "B" for air piping, or API 5L, for liquid piping. Pipe smaller than three (3") inches in diameter may be seamless steel butt weld or electric weld type. Pipe 3 1/2" inches in diameter or greater shall be Schedule 40 as indicated on the Contract Drawings or Specifications.
2. Pipe Fittings -
   a. Welded Fittings - Fittings shall be the same weight as the pipe, seamless steel, Grade B, ANSI B16.9.
   b. Flanged Fittings - Flanges for welded pipe shall be forged steel welding neck flanges, 150 lb., ANSI B16.10. Flanges for connection to valves and equipment shall be 125 lb. cast iron flanges, lap, slip-on or screwed, ANSI B16.1. One Hundred Twenty-Five (125) lb. flanges shall have plain face with smooth finish; 150 lb. flanges shall have 1/16 in. raised face with serrated finish. Bolts and nuts shall be of the hexagon type.

3. Joints - Joints shall be flanged, threaded, or welded as specified and shall be made or installed in full accordance with manufacturer's recommendations. Welding shall be done by a qualified welder and the welding procedure shall conform to the ASME Code Section 9 Standards for the temperature and pressure service to which the lines are to be subjected. Joints may be either electric-arc welded or gas welded. Standard manufactured fittings shall be used for all changes in direction. Lateral take-off shall be made at a shop or factory so that interior burrs can be ground out. Changes in direction shall be made with fittings, not with mitered sections of straight pipe.

C. Steel Pipe and Fittings

1. Pipe and Fittings - Steel pipe shall be manufactured in full accordance with AWWA C208, and shall be Schedule 40, unless otherwise indicated on the Drawings or Specifications. Fittings shall be "Tube Turn" or equal, and shall be the same weight as the pipe. Flanged pipe and fittings shall be fabricated in full accordance with ANSI B16.5.
2. Coating and Lining - Steel pipe and fittings for exterior work shall be fully coated interior and exterior with a coating meeting the requirements of NSF 61, and in accordance with Division 09 of these Specifications. Pipe and fittings for interior work shall have the surface prepared and coated in accordance with the Division 09 of these Specifications.

3. Joints - Joints shall be welded or of the flange type. The gaskets for flanged joints shall be cut in a neat and workmanlike manner and shall be bolts tightened uniformly in the pattern required for the flange to the proper torque for the size and material of the bolt to distribute the bolt stress evenly around the flange and bring the pipe into alignment. Field welding of joints shall be performed in full accordance with AWWA C206.

D. Galvanized Pipe and Fittings

1. Galvanized Wrought Iron Pipe - All pipe shall conform to ASTM A72. Pipe shall be Schedule 40 unless otherwise specified or indicated on the Drawings.
2. Galvanized Iron Fittings - Fittings shall conform to ASTM A153 and be equal to Crane standard malleable galvanized iron fittings. Fittings shall be the same weight as the pipe unless otherwise specified or indicated on the Drawings.
3. Joints - Joints shall be of the threaded type. Threads shall be neatly cut with sharp tools and the jointing procedure shall conform to best plumbing practice. Before jointing, all scale shall be removed from the pipe. After cutting, all pipe shall be reamed. All pipe shall be screwed together with an application of an approved compound applied to all threads, and after a joint has been screwed tight, it shall not be backed off unless the threads are recleaned and new compound applied.

E. Polyvinyl Chloride (PVC) Sewer Pipe and Fittings

1. PVC gravity sewer pipe sizes 15-inches and smaller shall be SDR 35. Pipe shall be supplied in either 13 or 20 foot lengths with bell and spigot ends of polyvinyl chloride. Pipe and fittings shall meet ASTM D3034. Joints shall be bell and spigot with rubber ring gaskets in accordance with the latest revision of ASTM D3212.
2. PVC gravity sewer pipe larger than 15-inches shall be in accordance with either ASTM F679 or F794 and shall have a homogeneous, smooth interior. Pipe manufactured in accordance with ASTM F794 shall have exterior ribs that are perpendicular to the axis of the pipe. Joints shall be bell and spigot with rubber ring gaskets in accordance with the latest revision of ASTM D3212.
3. Joints - Unless otherwise approved by the Engineer, pipe lengths shall be joint utilizing elastomeric gaskets as referenced in ASTM D3034 and meeting the requirements of ASTM D3212 and ASTM F477.

F. Polyvinyl Chloride (PVC) Pressure Pipe and Fittings

1. PVC pipe shall be used only for underground installation. Where the pipe run extends above ground, the pipe material shall be transitioned to a metallic pipe via couplings compatible with both pipe materials or specially fabricated transition couplings that have unique connections for the PVC pipe and the metal pipe.

2. Pipe and Fittings -

SECTION 15010 - PIPING

a. Pipe 1/2" through 3" - Pipe and fittings shall be Schedule 80 unless otherwise indicated on the Drawings. Pipe shall conform in all respects to ASTM D1785. Fittings shall conform in all respects to ASTM D2466.
b. Pipe 4" through 12" - Pipe and fittings shall meet all applicable provisions of AWWA C900. Unless otherwise indicated on the Drawings, pipe shall be Class 150 meeting the requirements of DR18. Fittings shall be ductile iron wrapped in polyethylene film.
c. Pipe larger than 12" - Pipe and fittings shall meet all applicable provisions of AWWA C905. Unless otherwise indicated on the Drawings or in the Specifications, pipe shall be DR25 (165 PSI Pressure Rated).

3. Joints -

a. Pipe 1/2" through 3" - Joints shall be solvent cemented, except at valves or fittings, where flanges or unions shall be required. Solvent cement shall conform in all respects to ASTM D2564. Solvent joints shall be made in full accordance with ASTM D2855.
b. Pipe 4" through 12" - Joints shall be bell and spigot type with factory installed elastomeric gaskets. Joints shall meet all requirements of ASTM D1869 and E477s. The bell section shall be designed to be at least as strong as the pipe wall.
c. Pipe larger than 12" - Joints shall be bell and spigot type with factory installed elastomeric gaskets. Joints shall meet all requirements of ASTM D1869 and E477s. The bell section shall be designed to be at least as strong as the pipe wall.
d. Where flanges or unions are required, the flanges or unions shall be solvent welded to the PVC pipe in accordance with the manufacturer's recommendations and ASTM D2855. Gaskets shall be full face and shall be cut in a neat and workmanlike manner and bolts tightened uniformly to distribute the bolt stress evenly. The flanges shall be joined utilizing Type 316 stainless steel machine bolts with heavy hexagon heads and nuts conforming to ANSI B18.21.

G. Cast Iron Soil Pipe and Fittings

1. Pipe and Fittings - Pipe and fittings shall be of extra heavy construction conforming to CS1880 or CS301. Pipe may be of the hub or hubless type.
2. Joints - Joints may be of oakum and soft lead using 12 ounces of lead per inch of pipe diameter or of the hubless type using a stainless shield and clamp assembly with an elastromeric sealing sleeve.

H. Copper Pipe and Fittings

1. Pipe and Fittings - Pipe and fittings for interior installation shall be "Type L", soft temper conforming to ASTM B88, with wrought copper solder joint fittings conforming to ANSI B-16.22. Pipe and fittings for exterior installation shall be "Type K" hard temper conforming to ASTM B88, with wrought copper solder joint fittings conforming to ANSI B-16.22.

2. Joints - Joints shall be made using a 95-5 tin-antimony solder, and shall comply with all state and local plumbing codes and regulations. Joints shall be prepared in full accordance with the solder manufacturer's recommendations.
3. Couplings - Couplings shall have 150 psi minimum pressure rating and conform to AWWA C800. Cast brass shall be copper alloy UNS Number C 83600 conforming to ASTM B62 or ASTM B584.

I. Copper Tubing and Fittings

1. Pipe and Fittings - Pipe and fittings for interior installation shall be "Type L", hard temper conforming to ASTM B88, with wrought copper solder joint fittings conforming to ANSI B16.22.
2. Pipe and fittings for exterior installation shall be "Type L", soft temper conforming to ASTM B88, with wrought copper solder joint fittings conforming to ANSI B16.22.
3. Joints - Solder joints shall be made using a 95-5 tin-antimony solder, and shall comply with all state and local plumbing codes and regulations. Joints shall be prepared in full accordance with the solder manufacturer's recommendations. Flared couplings shall comply with AWWA C800.

J. Corrugated Metal Pipe and Fittings

1. Pipe and Fittings - Pipe and fittings shall conform in all respects to AASTHO M36. Unless otherwise indicated on the Contract Drawings, or in the Specifications, the pipe shall be designed for HS-20 loading. Pipe and fittings shall be supplied with a bituminous coating inside and outside.
2. Joints - Joints shall be made with couplings and steel bands, and shall be assembled in accordance with the manufacturer's recommendations.

2.03 Miscellaneous Piping, Drains, Appurtenances and Piping Accessories - All miscellaneous piping, drains, appurtenances and piping accessories shown or listed on the Contract Drawings shall be installed in accordance with the Manufacturer's recommendation and as specified herein. It is the intent of this subsection of the Specifications to describe those appurtenances and accessories to be supplied for use with the mechanical process, air, sludge, and potable water piping systems shown on the Contract Drawings; specified plumbing fixtures such as urinals, lavatories, and water closets are described in Division 10 of the Specifications.

A. Strainers - Strainers with perforated monel metal, removable, 100 mesh screens shall be provided and installed in the flushing water seal lines to pumps and as shown on the Drawings.

B. Flexible Expansion Joints

SECTION 15010 - PIPING

1. Flexible expansion joints shall be furnished and installed at the locations indicated on the Drawings. Expansion joints provided shall be of the multiple arch type designed to absorb mechanical vibration, reduce noise and allow for thermal expansion and contraction. Flexible joints shall be hydrostatically tested to 1.5 times the operating pressure.
2. Flexible expansion joints furnished shall be protected with a seamless tube, leak-proof lining made of reinforced rubber. The joint body shall be constructed of a synthetic rubber compound, recommended by the manufacturer. The expansion joint body shall be adequately reinforced with fabric reinforcement, wire and/or solid steel rings, as required, to provide joint rigidity and strength for the rated working pressure. The exterior surface of the expansion joint shall be formed from neoprene or other material as recommended by the manufacturer for the application.
3. Expansion joints shall be flanged with ANSI Class 150 standard drilling pattern. Flanges shall be provided with galvanized steel split retaining rings to be placed directly against the inside of the flanges of the expansion joint to prevent damage to the cover body surface when bolts are tightened. Steel washers shall be used where rings are split.
4. Expansion joints shall be manufactured by Redflex Division of Red Valve Company, Garlock, Inc., Holtz Rubber Company, or equal. Flexible expansion joints shall be installed and supported in accordance with manufacturer's recommendations for the specific application.

C. Vibration Fittings - Vibration fittings (elbows and spools) shall be installed at locations as shown on the Drawings. Fittings shall consist of a rubber tube with nylon fabric reinforcement and synthetic rubber outer covering with steel wire reinforcement. Fittings shall be complete with integral 150 lb. ANSI standard flanges. Fittings shall be Redflex or equal.

D. Hose Bibbs (Inside) - Inside hose bibbs shall be of brass construction with compression valve and provided with a heavy brass C.P. wing elbow for bolting to the wall. Hose bibbs shall be located generally where shown on the Drawings, but exact location and height shall be as directed by the Engineer. Hose bibbs shall be equipped with vacuum breakers.

E. Hose Bibbs (Outside) - Outside hose bibbs shall be of the non-freeze type, heavy brass construction with 3/4" hose connection, polished brass face, neoprene washers and tee handle key. Bibb shall be No. 1400N as manufactured by Josam, or equal. Hose bibbs shall be located generally where shown on the Drawings, but exact location and height shall be as directed by the Engineer. Hose bibbs shall be equipped with vacuum breakers.

F. Rainwater Conductors - Rainwater conductors inside the buildings shall be galvanized iron, steel or Schedule 40 Polyvinyl Chloride (PVC). Galvanized fittings shall be long turn galvanized cast iron, recessed drainage type. PVC fittings shall conform to ASTM D2466. All conductors and fittings shall be insulated as indicated on the Contract Drawings.

SECTION 15010 - PIPING

G. Roof Drains - Roof drain fittings shall be of cast iron with high dome. The drain shall be suitable for installation on steel roof deck with recessed drainage sump. The roof drain shall be equal to Josam, Series 4550 with removable dome, Neenah, or equal.

H. Floor and Drip Drains - All floor drains shall be equal to Josam, Series 300, Zurn or equal, with cast iron body with lacquer finish. All drip drains shall be equal to Josam 300 EI, Zurn or equal with 7" extended rim, tractor grate, and drainage flange.

I. Trench Drains - Trench drain grates and frames shall be cast iron, rectangular type equal to Series VTFG-HD by Vulcan Foundries.

J. Cleanouts

1. Each vertical soil, waste, vent piping and rainwater conductor shall be fitted with a combination test tee and cleanout fitting. The fitting shall be installed at the floor level. Cleanouts full size up to four inches (4") shall be provided at all changes of direction on horizontal drainage lines at intervals of not greater than 40' on straight runs. Cleanouts shall be concealed or brought up to floor level as indicated on Drawings. Cleanouts used with extra heavy cast iron soil pipe shall be iron body ferrules, with brass or bronze raised hex head plug. Where cleanouts are to be raised to finished floor level, the cleanouts shall be similar to Zurn Z-1326 series, Josam, or equal. In area of tile, the floor cover shall be recessed; in all other cases cover shall be scoriated bronze cover and frame.
2. Cleanouts below grade shall be equal to Zurn Z-1326, Josam, or equal. Cleanouts above grade shall be Zurn 1326-Z, Josam or equal.
3. All buried traps shall have cleanout connections on top of trap which shall be brought to finished floor and be fitted with a Zurn Z-1326 Cleanout with scoriated bronze cover and frame.
4. All exterior cleanouts shall be brought to grade, 4 inch in size, and terminated with a Zurn 1325-12 Cleanout with scoriated Dura coated cover and frame, and encased in a 16" x 16" x 8" deep concrete pad.

K. Wall Sleeves - Wall sleeves shall be utilized where indicated on the Contract Drawings and shall be caulked type or of the mechanical joint adapter sleeve type. Sleeve shall permit the pipe to pass through the wall. Space between the pipe and sleeve shall be sealed with Link-Seal or equal. All wall sleeves shall be of cast iron construction.

L. Wall Pipe - Wall pipe shall be utilized where indicated on the Contract Drawings, and shall be a solid casting with water stops for all piping three inch diameter and larger passing through the structural concrete. The casting shall be supplied with the type of end connections specified on the Contract Drawings.

M. Storm Drainage Inlet Castings - Shall be Neenah Foundry Series R-4030, or equal, for flush installations. Shall be Neenah Foundry Series R-4350, or equal, for beehive installations.

SECTION 15010 - PIPING

N. Pipe Insulation - The Contractor shall furnish and install pipe insulation material as indicated on the Drawings. Insulation shall be fiberglass enclosed in performed aluminum jacket, one inch thick, such as Johns-Manville "Micro-Lok 650" or equal.

O. Sleeve Coupling - Shall be cylindrical steel ring type with resilient gaskets and high strength stainless steel bolts as manufactured by Dresser Industries, Rockwell, or equal.

PART - III EXECUTION

3.01 Product Handling

A. Protection - Contractor shall use all means necessary to protect the materials of this Section before, during, and after installation and to protect the work and materials of all other trades.

B. Protection of Utilities - Contractor shall protect existing utilities as specified under the General Conditions section of the Contract Documents and Division 01 of these Specifications.

C. Delivery and Storage - All materials shall be delivered to the job site in their original containers with all labels intact and legible at time of use, and shall be stored in strict accordance with the manufacturer's recommendations as approved by the Engineer.

D. Replacements - In the event of damage, Contractor shall immediately make all repairs and replacements necessary to the approval of the Engineer and at no additional cost to the Owner.

E. Care of Pipe Coatings - Pipe shall be handled so that the coating shall not be damaged. Repair of any damage shall be made by the Contractor at no additional cost to the Owner, and shall be made in a manner satisfactory to the Engineer.

3.02 Installation of Interior Piping and Appurtenances

A. Grade and Alignment - All interior piping shall be installed in a workmanlike manner in accordance with the grade and alignment shown upon the Drawings, or as directed by the Engineer.

B. Supports and Pipe Appurtenances - All water, wastewater, process, chemical and air piping, valves, meters, fittings, controllers and etc., shall be firmly and satisfactorily supported in a neat and professional manner by suitable blocks or pedestals of cast iron or concrete or by steel beams, hangers, columns, or other suitable methods. Where shown by the Drawings or where required for stability or where directed by the Engineer, the pipe shall be accurately built into or supported upon approved concrete structures.

C. Installation of Pipe and Appurtenances

SECTION 15010 - PIPING

1. All piping shall be assembled in accordance with the layout shown on the Drawings, and in accordance with the manufacturer's recommendations, with only such modifications as may be necessary to conform to the final detail dimensions of pumps, tanks, valves, meters, existing piping, etc. Any piping modifications required shall be approved by the Engineer, and at no additional cost to the Owner.
2. All piping shall be assembled so as to be free from strain and shall be securely supported and blocked with concrete, cast iron pedestals, hangers, or other suitable supports as shown, directed, or as may be necessary to prevent settlement or other movement.

3.03 Installation of Exterior Piping and Appurtenances

A. Grade and Alignment - All exterior piping shall be installed in a workmanlike manner in accordance with the grade and alignment shown on the Drawings, or as directed by the Engineer.

B. Supports for Pipe and Appurtenances - Where required or indicated on the Drawings, exterior piping, valves, fittings, etc., shall be firmly and satisfactorily supported in a neat and professional manner by suitable pads with steel anchor bolts or other approved methods.

C. Installation of Pipe and Appurtenances

1. All piping shall be assembled in accordance with the layout shown on the Drawings, and in accordance with the manufacturer's recommendations, with only such modifications as may be necessary to conform to the final detail dimensions of connections, valves, fittings, existing pipes, etc. Any piping modifications required shall be approved by the Engineer, at no additional costs to the Owner. All piping shall be assembled so as to be free from strain.
2. Required trenching shall be excavated to provide a uniform and continuous bearing for pipes. For backfilling and compaction, requirements for pipe trenches, refer to Section 2 of these Specifications.

3.04 Color Coding and Piping Identification - In order to facilitate identification, all exposed interior piping shall be identified and color coded as specified in Division 09 of these Specifications.

3.05 Tracers for Non-Metallic Pipe

A. A plastic bonded 12 gauge copper wire shall be laid along the top of the pipe. The wire shall be continuous along the entire length of the pipe and grounded to gate valves, fire hydrants, flush valves, and water meters.

B. Service pipe shall have the same wire laid along the top of the service pipe and project one foot (1’) into or along side each meter box.

SECTION 15010 - PIPING

3.06 Special Requirements for Installation of Underground PVC Pipe

A. Pipe shall be installed in full compliance with the recommended practice for ASTM D2321, "Underground Installation of Flexible Thermoplastic Sewer Pipe". In addition, the construction and testing procedures outlined in other sections of this Specification shall be adhered to.

B. Pipe shall be so constructed the initial internal vertical diameter does not decrease by more than 5% in order to provide the complete hydraulic carrying capacity conceived by the design engineer, and to obtain the joint performance at 5% maximum diametric deflection as specified in Section 7.4 of ASTM D3212.

3.07 Pipe Anchorage and Supports

A. Exposed Pipe Hangers and Supports

1. Piping shall be firmly held in place by adjustable clevis hanger as manufacturer by Penn Pipe Hanger Company, Unistrut Corporation or equal. Hangers shall be placed at each offset or change in direction, at ends of braces over five (5) feet in length, at riser pipes and along piping as necessary to prevent sags, bends, or vibration. Hangers used in conjunction with steel pipe shall be zinc plated. Hangers used with insulated piping shall be large enough to accommodate the pipe plus insulated pipe support. No piping shall be supported by any wire, rope, wood, plumber's tape, band iron, wire hooks, U-bolts, or other make-shift devices.
2. Inserts in poured concrete slabs shall be cadmium coated wrought iron to receive machine bolt head or nut after installation and permit adjustment of this bolt in the horizontal direction. Beam clamps shall be used to attach hanger rods to structural steel, and lag screws shall be used to attach hangers to wood construction. Vertical risers shall be supported with concealed pipe clamps as required.
3. Insulated pipe supports shall be a shop fabricated or manufactured item consisting of a galvanized sheet metal saddle enclosing the bottom third of the bore coated non-compressible cellular glass insulation when fiberglass pipe insulation is used and non-compressible foam plastic insulation when flexible foam plaster pipe insulation is used, which shall insulate and support the weight of the pipe at each hanger and pipe guide. Insulation and jacket shall extend a minimum of 2" beyond the saddle and shall be the same thickness and have the same characteristics as stated for materials in these Specifications.
4. Pipe support shields shall be as manufactured by Unific Products, Inc., Steelton, Pennsylvania; Insul-Coustic Corp., Sayreville, New Jersey; or equal.
5. Concrete supports shall be utilized where shown on the Drawings or as required to assure no pipe movement or settlement occurs. Supports shall be constructed in full accordance with Division 03 of these Specifications.

B. Pipe Anchorage for Buried Lines Under Pressure

1. All plugs, caps, tees, crosses or bends deflecting 22 1/2 degrees or more on pipelines 3" or larger shall be provided with joint restraint devices as previously specified and as shown on the Drawings or directed by the Engineer.
2. Reaction backing shall be concrete in accordance with standard drawings. Backing shall be placed between solid, undisturbed ground and the fitting to be anchored; the area of bearing on the pipe and on the ground in each instance shall be as directed by the Engineer. The backing shall, unless other shown or directed, be so placed that the pipe and fitting joints will be accessible for repair.

3.08 Pipe Testing

A. Hydrostatic Testing for Pressure Lines

1. Leakage Test Requirements

   a. After the pipe has been laid and backfilled as specified, all newly laid pipe, or any valved section thereof, shall be subjected to a pressure of 150 pounds per square inch, or 50% in excess of the normal working pressure, whichever is greater, as directed by the Engineer.
   b. Leakage is defined as the quantity of water to be supplied into the newly laid pipe, or any valved section thereof, necessary to maintain the specified leakage test pressure after the pipe has been filled with water and the air expelled.
   c. No pipe installation will be accepted until the leakage is less than the number of gallons per hour as determined by the formula:

$$L = NDP/3700$$

   in which "L" equals the allowable leakage in gallons per hour; "N" is the number of joints in the length of pipeline tested; "D" is the nominal diameter of the pipe, in inches, and "P" is the square root of the average test pressure during the leakage test, in pounds per square inch gauge. (The allowable leakage according to the formula is equivalent to 23.3 U.S. Gal. per 24 hours per mile of pipe per inch nominal diameter, for pipe in 18' lengths evaluated on a pressure basis of 150 psi).
   d. All pipelines located below concrete slabs or foundations shall be pressure tested prior to the installation of concrete slabs or foundations.
   e. A hydrostatic pressure and leak test form shall be completed on each segment of line tested.

2. Duration of Test - The duration of the test under pressure shall be 4 hours.
3. Procedure - Each valved section shall be slowly filled with water and the specified test pressure, based on the elevation of the lowest point of the line or section under test and corrected to the elevation of the test gauge, shall be applied by means of a pump connected to the pipe in a manner satisfactory to the Engineer. The pump, pipe connections, and all necessary apparatus, including gauges, shall be furnished by

the Contractor. The Contractor will make all taps into the pipe, and furnish all necessary assistance for conducting the tests.

4. Expelling Air Before Test - Before applying the specified test pressure, all air shall be expelled from the pipe. If hydrants or blowoffs are not available at high places, the Contractor shall make the necessary taps at points of highest elevation before the test is made and insert the plugs after the test has been completed. If high point are indicated on drawings, corp stops shall be installed at designated areas.
5. Variation from Permissible Leakage - Should any of pipe laid disclose leakage greater than that specified above, the Contractor shall, at his own expense, locate, repair, and replace the defective joints, pipe or fittings until the leakage is within the specified allowance.
6. Time for Making Test -

    a. HDPE pipe shall be filled with water and pressurized to the test pressure for a minimum of 24 hours prior to making any leakage tests. All other pipe may be subjected to hydrostatic pressure and inspected and tested for leakage at any convenient time after the above ground pipe has been properly restrained or the trench for underground pipe has been partially backfilled except at the joints in accordance with the specifications. The leakage allowance for all mains shall be that specified above.
    b. Where any section of a main is provided with concrete reaction backing, the hydrostatic pressure test shall not be made until at least five (5) days have elapsed after the concrete reaction backing was installed. If high early strength cement is used in the concrete reaction backing, the hydrostatic pressure test shall not be made until at least two (2) days have elapsed.

B. Alignment Test for Pressure Lines

1. Prior to backfilling of pressure lines, the joint alignment shall be inspected to assure the maximum deflection present in each joint does not exceed the manufacturer's recommendations.
2. Pressure lines which are a portion of a pump discharge system shall be inspected to assure the line is installed at a constant or increasing grade so as to eliminate the possibility for air accumulation at an intermediate high point.
3. Any and all defects shall be corrected by the Contractor at no additional cost to the Owner and to the satisfaction of the Engineer prior to backfilling. This shall be completed before the work shall proceed and before acceptance of and/or payment therefore shall be made.

C. Alignment, Infiltration and Leakage Testing for Gravity Lines

1. General - All mains which are not a portion of a pressure system shall be subjected to alignment and leakage tests as herein specified.

2. Alignment Test -

a. After the mains have been laid and backfill placed to a depth of one and on-half (1 1/2) feet above that of the pipe, a light will be flashed between manholes, manhole locations or the terminus of the main to determine whether the alignment of the main is true and whether any pipe section has been displaced, broken, or otherwise damaged subsequent to laying. This test will again be conducted before acceptance.
b. If a segment of gravity line is determined by the Engineer possibly to be out of alignment, the Contractor will be required to pull a test mandrel to ensure that no pipe shall exceed a deflection of five (5%) percent).
c. Any and all defects shall be corrected by the Contractor, and at no additional cost to the Owner and to the satisfaction of the Engineer, before the work shall proceed and before acceptance of and/or payment therefore shall be made.

3. Leakage Tests -

a. Air Testing - The preferable method for testing gravity flow mains shall be a low pressure air test conducted in accordance with the requirements of ASTM F1417. The pipe shall be considered acceptable if the air loss rate does not exceed 0.0030 cubic feet per minute per square foot of internal pipe surface when tested at an average pressure of 3.5 psig greater than the average back pressure exerted by the ground water on the backfilled main or the maximum operating water level to which the main will be subjected, whichever is greater. The time for the air pressure to decrease 1.0 psig from 3.5 to 2.5 psig greater than the average back pressure exerted by the ground water on the backfilled main shall not be less than the time indicated in Table 15010-1.

TABLE 15010-1

Pipe Diameter	Minutes	Seconds
6"	2	55
8"	3	57
10"	4	43
12"	5	40
15"	7	5
18"	8	30
21"	9	50
24"	11	20
27"	12	45
30"	14	10
36"	17	00
42"	19	50
48"	22	40

If the above rates of leakage are exceeded, corrective action shall be taken by the Contractor to bring it within the limits before acceptance.

A minimum period of two (2) minutes shall be provided to allow equilibrium of the air temperature with pipe wall before test readings shall commence. In areas of know high ground water conditions, the Contractor shall determine the height of the ground water above the main by piezometric tube or other methods approved by the Engineer.

The Contractor shall submit to the Engineer for approval the test procedure and list of test equipment he proposes to use prior to testing.

b. Exfiltration Test – In the event that low air pressure tests cannot be made and exfiltration test shall be performed. Each section of the main between manholes or terminus of the main shall be tested for exfiltration as directed by the Engineer at the Contractor's expense. Leakage from (exfiltration) the main shall not exceed 100 gallons per day, per inch diameter, per mile of pipe when a minimum internal pressure of two (2) feet of water over the crown of the pipe is maintained at the upper location, two (2) feet above high ground water level, or maximum operating water level to which the main will be subjected, whichever is greater. When leakage exceeds the specified amount, corrective action shall be taken by the Contractor to bring it within said limits before acceptance. All sections of the main and its appurtenances shall be properly braced against thrust due to water pressure.

D. Pressure Testing for Air Lines

1. All air piping and appurtenances shall be tested with air at a pressure of 120 lbs. per square inch (psi) for a two-hour test period.
2. Backfilling will be permitted before testing, only where, in the opinion of the Engineer, it is necessary for safety or the protection of property. All leakage apparent on testing must be repaired before backfilling. Pipe shall hold pressure with no more than 1 lb. drop per hour at uniform temperature, with one (1) degree more or less.
3. While pressure test is on, each joint shall be tested for bubbling air with soap suds brushed on to form a solid film about pipe and fitting joints. Any leakage shall be stopped before backfilling.
4. After each test and inspection of joints in a section completed, a 2-inch valve on the laying end of the pipe line shall be suddenly opened to blow dust from the pipe.
5. The Contractor shall furnish all necessary equipment for testing, including air compressor and an accurate pressure gauge.
6. All testing shall conform to the Code for Pressure Piping as approved by the American National Standards Institute (ANSI B 31.1).

3.09 Cleaning and Sterilization:

A. General: All pipes shall be flushed and purged of all loose scale and debris prior to installing or connecting new lines. All air lines or gas lines shall be flushed and purged

of all loose scale and debris prior to installing equipment. All yard piping, sewers, and force mains shall be flushed and cleaned of all loose material and debris prior to acceptance.

B. Sterilization of Potable Water Lines - All water lines noted on the Drawings as potable water lines shall be sterilized prior to acceptance. Prior to sterilization, the lines shall be flushed as thoroughly as possible with the water pressure and outlets available. Flushing shall be done after the line pressure test has been made. The sterilization procedure shall be as follows:

1. Before being placed in service, the entire lines shall be chlorinated. Chlorine may be applied by the following methods: Liquid chlorine gas-water mixture, or calcium hypochlorite and water mixture.

    a. Chlorine gas-water mixture shall be applied by means of a solution feed chlorinating device.
    b. Calcium hypochlorite shall be comparable to commercial products known as H.T.H., Perchloren, and Maxochlor. A solution consisting of 5% of powder to 95% of water by weight shall be prepared. The calcium hypochlorite and water mixture, first made into a paste and then thinned into a slurry, shall be injected or pumped into the newly laid line under the conditions specified herein.
    c. The chlorinating agent shall be applied at the beginning the section adjacent to the feeder connection and shall be injected through a corporation cock, hydrant, or other connection insuring treatment of entire line. The water shall be fed slowly into new line with chlorine applied in amounts to produce a dosage of 50 ppm. Mains previously filled shall be treated to a concent4rated dosage at intervals along the line and retained for a period of eight (8) hours or more. A residual of not less than 10 ppm shall be produced in all parts of the line. During the chlorination process, all valves and accessories shall be operated.
    d. After chlorination, the water shall be flushed from the line at its extremities until the replacement water tests are equal chemically and bactyeriologically to those of the permanent source of supply. All chemical and bacteriological testing shall be done at the expense of the Contractor at a certified laboratory.

END OF SECTION

TECHNICAL SPECIFICATIONS
DIVISION 15 - MECHANICAL

SECTION 15020 - VALVES AND APPURTENANCES

PART - I GENERAL

1.01 Scope - All valves and appurtenances shown or listed on the Drawings shall be installed as indicated or detailed on said Drawings or as directed by the Engineer, and shall be as specified in this section of the Specifications.

PART - II PRODUCTS

2.01 Flanges

All flanges on devices detailed by this specification shall be drilled and faced to the American 125 pounds standard template, and in accordance with ANSI B16.1, unless otherwise noted on the Drawings.

2.02 Control Valves

A. Gate Valve 2" and Larger

1. All gate valves 2" and larger shall conform in all respects to AWWA C509, Resilient Seat Gate Valves, latest revision. All valves shall be of the non-rising stem type, with iron body full bronze mounted. Gate valves shall be of such design as to maintain the full area of the pipe through the valve when open. Valves shall be pressure rated for 200 psi unless otherwise indicated on the Drawings.

2. Valves shall open left (counter-clockwise) and shall be supplied with operators as indicated on the Drawings and specified herein.

3. Exposed manually actuated valves shall be handwheel actuated unless otherwise indicated on the Drawings. Handwheel operators shall be designed to hold the valve in any intermediate position between fully open and fully closed without creeping or fluttering.

4. Valves installed in overhead pipelines where the centerline of pipe is 8 feet or more above the floor shall be provided complete with geared chain wheel operators. Chain guides shall be provided. Chains shall reach within four feet of the floor. Chains shall be galvanized.

5. Buried valves shall have 2 inch square cast iron operating nuts. Operating nut shall be extended to within 12 inches of finished grade. Each valve shall also be supplied with a roadway type valve box and valve wrench.

6. Where indicated on the Drawings, valves shall be provided with extension stems and either cast iron floor boxes or floor stands. Floor stands shall be cast iron, medium

duty, with indicators. Extension stems shall be cold rolled steel complete with necessary steady bearings and couplings required to complete the installation indicated. Ratio of total stem length to radius shall not exceed 150.

7. All operating nuts, handwheels, and chainwheels shall have the direction of opening cast on them.

8. Gate valves installed in buried vertical pipe lines shall be provided with bevel gears and enclosed gear cases. Gearing shall be in accordance with the valve manufacturer's recommendations as required to permit easy operation of the valve by one man without excessively large handwheel or cranks.

9. Gate valves above grade or exposed shall be supplied with flanged ends in accordance with ANSI B16.1 Class 125, unless otherwise indicated on the Drawings, and shall be of the non-rising stem type.

10. Buried valves shall be supplied with mechanical joint end connections. Valves shall be as manufactured by Crane, Clow, Mueller, Dresser, American Cast Iron Pipe Co., or equal.

B. Gate Valves Smaller than 2 Inches

Valves shall be 150 pound wedge disc non-rising stem brass gate valves with screwed or flanged ends as described in the Drawings. Valves shall be Crane No. 437, or equal. Valves shall be supplied with handwheel operator.

C. Knife Gate Valves

1. Valves shall be of the bonnetless type with fully flanged connections. Flanges shall be drilled to ANSI B16.1 Class 125 pound standard. Valve pressure rating shall be 150 psi in sizes 2 inch through 24 inch and 125 psi in sizes 30 inch and 36 inch. Valves shall be by DeZurick or equal.

2. Knife valves shall have resilient seats. Valve bodies shall have wetted parts of type 304 or 316 stainless steel. The gate shall have a knife edge and both sides shall be finish ground. The stem shall be stainless steel.

3. Knife valves shall be supplied with operators as shown on the Drawings.

D. Plug Valves

1. Valves shall be non-lubricated, eccentric type with resilient faced plug, with screwed, flanged or mechanical joint ends as shown on the Drawings. Port areas shall be at least 80% of the full pipe area. Valve body shall be of semi-steel unless otherwise noted on the Drawings. Body seats shall be 90% nickel or resin material. Stem

bearings shall be of corrosion resistant material. Bearings shall be sealed or capable of being repacked without removing bonnet from valve. All nuts, bolts, springs, and washers shall be zinc plated. Flanged valves shall be faced and drilled to ANSI B16.1 Class 125 pound standard. Means of valve operation shall be as indicated on the Drawings or as specified hereafter. The valves shall be as manufactured by DeZurik, Homestead or equal.

2. Plug valves shall be provided with means of operation as indicated on the Drawings and as specified herein.

   a. Valves 4 inches and smaller installed in other than buried or submerged locations shall be lever-operated, and by suitable level shall be either permanently or semi-permanently attached to each valve.

   b. Valves larger than 4 inches that are installed in easily accessible locations, but not included buried or submerged locations, shall be lever operated unless otherwise indicated or specified.

   c. Buried valves shall have 2 inch square operating nuts extended to within 12 inches of finished grade. Each valve shall be supplied with a roadway type valve box and valve wrench. Submerged plug valves that are not indicated or specified to be operated from floor stands shall have extension stems, floor boxes, and 2 inch square operating nuts.

   d. Submerged valves shall be operated by floor stands where indicated or specified. Where gearing is required for proper operation of submerged valves, the gearing shall be located in enclosed gear cases installed on the floor stand. Gearing shall be in accordance with the valve manufacturer's recommendations as required to permit easy operation of the valve by one man without excessively large handwheel or cranks. Handwheels shall not exceed 30 inches in diameter.

   e. Extension stems, stem guides, operating levers, and other miscellaneous items required for a complete installation shall be provided in accordance with the requirements and recommendations of the valve manufacturer. Two tee handle valve operating wrenches shall be provided.

   f. Gearing shall be provided where either indicated, specified or recommended by the valve manufacturer. All gearing shall be provided in enclosed gear cases.

   g. Buried plug valves shall be provided with adjustable cast iron valve boxes in accordance with requirements previously specified for valve boxes in connection with gate valves.

h. Valves installed in overhead pipelines where the center-line of pipe is 8 feet or more above the floor shall be provided complete with geared chainwheel operators. Chain guides shall be provided. Chains shall reach within four feet of the floor. Chains shall be galvanized.

i. All plug valves 10 inches and larger in easily accessible locations shall be provided with worm gear operators and handwheels.

E. Butterfly Valves

1. Liquid Service Valves

a. All butterfly valves for liquid service, unless otherwise noted on Drawings or specified, shall be of the tight-closing, rubber seat type with rubber seats that are securely fastened to the valve body. Valves shall be bubble-tight at rated pressures with flow in either direction. Valves shall have fully threaded and tapped log type cast iron bodies. All butterfly valves shall meet the full requirements of AWWA C504 for Class 150B, and shall be as manufactured by Henry Pratt Company, Centerline, or equal.

b. All butterfly valves installed underground shall meet design-for-burial requirements of AWWA Butterfly valves installed underground shall be Henry Pratt Company "Groundhog" valves, Centerline equivalent, or equal.

2. Air Service Valves

All butterfly valves for air service shall have cast iron bodies designed for air service and for bolting between ANSI B16.1 Class 125 pound standard valves. Valve disc shall be designed to offer minimum resistance to flow and shall be capable of rotating 90 degrees to achieve full flow from a shut position. Disc shall be securely fastened to shaft. A full circumference rubber seat shall cover the inner surface of the valve body. All bearings of operating shaft shall be self-lubricating. The valves shall be manufactured by Henry Pratt Company, Centerline, or equal.

3. Valve Operators

Butterfly valves shall be supplied with operators as shown on the Drawings. Lever operators for valves shall conform in all respects to AWWA C504, latest revision, and shall be designed to hold the valve in any intermediate position between fully open or fully closed without creeping or fluttering.

F. Ball Valves

1. Ball Valves 2 Inches and Larger

a. All ball valves 2 inches and larger shall conform to AWWA C507, latest revision, Class 150, and shall be supplied with 150 pound ANSI flanges. The valve body shall be of single-piece construction, and shall be ductile iron with stainless steel trim. The valve seat and all seats shall be TFEE-LOK, or equal.

b. Valves shall be of absolutely leaktight construction, and of the double seal design as manufactured by Henry Pratt Co., Jamesbury Corporation, Marpac Corporation, or equal.

c. Valves shall be supplied with operators as indicated on the Drawings.

2. Ball Valves Smaller than 2 Inches

All ball valves smaller than 2 inches shall be of all bronze construction, with TFE seals and seat. Valves shall have screwed end connections, and shall be lever operated, unless otherwise specified or shown on the Drawings. Valves shall be Jamesbury Corporation "Clincher," Marpac equivalent or equal.

3. Plastic Ball Valves

Plastic ball valves shall be utilized on chemical feed and chlorine gas lines, and shall be of PVC construction with teflon seat and Viton O-ring seals. The shaft couplings shall be cadmium plated steel. Valves less than 3 inches shall be supplied with true union or flanged end connections. Valves 3 inches and greater shall be supplied with Schedule 80 flanges faced and drilled to 150 pound ANSI B16.1 pattern. Valves shall be as manufactured by Chemtrol, or equal.

4. Ball Check Valves for Air Service

a. Ball check valves shall be rated for maximum operating pressure of 200 psi, shall be suitable for air line service and shall operate equally effective in either the horizontal or vertical position.

b. Ball check valves shall be of a design to insure free movement of ball and the ball shall be supported in such a manner as to provide full flow with minimum turbulence and chatter. Only inches of head pressure shall be required to seal and open the ball check valves. Ball check valves provided shall be constructed of materials and shall be furnished with threaded joints which are compatible for connection to the air line piping provided.

2.03 Check Valves

A. Liquid Service Valves 3 Inches and Greater

1. Check valves 3 inches and larger shall be iron body horizontal swing check valves with outside lever and weight, unless otherwise indicated. Seats, seat rings, pins, bushings, shaft and hinges shall be constructed of bronze.

2. Unless otherwise specified or indicated on the Drawings, check valves shall be supplied with ANSI B16.1 Class 125 flanges.

3. Valves shall be designed for 150 pound working hydrostatic pressure, unless otherwise indicated on the Drawings and shall be as manufactured by Clow, Mueller, or equal.

4. Liquid Service Valves Less than 3 Inches

   Check valves less than 3 inches shall be of all bronze construction, and shall be supplied with threaded end connections. The valves shall be designed for a 150 pound working pressure and shall be of the swing check type as manufactured by Crane, Kennedy, or equal.

B. Air Service Valves

1. Check valves to be installed on air lines shall be of wafer type construction, with aluminum intervals and silicone seal members. Valves shall be provided with cast iron body, and shall be provided with standard ANSI B16.1 Class 125 pound flanges.

2. Valves shall be rated for continuous duty at 300°F, 35 PSIG, and shall be as manufactured by Hoffman Air and Filtration Division of Clarkson Industries, or equal.

3. Flexible Sleeve Check Valves

   Flexible sleeve type check valves shall be furnished with cast iron body and flanges conforming to ANSI B16.1, Class 12.5. Sleeve material shall be neoprene with nylon fabric reinforcement. Valves shall be series 33 by Red Valve or equal.

C. Double Door Check Valves

1. Valves shall be compact design, with fully tapped and threaded lugs by Valve and Primer Corporation or equal.

2. Doors shall be spring loaded, normally closed, by means of one or more heavy duty stainless steel torsion springs. Seating shall be resilient and water tight. The sealing element shall be Buna-N molded to the body. Body shall be of cast iron construction, doors shall be cast steel. Springs and shafts shall be T316 stainless steel.

2.04 Pinch Valves

Pinch valves shall be utilized only where specifically indicated on the Drawings, and shall be a Series 75 valve as manufactured by Red Valve Company, Inc. The valves shall meet or exceed ANSI B16.10, and shall be provided with a handwheel operator. The valve sleeve shall be Buna-N Rubber, and the valve body shall be cast iron.

2.05 Mud Valves

A. Mud valves shall be utilized only where specifically indicated on the Drawings, and shall be the non-rising stem type. The valve body shall be cast iron. Stem, stem nut, disc ring and seat ring shall be bronze.

B. Rising stem bench standard shall be cast iron suitable for mounting on tank walls.

C. Floor stands shall be non-rising stem floor stands equipped with indicators. Floor stands shall be of cast iron with steel extension stem. Handwheels shall not exceed 20 inch diameter.

2.06 Diaphragm Valves

A. Valve bodies and bonnets shall be cast iron. Valve bodies shall be lined with neoprene material. Valve bonnets shall be of the indicating type with travel stop, suitable for handwheel manual operators. All diaphragm valves shall be furnished with manual handwheel-type operators. Diaphragm material shall be EPT.

B. Straightway diaphragm valves furnished shall be closecoupled type with flanged ends. Flange drilling shall be in accordance with ANSI B16.5 Standard for Class 150 flanges. All valve joint accessories including gaskets, bolts, and nuts shall be furnished with each diaphragm valve.

C. All straightway diaphragm valves shall be as manufactured by the ITT Grinnell Corporation, Clayton Valve Co., or equal.

2.07 Solenoid Valves

Solenoid valves shall be fullport, normally closed type with current to open. Valves shall have one-inch screwed connections, explosion proof solenoids with molded epoxy resin coils and NEMA 4 housing, and shall be designed for operation on 12 volt DC current, unless otherwise indicated. Valves shall be bronze body type with renewable discs which can be replaced without removing valve body from piping system.

2.08 Yard Hydrants

Yard hydrants shall be 1 1/2" - 4' depth of bury, non-freezing type with aluminum housing, similar to Series 1440-N, as manufactured by Josam Manufacturing Company, an equivalent model by Zurn, or equal.

2.09 Liquid Pressure Reducing Valves

Pressure reducing valves shall be self-contained type all bronze body with screwed connections. Valves shall be capable of reducing pressure on water lines by field adjustments to approximately 5 pounds greater than the shut-off pressure of the pump for which the valve serves. Range of reduced pressure adjustment shall be 10 to 100 pounds.

2.10 Air Pressure Reducing Valves

Valves shall be self contained, internal pilot, piston operated type of cast iron and bronze construction. Valves shall be suitable for intended application in accordance with manufacturer's recommendations, and as per specified equipment requirements. Valves shall be as manufactured by Leslie Company, or equal.

2.11 Combination Air Release Valves

A. Combination valves shall consist of an air and vacuum valve and an air release valve rated for 125 psi, completely piped and assembled together, with one-inch gate between. Valve shall be Series 1800 by Valve and Primer Company, APCO, or equal.

B. Air and vacuum valve shall be designed to allow large quantities of air to escape out the orifice when filling a pipeline and to close water tight when the liquid enters the valve. The air and vacuum valve shall also permit large quantities of air to enter thru the orifice when the pipeline is being drained to break the vacuum. The discharge orifice area shall be equal or greater than the inlet of the valve.

C. The valve shall consist of a body, cover, baffle, float and seat. The baffle will be designed to protect the float from direct contact of the rushing air and water to prevent the float from closing prematurely in the valve. The seat shall be fastened into the valve cover, without distortion, and shall be easily removed, if necessary. The float shall be stainless steel designed to withstand a minimum of 100 psi. The float shall be center guided for positive shutoff into the seat.

D. All materials of construction shall be certified in writing to conform to ASTM Standards as follows:

Body, Cover & Baffle	Cast Iron	ASTM A48, Class 30
Float	Stainless Steel	ASTM A240
Seat	Buna-N	
Exterior Paint	Phenolic Primer	FDA Approved or
	Red Oxide	Potable Water Contact
	Steel	

E. Air release valve shall be designed to release small pockets of trapped air as line fills under pressure. Valve shall be designed to open against internal pressure. Valve shall

have cast iron body, stainless steel float; Buna-N seat, and Delrin and bronze linkage. All other internal parts shall be stainless steel or bronze.

2.12 Air Release Valve

Air release valves, size as indicated on the Drawings, shall be as manufactured by Valve and Primer Company, or equal. Valves shall comply in all respects with Air Release Valve component for Combination Air Release Valves.

2.13 Hydrants

A. Fire hydrants shall be cast iron body, fully bronze mounted, suitable for working pressure of 150 psi and shall meet all requirements of the latest AWWA C502. Each hydrant shall be given a 300 psi hydrostatic test in the shop.

B. Hydrants shall be Mueller Co. Improved AWWA type or equal.

C. The waterways of hydrants shall be as free as possible of obstructions, sharp turns, corners, or other cause for resistance. The base of the hydrant shall have a mechanical joint connection.

D. The hydrants shall have a 6-inch mechanical joint connection to street main with auxiliary gate valve, two 2-1/2 inch brass nozzles with threads for hose connections and one pumper nozzle together with caps fastened securely to each hydrant with steel chain and threaded to fit nozzles. The bottom valve of the hydrant shall not be less than 5-1/4 inches in diameter and 7-inch minimum I.D. riser barrel. Threads for hose and steamer connections shall match existing hydrants and shall be opened by turning in a counter-clockwise direction.

E. The hydrant main valve shall be of the compression type, closing with pressure. The valve shall be faced with rubber, or other approved material.

F. Drain valves shall be automatic and positive acting. When the main valve is closed, drain valves shall automatically open, insuring rapid and complete drainage of the hydrant riser. They shall close automatically when the main valve is opened.

G. Hydrants shall have a safety "breakable" section located above ground line. The distance from the ground line of the hydrant to the top of the hydrant head shall not be less than 30 inches. Hydrants shall come with one shop coat of primer. After installation, skinned or scratched surfaces of hydrants shall be wire brushed and touched up with one coat of primer. Two coats of Sonneborn's Hydrant Enamel shall be applied in the field. Color shall be determined by the Owner with the first coat having lamp black added to distinguish it from the final coat.

H. Hydrants shall be placed with pumper nozzle facing street and shall be located as indicated on Plans. Each hydrant shall be placed on a concrete base and shall be secured

against dislocation as shown on Plans. A minimum of 7 cubic feet of clean washed gravel shall be placed around each hydrant base. Backfill above gravel shall be thoroughly tamped. Care shall be taken so as to keep the drain holes clear.

2.14 Telescoping Valves

Telescoping valves shall be of the general design indicated on the Drawings. Valves shall be equal to those manufactured by Walker Process Division of CBI, Envirex, or equal. They shall consist of a brass slip pipe which slides in a cast iron enclosing pipe with a gland for seal. Clear travel of the slip pipe shall be as shown. Top of slip pipe shall feature 13-1/2 inch diameter (O.D.) flare. A substantial cast iron or steel operating stand shall support the slip pipe through an extension stem rigidly connected to the slip pipe. The slip pipe shall be positioned by a hand operator and the position of the outlet shall be indicated through a brass pointer on a graduated scale.

2.15 Inserting Valves and Tapping Valves and Tees:

Special valves for inserting into or tapping onto pressurized lines shall be used where shown on the Drawings for locations in which it is not desirable or possible to valve off the line for connection by normal cutting-in methods. Housings and bodies shall be manufacturer's standards to accompany the valve. Valves shall be equal to Mueller, A.P. Smith or Clow.

2.16 Flap Valves

Flap valves shall be cast iron with joints as required. They shall have bronze seating rings and bolts, and the seat shall fit tightly when closed. A ring shall be provided in lower part of valve. Flap valves shall be equal to Eddy, M&H Valve and Fittings Company, or Mueller.

2.17 Stainless Steel Slide Gate

A. Fabricated stainless steel slide gates, where shown on the Drawings or indicated in the specification, shall be as manufactured by the Rodney Hunt Company or approved equal. The gates shall be self-contained, rising stem with the guides designed to embed in concrete or to mount to the face of the concrete.

B. All parts of the gate will be stainless steel, ASTM A276, Type 304. The gate frame will consist of guides, an invert member and the actuator support yoke, welded together to form a one-piece frame. The guides will be of a sandwich type construction using plates and structural angles. The design shall be such that the reinforcing rib and flushbottom closure seal will extend beyond the seating surface of the guide. An angle shall be welded to the bottom of the guides to form a flat seat for the seal on the disc. The yoke to support the operating benchstand shall be formed by two angles welded at the top of the guides.

C. Where the guides extend above the operating floor they shall be sufficiently strong so that no further reinforcing will be required. The deflection of the yoke under the design thrust will not exceed 1/360 of its span.

D. The disc or sliding member will be of stainless steel plate reinforced with structural or formed members welded to the plate. The disc shall not deflect more than 1/360 of the span of the gate under the design head. A specially shaped resilient seal shall be mounted on the bottom of the disc to provide flush-bottom closure. The shape of the seal shall produce a seating surface having a minimum width of ¾", and the seal shall extend beyond the seating surface of the frame. The vertical face of the seal shall be in contact with the seating surface of the guide to provide a proper seal at the corners.

E. Operation of the gate shall be by means of a handwheel or crank operated benchstand mounted on the yoke of the gate. The operating stem shall be Type 303 or Type 304 stainless steel designed to have a L/r of less than 200 and to withstand in compression at least twice the rated output of the benchstand. The stem shall be connected to the disc by means of a bolted connection.

F. All necessary attaching bolts and anchor bolts shall be stainless steel and shall be furnished by the slide gate manufacturer.

G. Where the gate is to be used to cover a submerged opening a resilient J-shaped seal shall be attached to the frame of the gate, across the top and down both sides. The seal shall be held in place with a stainless steel bar and stainless steel fasteners. The seal shall be set so that it is slightly compressed when the disc is in the closed position. The seal shall be adjustable and replaceable in the field.

H. Provide plastic stem covers and stem opening indicator.

2.18 Totalizing Flow Meter

Totalizing flow meters shall be for the purpose of measuring the total quantity of water at the point of installation. Totalizing flow meters shall be propeller type meters and shall be manufactured in accordance with AWWA C704. The meter register shall be permanently sealed and shall read in US gallons. Totalizing flow meters shall be equal to those manufactured by Sensus Technologies, Inc.

PART - III EXECUTION

3.01 Painting

All surfaces of each valve body assembly shall be clean, dry and free from grease before painting. All unmachined surfaces of the valve body assembly shall be wire brushed down to clean metal and given two coats of an approved shop primer. Two coats of an asphalt varnish complying with Federal Specification TT-V 51a shall be applied to all exterior surfaces.

SECTION 15020 - VALVES AND APPURTENANCES

3.02 Installation and Storage

The valves and appurtenances shall be installed in accordance with the installation manual furnished by the valve manufacturer. Extreme care shall be used in the handling, storage and installation of these valves to prevent damage or distortion of the equipment and to insure proper performance.

3.03 Spare Parts and Tools

Repair or service parts for one of each type of valve used in this Work shall be furnished and stored as directed by the Engineer. The equipment shall include, in general the following items: special tools required for maintenance or operation of valves, gaskets, rings, seals, lubricants, bolts, washers, operation manuals, drawings, etc., required to maintain valves in proper operating service.

3.04 Submittals

Within ten (10) calendar days after award of the Contract, the Contractor shall submit to the Engineer for approval:

A. Complete list of materials and items proposed to be furnished and installed under this Section.

B. Manufacturer's specifications and other data required to demonstrate compliance with these Specifications.

C. Manufacturer's recommended installation procedure which when approved by the Engineer shall become the basis for inspection and acceptance or rejection of the work.

END OF SECTION