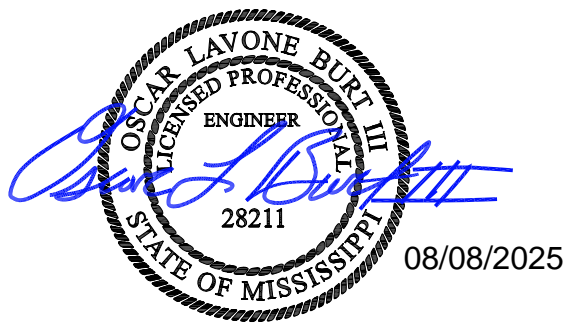


**CONTRACT DOCUMENTS AND SPECIFICATIONS**

**FOR**

**WHEATLEY STREET RECONSTRUCTION & SIDEWALK IMPROVEMENTS**

**JULY 2025**



**CONTRACT DOCUMENTS AND SPECIFICATIONS  
FOR  
WHEATLEY STREET RECONSTRUCTION & SIDEWALK IMPROVEMENTS  
CITY OF RIDGELAND, MISSISSIPPI**

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**ADVERTISEMENT FOR BIDS  
FOR  
WHEATLEY ST. RECONSTRUCTION AND SIDEWALK IMPROVEMENTS  
CITY OF RIDGELAND, MISSISSIPPI**

NOTICE is hereby given that the City of Ridgeland, Mississippi will receive written and electronic sealed bids for the construction of that certain project designated as **“Wheatley St. Reconstruction and Sidewalk Improvements”** until the hour of **10:00 AM, local time, on WEDNESDAY, SEPTEMBER 10<sup>TH</sup>, 2025,** in the Public Works Conference Room at Ridgeland City Hall, 100 West School Street, Ridgeland, Mississippi 39157; or electronically at [www.centralbidding.com](http://www.centralbidding.com). Registration and a valid email address are required for electronic bid submission. Bids are to be stated for the reconstruction and improvements to approximately 1 mile of roadway including leveling and asphalt overlay, base repair, curb replacement, storm drain repairs, sidewalk improvements and all other work with its related appurtenances necessary to complete the above project as shown and specified in the Contract Documents.

The **Total Contract Time will be 270 CALENDAR DAYS** and the **liquidated damages will be \$1,000.00 per consecutive calendar day** thereafter. A non-mandatory pre-bid conference will be held at **10:00AM, on FRIDAY , AUGUST 29<sup>TH</sup>, 2025,** in the Public Works Conference Room at Ridgeland City Hall. All plan holders are encouraged to attend.

Bid documents are being made available via paper copy or digital copy through [www.centralbidding.com](http://www.centralbidding.com). Plans can be viewed for no charge or physically purchased at this website location. All plan holders are required to have a valid e-mail address to register for an account and log in at [www.centralbidding.com](http://www.centralbidding.com). Purchased bid documents are non-refundable and must be purchased through the website. For any questions relating to the electronic bidding process and to register, please call Central Bidding at 225-810-4814.

Each bid shall be accompanied by a Certified Check on a solvent bank or a Bidder's Bond issued by a Surety Company licensed to operate in the State of Mississippi, in the amount of five percent (5%) of the total bid price, payable to the City of Ridgeland, Mississippi as bid security. The successful bidder will be required to furnish a Performance Bond and a Payment Bond each in the amount of one hundred percent (100%) of the contract amount.

The proposal and contract documents in its entirety shall be submitted in a sealed envelope and deposited with Ridgeland City Hall, Ridgeland, Mississippi prior to the hour and date above designated. No bidder may withdraw his bid within sixty (60) days after the date of actual bid opening, without Owner's consent.

Optional hard copies of project bid documents are also available for a nonrefundable price of **\$100.00** for each set. Paper copies of the Proposal and Contract Documents may be obtained from the Public Works Department of the City of Ridgeland, Mississippi, at the Ridgeland City Hall, 100 West School Street, Ridgeland, Mississippi 39157.

Contract award will be made to the lowest and best bidder offering the low aggregate amount for the base bid item, plus additive or deductive bid alternates applied in the order which is most beneficial to the Owner, and within funds available for the project.

The DRAWINGS, SPECIFICATIONS AND BID SCHEDULE may also be examined at the following locations:

Mississippi Procurement Technical  
Assistance Program (MPTAP)  
501 North West Street, Suite B 01  
Jackson, MS 39201  
Contact: Carlyn McGee  
601-359-3448

City of Ridgeland  
Public Works Department  
Ridgeland City Hall  
100 W. School Street  
Ridgeland, MS 39157  
Contact: Alan Hart, PLA, 601-853-  
219

Central Bidding  
[www.centralbidding.com](http://www.centralbidding.com)  
225-810-4814

The City of Ridgeland reserves the right to amend the specifications and contract documents as necessary prior to bid and agrees to notify all plan holders. The City of Ridgeland reserves the right to accept or reject any and all bids and to waive any and all informalities.

The City of Ridgeland, Mississippi hereby notifies all bidders that it will affirmatively ensure that in any contract entered into pursuant to this advertisement, disadvantaged business enterprises will be afforded full opportunity to submit bids in response

to this invitation and will not be discriminated against on the grounds of race, color, sex, religion or national origin in consideration for an award.

Minority and women's business enterprises are solicited to bid on this contract as prime contractors and are encouraged to make inquiries regarding potential subcontracting opportunities and equipment, material, and/or supply needs.

Any contract or contracts awarded under this invitation for bids are expected to be funded in whole or in part by anticipated funds from the Mississippi Municipality and County Water Infrastructure Grant Program (MCWI) and/or the Environmental Protection Agency's State and Tribal Assistance Grant Program (EPA-STAG). This procurement will be subject to all applicable sections of the Mississippi Code of 1972, Annotated, as they apply to local governments, in accordance with MCWI and EPA-STAG Program Regulations.

Based on the Assistance Listing: Coronavirus State and Local Fiscal Recovery Funds and Part 2 of the US treasury State and Local Fiscal Recovery Funds Compliance and Reporting Guidance (V3.0 February 2022) (Compliance Guide), the following Uniform Guidance Provisions will be required in all contracts:

- Subpart A, Acronyms and Definitions
- Subpart B, General Provisions
- Subpart C, Pre-Federal Award Requirements and Contents of Federal Awards (Except 2 CFR 200.204, .205, .210 and .213)
- Subpart D, Post Federal Award Requirements (Except 2 CFR 200.305(b)(8) & (9), 3.08, 3.09 and .320(c)(4))
- Subpart E, Cost Principles
- Subpart F, Audit Requirements
- 2 CFR 25 (Universal Identifier & System for Award Management)
- 2 CFR 170 (Reporting Subaward and Executive Compensation Information)
- 2 CFR 180 (OMB Guidelines to Agencies on Governmentwide Debarment and Suspension (Non-procurement))
- 2 CFR 200 Appendix ii

**The Mayor and Board of Aldermen reserve the right to accept or reject any and all bids and to waive any and all informalities.**

**BY ORDER OF THE MAYOR AND BOARD OF ALDERMEN, ON THIS THE 5<sup>th</sup> DAY OF AUGUST 2025.  
CITY OF RIDGELAND, MISSISSIPPI**

BY: Gene F. McGee, MAYOR

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**Publish MONDAY, AUGUST 11<sup>TH</sup>, 2025 and MONDAY, AUGUST 18<sup>TH</sup>, 2025 IN THE CLARION LEDGER.**

**Furnish proof of publication to:** Ina Byrd, Deputy City Clerk, and Alan Hart, Public Works Director, City of Ridgeland; P.O. Box 217; Ridgeland, MS 39158-0217 (601-856-7113)

**Send invoice to:** Ina Byrd, Deputy City Clerk, City of Ridgeland; P.O. Box 217; Ridgeland, MS 39158 (601-856-7113)

## **INFORMATION FOR BIDDERS**

1. **Receipt and Opening of Bids:** See copy of Advertisement for Bids bound herewith.
2. **Bids:**
  - A. Shall be made on the forms provided and all applicable blank spaces filled in. Alterations, erasures or changes of any kind must be initialed by the BIDDER and shall not contain any recapitulation of the work to be done. No oral, telephonic or telegraphic proposals will be considered.
  - B. **BIDDERS ARE HEREBY NOTIFIED THAT ANY PROPOSAL ACCOMPANIED BY LETTERS, QUALIFYING IN ANY MANNER, THE CONDITION UNDER WHICH THE PROPOSAL IS TENDERED, WILL BE CONSIDERED AS AN IRREGULAR BID AND SHALL NOT BE CONSIDERED IN MAKING THE AWARD.**
  - C. Bids may be withdrawn prior to the above scheduled time for the opening of bids or authorized postponement thereof. **Bids received after the time and date specified shall not be considered.**
  - D. Submit bids **(in duplicate)** in an opaque sealed envelope marked as follows:
    1. Bid for construction of:  
**WHEATLEY STREET RECONSTRUCTION & SIDEWALK IMPROVEMENTS**
    2. Certificate of Responsibility No. \_\_\_\_\_.
  - E. Any addenda issued during the bidding shall be noted on the Bid Form and shall become a part of the executed Contract.
3. **Method of Bidding:**
  - A. Contract award will be made to the lowest and best bidder offering the low aggregate amount for the base bid item, plus additive or deductive bid alternates applied in the order which is most beneficial to the Owner, and within funds available for the project.
  - B. The Contract will only become effective when signed by the Owner. Prior to the Owner's signature, any and all costs incurred shall be the sole responsibility of the bidder.
  - C. The Owner may negotiate bid price adjustments with the low responsive bidder, including changes in the contract documents, in order to enter a contract for an amount not to exceed the funds allocated if the low bidder is not more than ten percent (10%) above the funds allocated.
  - D. **The CITY OF RIDGELAND, MISSISSIPPI reserves the right to reject any or all bids and to waive any and all informalities.**
4. **Addenda and Interpretations:**
  - A. Should a bidder find discrepancies in, or omissions from, the drawings or specifications or should be in doubt as to their written meaning, he should at once notify the Engineer, who will send a written instruction or interpretation to all known holders of the documents. The Engineer will not be responsible for any oral instructions.

- B. Addenda to specifications or drawings that may be issued before or during the time of bidding shall be included in the bid form and will become a part of the Contract.
5. **Certificate of Responsibility Number:**
- A. Each Contractor submitting a bid must show on the face of the envelope containing the bid, his Mississippi State Certificate of Responsibility Number unless there appears a statement on the face of the envelope that the enclosed bid does not exceed \$50,000.00 with respect to public projects or \$100,000.00 with respect to private projects.
  - B. **No bids will be accepted, opened or considered unless the above information is given as specified.**
  - C. Sufficient evidence that said certificate of responsibility number has been issued and is in effect at the time of receiving bids, and that Bidder's CR work classification(s) qualifies him to perform the type(s) of work required for this project, must be submitted when required by Owner or Engineer.
6. **Notice to Nonresident Bidders:**
- A. A nonresident BIDDER domiciled in a state having laws granting preference to local contractors shall be awarded Mississippi public contracts only on the same basis as the nonresident bidder's state awards contracts to Mississippi contractors bidding under similar circumstances; and resident contractors actually domiciled in Mississippi, be they corporate, individuals or partnerships, are to be granted preference over nonresidents in awarding of contracts in the same manner and to the same extent as provided by the laws of the state of domicile of the nonresident.
  - B. When a nonresident CONTRACTOR submits a bid for a public project, he **shall** attach thereto a copy of his resident state's current bid law pertaining to such state's treatment of nonresident CONTRACTORS. **Any bid submitted by a nonresident CONTRACTOR which does not include the nonresident CONTRACTOR'S current state law shall be rejected and not considered for award.**
  - C. Nonresident BIDDERS Certificate: Nonresident CONTRACTORS must complete the Nonresident BIDDERS Certificate included in the Contract Documents (page C-9) and submit same as part of their bid.
  - D. As used in this section, the term "resident contractors" includes a nonresident person, firm or corporation that has been qualified to do business in this state and has maintained a permanent full-time office in the State of Mississippi for two (2) years prior to January 1, 1986, and the subsidiaries and affiliates of such a person, firm or corporation.
7. **Bid Security**
- A. Each bid must be accompanied by a certified check of the bidder, or a Bid Bond prepared on the form of a bid bond as included herein, duly executed by the bidder as principal and having as surety thereon a surety company licensed by the State of Mississippi and signed by an agent resident in Mississippi, **in the amount of five percent (5%) of the base bid.**
8. **Liquidated Damages for Failure to Enter into Contract**

- A. The successful bidder, upon his failure or refusal to execute and deliver the contract and bonds required **within ten (10) working days after he has received the contract for execution**, shall forfeit to the Owner, as liquidated damages, the bid security deposited with his bid.
9. **Security for Faithful Performance**
- A. Simultaneously with his delivery of the executed Contract, the Contractor shall furnish Contract Performance and Payment Bonds in the full amount of the Contract for the payment of all persons performing labor on this Contract and for furnishing all materials in connection with this Contract. The surety on such Bond or Bonds shall be a duly authorized Surety Company doing business in the State of Mississippi.
10. **Law and Regulations**
- A. The bidder's attention is directed to the fact that all applicable state laws, municipal ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the project shall apply to the Contract throughout, and they will be deemed to be included in the contract the same as though herein written out in full.
11. **Condition of Work**
- A. Each bidder shall visit the site and inform himself fully of the conditions at the site relating to the completion of the project. Failure to do so will not relieve a successful bidder of his obligation to furnish all material and labor necessary to carry out the provisions of his contract.
12. **Obligation of Bidder**
- A. At the time of the opening of bids, each bidder will be presumed to have inspected the site and to have read and to be thoroughly familiar with the Drawings, Specifications and Contract Documents (including addenda issued, if any).
13. **Time of Completion**
- A. Bidder must agree to commence work on or before the date specified in a written "Notice to Proceed" from the Owner and to fully complete the project within the number of consecutive calendar days as set forth in these Contract Documents.
14. **Proposal Guarantees**
- A. Proposal guarantees will be returned to the unsuccessful bidders as soon as a Contract has been awarded, and to the successful bidder after he has executed the Contract and has furnished Contract Performance and Payment Bonds and Certificates of Insurance as required.

15. **Non-Collusion Affidavit**

- A. Contractor must complete **(in duplicate)** the non-collusion affidavits included in the Contract Documents and submit same as part of his bid. **FAILURE TO DO SO WILL DISQUALIFY HIS BID.**

16. **Interpretations:**

- A. No oral interpretation made to any Bidder as to the meaning of the Drawings and Specifications or Contract Documents, shall be considered an effective modification of the provisions of the Contract Documents. Written and oral requests for interpretation of the Drawings and Specifications shall be submitted to the Engineer for a formal decision which will be given in writing to all Drawing and Specification holders.

17. **Subcontractor**

- A. The Bidder is specifically advised that any person, firm or other party to whom it proposes to award a subcontract must be acceptable to the Owner. The total allowable subcontract amount shall not exceed **fifty percent (50%) of contract amount.**
- B. **Qualifications of Subcontractors: Material and Equipment Suppliers:**  
Within ten (10) working days after award of contract, the CONTRACTOR will submit to the OWNER and the ENGINEER for acceptance, a list of the names of Subcontractors and such other persons and organization (including those who are to furnish principal items of materials or equipment) proposed for those portions of the Work as to which the identity of the Subcontractors and other persons and organizations must be submitted as specified in the Contract Documents. Within thirty (30) working days after receiving the list, the ENGINEER will notify the CONTRACTOR in writing if either the OWNER or the ENGINEER, after due investigation, has reasonable objection to any Subcontractor, person or organization on such list. The failure of the OWNER or the ENGINEER to make objection to any Subcontractor, person or organization on the list within thirty (30) working days of receipt shall constitute an acceptance of such Subcontractor, person or organization but shall not constitute a waiver of any right of the OWNER or the ENGINEER to reject any WORK, MATERIAL or EQUIPMENT that is not in conformance with the requirements of the Contract Documents.
- C. The CONTRACTOR will not employ any Subcontractor, other person or organization, whether initially or as a substitute, against whom the OWNER or the ENGINEER may have reasonable objection, nor will the CONTRACTOR be required to employ a Subcontractor who has been accepted by the OWNER and the ENGINEER, unless the ENGINEER determines that there is good cause for doing so.



- D. The CONTRACTOR shall be fully responsible for all acts and omissions of his Subcontractors and of persons and organizations directly or indirectly employed by them and of persons and organizations for whose acts any of them may be liable to the same extent that he is responsible for the acts and omissions of persons directly employed by him. Nothing in the Contract Documents shall create any obligation on the part of OWNER or ENGINEER to pay or to see to the payment of monies due Subcontractors or other persons or organizations, except as may otherwise be required by law. OWNER or ENGINEER may furnish to Subcontractors or other persons or organizations, to the extent practicable, evidence of amounts paid to the CONTRACTOR on account of specific Work done in accordance with the schedule of values.
- E. The divisions and sections of the Specifications and the identifications of Drawings shall not control the CONTRACTOR in dividing the Work among Subcontractors or delineating the Work to be performed by specific trades.
- F. The CONTRACTOR agrees to bind specifically every Subcontractor to the applicable terms and conditions of the Contract Documents for the benefit of the OWNER.
- G. All Work performed for the CONTRACTOR by a Subcontractor shall be pursuant to an appropriate agreement between the CONTRACTOR and the Subcontractor.
- H. The CONTRACTOR shall be responsible for the coordination of the trades, Subcontractors and materialmen engaged in the Work.
  - a. The CONTRACTOR shall cause appropriate provisions to be inserted in all subcontracts relative to the Work to bind Subcontractors to the CONTRACTOR by the terms of these General Conditions and other Contract Documents insofar as applicable to the Work of Subcontractors, and to give the CONTRACTORS the same power as regards terminating subcontracts that the OWNER may exercise over the CONTRACTOR under provisions of the Contract Documents.
  - b. The OWNER or ENGINEER will not undertake to settle differences between the CONTRACTOR and his Subcontractors or between Subcontractors.
  - c. If in the opinion of the ENGINEER, a Subcontractor on the Project proves to be incompetent or otherwise unsatisfactory, he shall be replaced if and when the CONTRACTOR is so directed in writing.

18. **Qualifications of Bidders**

- A. The Owner may make such investigations as he deems necessary to determine the ability of the Bidder to perform the work and the Bidder shall furnish to the Owner all such information and data for this purpose as the Owner may request. The Owner reserves the right to reject a Bid if the evidence submitted by or investigation of such Bidder fails to satisfy the Owner that such Bidder is properly qualified to carry out the items of Work contemplated therein.

19. **Insurance**

- A. The Contractor will be required to carry the types and amounts of insurance specified in the Project Supplemental Conditions, Section 4, as enclosed herein for the full term of the Contract.

20. **Contract Award**

- A. Award of Contract, if made, shall be **within ten (10) calendar days of the Bid Opening date.**

21. **Issuance of "Notice to Proceed"**

- A. If the Contract is awarded, the Owner will issue the "Notice to Proceed" **within ten (10) calendar days after the date of agreement of the Contract.**

## PROPOSAL

Proposal of \_\_\_\_\_ (hereinafter called "BIDDER"), organized and existing under the laws of the State of \_\_\_\_\_ doing business as a \_\_\_\_\_, insert: (corporation, partnership, limited liability company, or individual) to: the **City of Ridgeland, Mississippi**, (hereinafter called "OWNER").

In compliance with your advertisement for Bids for construction of:

### **WHEATLEY STREET RECONSTRUCTION & SIDEWALK IMPROVEMENTS**

BIDDER, hereby proposes to perform all WORK for construction of the in strict accordance with the CONTRACT DOCUMENTS, within the time set forth herein, and at the prices stated below. By submission of the BID, each BIDDER certifies, and in the case of a joint BID each party thereto certifies as to his own organization, that this BID has been developed independently, without consultation, communication or agreement as to any matter relating to this BID with any other BIDDER or with any competitor.

BIDDER hereby agrees to commence WORK under this contract on or before a date to be specified in a written "NOTICE TO PROCEED" and to fully complete the Project within **30 consecutive calendar days** thereafter. BIDDER further agrees to pay as liquidated damages, the sum of **\$1,000 for each consecutive calendar day** thereafter as provided for elsewhere in these CONTRACT DOCUMENTS.

BIDDER ACKNOWLEDGES receipt of the following ADDENDA:

NUMBER

DATE


Each BIDDER is responsible for inspecting the site and for reading and being thoroughly familiar with the CONTRACT DOCUMENTS. The failure or omission of any BIDDER to do any of the foregoing shall in no way relieve any BIDDER from any obligation in respect to this bid.

BIDDER understands that the quantities mentioned below are approximate only and are subject to either increase or decrease, and **hereby agrees to perform ANY increased or decreased quantities of work at the Unit Price Bid.**

In accordance with the requirements of the Plans, Specifications and Contract Documents, BIDDER proposes to furnish all necessary materials, equipment, labor, tools and other means of construction and to construct the Project in accordance with the Contract Documents within the specified Contract Time for the following Unit Prices specified.

It is agreed that the description under each item, being briefly stated, implies, although it does not mention, all incidentals and that the prices stated are intended to cover all such work, materials, and incidentals as constitute Bidder's obligations as described in the Specifications and any details not specifically mentioned, but evidently included in the Contract shall be compensated for in the item which most logically includes it.

Bidder further agrees to execute the contract agreement as bound herein **within ten (10) working days after receipt of contract forms** from the owner.

BIDDER agrees to pay as liquidated damages the amount provided herein for each consecutive calendar day after the Contract completion date specified in a written "NOTICE TO PROCEED" that he fails to complete the work unless the Contract Time is extended by a written Change Order.

BIDDER also proposes to execute a Performance Bond and a Payment Bond, as shown in the Specifications, each in an amount of **not less than one hundred percent (100%) of the total of the Base Bid**. These Bonds shall not only serve to guarantee the completion of the work on the BIDDERS part, but also to guarantee the excellence of both workmanship and materials until the work is finally accepted.

BIDDER encloses a Bid Bond or Certified Check for 5% of Base Bid Amount        DOLLARS (\$                  ), and hereby agree that in case of failure to execute the Contract and furnish the required Bonds within (10) working days after the Receipt of Contract Forms, the amount of this Certified Check or Bid Bond will be forfeited to the OWNER, as liquidated damages arising out of his failure to execute the Contract as proposed.

It is understood that in case BIDDER is awarded the work, the Certified Check or Bid Bond submitted as Bid security will be returned as stipulated in the Specifications.

Further, the BIDDER agrees to abide by the requirements under Executive Order No. 11246, as amended, including specifically the provision of the Equal Opportunity Clause set forth in the Federal Requirements, if applicable.

The low BIDDER shall supply the names and address of major MATERIAL SUPPLIERS AND SUBCONTRACTORS when required to do so by the OWNER.

The Engineer is Benchmark Engineering & Surveying, LLC.

BIDDER agrees to perform all the work described in the CONTRACT DOCUMENTS for the following unit prices or base bid amount: **SEE PAGE C-5-1 FOR BID ITEMS.**

**NOTES:**

1. Unit price amounts are to be shown in figures where indicated. Where a discrepancy in the unit price and the extension of any items occurs, the unit price will govern.
2. Unit prices shall include all labor, materials, bonding, shoring, removal, overhead, profit, insurance, etc., to cover the finished work of the several kinds called for.
3. Any erasure, change or alteration of any kind must be initialed by the BIDDER.
4. Bid prices shall include sales tax and all other applicable taxes and fees.
5. Any item of work not specified on the Proposal as a separate pay item or indicated as an absorbed cost in a pay item but which is incidental to completion of the work shall be considered as an absorbed cost with full compensation included in the unit price bid for the particular item involved.
6. The bid items listed on the Proposal are generalized only for the purpose of comparing bids. **Any differences between these items described and actual quantities and items required for construction shall not be taken as a basis for claims by the Contractor for extra compensation. By submission of your Proposal, you hereby acknowledge the previous statement.** Compensation will be based on the lump sum and actual construction quantities indicated in the Contract Documents, which include all plans, specifications, and other enclosed documents.
7. Owner reserves the right to award any combination of base and alternate bids (if any) it deems advantageous, and in the event that all specified bid item units are lump sum (LS), the Owner reserves the right to delete any such item or combination of such items from the project. The Owner further reserves the right to delete any item or items desired from the Bid Schedule after the Contract has been awarded. **Any deletions, if any made, shall be by Change Order and bidder hereby agrees to accept such Change Orders.**
8. Each bidder shall furnish with the bid a letter showing the following information:
  - a. Experience record of the bidder on similar projects.
  - b. Name and experience record of the person or persons likely to serve as construction superintendent.
  - c. Failure of the bidder to furnish the above information with his bid shall be grounds to reject his bid.

**(SEE FOLLOWING SHEETS FOR BID ITEMS)**

**BID FORM**

**WHEATLEY STREET RECONSTRUCTION & SIDEWALK IMPROVEMENTS**

CITY OF RIDGELAND, MISSISSIPPI

JULY 2025

ITEM NO	DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
<b>BASE BID</b>					
1	MOBILIZATION	LS	1		
2	MAINTENANCE OF TRAFFIC	LS	1		
3	CLEARING & GRUBBING	AC	1		
4	SILT FENCE	LF	6,479		
5	SOLID SOD, MATCH EXISTING TYPE	SY	4,499		
6	SAW CUT, ALL TYPES, ALL DEPTHS	LF	2,682		
7	REMOVAL OF ASPHALT PAVEMENT, ALL DEPTHS	SY	1,037		
8	REMOVAL OF CONCRETE, ALL DEPTHS	SY	1,700		
9	REMOVAL OF BRICK & PAVERS, ALL DEPTHS	SY	42		
10	REMOVAL OF CURB & GUTTER, ALL TYPES	LF	6,374		
11	REMOVAL OF STORM DRAIN STRUCTURES, ALL TYPES	EA	22		
12	REMOVAL OF STORM DRAIN PIPE, ALL TYPES & SIZE	LF	162		
13	REMOVAL OF SANITARY SEWER LINE, ALL TYPES & SIZES	LF	158		
14	TREE REMOVAL	EA	4		
15	SIGN REMOVAL & RELOCATION	EA	2		
16	MAILBOX REMOVAL & RELOCATION	EA	16		
17	FENCE REMOVAL & REPLACEMENT (TO MATCH EXISTING)	LF	121		
18	UNCLASSIFIED EXCAVATION, FM, AH	CY	485		
19	BORROW EXCAVATION, FM, AH	CY	1,185		
20	EXCESS EXCAVATION, FM, AH	CY	485		
21	15" REINFORCED CONCRETE PIPE, CLASS III	LF	161		
22	18" REINFORCED CONCRETE PIPE, CLASS III	LF	24		
23	CURB INLET	EA	26		
25	JUNCTION BOX (CONVERT EXISTING CURB INLET)	EA	4		
26	JUNCTION BOX (ADJUST TO FINISHED GRADE)	EA	4		
27	WATER VALVE (ADJUST TO FINISHED GRADE)	EA	8		
28	WATER METER BOX (ADJUST TO PLANNED GRADE)	EA	1		
29	IRRIGATION MAINTENANCE (INCLUDING PATCHING, FITTINGS, WIRING, ETC.)	LS	1		
30	CONNECTION TO EXISTING MANHOLE	EA	2		
31	8" SDR-26 SANITARY SEWER LINE (ALL DEPTHS)	LF	158		
32	MANHOLE RISER TO MATCH PLANNED GRADE	EA	12		
33	NORMAL CLEANING (1 TO 3 PASSES) (8" LINE)	LF	1,786		
34	HEAVY MECHANICAL CLEANING (MORE THAN 3 PASSES) (8" LINE)	LF	446		
35	CCTV INVESTIGATION	LF	2,232		
36	CIPP 8" (ALL TYPES OF EXISTING PIPE)	LF	2,232		
37	MANHOLE INSPECTION	EA	11		

38	REHAB SEWER MANHOLE (CONDITION B / PRECAST)	SF	440		
39	REHAB SEWER MANHOLE (CONDITION B / BRICK)	SF	265		
40	REHAB SEWER MANHOLE (CONDITION C / PRECAST)	SF	88		
41	REHAB SEWER MANHOLE (CONDITION C / BRICK)	SF	176		
42	4" REINFORCED CONCRETE SIDEWALK	SY	1,689		
43	STAMPED AND STAINED CONCRETE SIDEWALK	SY	111		
44	DETECTABLE WARNING PANELS	SF	292		
45	CONCRETE DRIVEWAY APRON (INCLUDES CURB, GUTTER & REINFORCEMENT)	SY	860		
46	24" STANDARD CURB AND GUTTER	LF	6,634		
47	6" HEADER CURB	LF	24		
48	26" TYPE "3B" CURB & GUTTER	LF	339		
49	GEOTEXTILE GABRIC, TYPE V, NON-WOVEN	SY	1,613		
50	SIZE NO. 610 CRUSHED STONE BASE	TON	768		
51	ASPHALT BASE REPAIR	SY	705		
52	COLD MILLING OF BITUMINOUS PAVEMENT	SY	10,256		
53	1-1/2" & VAR. ASPHALT LEVELING COURSE (SC 1 - TYPE 8)	TON	383		
54	4" & VAR. ASPHALT LEVELING COURSE (BB-1, TYPE 6)	TON	1,030		
55	2" HOT BITUMINOUS ASPHALT SURFACE COURSE (SC 1 - TYPE 8)	TON	1,936		
56	4" HOT BITUMINOUS ASPHALT BASE COURSE (BB 1 - TYPE 6)	TON	311		
57	6" HOT BITUMINOUS ASPHALT BASE COURSE (BB 1 - TYPE 6) (WIDENING)	TON	60		
58	6" THERMOPLASTIC EDGE STRIPE, CONTINUOUS WHITE	LF	8,791		
61	6" THERMOPLASTIC TRAFFIC STRIPE, CONTINUOUS YELLOW	LF	5,959		
62	6" THERMOPLASTIC TRAFFIC STRIPE, SKIP YELLOW	LF	1,429		
63	6" THERMOPLASTIC DETAIL STRIPE, WHITE	LF	2,741		
64	6" THERMOPLASTIC DETAIL STRIPE, YELLOW	LF	360		
65	6" THERMOPLASTIC LEGEND, WHITE	SF	403		
66	6" THERMOPLASTIC LEGEND, WHITE	LF	1,219		
67	TWO-WAY RELFECTIVE YELLOW HIGH PERFORMANCE RAISED PAVEMENT MARKER	EA	223		
68	REFLECTIVE RED-CLEAR HIGH PERFORMANCE RAISED MARKER	EA	37		
69	STANDARD ROADSIDE SIGN ASSY.	EA	2		
70	TRAFFIC SIGNAL HEAD, TYPE 6	EA	3		
71	VIDEO VEHICLE DETECTION SENSOR	EA	4		
72	ELECTRIC CABLE, UNDERGROUND IN CONDUIT, IMSA 20-1, AWG 14, 5 CONDUCTOR	LF	179		
73	ELECTRIC CABLE, AERIAL SUPPORTED IN CONDUIT, IMSA 20-1, AWG 14, 5 CONDUCTOR	LF	24		
74	PULLBOX ENCLOSURE, TYPE 2	EA	1		
75	TRAFFIC SIGNAL CONDUIT, UNDERGROUND, TYPE 4, 2"	LF	29		
76	TRAFFIC SIGNAL CONDUIT, UNDERGROUND DRILLED OR JACKED, ROLLED PIPE, 3"	LF	149		
<b>TOTAL BASE BID</b>					

ITEM NO	DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
<b>ADD ALTERNATE #1</b>					
3	CLEARING & GRUBBING	AC	0.1		
4	SILT FENCE	LF	858		
5	SOLID SOD, MATCH EXISTING TYPE	SY	292		
7	REMOVAL OF ASPHALT PAVEMENT, ALL DEPTHS	SY	24		
8	REMOVAL OF CONCRETE, ALL DEPTHS	SY	218		
10	REMOVAL OF CURB & GUTTER, ALL TYPES	LF	178		
11	REMOVAL OF STORM DRAIN STRUCTURES, ALL TYPES	EA	1		
14	TREE REMOVAL	EA	7		
15	SIGN REMOVAL & RELOCATION	EA	1		
16	MAILBOX REMOVAL & RELOCATION	EA	1		
18	UNCLASSIFIED EXCAVATION, FM, AH	CY	75		
19	BORROW EXCAVATION, FM, AH	CY	150		
20	EXCESS EXCAVATION, FM, AH	CY	75		
24	GUTTER INLET	EA	1		
27	WATER VALVE (ADJUST TO FINISHED GRADE)	EA	2		
28	WATER METER BOX (ADJUST TO PLANNED GRADE)	EA	1		
42	4" REINFORCED CONCRETE SIDEWALK	SY	533		
45	CONCRETE DRIVEWAY APRON (INCLUDES CURB, GUTTER & REINFORCEMENT)	SY	241		
46	24" STANDARD CURB AND GUTTER	LF	185		
50	SIZE NO. 610 CRUSHED STONE BASE	TON	128		
51	ASPHALT BASE REPAIR	SY	96		
52	COLD MILLING OF BITUMINOUS PAVEMENT	SY	4,583		
55	2" HOT BITUMINOUS ASPHALT SURFACE COURSE (SC 1 - TYPE 8)	TON	554		
58	6" THERMOPLASTIC EDGE STRIPE, CONTINUOUS WHITE	LF	1,218		
59	6" THERMOPLASTIC EDGE STRIPE, CONTINUOUS YELLOW	LF	1,190		
60	6" THERMOPLASTIC TRAFFIC STRIPE, CONTINUOUS WHITE	LF	671		
61	6" THERMOPLASTIC TRAFFIC STRIPE, CONTINUOUS YELLOW	LF	193		
63	6" THERMOPLASTIC DETAIL STRIPE, WHITE	LF	678		
65	6" THERMOPLASTIC LEGEND, WHITE	SF	464		
66	6" THERMOPLASTIC LEGEND, WHITE	LF	187		
67	TWO-WAY RELFECTIVE YELLOW HIGH PERFORMANCE RAISED PAVEMENT MARKER	EA	8		
68	REFLECTIVE RED-CLEAR HIGH PERFORMANCE RAISED MARKER	EA	50		
69	STANDARD ROADSIDE SIGN ASSY.	EA	1		
<b>TOTAL BID OF ADD ALTERNATE #1 ONLY</b>					
<b>TOTAL BASE BID + ADD ALTERNATE #1</b>					



**BID FORM**

**WHEATLEY STREET RECONSTRUCTION & SIDEWALK IMPROVEMENTS**

CITY OF RIDGELAND, MISSISSIPPI

JULY 2025

RESPECTFULLY SUBMITTED BY: _____	
	(COMPANY, PRINT)
	_____ (NAME, PRINT)
	_____ (TITLE, PRINT)
(SEAL) IF BY CORPORATION	_____ (SIGNATURE)
ADDRESS:	_____
	_____
	_____
PHONE NUMBER:	_____
CERTIFICATE OF RESPONSIBILITY NUMBER:	_____

**CORPORATE CERTIFICATE**

(To Be Executed If Bidder Is a Corporation)

I, \_\_\_\_\_ certify that I am the Secretary of the Corporation named as Contractor in the foregoing Proposal; that \_\_\_\_\_ who signed said Proposal on behalf of the Contractor, was then \_\_\_\_\_ of said Corporation; that said Proposal was duly signed for and in behalf of said Corporation by authority of its governing body and is within the scope of its corporate powers.

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Signature: \_\_\_\_\_

(CORPORATE SEAL)

**PARTNERSHIP CERTIFICATE**  
(To Be Executed If Bidder is a Partnership)

STATE OF \_\_\_\_\_ )  
 ) ss:  
COUNTY OF \_\_\_\_\_ )

On this \_\_\_\_ day of \_\_\_\_\_, 2025, before me personally appeared:

\_\_\_\_\_  
known to be and known by me to be the person who executed the above instrument, who being by  
me first duly sworn, did depose and say that he is general partner in the firm of:

\_\_\_\_\_  
that said firm consists of himself and:

\_\_\_\_\_  
and that he executed the foregoing instrument for and on behalf of said firm for the uses and  
purposes stated herein.

Name: \_\_\_\_\_

Signature: \_\_\_\_\_

Notary Public in and for the

County of \_\_\_\_\_  
State of \_\_\_\_\_

(Notarial Seal)

My Commission Expires: \_\_\_\_\_

**LIMITED LIABILITY COMPANY CERTIFICATE**  
(To Be Executed If Bidder is a Limited Liability Company)

I, the undersigned \_\_\_\_\_, hereby certify that I am the Manager of \_\_\_\_\_ (the "Company") or if the Company does not have a Manager, a Member of the Company with full power and authority to bind the Company; that \_\_\_\_\_ who executed the Proposal on behalf of the Company is \_\_\_\_\_ of the Company with full power and authority to execute same on behalf of the Company, and that the Proposal and the Contract, if awarded to the Company, are within the powers and authority of the Company.

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Signature: \_\_\_\_\_

Name: \_\_\_\_\_

Signature: \_\_\_\_\_

Notary Public in and for the

County of \_\_\_\_\_  
State of \_\_\_\_\_

(Notarial Seal)

My Commission Expires: \_\_\_\_\_

**NONRESIDENT BIDDER CERTIFICATE**

(To Be Executed If Bidder is a Nonresident)

I, \_\_\_\_\_, hereby certify that the CONTRACTOR,  
\_\_\_\_\_, is domiciled in the State of \_\_\_\_\_ and  
(check and complete one of the following):

(\_\_\_\_) attached is a copy of the State of \_\_\_\_\_'s current law pertaining to the treatment of nonresident CONTRACTORS. Paragraph \_\_\_\_\_, page \_\_\_\_\_ of said law grants resident CONTRACTORS a \_\_\_\_\_ percent preference over nonresident CONTRACTORS for similar projects.

**FAILURE TO ATTACH SAID LAW WILL DISQUALIFY THE BID.**

(\_\_\_\_) the State of \_\_\_\_\_ has no current law pertaining to the treatment to the treatment of nonresident CONTRACTORS.

(\_\_\_\_) I claim "resident contractor" status based upon having been qualified to do business in this state and having maintained a permanent full-time office in the State of Mississippi for two (2) years prior to January 1, 1986. Proof of such claim must be submitted and approved before contract is signed.

Signature \_\_\_\_\_

Title \_\_\_\_\_

(SEAL)

Sworn before me this \_\_\_\_ day of \_\_\_\_\_, 2025.

\_\_\_\_\_, Notary Public

My commission expires \_\_\_\_\_

**AFFIDAVIT**

(TO BE EXECUTED IN DUPLICATE)

STATE OF MISSISSIPPI

COUNTY OF \_\_\_\_\_

I, \_\_\_\_\_

(name of person signing affidavit)

individually, and in my capacity as \_\_\_\_\_

(title)

of \_\_\_\_\_

(name of firm, partnership, limited liability company, or corporation.)

being duly sworn, on oath do depose and say as follows:

(a) That \_\_\_\_\_, Bidder on **the WHEATLEY STREET RECONSTRUCTION & SIDEWALK IMPROVEMENTS, in the City of Ridgeland, Mississippi**, has not either directly or indirectly entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free competitive bidding in connection with this contract; nor have any of its officers, partners, employees or principal owners.

(b) further, that neither said legal entity nor any of its directors, officers, partners, principal owners or managerial employees are currently debarred from bidding on public contracts by the State of Mississippi or any of its agencies; or by one or more of the other states or any of their agencies; or by the Federal Highway Administration.

Signature \_\_\_\_\_

Title \_\_\_\_\_

(SEAL)

Sworn before me this \_\_\_ day of \_\_\_\_\_, 2025.

My commission expires \_\_\_\_\_ Notary Public

**NOTE: FAILURE TO PROPERLY SIGN AND NOTARIZE THIS AFFIDAVIT WILL DISQUALIFY THE BID.**

**AFFIDAVIT**

(TO BE EXECUTED IN DUPLICATE)

STATE OF MISSISSIPPI

COUNTY OF \_\_\_\_\_

I, \_\_\_\_\_

(name of person signing affidavit)

individually, and in my capacity as \_\_\_\_\_

(title)

of \_\_\_\_\_

(name of firm, partnership, limited liability company, or corporation.)

being duly sworn, on oath do depose and say as follows:

(a) That \_\_\_\_\_, Bidder on **the WHEATLEY STREET RECONSTRUCTION & SIDEWALK IMPROVEMENTS, in the City of Ridgeland, Mississippi**, has not either directly or indirectly entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free competitive bidding in connection with this contract; nor have any of its officers, partners, employees or principal owners.

(b) further, that neither said legal entity nor any of its directors, officers, partners, principal owners or managerial employees are currently debarred from bidding on public contracts by the State of Mississippi or any of its agencies; or by one or more of the other states or any of their agencies; or by the Federal Highway Administration.

Signature \_\_\_\_\_

Title \_\_\_\_\_

(SEAL)

Sworn before me this \_\_\_ day of \_\_\_\_\_, 2025.

My commission expires \_\_\_\_\_ Notary Public

**NOTE: FAILURE TO PROPERLY SIGN AND NOTARIZE THIS AFFIDAVIT WILL DISQUALIFY THE BID.**

**BID BOND**

KNOW ALL MEN BY THESE PRESENTS:

That

\_\_\_\_\_  
(Name of Contractor)

\_\_\_\_\_  
(Address of Contractor)

a \_\_\_\_\_ hereinafter called "Principal",

(Corporation, Partnership, Limited Liability Company, or Individual)

AND \_\_\_\_\_ hereinafter called "Surety",

(Name of Surety)

are held and firmly bound unto the **CITY OF RIDGELAND, MISSISSIPPI**, hereinafter called "**OWNER**" in the penal sum of 5% of Total Bid, for the payment of which sum well and truly to be made, we bind ourselves, successors, and assigns, jointly and severally, firmly by these presents.

Signed, this the \_\_\_\_ day of \_\_\_\_\_, 2025. The Condition of the above obligation is such that whereas the Principal has submitted to the **City of Ridgeland, Mississippi** a certain BID, attached hereto and hereby made a part thereof to enter into a contract in writing, for the construction of:

**"WHEATLEY STREET RECONSTRUCTION & SIDEWALK IMPROVEMENTS"**

NOW, THEREFORE,

(a) If said BID shall be rejected, or,

(b) If said BID shall be accepted and the Principal shall execute and deliver a contract on the Contract form as attached hereto (properly completed in accordance with said BID) and shall furnish BONDS for his faithful performance of said contract, and for the payment of all persons performing labor or furnishing materials in connection herewith, and shall in all other respects perform the agreement created by the acceptance of said BID, then this obligation shall be void, otherwise the same shall remain in effect; it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

The Surety, for value received, hereby stipulates and agrees that the obligations of said Surety and its BOND shall be in no way impaired or affected by any extension of the time within which the OWNER may accept such BID; and said Surety does hereby waive notice of any such extension.

IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these present to be signed by their officers, the day and year first set forth above.

(L.S.)

\_\_\_\_\_  
Principal

\_\_\_\_\_  
Surety

\_\_\_\_\_  
By:

\_\_\_\_\_  
By:

**IMPORTANT:** Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the state where the project is located.

**END OF SECTION**



## CONTRACT

THIS AGREEMENT, made this the \_\_\_\_\_ day of \_\_\_\_\_, 2025, by and between the **CITY OF RIDGELAND MISSISSIPPI** hereinafter called "OWNER" and \_\_\_\_\_, doing business as (an Individual), (a Partnership),( a Limited Liability Company) or (a Corporation) hereinafter called "CONTRACTOR".

WITNESSETH: That for and in consideration of the payments and agreements hereinafter mentioned:

1. The CONTRACTOR will commence and complete the construction of **"WHEATLEY STREET RECONSTRUCTION & SIDEWALK"** hereinafter called "PROJECT".
2. The CONTRACTOR will furnish all of the material, supplies, tools, equipment, labor and other services necessary for the construction and completion of the PROJECT described herein.
3. The CONTRACTOR will commence the work required by the CONTRACT DOCUMENTS on or before the date specified in a written NOTICE TO PROCEED from the Owner and will fully complete the Project within **30 calendar days** as set forth in these Contract Documents.
4. The CONTRACTOR agrees to perform all of the work described in the CONTRACT DOCUMENTS, and comply with the terms therein for the sum of \_\_\_\_\_ or as shown in the BID Schedule.
5. The term "CONTRACT DOCUMENTS" means and includes the following:
  - (a) This Agreement
  - (b) Advertisement for Bids
  - (c) Instruction to Bidders
  - (d) Signed Copy of Proposal Form and Bidder's Certificate
  - (e) Executed Non-Collusion Form and Compliance Statements
  - (f) Executed Performance Bond
  - (g) Executed Payment Bond
  - (h) NSPE General Conditions
  - (i) Special Contract Provisions
  - (j) Technical Specifications
  - (K) SPECIFICATIONS prepared or issued by the **Benchmark Engineering & Surveying LLC**, dated **July 2025**.
  - (l) ADDENDA:  
No. \_\_ Dated \_\_\_\_\_  
No. \_\_ Dated \_\_\_\_\_
  - (m) All federal government conditions, specifications, regulations and requirements bound herein.

6. The Contractor agrees to abide by the following consequences for failure to complete the project within the time specified in the Contract Documents:
  - A. LIQUIDATED DAMAGES - CONTRACTOR shall pay to OWNER for each and every calendar day that he shall be in default in attaining Completion of the Work within the time stipulated the sum of \$ 1,000.00 as liquidated damages. The CONTRACTOR shall be liable for the continued assessment of liquidated damages of \$ 1,000.00 for each calendar day that he shall be in default in completing the Work within the stipulated time as provided herein. Since the OWNER's losses are due to the CONTRACTOR's delay and are not readily ascertainable, the amount provided herein for liquidated damages constitutes agreed damages and not a penalty.
  - B. INDEMNIFICATION - In addition to payment of the above liquidated damages, CONTRACTOR s shall fully indemnify and hold harmless the OWNER, the ENGINEER and their officers, personnel, and agents from and against: (1) any and all fines, civil penalties, and assessments levied by the State of Mississippi Office of Pollution Control, State of Mississippi Bureau of Environmental Health or any federal or state court for failure to meet, perform, or comply with any part of the time schedule as defined in the Contract Documents, and (2) any and all claims, damages, losses, expenses, liabilities, actions, judgments, and decrees of any and every mature whatsoever in any manner caused by, resulting from, or arising out of such failure.
  - C. RIGHT OF SET-OFF - The OWNER, in addition to its other remedies under this Contract and in law and in equity, may deduct from monies which become due the CONTRACTOR under this Contract any unpaid amounts which become to or for the OWNER under any of the foregoing provisions.
7. The OWNER will pay to the CONTRACTOR in the manner and at such times set forth in the General Conditions such amount as required by the CONTRACT DOCUMENTS. The OWNER shall retain five percent (5%) of the amount of each payment until final completion and acceptance of all work covered by the CONTRACT DOCUMENTS unless otherwise mutually agreed.
8. The CONTRACTOR shall guarantee to the OWNER all work performed and all equipment installed under this contract shall be free from defects in workmanship and materials for a period of one (1) year unless noted otherwise from date of partial maintenance release and final written acceptance by the OWNER. Defects shall be corrected arising during this one (1) year period at the CONTRACTOR's own expense, upon written notice of the OWNER or his authorized representative.
9. The Contractor agrees to allow the Owner or a duly authorized representatives thereof, access to books, documents, papers and records of the Contractor which are directly pertinent to the project which is the subject of this Contract, for the purpose of making audits, examinations, excerpts and transcriptions, and Contractor agrees to insert an identical access to records clause into all subcontracts.

10. The Contractor shall be held responsible for forfeiture of monies in the event that an audit indicates his failure to keep adequate records, including change orders, force accounts and payroll records.

11. Attached hereto and made a part of this Contract is a Payment Bond, executed by a Surety Company doing business in the State of Mississippi, in the sum of:

\_\_\_\_\_  
(not less than one hundred percent of Contract amount)

12. Attached hereto and made a part of this Contract is a Performance Bond, executed by a Surety Company doing business in the State of Mississippi, in the sum of:

\_\_\_\_\_  
(not less than one hundred percent of Contract amount)

12. This Agreement shall be binding upon all parties hereto and their respective heirs, executors, administrators, successors, and assigns.

IN WITNESS WHEREOF, the parties hereto have executed or caused to be executed by their duly authorized officials, this Agreement in **4 copies** each of which shall be deemed an original on the date first above written.

**City of Ridgeland**

BY: \_\_\_\_\_  
NAME: Gene F. McGee  
TITLE: Mayor

ATTEST:

BY: \_\_\_\_\_  
NAME: Paula Tierce  
TITLE: City Clerk

(SEAL)

**Contractor**

BY: \_\_\_\_\_  
COMPANY: \_\_\_\_\_  
NAME: \_\_\_\_\_  
TITLE: \_\_\_\_\_

ATTEST:

BY: \_\_\_\_\_  
NAME: \_\_\_\_\_  
TITLE: \_\_\_\_\_

**END OF SECTION**

## PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS:

That

\_\_\_\_\_  
(Name of Contractor)

\_\_\_\_\_  
(Address of Contractor)

a \_\_\_\_\_ hereinafter called "Principal",  
(Corporation, Partnership, Limited Liability Company, or Individual)

AND \_\_\_\_\_ hereinafter called "Surety",  
(Name of Surety)

are held and firmly bound unto the **CITY OF RIDGELAND, MISSISSIPPI**, hereinafter called  
**"OWNER"** in the penal sum of

\_\_\_\_\_  
Dollars \_\_\_\_\_

in lawful money of the United States, for the payment of which sum well and truly to be made, we  
bind ourselves, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain  
Contract with the OWNER, dated the \_\_\_\_\_ day of \_\_\_\_\_, 2025, a copy of which is  
hereto attached and made a part hereof for the construction of:

### **"WHEATLEY STREET RECONSTRUCTION & SIDEWALK IMPROVEMENTS"**

NOW, THEREFORE, if the Principal shall well, truly and faithfully perform its duties, all the  
undertakings, covenants, terms, conditions, and agreements of said Contract during the Original  
term thereof, and any extensions thereof which may be granted by the OWNER, with or without  
notice to the Surety and during the one year guaranty period and if he shall satisfy all claims and  
demands incurred under such Contract, and shall fully indemnify and save harmless the OWNER  
from all costs and damages which it may suffer by reason of failure to do so, and shall reimburse  
and repay the OWNER of all of outlay and expense which the OWNER may incur in making good  
any default, then this obligation shall be void; otherwise to remain in full force and effect.  
PROVIDED, FURTHER, that the said Surety for value received hereby stipulates and sees that no  
change, extension of time, alteration or addition to the terms of the Contract or to the WORK to  
be performed hereunder or the SPECIFICATIONS accompanying the same shall in any wise affect  
its obligation on this BOND, and it does hereby waive notice of any such change, extension of time,  
alteration or addition to the loans of this Contract or to the WORK or to the SPECIFICATIONS.

PROVIDED, FURTHER, that no final settlement between the OWNER and the CONTRACTOR shall abridge the right of any beneficiary hereunder, whose claim may not yet be satisfied.

WITNESS WHEREOF, this instrument is executed in four (4) counterparts, each of which shall be deemed an original, this the \_\_\_\_\_ day of \_\_\_\_\_, 2025.

**ATTEST:**

\_\_\_\_\_  
(Principal)

(SEAL)

\_\_\_\_\_  
Witness as to Principal

\_\_\_\_\_  
(Address)

\_\_\_\_\_

**ATTEST:**

(SEAL)

\_\_\_\_\_  
Witness as to Surety

\_\_\_\_\_  
(Address)

\_\_\_\_\_

\_\_\_\_\_  
(Principal)

By \_\_\_\_\_

\_\_\_\_\_  
(Address)

\_\_\_\_\_

\_\_\_\_\_  
(Surety)

By \_\_\_\_\_  
Attorney-in-Fact

\_\_\_\_\_  
(Address)

\_\_\_\_\_

**NOTE:**

Date of BOND **must not be** prior to date of CONTRACT. If CONTRACTOR is Partnership, all partners should execute BOND.

**IMPORTANT:**

Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the State where the Project is located.

**END OF SECTION**

## PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS:

That

\_\_\_\_\_  
(Name of Contractor)

\_\_\_\_\_  
(Address of Contractor)

a \_\_\_\_\_ hereinafter called "Principal",  
(Corporation, Partnership, Limited Liability Company, or Individual)

AND \_\_\_\_\_ hereinafter called "Surety",  
(Name of Surety)

are held and firmly bound unto the **CITY OF RIDGELAND, MISSISSIPPI**, hereinafter called  
**"OWNER"** in the penal sum of

\_\_\_\_\_ Dollars \_\_\_\_\_

in lawful money of the United States, for the payment of which sum well and truly to be made, we  
bind ourselves, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain  
Contract with the OWNER, dated the \_\_\_\_\_ day of \_\_\_\_\_, 2025, a copy of which is  
hereto attached and made a part hereof for the construction of:

### **WHEATLEY STREET RECONSTRUCTION & SIDEWALK IMPROVEMENTS**

NOW, THEREFORE, if the Principal shall promptly make payment to all persons, firms,  
SUBCONTRACTORS, and corporations furnishing materials for or performing labor in the  
prosecution of the WORK provided for in such Contract, and any authorized extension or  
modification thereof, including all amounts due for materials, lubricants, oil, gasoline, coal and  
coke, repairs on machinery, equipment and tools, consumed or used in connection with the  
construction of such WORK, and all insurance premiums on said WORK, and for all labor,  
performed in such WORK whether by SUBCONTRACTOR or otherwise, then this obligation shall be  
void; otherwise to remain in full force and effect. PROVIDED, FURTHER, that the said Surety for  
value received hereby stipulates and sees that no change, extension of time, alteration or addition  
to the terms of the Contract or to the WORK to be performed hereunder or the SPECIFICATIONS  
accompanying the same shall in any wise affect its obligation on this BOND, and it does hereby  
waive notice of any such change, extension of time, alteration or addition to the loans of this  
Contract or to the WORK or to the SPECIFICATIONS.

PROVIDED, FURTHER, that no final settlement between the OWNER and the CONTRACTOR shall abridge the right of any beneficiary hereunder, whose claim may not yet be satisfied.

WITNESS WHEREOF, this instrument is executed in four (4) counterparts, each of which shall be deemed an original, this the \_\_\_\_\_ day of \_\_\_\_\_, 2025.

**ATTEST:**

\_\_\_\_\_  
(Principal)

(SEAL)

\_\_\_\_\_

By \_\_\_\_\_

\_\_\_\_\_  
(Address)

\_\_\_\_\_  
Witness as to Principal

\_\_\_\_\_  
(Address)

**ATTEST:**

(SEAL)

\_\_\_\_\_  
(Surety)

By \_\_\_\_\_  
Attorney-in-Fact

\_\_\_\_\_  
Witness as to Surety

\_\_\_\_\_  
(Address)

\_\_\_\_\_  
(Address)

**NOTE:**

Date of BOND **must not be** prior to date of CONTRACT. If CONTRACTOR is Partnership, all partners should execute BOND.

**IMPORTANT:**

Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the State where the Project is located.

**END OF SECTION**

## CERTIFICATE OF SUFFICIENCY

I, \_\_\_\_\_, Pyle, Mills, Dye & Pittman, P.A., Chief Legal Officer for the **City of Ridgeland, Mississippi** do hereby certify that I have examined the agreement, contract bonds and evidence of insurance offered by the Contractor and I am of the opinion that each of the aforesaid documents is adequate and sufficient and has been duly executed by the proper parties thereto acting through their duly authorized representatives; that said representatives have full power and authority to execute said documents on behalf of the respective parties named thereon; and that the foregoing documents constitute valid and legally binding obligations upon the parties executing the same in accordance with terms, conditions and provisions thereof.

Signed By: \_\_\_\_\_,  
Pyle, Mills, Dye & Pittman, P.A., Chief Legal Officer

Date: \_\_\_\_\_

END OF SECTION



**Engineers Joint Documents Committee  
Design and Construction Related Documents  
Instructions and License Agreement**

**Instructions**

**Before you use any EJCDC document:**

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Arthur Schwartz, Esq.  
General Counsel  
National Society of Professional Engineers  
1420 King Street  
Alexandria, VA 22314

Phone: (703) 684-2845

Fax: (703) 836-4875  
e-mail: [aschwartz@nspe.org](mailto:aschwartz@nspe.org)

**You acknowledge that you have read this agreement, understand it and agree to be bound by its terms and conditions. You further agree that it is the complete and exclusive statement of the agreement between us which supersedes any proposal or prior agreement, oral or written, and any other communications between us relating to the subject matter of this agreement.**

This document has important legal consequences; consultation with an attorney is encouraged with respect to its use or modification. This document should be adapted to the particular circumstances of the contemplated Project and the controlling Laws and Regulations.

# STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared by

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and

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These General Conditions have been prepared for use with the Suggested Forms of Agreement Between Owner and Contractor (EJCDC C-520 or C-525, 2007 Editions). Their provisions are interrelated and a change in one may necessitate a change in the other. Comments concerning their usage are contained in the Narrative Guide to the EJCDC Construction Documents (EJCDC C-001, 2007 Edition). For guidance in the preparation of Supplementary Conditions, see Guide to the Preparation of Supplementary Conditions (EJCDC C-800, 2007 Edition).

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1420 King Street, Alexandria, VA 22314-2794  
(703) 684-2882  
[www.nspe.org](http://www.nspe.org)

American Council of Engineering Companies  
1015 15th Street N.W., Washington, DC 20005  
(202) 347-7474  
[www.acec.org](http://www.acec.org)

American Society of Civil Engineers  
1801 Alexander Bell Drive, Reston, VA 20191-4400  
(800) 548-2723  
[www.asce.org](http://www.asce.org)

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## ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

### 1.01 *Defined Terms*

- A. Wherever used in the Bidding Requirements or Contract Documents and printed with initial capital letters, the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.
1. *Addenda*—Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.
  2. *Agreement*—The written instrument which is evidence of the agreement between Owner and Contractor covering the Work.
  3. *Application for Payment*—The form acceptable to Engineer which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.
  4. *Asbestos*—Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.
  5. *Bid*—The offer or proposal of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
  6. *Bidder*—The individual or entity who submits a Bid directly to Owner.
  7. *Bidding Documents*—The Bidding Requirements and the proposed Contract Documents (including all Addenda).
  8. *Bidding Requirements*—The advertisement or invitation to bid, Instructions to Bidders, Bid security of acceptable form, if any, and the Bid Form with any supplements.
  9. *Change Order*—A document recommended by Engineer which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement.
  10. *Claim*—A demand or assertion by Owner or Contractor seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.
  11. *Contract*—The entire and integrated written agreement between the Owner and Contractor concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.

12. *Contract Documents*—Those items so designated in the Agreement. Only printed or hard copies of the items listed in the Agreement are Contract Documents. Approved Shop Drawings, other Contractor submittals, and the reports and drawings of subsurface and physical conditions are not Contract Documents.
13. *Contract Price*—The moneys payable by Owner to Contractor for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of Paragraph 11.03 in the case of Unit Price Work).
14. *Contract Times*—The number of days or the dates stated in the Agreement to: (i) achieve Milestones, if any; (ii) achieve Substantial Completion; and (iii) complete the Work so that it is ready for final payment as evidenced by Engineer's written recommendation of final payment.
15. *Contractor*—The individual or entity with whom Owner has entered into the Agreement.
16. *Cost of the Work*—See Paragraph 11.01 for definition.
17. *Drawings*—That part of the Contract Documents prepared or approved by Engineer which graphically shows the scope, extent, and character of the Work to be performed by Contractor. Shop Drawings and other Contractor submittals are not Drawings as so defined.
18. *Effective Date of the Agreement*—The date indicated in the Agreement on which it becomes effective, but if no such date is indicated, it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.
19. *Engineer*—The individual or entity named as such in the Agreement.
20. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but which does not involve a change in the Contract Price or the Contract Times.
21. *General Requirements*—Sections of Division 1 of the Specifications.
22. *Hazardous Environmental Condition*—The presence at the Site of Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto.
23. *Hazardous Waste*—The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.
24. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.
25. *Liens*—Charges, security interests, or encumbrances upon Project funds, real property, or personal property.
26. *Milestone*—A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.

27. *Notice of Award*—The written notice by Owner to the Successful Bidder stating that upon timely compliance by the Successful Bidder with the conditions precedent listed therein, Owner will sign and deliver the Agreement.
28. *Notice to Proceed*—A written notice given by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work under the Contract Documents.
29. *Owner*—The individual or entity with whom Contractor has entered into the Agreement and for whom the Work is to be performed.
30. *PCBs*—Polychlorinated biphenyls.
31. *Petroleum*—Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils.
32. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor's plan to accomplish the Work within the Contract Times.
33. *Project*—The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part.
34. *Project Manual*—The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents.
35. *Radioactive Material*—Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.
36. *Resident Project Representative*—The authorized representative of Engineer who may be assigned to the Site or any part thereof.
37. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.
38. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements to support scheduled performance of related construction activities.
39. *Schedule of Values*—A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

40. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work.
41. *Site*—Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by Owner which are designated for the use of Contractor.
42. *Specifications*—That part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable thereto.
43. *Subcontractor*—An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work at the Site.
44. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms “substantially complete” and “substantially completed” as applied to all or part of the Work refer to Substantial Completion thereof.
45. *Successful Bidder*—The Bidder submitting a responsive Bid to whom Owner makes an award.
46. *Supplementary Conditions*—That part of the Contract Documents which amends or supplements these General Conditions.
47. *Supplier*—A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or Subcontractor.
48. *Underground Facilities*—All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.
49. *Unit Price Work*—Work to be paid for on the basis of unit prices.
50. *Work*—The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.
51. *Work Change Directive*—A written statement to Contractor issued on or after the Effective Date of the Agreement and signed by Owner and recommended by Engineer ordering an

addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

## 1.02 *Terminology*

A. The words and terms discussed in Paragraph 1.02.B through F are not defined but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.

### B. *Intent of Certain Terms or Adjectives:*

1. The Contract Documents include the terms “as allowed,” “as approved,” “as ordered,” “as directed” or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives “reasonable,” “suitable,” “acceptable,” “proper,” “satisfactory,” or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 9.09 or any other provision of the Contract Documents.

### C. *Day:*

1. The word “day” means a calendar day of 24 hours measured from midnight to the next midnight.

### D. *Defective:*

1. The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it:
  - a. does not conform to the Contract Documents; or
  - b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or
  - c. has been damaged prior to Engineer’s recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 14.04 or 14.05).

### E. *Furnish, Install, Perform, Provide:*

1. The word “furnish,” when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.
  2. The word “install,” when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.
  3. The words “perform” or “provide,” when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.
  4. When “furnish,” “install,” “perform,” or “provide” is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of Contractor, “provide” is implied.
- F. Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

## **ARTICLE 2 – PRELIMINARY MATTERS**

### **2.01   *Delivery of Bonds and Evidence of Insurance***

- A. When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.
- B. *Evidence of Insurance:* Before any Work at the Site is started, Contractor and Owner shall each deliver to the other, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance which either of them or any additional insured may reasonably request) which Contractor and Owner respectively are required to purchase and maintain in accordance with Article 5.

### **2.02   *Copies of Documents***

- A. Owner shall furnish to Contractor up to ten printed or hard copies of the Drawings and Project Manual. Additional copies will be furnished upon request at the cost of reproduction.

### **2.03   *Commencement of Contract Times; Notice to Proceed***

- A. The Contract Times will commence to run on the thirtieth day after the Effective Date of the Agreement or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Agreement. In no event will the Contract Times commence to run later than the sixtieth day after the day of Bid opening or the thirtieth day after the Effective Date of the Agreement, whichever date is earlier.

## 2.04 *Starting the Work*

- A. Contractor shall start to perform the Work on the date when the Contract Times commence to run. No Work shall be done at the Site prior to the date on which the Contract Times commence to run.

## 2.05 *Before Starting Construction*

- A. *Preliminary Schedules:* Within 10 days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), Contractor shall submit to Engineer for timely review:
  - 1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract Documents;
  - 2. a preliminary Schedule of Submittals; and
  - 3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

## 2.06 *Preconstruction Conference; Designation of Authorized Representatives*

- A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in Paragraph 2.05.A, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, and maintaining required records.
- B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit instructions, receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

## 2.07 *Initial Acceptance of Schedules*

- A. At least 10 days before submission of the first Application for Payment a conference attended by Contractor, Engineer, and others as appropriate will be held to review for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.05.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.
  - 1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of

the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.

2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.
3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to component parts of the Work.

### **ARTICLE 3 – CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE**

#### **3.01 *Intent***

- A. The Contract Documents are complementary; what is required by one is as binding as if required by all.
- B. It is the intent of the Contract Documents to describe a functionally complete project (or part thereof) to be constructed in accordance with the Contract Documents. Any labor, documentation, services, materials, or equipment that reasonably may be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the indicated result will be provided whether or not specifically called for, at no additional cost to Owner.
- C. Clarifications and interpretations of the Contract Documents shall be issued by Engineer as provided in Article 9.

#### **3.02 *Reference Standards***

- A. Standards, Specifications, Codes, Laws, and Regulations
  1. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard, specification, manual, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.
  2. No provision of any such standard, specification, manual, or code, or any instruction of a Supplier, shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees, from those set forth in the Contract Documents. No such provision or instruction shall be effective to assign to Owner, Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

#### **3.03 *Reporting and Resolving Discrepancies***

- A. *Reporting Discrepancies:*



1. *Contractor's Review of Contract Documents Before Starting Work:* Before undertaking each part of the Work, Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy which Contractor discovers, or has actual knowledge of, and shall obtain a written interpretation or clarification from Engineer before proceeding with any Work affected thereby.
2. *Contractor's Review of Contract Documents During Performance of Work:* If, during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) any standard, specification, manual, or code, or (c) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 6.16.A) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in Paragraph 3.04.
3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof.

B. *Resolving Discrepancies:*

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Contract Documents and:
  - a. the provisions of any standard, specification, manual, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference in the Contract Documents); or
  - b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 *Amending and Supplementing Contract Documents*

- A. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof by either a Change Order or a Work Change Directive.
- B. The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, by one or more of the following ways:
  1. A Field Order;
  2. Engineer's approval of a Shop Drawing or Sample (subject to the provisions of Paragraph 6.17.D.3); or

3. Engineer's written interpretation or clarification.

### 3.05 *Reuse of Documents*

- A. Contractor and any Subcontractor or Supplier shall not:
  1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media editions; or
  2. reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer.
- B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

### 3.06 *Electronic Data*

- A. Unless otherwise stated in the Supplementary Conditions, the data furnished by Owner or Engineer to Contractor, or by Contractor to Owner or Engineer, that may be relied upon are limited to the printed copies (also known as hard copies). Files in electronic media format of text, data, graphics, or other types are furnished only for the convenience of the receiving party. Any conclusion or information obtained or derived from such electronic files will be at the user's sole risk. If there is a discrepancy between the electronic files and the hard copies, the hard copies govern.
- B. Because data stored in electronic media format can deteriorate or be modified inadvertently or otherwise without authorization of the data's creator, the party receiving electronic files agrees that it will perform acceptance tests or procedures within 60 days, after which the receiving party shall be deemed to have accepted the data thus transferred. Any errors detected within the 60-day acceptance period will be corrected by the transferring party.
- C. When transferring documents in electronic media format, the transferring party makes no representations as to long term compatibility, usability, or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by the data's creator.

## **ARTICLE 4 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS; REFERENCE POINTS**

### 4.01 *Availability of Lands*

- A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work. Owner will obtain in a timely manner and pay for easements for permanent structures or permanent changes in existing facilities. If Contractor and Owner are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the

Contract Price or Contract Times, or both, as a result of any delay in Owner's furnishing the Site or a part thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

- B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which the Work is to be performed and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.
- C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

#### 4.02 *Subsurface and Physical Conditions*

A. *Reports and Drawings:* The Supplementary Conditions identify:

- 1. those reports known to Owner of explorations and tests of subsurface conditions at or contiguous to the Site; and
- 2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities).

B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:

- 1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or
- 2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or
- 3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions, or information.

#### 4.03 *Differing Subsurface or Physical Conditions*

A. *Notice:* If Contractor believes that any subsurface or physical condition that is uncovered or revealed either:

- 1. is of such a nature as to establish that any "technical data" on which Contractor is entitled to rely as provided in Paragraph 4.02 is materially inaccurate; or
- 2. is of such a nature as to require a change in the Contract Documents; or
- 3. differs materially from that shown or indicated in the Contract Documents; or

4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.

- B. *Engineer's Review*: After receipt of written notice as required by Paragraph 4.03.A, Engineer will promptly review the pertinent condition, determine the necessity of Owner's obtaining additional exploration or tests with respect thereto, and advise Owner in writing (with a copy to Contractor) of Engineer's findings and conclusions.

C. *Possible Price and Times Adjustments*:

1. The Contract Price or the Contract Times, or both, will be equitably adjusted to the extent that the existence of such differing subsurface or physical condition causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:
  - a. such condition must meet any one or more of the categories described in Paragraph 4.03.A; and
  - b. with respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraphs 9.07 and 11.03.
2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times if:
  - a. Contractor knew of the existence of such conditions at the time Contractor made a final commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract; or
  - b. the existence of such condition could reasonably have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such final commitment; or
  - c. Contractor failed to give the written notice as required by Paragraph 4.03.A.
3. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, a Claim may be made therefor as provided in Paragraph 10.05. However, neither Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

#### 4.04 *Underground Facilities*

A. *Shown or Indicated:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the Site is based on information and data furnished to Owner or Engineer by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:

1. Owner and Engineer shall not be responsible for the accuracy or completeness of any such information or data provided by others; and
2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:
  - a. reviewing and checking all such information and data;
  - b. locating all Underground Facilities shown or indicated in the Contract Documents;
  - c. coordination of the Work with the owners of such Underground Facilities, including Owner, during construction; and
  - d. the safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.

B. *Not Shown or Indicated:*

1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy in the Contract Documents, Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer. Engineer will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence or location of the Underground Facility. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.
2. If Engineer concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued to reflect and document such consequences. An equitable adjustment shall be made in the Contract Price or Contract Times, or both, to the extent that they are attributable to the existence or location of any Underground Facility that was not shown or indicated or not shown or indicated with reasonable accuracy in the Contract Documents and that Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment in Contract Price or Contract Times, Owner or Contractor may make a Claim therefor as provided in Paragraph 10.05.

#### 4.05 *Reference Points*

- A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

#### 4.06 *Hazardous Environmental Condition at Site*

- A. *Reports and Drawings:* The Supplementary Conditions identify those reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at the Site.
- B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:
  - 1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor and safety precautions and programs incident thereto; or
  - 2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or
  - 3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions or information.
- C. Contractor shall not be responsible for any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work. Contractor shall be responsible for a Hazardous Environmental Condition created with any materials brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible.
- D. If Contractor encounters a Hazardous Environmental Condition or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, Contractor shall immediately: (i) secure or otherwise isolate such condition; (ii) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 6.16.A); and (iii) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to

permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 4.06.E.

- E. Contractor shall not be required to resume Work in connection with such condition or in any affected area until after Owner has obtained any required permits related thereto and delivered written notice to Contractor: (i) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work; or (ii) specifying any special conditions under which such Work may be resumed safely. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, either party may make a Claim therefor as provided in Paragraph 10.05.
- F. If after receipt of such written notice Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of an adjustment in Contract Price or Contract Times as a result of deleting such portion of the Work, then either party may make a Claim therefor as provided in Paragraph 10.05. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 7.
- G. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition: (i) was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be included within the scope of the Work, and (ii) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.G shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- H. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.H shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- I. The provisions of Paragraphs 4.02, 4.03, and 4.04 do not apply to a Hazardous Environmental Condition uncovered or revealed at the Site.

## ARTICLE 5 – BONDS AND INSURANCE

### 5.01 *Performance, Payment, and Other Bonds*

- A. Contractor shall furnish performance and payment bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all of Contractor's obligations under the Contract Documents. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 13.07, whichever is later, except as provided otherwise by Laws or Regulations or by the Contract Documents. Contractor shall also furnish such other bonds as are required by the Contract Documents.
- B. All bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. All bonds signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority shall show that it is effective on the date the agent or attorney-in-fact signed each bond.
- C. If the surety on any bond furnished by Contractor is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of Paragraph 5.01.B, Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the requirements of Paragraphs 5.01.B and 5.02.

### 5.02 *Licensed Sureties and Insurers*

- A. All bonds and insurance required by the Contract Documents to be purchased and maintained by Owner or Contractor shall be obtained from surety or insurance companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds or insurance policies for the limits and coverages so required. Such surety and insurance companies shall also meet such additional requirements and qualifications as may be provided in the Supplementary Conditions.

### 5.03 *Certificates of Insurance*

- A. Contractor shall deliver to Owner, with copies to each additional insured and loss payee identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Owner or any other additional insured) which Contractor is required to purchase and maintain.
- B. Owner shall deliver to Contractor, with copies to each additional insured and loss payee identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Contractor or any other additional insured) which Owner is required to purchase and maintain.



- C. Failure of Owner to demand such certificates or other evidence of Contractor's full compliance with these insurance requirements or failure of Owner to identify a deficiency in compliance from the evidence provided shall not be construed as a waiver of Contractor's obligation to maintain such insurance.
- D. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor.
- E. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner in the Contract Documents.

#### 5.04 *Contractor's Insurance*

- A. Contractor shall purchase and maintain such insurance as is appropriate for the Work being performed and as will provide protection from claims set forth below which may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable:
  - 1. claims under workers' compensation, disability benefits, and other similar employee benefit acts;
  - 2. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees;
  - 3. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees;
  - 4. claims for damages insured by reasonably available personal injury liability coverage which are sustained:
    - a. by any person as a result of an offense directly or indirectly related to the employment of such person by Contractor, or
    - b. by any other person for any other reason;
  - 5. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom; and
  - 6. claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle.
- B. The policies of insurance required by this Paragraph 5.04 shall:
  - 1. with respect to insurance required by Paragraphs 5.04.A.3 through 5.04.A.6 inclusive, be written on an occurrence basis, include as additional insureds (subject to any customary exclusion regarding professional liability) Owner and Engineer, and any other individuals or entities identified in the Supplementary Conditions, all of whom shall be listed as additional insureds, and include coverage for the respective officers, directors, members, partners,

employees, agents, consultants, and subcontractors of each and any of all such additional insureds, and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby;

2. include at least the specific coverages and be written for not less than the limits of liability provided in the Supplementary Conditions or required by Laws or Regulations, whichever is greater;
3. include contractual liability insurance covering Contractor's indemnity obligations under Paragraphs 6.11 and 6.20;
4. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued (and the certificates of insurance furnished by the Contractor pursuant to Paragraph 5.03 will so provide);
5. remain in effect at least until final payment and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work in accordance with Paragraph 13.07; and
6. include completed operations coverage:
  - a. Such insurance shall remain in effect for two years after final payment.
  - b. Contractor shall furnish Owner and each other additional insured identified in the Supplementary Conditions, to whom a certificate of insurance has been issued, evidence satisfactory to Owner and any such additional insured of continuation of such insurance at final payment and one year thereafter.

#### 5.05 *Owner's Liability Insurance*

- A. In addition to the insurance required to be provided by Contractor under Paragraph 5.04, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.

#### 5.06 *Property Insurance*

- A. Unless otherwise provided in the Supplementary Conditions, Owner shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:
  1. include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of

them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee;

2. be written on a Builder's Risk "all-risk" policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage (other than that caused by flood), and such other perils or causes of loss as may be specifically required by the Supplementary Conditions.
  3. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);
  4. cover materials and equipment stored at the Site or at another location that was agreed to in writing by Owner prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by Engineer;
  5. allow for partial utilization of the Work by Owner;
  6. include testing and startup; and
  7. be maintained in effect until final payment is made unless otherwise agreed to in writing by Owner, Contractor, and Engineer with 30 days written notice to each other loss payee to whom a certificate of insurance has been issued.
- B. Owner shall purchase and maintain such equipment breakdown insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee.
- C. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with this Paragraph 5.06 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other loss payee to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with Paragraph 5.07.
- D. Owner shall not be responsible for purchasing and maintaining any property insurance specified in this Paragraph 5.06 to protect the interests of Contractor, Subcontractors, or others in the Work to the extent of any deductible amounts that are identified in the Supplementary Conditions. The risk of loss within such identified deductible amount will be borne by Contractor, Subcontractors, or others suffering any such loss, and if any of them wishes property insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser's own expense.

- E. If Contractor requests in writing that other special insurance be included in the property insurance policies provided under this Paragraph 5.06, Owner shall, if possible, include such insurance, and the cost thereof will be charged to Contractor by appropriate Change Order. Prior to commencement of the Work at the Site, Owner shall in writing advise Contractor whether or not such other insurance has been procured by Owner.

#### 5.07 *Waiver of Rights*

- A. Owner and Contractor intend that all policies purchased in accordance with Paragraph 5.06 will protect Owner, Contractor, Subcontractors, and Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) in such policies and will provide primary coverage for all losses and damages caused by the perils or causes of loss covered thereby. All such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or loss payees thereunder. Owner and Contractor waive all rights against each other and their respective officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them for all losses and damages caused by, arising out of or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Subcontractors and Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Owner as trustee or otherwise payable under any policy so issued.
- B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them for:
1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by Owner; and
  2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial utilization pursuant to Paragraph 14.05, after Substantial Completion pursuant to Paragraph 14.04, or after final payment pursuant to Paragraph 14.07.
- C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 5.07.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them.

#### 5.08 *Receipt and Application of Insurance Proceeds*

- A. Any insured loss under the policies of insurance required by Paragraph 5.06 will be adjusted with Owner and made payable to Owner as fiduciary for the loss payees, as their interests may appear, subject to the requirements of any applicable mortgage clause and of Paragraph 5.08.B. Owner shall deposit in a separate account any money so received and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the moneys so received applied on account thereof, and the Work and the cost thereof covered by an appropriate Change Order.
- B. Owner as fiduciary shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within 15 days after the occurrence of loss to Owner's exercise of this power. If such objection be made, Owner as fiduciary shall make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If no such agreement among the parties in interest is reached, Owner as fiduciary shall adjust and settle the loss with the insurers and, if required in writing by any party in interest, Owner as fiduciary shall give bond for the proper performance of such duties.

#### 5.09 *Acceptance of Bonds and Insurance; Option to Replace*

- A. If either Owner or Contractor has any objection to the coverage afforded by or other provisions of the bonds or insurance required to be purchased and maintained by the other party in accordance with Article 5 on the basis of non-conformance with the Contract Documents, the objecting party shall so notify the other party in writing within 10 days after receipt of the certificates (or other evidence requested) required by Paragraph 2.01.B. Owner and Contractor shall each provide to the other such additional information in respect of insurance provided as the other may reasonably request. If either party does not purchase or maintain all of the bonds and insurance required of such party by the Contract Documents, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage. Without prejudice to any other right or remedy, the other party may elect to obtain equivalent bonds or insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and a Change Order shall be issued to adjust the Contract Price accordingly.

#### 5.10 *Partial Utilization, Acknowledgment of Property Insurer*

- A. If Owner finds it necessary to occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 14.05, no such use or occupancy shall commence before the insurers providing the property insurance pursuant to Paragraph 5.06 have acknowledged notice thereof and in writing effected any changes in coverage necessitated thereby. The insurers providing the property insurance shall consent by endorsement on the policy or policies, but the property insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy.

## ARTICLE 6 – CONTRACTOR’S RESPONSIBILITIES

### 6.01 *Supervision and Superintendence*

- A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction. Contractor shall not be responsible for the negligence of Owner or Engineer in the design or specification of a specific means, method, technique, sequence, or procedure of construction which is shown or indicated in and expressly required by the Contract Documents.
- B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

### 6.02 *Labor; Working Hours*

- A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall at all times maintain good discipline and order at the Site.
- B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours. Contractor will not permit the performance of Work on a Saturday, Sunday, or any legal holiday without Owner’s written consent (which will not be unreasonably withheld) given after prior written notice to Engineer.

### 6.03 *Services, Materials, and Equipment*

- A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start-up, and completion of the Work.
- B. All materials and equipment incorporated into the Work shall be as specified or, if not specified, shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.
- C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

#### 6.04 *Progress Schedule*

- A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.07 as it may be adjusted from time to time as provided below.
1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.07) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times. Such adjustments will comply with any provisions of the General Requirements applicable thereto.
  2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 12. Adjustments in Contract Times may only be made by a Change Order.

#### 6.05 *Substitutes and "Or-Equals"*

- A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or-equal" item or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be submitted to Engineer for review under the circumstances described below.
1. *"Or-Equal" Items:* If in Engineer's sole discretion an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by Engineer as an "or-equal" item, in which case review and approval of the proposed item may, in Engineer's sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. For the purposes of this Paragraph 6.05.A.1, a proposed item of material or equipment will be considered functionally equal to an item so named if:
    - a. in the exercise of reasonable judgment Engineer determines that:
      - 1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;
      - 2) it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole; and
      - 3) it has a proven record of performance and availability of responsive service.
    - b. Contractor certifies that, if approved and incorporated into the Work:
      - 1) there will be no increase in cost to the Owner or increase in Contract Times; and
      - 2) it will conform substantially to the detailed requirements of the item named in the Contract Documents.

## 2. *Substitute Items:*

- a. If in Engineer's sole discretion an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item under Paragraph 6.05.A.1, it will be considered a proposed substitute item.
- b. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor. Requests for review of proposed substitute items of material or equipment will not be accepted by Engineer from anyone other than Contractor.
- c. The requirements for review by Engineer will be as set forth in Paragraph 6.05.A.2.d, as supplemented by the General Requirements, and as Engineer may decide is appropriate under the circumstances.
- d. Contractor shall make written application to Engineer for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application:
  - 1) shall certify that the proposed substitute item will:
    - a) perform adequately the functions and achieve the results called for by the general design,
    - b) be similar in substance to that specified, and
    - c) be suited to the same use as that specified;
  - 2) will state:
    - a) the extent, if any, to which the use of the proposed substitute item will prejudice Contractor's achievement of Substantial Completion on time,
    - b) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item, and
    - c) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty;
  - 3) will identify:
    - a) all variations of the proposed substitute item from that specified, and
    - b) available engineering, sales, maintenance, repair, and replacement services; and
  - 4) shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change.



- B. *Substitute Construction Methods or Procedures:* If a specific means, method, technique, sequence, or procedure of construction is expressly required by the Contract Documents, Contractor may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction approved by Engineer. Contractor shall submit sufficient information to allow Engineer, in Engineer's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The requirements for review by Engineer will be similar to those provided in Paragraph 6.05.A.2.
- C. *Engineer's Evaluation:* Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to Paragraphs 6.05.A and 6.05.B. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No "or equal" or substitute will be ordered, installed or utilized until Engineer's review is complete, which will be evidenced by a Change Order in the case of a substitute and an approved Shop Drawing for an "or equal." Engineer will advise Contractor in writing of any negative determination.
- D. *Special Guarantee:* Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.
- E. *Engineer's Cost Reimbursement:* Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor pursuant to Paragraphs 6.05.A.2 and 6.05.B. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.
- F. *Contractor's Expense:* Contractor shall provide all data in support of any proposed substitute or "or-equal" at Contractor's expense.

#### 6.06 *Concerning Subcontractors, Suppliers, and Others*

- A. Contractor shall not employ any Subcontractor, Supplier, or other individual or entity (including those acceptable to Owner as indicated in Paragraph 6.06.B), whether initially or as a replacement, against whom Owner may have reasonable objection. Contractor shall not be required to employ any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against whom Contractor has reasonable objection.
- B. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, or other individuals or entities to be submitted to Owner in advance for acceptance by Owner by a specified date prior to the Effective Date of the Agreement, and if Contractor has submitted a list thereof in accordance with the Supplementary Conditions, Owner's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Bidding Documents or the Contract Documents) of any such Subcontractor, Supplier, or other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity, and the Contract Price will be adjusted by the difference in the cost occasioned by such replacement, and an appropriate Change Order will be issued. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or

entity, whether initially or as a replacement, shall constitute a waiver of any right of Owner or Engineer to reject defective Work.

- C. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions. Nothing in the Contract Documents:
  - 1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier or other individual or entity; nor
  - 2. shall create any obligation on the part of Owner or Engineer to pay or to see to the payment of any moneys due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.
- D. Contractor shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work under a direct or indirect contract with Contractor.
- E. Contractor shall require all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work to communicate with Engineer through Contractor.
- F. The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.
- G. All Work performed for Contractor by a Subcontractor or Supplier will be pursuant to an appropriate agreement between Contractor and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer. Whenever any such agreement is with a Subcontractor or Supplier who is listed as a loss payee on the property insurance provided in Paragraph 5.06, the agreement between the Contractor and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against Owner, Contractor, Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, Contractor will obtain the same.

#### 6.07 *Patent Fees and Royalties*

- A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if, to the actual knowledge of Owner or Engineer, its

use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by Owner in the Contract Documents.

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

#### 6.08 *Permits*

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

#### 6.09 *Laws and Regulations*

- A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.
- B. If Contractor performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work. However, it shall not be Contractor's responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.
- C. Changes in Laws or Regulations not known at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids) having an effect on the cost or time of performance of the Work shall be the subject of an adjustment in Contract Price or Contract Times. If Owner

and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

#### 6.10 *Taxes*

- A. Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

#### 6.11 *Use of Site and Other Areas*

##### *A. Limitation on Use of Site and Other Areas:*

1. Contractor shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the Site and other areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and other areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof, or of any adjacent land or areas resulting from the performance of the Work.
2. Should any claim be made by any such owner or occupant because of the performance of the Work, Contractor shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law.
3. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused by or based upon Contractor's performance of the Work.

- B. *Removal of Debris During Performance of the Work:* During the progress of the Work Contractor shall keep the Site and other areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.

- C. *Cleaning:* Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.

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

## 6.12 *Record Documents*

- A. Contractor shall maintain in a safe place at the Site one record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, and written interpretations and clarifications in good order and annotated to show changes made during construction. These record documents together with all approved Samples and a counterpart of all approved Shop Drawings will be available to Engineer for reference. Upon completion of the Work, these record documents, Samples, and Shop Drawings will be delivered to Engineer for Owner.

## 6.13 *Safety and Protection*

- A. Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:
  - 1. all persons on the Site or who may be affected by the Work;
  - 2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
  - 3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.
- B. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify owners of adjacent property and of Underground Facilities and other utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property.
- C. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. The Supplementary Conditions identify any Owner's safety programs that are applicable to the Work.
- D. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.
- E. All damage, injury, or loss to any property referred to in Paragraph 6.13.A.2 or 6.13.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts

any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).

- F. Contractor's duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 14.07.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

#### 6.14 *Safety Representative*

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

#### 6.15 *Hazard Communication Programs*

- A. Contractor shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with Laws or Regulations.

#### 6.16 *Emergencies*

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

#### 6.17 *Shop Drawings and Samples*

- A. Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals (as required by Paragraph 2.07). Each submittal will be identified as Engineer may require.

##### 1. *Shop Drawings:*

- a. Submit number of copies specified in the General Requirements.
- b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide and to enable Engineer to review the information for the limited purposes required by Paragraph 6.17.D.

##### 2. *Samples:*

- a. Submit number of Samples specified in the Specifications.

- b. Clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 6.17.D.
- B. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.

C. *Submittal Procedures:*

- 1. Before submitting each Shop Drawing or Sample, Contractor shall have:
  - a. reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;
  - b. determined and verified all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;
  - c. determined and verified the suitability of all materials offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and
  - d. determined and verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.
- 2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review and approval of that submittal.
- 3. With each submittal, Contractor shall give Engineer specific written notice of any variations that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be both a written communication separate from the Shop Drawings or Sample submittal; and, in addition, by a specific notation made on each Shop Drawing or Sample submitted to Engineer for review and approval of each such variation.

D. *Engineer's Review:*

- 1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
- 2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the

Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

3. Engineer's review and approval shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 6.17.C.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer's review and approval shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 6.17.C.1.

E. *Resubmittal Procedures:*

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

6.18 *Continuing the Work*

- A. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as permitted by Paragraph 15.04 or as Owner and Contractor may otherwise agree in writing.

6.19 *Contractor's General Warranty and Guarantee*

- A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on representation of Contractor's warranty and guarantee.
- B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:
  1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or
  2. normal wear and tear under normal usage.
- C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:
  1. observations by Engineer;
  2. recommendation by Engineer or payment by Owner of any progress or final payment;



3. the issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;
4. use or occupancy of the Work or any part thereof by Owner;
5. any review and approval of a Shop Drawing or Sample submittal or the issuance of a notice of acceptability by Engineer;
6. any inspection, test, or approval by others; or
7. any correction of defective Work by Owner.

#### 6.20 *Indemnification*

- A. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable .
- B. In any and all claims against Owner or Engineer or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 6.20.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.
- C. The indemnification obligations of Contractor under Paragraph 6.20.A shall not extend to the liability of Engineer and Engineer's officers, directors, members, partners, employees, agents, consultants and subcontractors arising out of:
  1. the preparation or approval of, or the failure to prepare or approve maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or
  2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

## 6.21 *Delegation of Professional Design Services*

- A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable law.
- B. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.
- C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.
- D. Pursuant to this Paragraph 6.21, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 6.17.D.1.
- E. Contractor shall not be responsible for the adequacy of the performance or design criteria required by the Contract Documents.

## **ARTICLE 7 – OTHER WORK AT THE SITE**

### 7.01 *Related Work at Site*

- A. Owner may perform other work related to the Project at the Site with Owner's employees, or through other direct contracts therefor, or have other work performed by utility owners. If such other work is not noted in the Contract Documents, then:
  - 1. written notice thereof will be given to Contractor prior to starting any such other work; and
  - 2. if Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times that should be allowed as a result of such other work, a Claim may be made therefor as provided in Paragraph 10.05.
- B. Contractor shall afford each other contractor who is a party to such a direct contract, each utility owner, and Owner, if Owner is performing other work with Owner's employees, proper and safe

access to the Site, provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work, and properly coordinate the Work with theirs. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected. The duties and responsibilities of Contractor under this Paragraph are for the benefit of such utility owners and other contractors to the extent that there are comparable provisions for the benefit of Contractor in said direct contracts between Owner and such utility owners and other contractors.

- C. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 7, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.

#### 7.02 *Coordination*

- A. If Owner intends to contract with others for the performance of other work on the Project at the Site, the following will be set forth in Supplementary Conditions:
  - 1. the individual or entity who will have authority and responsibility for coordination of the activities among the various contractors will be identified;
  - 2. the specific matters to be covered by such authority and responsibility will be itemized; and
  - 3. the extent of such authority and responsibilities will be provided.
- B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

#### 7.03 *Legal Relationships*

- A. Paragraphs 7.01.A and 7.02 are not applicable for utilities not under the control of Owner.
- B. Each other direct contract of Owner under Paragraph 7.01.A shall provide that the other contractor is liable to Owner and Contractor for the reasonable direct delay and disruption costs incurred by Contractor as a result of the other contractor's wrongful actions or inactions.
- C. Contractor shall be liable to Owner and any other contractor under direct contract to Owner for the reasonable direct delay and disruption costs incurred by such other contractor as a result of Contractor's wrongful action or inactions.

## ARTICLE 8 – OWNER’S RESPONSIBILITIES

### 8.01 *Communications to Contractor*

- A. Except as otherwise provided in these General Conditions, Owner shall issue all communications to Contractor through Engineer.

### 8.02 *Replacement of Engineer*

- A. In case of termination of the employment of Engineer, Owner shall appoint an engineer to whom Contractor makes no reasonable objection, whose status under the Contract Documents shall be that of the former Engineer.

### 8.03 *Furnish Data*

- A. Owner shall promptly furnish the data required of Owner under the Contract Documents.

### 8.04 *Pay When Due*

- A. Owner shall make payments to Contractor when they are due as provided in Paragraphs 14.02.C and 14.07.C.

### 8.05 *Lands and Easements; Reports and Tests*

- A. Owner’s duties with respect to providing lands and easements and providing engineering surveys to establish reference points are set forth in Paragraphs 4.01 and 4.05. Paragraph 4.02 refers to Owner’s identifying and making available to Contractor copies of reports of explorations and tests of subsurface conditions and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

### 8.06 *Insurance*

- A. Owner’s responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 5.

### 8.07 *Change Orders*

- A. Owner is obligated to execute Change Orders as indicated in Paragraph 10.03.

### 8.08 *Inspections, Tests, and Approvals*

- A. Owner’s responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 13.03.B.

### 8.09 *Limitations on Owner’s Responsibilities*

- A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor’s means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws

and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

8.10 *Undisclosed Hazardous Environmental Condition*

- A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 4.06.

8.11 *Evidence of Financial Arrangements*

- A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents.

8.12 *Compliance with Safety Program*

- A. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed pursuant to Paragraph 6.13.D.

**ARTICLE 9 – ENGINEER'S STATUS DURING CONSTRUCTION**

9.01 *Owner's Representative*

- A. Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative during construction are set forth in the Contract Documents.

9.02 *Visits to Site*

- A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.
- B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 9.09. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

### 9.03 *Project Representative*

- A. If Owner and Engineer agree, Engineer will furnish a Resident Project Representative to assist Engineer in providing more extensive observation of the Work. The authority and responsibilities of any such Resident Project Representative and assistants will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in Paragraph 9.09. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer's consultant, agent or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

### 9.04 *Authorized Variations in Work*

- A. Engineer may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. These may be accomplished by a Field Order and will be binding on Owner and also on Contractor, who shall perform the Work involved promptly. If Owner or Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, and the parties are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

### 9.05 *Rejecting Defective Work*

- A. Engineer will have authority to reject Work which Engineer believes to be defective, or that Engineer believes will not produce a completed Project that conforms to the Contract Documents or that will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Engineer will also have authority to require special inspection or testing of the Work as provided in Paragraph 13.04, whether or not the Work is fabricated, installed, or completed.

### 9.06 *Shop Drawings, Change Orders and Payments*

- A. In connection with Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, see Paragraph 6.17.
- B. In connection with Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, see Paragraph 6.21.
- C. In connection with Engineer's authority as to Change Orders, see Articles 10, 11, and 12.
- D. In connection with Engineer's authority as to Applications for Payment, see Article 14.

### 9.07 *Determinations for Unit Price Work*

- A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations

on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, subject to the provisions of Paragraph 10.05.

9.08 *Decisions on Requirements of Contract Documents and Acceptability of Work*

- A. Engineer will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. All matters in question and other matters between Owner and Contractor arising prior to the date final payment is due relating to the acceptability of the Work, and the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, will be referred initially to Engineer in writing within 30 days of the event giving rise to the question.
- B. Engineer will, with reasonable promptness, render a written decision on the issue referred. If Owner or Contractor believes that any such decision entitles them to an adjustment in the Contract Price or Contract Times or both, a Claim may be made under Paragraph 10.05. The date of Engineer's decision shall be the date of the event giving rise to the issues referenced for the purposes of Paragraph 10.05.B.
- C. Engineer's written decision on the issue referred will be final and binding on Owner and Contractor, subject to the provisions of Paragraph 10.05.
- D. When functioning as interpreter and judge under this Paragraph 9.08, Engineer will not show partiality to Owner or Contractor and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity.

9.09 *Limitations on Engineer's Authority and Responsibilities*

- A. Neither Engineer's authority or responsibility under this Article 9 or under any other provision of the Contract Documents nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.
- B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.
- C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.
- D. Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 14.07.A will only be to determine generally that their content complies with the requirements of,

and in the case of certificates of inspections, tests, and approvals that the results certified indicate compliance with, the Contract Documents.

- E. The limitations upon authority and responsibility set forth in this Paragraph 9.09 shall also apply to the Resident Project Representative, if any, and assistants, if any.

#### 9.10 *Compliance with Safety Program*

- A. While at the Site, Engineer's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Engineer has been informed pursuant to Paragraph 6.13.D.

### **ARTICLE 10 – CHANGES IN THE WORK; CLAIMS**

#### 10.01 *Authorized Changes in the Work*

- A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work by a Change Order, or a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).
- B. If Owner and Contractor are unable to agree on entitlement to, or on the amount or extent, if any, of an adjustment in the Contract Price or Contract Times, or both, that should be allowed as a result of a Work Change Directive, a Claim may be made therefor as provided in Paragraph 10.05.

#### 10.02 *Unauthorized Changes in the Work*

- A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents as amended, modified, or supplemented as provided in Paragraph 3.04, except in the case of an emergency as provided in Paragraph 6.16 or in the case of uncovering Work as provided in Paragraph 13.04.D.

#### 10.03 *Execution of Change Orders*

- A. Owner and Contractor shall execute appropriate Change Orders recommended by Engineer covering:
  - 1. changes in the Work which are: (i) ordered by Owner pursuant to Paragraph 10.01.A, (ii) required because of acceptance of defective Work under Paragraph 13.08.A or Owner's correction of defective Work under Paragraph 13.09, or (iii) agreed to by the parties;
  - 2. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive; and
  - 3. changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by Engineer pursuant to Paragraph 10.05; provided that, in lieu of



executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, Contractor shall carry on the Work and adhere to the Progress Schedule as provided in Paragraph 6.18.A.

#### 10.04 *Notification to Surety*

- A. If the provisions of any bond require notice to be given to a surety of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times), the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

#### 10.05 *Claims*

- A. *Engineer's Decision Required:* All Claims, except those waived pursuant to Paragraph 14.09, shall be referred to the Engineer for decision. A decision by Engineer shall be required as a condition precedent to any exercise by Owner or Contractor of any rights or remedies either may otherwise have under the Contract Documents or by Laws and Regulations in respect of such Claims.
- B. *Notice:* Written notice stating the general nature of each Claim shall be delivered by the claimant to Engineer and the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto. The responsibility to substantiate a Claim shall rest with the party making the Claim. Notice of the amount or extent of the Claim, with supporting data shall be delivered to the Engineer and the other party to the Contract within 60 days after the start of such event (unless Engineer allows additional time for claimant to submit additional or more accurate data in support of such Claim). A Claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of Paragraph 12.01.B. A Claim for an adjustment in Contract Times shall be prepared in accordance with the provisions of Paragraph 12.02.B. Each Claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to Engineer and the claimant within 30 days after receipt of the claimant's last submittal (unless Engineer allows additional time).
- C. *Engineer's Action:* Engineer will review each Claim and, within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any, take one of the following actions in writing:
  - 1. deny the Claim in whole or in part;
  - 2. approve the Claim; or
  - 3. notify the parties that the Engineer is unable to resolve the Claim if, in the Engineer's sole discretion, it would be inappropriate for the Engineer to do so. For purposes of further resolution of the Claim, such notice shall be deemed a denial.
- D. In the event that Engineer does not take action on a Claim within said 30 days, the Claim shall be deemed denied.

- E. Engineer's written action under Paragraph 10.05.C or denial pursuant to Paragraphs 10.05.C.3 or 10.05.D will be final and binding upon Owner and Contractor, unless Owner or Contractor invoke the dispute resolution procedure set forth in Article 16 within 30 days of such action or denial.
- F. No Claim for an adjustment in Contract Price or Contract Times will be valid if not submitted in accordance with this Paragraph 10.05.

## **ARTICLE 11 – COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK**

### **11.01 *Cost of the Work***

- A. *Costs Included:* The term Cost of the Work means the sum of all costs, except those excluded in Paragraph 11.01.B, necessarily incurred and paid by Contractor in the proper performance of the Work. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, the costs to be reimbursed to Contractor will be only those additional or incremental costs required because of the change in the Work or because of the event giving rise to the Claim. Except as otherwise may be agreed to in writing by Owner, such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall not include any of the costs itemized in Paragraph 11.01.B, and shall include only the following items:
  - 1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.
  - 2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.
  - 3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 11.01.

4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.
5. Supplemental costs including the following:
  - a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.
  - b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.
  - c. Rentals of all construction equipment and machinery, and the parts thereof whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.
  - d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.
  - e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.
  - f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 5.06.D), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.
  - g. The cost of utilities, fuel, and sanitary facilities at the Site.
  - h. Minor expenses such as telegrams, long distance telephone calls, telephone service at the Site, express and courier services, and similar petty cash items in connection with the Work.
  - i. The costs of premiums for all bonds and insurance Contractor is required by the Contract Documents to purchase and maintain.

B. *Costs Excluded:* The term Cost of the Work shall not include any of the following items:

1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 11.01.A.1 or specifically covered by Paragraph 11.01.A.4, all of which are to be considered administrative costs covered by the Contractor's fee.
  2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
  3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
  4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.
  5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraphs 11.01.A.
- C. *Contractor's Fee:* When all the Work is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 12.01.C.
- D. *Documentation:* Whenever the Cost of the Work for any purpose is to be determined pursuant to Paragraphs 11.01.A and 11.01.B, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

## 11.02 Allowances

- A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.
- B. *Cash Allowances:*
1. Contractor agrees that:
    - a. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and
    - b. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in

the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.

C. *Contingency Allowance:*

1. Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.
- D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

11.03 *Unit Price Work*

- A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.
- B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by Contractor will be made by Engineer subject to the provisions of Paragraph 9.07.
- C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.
- D. Owner or Contractor may make a Claim for an adjustment in the Contract Price in accordance with Paragraph 10.05 if:
  1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and
  2. there is no corresponding adjustment with respect to any other item of Work; and
  3. Contractor believes that Contractor is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price and the parties are unable to agree as to the amount of any such increase or decrease.

## **ARTICLE 12 – CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES**

12.01 *Change of Contract Price*

- A. The Contract Price may only be changed by a Change Order. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.

- B. The value of any Work covered by a Change Order or of any Claim for an adjustment in the Contract Price will be determined as follows:
1. where the Work involved is covered by unit prices contained in the Contract Documents, by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 11.03); or
  2. where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 12.01.C.2); or
  3. where the Work involved is not covered by unit prices contained in the Contract Documents and agreement to a lump sum is not reached under Paragraph 12.01.B.2, on the basis of the Cost of the Work (determined as provided in Paragraph 11.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 12.01.C).
- C. *Contractor's Fee*: The Contractor's fee for overhead and profit shall be determined as follows:
1. a mutually acceptable fixed fee; or
  2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
    - a. for costs incurred under Paragraphs 11.01.A.1 and 11.01.A.2, the Contractor's fee shall be 15 percent;
    - b. for costs incurred under Paragraph 11.01.A.3, the Contractor's fee shall be five percent;
    - c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 12.01.C.2.a and 12.01.C.2.b is that the Subcontractor who actually performs the Work, at whatever tier, will be paid a fee of 15 percent of the costs incurred by such Subcontractor under Paragraphs 11.01.A.1 and 11.01.A.2 and that any higher tier Subcontractor and Contractor will each be paid a fee of five percent of the amount paid to the next lower tier Subcontractor;
    - d. no fee shall be payable on the basis of costs itemized under Paragraphs 11.01.A.4, 11.01.A.5, and 11.01.B;
    - e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and
    - f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 12.01.C.2.a through 12.01.C.2.e, inclusive.

## 12.02 *Change of Contract Times*

- A. The Contract Times may only be changed by a Change Order. Any Claim for an adjustment in the Contract Times shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.
- B. Any adjustment of the Contract Times covered by a Change Order or any Claim for an adjustment in the Contract Times will be determined in accordance with the provisions of this Article 12.

## 12.03 *Delays*

- A. Where Contractor is prevented from completing any part of the Work within the Contract Times due to delay beyond the control of Contractor, the Contract Times will be extended in an amount equal to the time lost due to such delay if a Claim is made therefor as provided in Paragraph 12.02.A. Delays beyond the control of Contractor shall include, but not be limited to, acts or neglect by Owner, acts or neglect of utility owners or other contractors performing other work as contemplated by Article 7, fires, floods, epidemics, abnormal weather conditions, or acts of God.
- B. If Owner, Engineer, or other contractors or utility owners performing other work for Owner as contemplated by Article 7, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
- C. If Contractor is delayed in the performance or progress of the Work by fire, flood, epidemic, abnormal weather conditions, acts of God, acts or failures to act of utility owners not under the control of Owner, or other causes not the fault of and beyond control of Owner and Contractor, then Contractor shall be entitled to an equitable adjustment in Contract Times, if such adjustment is essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays described in this Paragraph 12.03.C.
- D. Owner, Engineer, and their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall not be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.
- E. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delays within the control of Contractor. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of Contractor.

## **ARTICLE 13 – TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK**

### **13.01 *Notice of Defects***

- A. Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor. Defective Work may be rejected, corrected, or accepted as provided in this Article 13.

### **13.02 *Access to Work***

- A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and governmental agencies with jurisdictional interests will have access to the Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's safety procedures and programs so that they may comply therewith as applicable.

### **13.03 *Tests and Inspections***

- A. Contractor shall give Engineer timely notice of readiness of the Work for all required inspections, tests, or approvals and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.
- B. Owner shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by the Contract Documents except:
  - 1. for inspections, tests, or approvals covered by Paragraphs 13.03.C and 13.03.D below;
  - 2. that costs incurred in connection with tests or inspections conducted pursuant to Paragraph 13.04.B shall be paid as provided in Paragraph 13.04.C; and
  - 3. as otherwise specifically provided in the Contract Documents.
- C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.
- D. Contractor shall be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests, or approvals required for Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work; or acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work. Such inspections, tests, or approvals shall be performed by organizations acceptable to Owner and Engineer.



- E. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation.
- F. Uncovering Work as provided in Paragraph 13.03.E shall be at Contractor's expense unless Contractor has given Engineer timely notice of Contractor's intention to cover the same and Engineer has not acted with reasonable promptness in response to such notice.

#### 13.04 *Uncovering Work*

- A. If any Work is covered contrary to the written request of Engineer, it must, if requested by Engineer, be uncovered for Engineer's observation and replaced at Contractor's expense.
- B. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, furnishing all necessary labor, material, and equipment.
- C. If it is found that the uncovered Work is defective, Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05.
- D. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

#### 13.05 *Owner May Stop the Work*

- A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work shall not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

#### 13.06 *Correction or Removal of Defective Work*

- A. Promptly after receipt of written notice, Contractor shall correct all defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by Engineer, remove it from the Project and replace it with Work that is not defective. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers,

architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or removal (including but not limited to all costs of repair or replacement of work of others).

- B. When correcting defective Work under the terms of this Paragraph 13.06 or Paragraph 13.07, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.

### 13.07 *Correction Period*

- A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents) or by any specific provision of the Contract Documents, any Work is found to be defective, or if the repair of any damages to the land or areas made available for Contractor's use by Owner or permitted by Laws and Regulations as contemplated in Paragraph 6.11.A is found to be defective, Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:
  - 1. repair such defective land or areas; or
  - 2. correct such defective Work; or
  - 3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and
  - 4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others or other land or areas resulting therefrom.
- B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by Contractor.
- C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.
- D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this Paragraph 13.07, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.
- E. Contractor's obligations under this Paragraph 13.07 are in addition to any other obligation or warranty. The provisions of this Paragraph 13.07 shall not be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

### 13.08 *Acceptance of Defective Work*

- A. If, instead of requiring correction or removal and replacement of defective Work, Owner (and, prior to Engineer's recommendation of final payment, Engineer) prefers to accept it, Owner may do so. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness) and for the diminished value of the Work to the extent not otherwise paid by Contractor pursuant to this sentence. If any such acceptance occurs prior to Engineer's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work, and Owner shall be entitled to an appropriate decrease in the Contract Price, reflecting the diminished value of Work so accepted. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05. If the acceptance occurs after such recommendation, an appropriate amount will be paid by Contractor to Owner.

### 13.09 *Owner May Correct Defective Work*

- A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace rejected Work as required by Engineer in accordance with Paragraph 13.06.A, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, Owner may, after seven days written notice to Contractor, correct, or remedy any such deficiency.
- B. In exercising the rights and remedies under this Paragraph 13.09, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, take possession of Contractor's tools, appliances, construction equipment and machinery at the Site, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this Paragraph.
- C. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 13.09 will be charged against Contractor, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount of the adjustment, Owner may make a Claim therefor as provided in Paragraph 10.05. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.

- D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 13.09.

## **ARTICLE 14 – PAYMENTS TO CONTRACTOR AND COMPLETION**

### **14.01 *Schedule of Values***

- A. The Schedule of Values established as provided in Paragraph 2.07.A will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed.

### **14.02 *Progress Payments***

#### **A. *Applications for Payments:***

1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens and evidence that the materials and equipment are covered by appropriate property insurance or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.
2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.
3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

#### **B. *Review of Applications:***

1. Engineer will, within 10 days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to Owner or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.
2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's

review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:

- a. the Work has progressed to the point indicated;
  - b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 9.07, and any other qualifications stated in the recommendation); and
  - c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.
3. By recommending any such payment Engineer will not thereby be deemed to have represented that:
- a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract Documents; or
  - b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.
4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:
- a. to supervise, direct, or control the Work, or
  - b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or
  - c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or
  - d. to make any examination to ascertain how or for what purposes Contractor has used the moneys paid on account of the Contract Price, or
  - e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.
5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 14.02.B.2. Engineer may also refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent inspections or tests, revise or revoke any such payment recommendation previously made, to such extent as may be necessary in Engineer's opinion to protect Owner from loss because:

- a. the Work is defective, or completed Work has been damaged, requiring correction or replacement;
- b. the Contract Price has been reduced by Change Orders;
- c. Owner has been required to correct defective Work or complete Work in accordance with Paragraph 13.09; or
- d. Engineer has actual knowledge of the occurrence of any of the events enumerated in Paragraph 15.02.A.

*C. Payment Becomes Due:*

- 1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended will (subject to the provisions of Paragraph 14.02.D) become due, and when due will be paid by Owner to Contractor.

*D. Reduction in Payment:*

- 1. Owner may refuse to make payment of the full amount recommended by Engineer because:
  - a. claims have been made against Owner on account of Contractor's performance or furnishing of the Work;
  - b. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;
  - c. there are other items entitling Owner to a set-off against the amount recommended; or
  - d. Owner has actual knowledge of the occurrence of any of the events enumerated in Paragraphs 14.02.B.5.a through 14.02.B.5.c or Paragraph 15.02.A.
- 2. If Owner refuses to make payment of the full amount recommended by Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, when Contractor remedies the reasons for such action.
- 3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 14.02.C.1 and subject to interest as provided in the Agreement.

**14.03 Contractor's Warranty of Title**

- A. Contractor warrants and guarantees that title to all Work, materials, and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to Owner no later than the time of payment free and clear of all Liens.

#### 14.04 *Substantial Completion*

- A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete (except for items specifically listed by Contractor as incomplete) and request that Engineer issue a certificate of Substantial Completion.
- B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.
- C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment. Owner shall have seven days after receipt of the tentative certificate during which to make written objection to Engineer as to any provisions of the certificate or attached list. If, after considering such objections, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the tentative certificate to Owner, notify Contractor in writing, stating the reasons therefor. If, after consideration of Owner's objections, Engineer considers the Work substantially complete, Engineer will, within said 14 days, execute and deliver to Owner and Contractor a definitive certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as Engineer believes justified after consideration of any objections from Owner.
- D. At the time of delivery of the tentative certificate of Substantial Completion, Engineer will deliver to Owner and Contractor a written recommendation as to division of responsibilities pending final payment between Owner and Contractor with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless Owner and Contractor agree otherwise in writing and so inform Engineer in writing prior to Engineer's issuing the definitive certificate of Substantial Completion, Engineer's aforesaid recommendation will be binding on Owner and Contractor until final payment.
- E. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the tentative list.

#### 14.05 *Partial Utilization*

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

1. Owner at any time may request Contractor in writing to permit Owner to use or occupy any such part of the Work which Owner believes to be ready for its intended use and substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 14.04.A through D for that part of the Work.
2. Contractor at any time may notify Owner and Engineer in writing that Contractor considers any such part of the Work ready for its intended use and substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.
3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 14.04 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.
4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 5.10 regarding property insurance.

#### 14.06 *Final Inspection*

- A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

#### 14.07 *Final Payment*

##### A. *Application for Payment:*

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, marked-up record documents (as provided in Paragraph 6.12), and other documents, Contractor may make application for final payment following the procedure for progress payments.
2. The final Application for Payment shall be accompanied (except as previously delivered) by:
  - a. all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by Paragraph 5.04.B.6;
  - b. consent of the surety, if any, to final payment;
  - c. a list of all Claims against Owner that Contractor believes are unsettled; and



- d. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of or Liens filed in connection with the Work.
3. In lieu of the releases or waivers of Liens specified in Paragraph 14.07.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (i) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (ii) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien.

*B. Engineer's Review of Application and Acceptance:*

1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract Documents have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of payment and present the Application for Payment to Owner for payment. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable subject to the provisions of Paragraph 14.09. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

*C. Payment Becomes Due:*

1. Thirty days after the presentation to Owner of the Application for Payment and accompanying documentation, the amount recommended by Engineer, less any sum Owner is entitled to set off against Engineer's recommendation, including but not limited to liquidated damages, will become due and will be paid by Owner to Contractor.

**14.08 Final Completion Delayed**

- A. If, through no fault of Contractor, final completion of the Work is significantly delayed, and if Engineer so confirms, Owner shall, upon receipt of Contractor's final Application for Payment (for Work fully completed and accepted) and recommendation of Engineer, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by Owner for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if bonds have been furnished as required in Paragraph 5.01, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by Contractor to Engineer with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

## 14.09 *Waiver of Claims*

A. The making and acceptance of final payment will constitute:

1. a waiver of all Claims by Owner against Contractor, except Claims arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 14.06, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from Contractor's continuing obligations under the Contract Documents; and
2. a waiver of all Claims by Contractor against Owner other than those previously made in accordance with the requirements herein and expressly acknowledged by Owner in writing as still unsettled.

## **ARTICLE 15 – SUSPENSION OF WORK AND TERMINATION**

### 15.01 *Owner May Suspend Work*

A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by notice in writing to Contractor and Engineer which will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be granted an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension if Contractor makes a Claim therefor as provided in Paragraph 10.05.

### 15.02 *Owner May Terminate for Cause*

A. The occurrence of any one or more of the following events will justify termination for cause:

1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule established under Paragraph 2.07 as adjusted from time to time pursuant to Paragraph 6.04);
2. Contractor's disregard of Laws or Regulations of any public body having jurisdiction;
3. Contractor's repeated disregard of the authority of Engineer; or
4. Contractor's violation in any substantial way of any provisions of the Contract Documents.

B. If one or more of the events identified in Paragraph 15.02.A occur, Owner may, after giving Contractor (and surety) seven days written notice of its intent to terminate the services of Contractor:

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

2. incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere; and
  3. complete the Work as Owner may deem expedient.
- C. If Owner proceeds as provided in Paragraph 15.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Owner arising out of or relating to completing the Work, such excess will be paid to Contractor. If such claims, costs, losses, and damages exceed such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this Paragraph, Owner shall not be required to obtain the lowest price for the Work performed.
- D. Notwithstanding Paragraphs 15.02.B and 15.02.C, Contractor's services will not be terminated if Contractor begins within seven days of receipt of notice of intent to terminate to correct its failure to perform and proceeds diligently to cure such failure within no more than 30 days of receipt of said notice.
- E. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue. Any retention or payment of moneys due Contractor by Owner will not release Contractor from liability.
- F. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 5.01.A, the termination procedures of that bond shall supersede the provisions of Paragraphs 15.02.B and 15.02.C.

#### *15.03 Owner May Terminate For Convenience*

- A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):
1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;
  2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses;
  3. all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other

dispute resolution costs) incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others; and

4. reasonable expenses directly attributable to termination.

B. Contractor shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

#### 15.04 *Contractor May Stop Work or Terminate*

A. If, through no act or fault of Contractor, (i) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (ii) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (iii) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the Contract and recover from Owner payment on the same terms as provided in Paragraph 15.03.

B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this Paragraph 15.04 are not intended to preclude Contractor from making a Claim under Paragraph 10.05 for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this Paragraph.

### ARTICLE 16 – DISPUTE RESOLUTION

#### 16.01 *Methods and Procedures*

A. Either Owner or Contractor may request mediation of any Claim submitted to Engineer for a decision under Paragraph 10.05 before such decision becomes final and binding. The mediation will be governed by the Construction Industry Mediation Rules of the American Arbitration Association in effect as of the Effective Date of the Agreement. The request for mediation shall be submitted in writing to the American Arbitration Association and the other party to the Contract. Timely submission of the request shall stay the effect of Paragraph 10.05.E.

B. Owner and Contractor shall participate in the mediation process in good faith. The process shall be concluded within 60 days of filing of the request. The date of termination of the mediation shall be determined by application of the mediation rules referenced above.

C. If the Claim is not resolved by mediation, Engineer's action under Paragraph 10.05.C or a denial pursuant to Paragraphs 10.05.C.3 or 10.05.D shall become final and binding 30 days after termination of the mediation unless, within that time period, Owner or Contractor:

1. elects in writing to invoke any dispute resolution process provided for in the Supplementary Conditions; or

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

## **ARTICLE 17 – MISCELLANEOUS**

### **17.01 *Giving Notice***

- A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:
  1. delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended; or
  2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

### **17.02 *Computation of Times***

- A. When any period of time is referred to in the Contract Documents by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

### **17.03 *Cumulative Remedies***

- A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract Documents. The provisions of this Paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

### **17.04 *Survival of Obligations***

- A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract Documents, as well as all continuing obligations indicated in the Contract Documents, will survive final payment, completion, and acceptance of the Work or termination or completion of the Contract or termination of the services of Contractor.

### **17.05 *Controlling Law***

- A. This Contract is to be governed by the law of the state in which the Project is located.

### **17.06 *Headings***

- A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

## SECTION 1 SPECIAL CONDITIONS

### 1-01 GENERAL

- A. The following Special Conditions consist of special requirements which shall apply to this project and to the Contractor executing the work.
- B. The information contained in these special conditions and technical specifications shall supersede information contained in NSPE, EDA, CDBG or SRF General Conditions if any found elsewhere herein.
- C. OWNER shall furnish to CONTRACTOR up to three (3) copies (unless otherwise specified in the General Requirements) of the Contract Documents as are reasonably necessary for the execution of the Work. Additional copies will be furnished, upon request, at the cost of reproduction.
- D. Protect the finished work from damage and loss resulting from carelessness or by reason of the elements and from all other causes until the entire work is completed and accepted. The work is entirely at the Contractor's risk. The Owner assumes no responsibility or obligation whatsoever for damage or loss to the work.
- E. At all times protect existing work and adjacent property. Correct all damage thereto caused by construction operations of the Contractor's employees at the expense of the Contractor, and to the complete satisfaction of the Owners and Engineer.
- F. **CONSTRUCTION SAFETY IS A PROJECT REQUIREMENT.** The Contractor shall be responsible for providing Safety equipment and or methods necessary for the safe prosecution of the work by his personnel and the personnel of any sub-contractors, as well as providing safe access and site conditions to all elements of the project for the Owner, Engineer and their representatives. Such safety requirements shall meet guidelines as contained in OSHA and U.S. Department of Health and Human Services (National Institute for Occupational Safety and Health) (NIOSH) publication sections relative to the work contemplated herein.
- G. **PAYMENTS TO CONTRACTOR:** The Owner will pay to the Contractor in the manner and at such times as set forth in the General Conditions, such amounts as required by the Contract Documents. The Owner shall retain five percent (5%) of the amount of each progress payment until final completion and acceptance of all work covered by the Contract Documents unless otherwise mutually agreed.

### 1-02 PUBLIC SAFETY AND CONVENIENCE

- A. The Contractor shall at all times so conduct his work as to ensure the least possible obstruction to traffic and inconvenience to the general public and the residents in the vicinity of the work, and to ensure the protection of persons and property in a manner satisfactory to the Owner and Engineer.

- B. All work on existing highways, roads or streets, shall be in a manner to assure the least practicable interference with the public use of the facility. The Contractor shall use reasonable care and precaution to avoid accidents, damage, unnecessary delay or interference with traffic and provide competent flaggers when necessary to insure maximum public safety.

#### **1-03 CONSTRUCTION STAKES AND GRADES**

- A. The Contractor must provide all horizontal and vertical control for the construction of the Project at the Contractor's expense. Preservation of reference points will be the responsibility of the Contractor. The Contractor must provide all grades, string lines, and other control work necessary for completion of the project in accordance with the requirements of the Specifications and Drawings.
- B. No changes to grades will be made without the approval of the Engineer.

#### **1-04 EXISTING WATER, SEWER, ELECTRIC GAS AND UNDERGROUND TELEPHONE FACILITIES**

- A. Existing water, sewer, gas, electricity, television cable, and buried telephone cable facilities shown on the drawings are approximate locations. The Contractor is required to contact 811 to request utility locates and coordinate his work with the representative of the respective utility company and protect all other adjacent structures, utilities, and work against damage or interruption of services. Damages which may result from failure of the Contractor to observe such precautions is the responsibility of the Contractor.
- B. **The Owner shall be held harmless of the cost of repairing damage to public or private utilities.**

#### **1-05 UTILITIES**

- A. Water, electricity, gas or other utilities required on the site of the work by the Contractor must be arranged for by him and furnished at his expense.
- B. Required temporary utility installations are subject to the approval of the Engineer and are to be maintained and removed by the Contractor at his expense prior to completion of the construction work.

#### **1-06 TEMPORARY STORAGE**

- A. If materials are stored on the site of the work, each Contractor shall provide and maintain on the premises, where directed, water-tight storage sheds for the storage of materials that would be subject to damage by the weather.
- B. The Contractor shall be responsible for security of material storage sites.

#### **1-07 CLEAN AIR ACT AND FEDERAL WATER POLLUTION CONTROL ACT**

- A. The Contractor will execute and provide to the Engineer at the Pre-construction Conference a compliance statement where required.
- B. Such compliance form shall be provided by the Engineer.

**1-08 LEAD BASED PAINT**

- A. Use of lead based paint on the project is prohibited.

**1-09 TEMPORARY TOILETS**

- A. Provide and maintain temporary toilets as necessary for use of workmen. Locate toilets in locations acceptable to the Owner.
- B. Toilets shall meet requirements of the State Health Department and any local codes.

**1-10 TEMPORARY JOB OFFICE FOR ENGINEER**

- A. None required for this Contract.

**1-11 WAGE RATES**

- A. None required for this Contract.

**1-12 PROJECT SIGN**

- A. Not required for this Contract.

**1-13 TESTING LABORATORY SERVICES**

- A. Scope: The Contractor will employ and pay for the services of an independent laboratory to perform specified services. Employment of a testing laboratory shall in no way relieve Contractor of his obligation to perform work in accordance with the contract.

**1-14 PRE-CONSTRUCTION CONFERENCE**

- A. Prior to commencement of construction, a pre-construction conference will be scheduled with the date, time and location of the meeting to be established by the Engineer.
- B. The Engineer will prepare an agenda and distribute advance copies to each participant. The Engineer will also prepare and complete the minutes of the meeting and distribute same to all participants.
- C. Prior to the pre-construction conference, CONTRACTOR shall submit to ENGINEER an estimated progress schedule, in the form of a bar chart, indicating the starting and completion dates of the various stages of the Work along with anticipated earnings, and a preliminary schedule of Shop Drawings submissions. The ENGINEER shall review and return this schedule or require revisions thereto within fourteen (14) days of its submittal. If there is more than one CONTRACTOR involved in a Project the responsibility for coordinating the Work of all CONTRACTORS shall be as provided in the Special Conditions. Updated progress schedules will be required on a monthly basis at the time of submittal of the CONTRACTOR's monthly progress pay request.
- D. The above schedules will be reviewed during the pre-construction conference to establish procedures for handling Shop Drawings and other submissions and for processing Application for Payment, and to establish a working understanding between the parties as to the Project requirements. Present at the conference will be the OWNER or his representative, ENGINEER, Resident Project Representative, CONTRACTOR, his Superintendent, and major Subcontractors.

**END OF SECTION**



## SECTION 2

### INSTRUCTIONS FOR BONDS

#### PART 1 - GENERAL

- 1-01 GENERAL: The following instructions and requirements for Bonds shall apply to this Project.
- 1-02 SURETY: The surety on each bond must be a responsible surety company, qualified to do business in Mississippi, and shall be satisfactory to the Owner.
- 1-03 NAME: The name, including full Christian name, and residence of each individual party to the bond shall be inserted in the body thereof, and each such party shall sign the bond with his usual signature on the line opposite the seal.

#### 1-04 PARTNERSHIPS

- A. If the principals are partners, their individual names will appear in the body of the bond with the recital that they are partners composing a firm, naming it, and shall have all the partners of the firm execute the bond as individuals.
- B. The signature of a witness shall appear in the appropriate place, attesting to the signature of each individual party to the bond.

#### 1-05 CORPORATIONS

- A. If the principal or surety is a corporation, the name of the State in which incorporated shall be inserted in the appropriate place in the body of the bond, and said instrument shall be executed and attested under the corporate seal as indicated in the form.
- B. The official character and authority of the person or persons executing the bond for the principal, if a corporation, shall be secretary or assistant secretary according to the form attached hereto. In lieu of such certificate, there may be attached to the bond copies of so much of the records of the corporation as will show the official character and authority of the officer signing, duly certified by the secretary or assistant secretary, under the corporate seal, to be true copies.

#### 1-06 LIMITED LIABILITY COMPANIES

- A. If the principal is a limited liability company, the name of the state under which the limited liability company is organized shall be inserted in the appropriate place in the body of the bond, and said instrument shall be executed and attested.
- B. The bond shall be executed by a Manager of the limited liability company if managed by one or more Managers, or by a Member if managed by one or more Members. The bond shall disclose the capacity in which executed by the Member or Manager.
- 1-07 **DATE:** The date shown on these bonds **must not be** prior to the date of the contract in connection with which they are given.

END OF SECTION

## **SECTION 3**

### **SPECIAL PROVISIONS**

#### **1. SCOPE OF WORK**

##### **1.1 Location and Description**

The work required under this contract includes the furnishing of all materials, tools, equipment, labor and incidentals necessary for satisfactory completion of

#### **“OLD AGENCY ROAD GUARDRAIL REPAIRS”**

#### **2. TEMPORARY CONTROLS**

##### **2.1 General**

The Contractor shall provide and maintain methods, equipment, and temporary construction, as necessary to provide control over environmental conditions at the construction site and adjacent areas. Physical evidence of temporary facilities shall be removed after completion of the work.

##### **2.2 Noise Control**

The Contractor's vehicles and equipment shall be such as to minimize noise to the greatest degree practical. Noise levels shall conform to the latest OSHA standards and in no case will noise levels be permitted which interfere with the work of the City or others.

##### **2.3 Water Control**

2.3.1 The Contractor shall provide methods to control surface water and water from excavations and structures to prevent damage to the work, the site, or adjoining properties, including beaver control on-site and adjacent thereto.

2.3.2 Fill, grading and ditching shall be controlled to direct water away from excavations, pits, tunnels and other construction areas, and to proper runoff course so as to prevent any erosion, damage or nuisance.

2.3.3 The Contractor shall provide, operate and maintain equipment and facilities of adequate size to control surface water.

2.3.4 Drainage water shall be disposed of in a manner to prevent flooding, erosion, or other damage to any portion of the site or to adjoining areas and in conformance with all environmental requirements.

## **2.4 Pollution Control**

2.4.1 The Contractor shall provide methods, means and facilities required to prevent contamination of soil, water or atmosphere by the discharge of noxious substances from construction operations.

2.4.2 The Contractor shall provide equipment and personnel, perform emergency measures required to contain any spillage, and remove contaminated soils or liquids. The contaminated earth will be removed and disposed of offsite, and replaced with suitable compacted fill and topsoil at no additional cost to the Owner.

2.4.3 The Contractor shall prevent disposal of wastes, effluents, chemicals, or other such substances adjacent to streams, or in sanitary or storm sewers. All sewage, oil and refuse generated during the course of the work shall not be discharged into any watercourses adjacent to the job site.

## **2.5 Erosion Control**

2.5.1 The Contractor shall plan and execute construction and earthwork by methods to control surface drainage from cuts and fills, and from borrow and waste disposal areas, to prevent erosion and sedimentation. The areas of bare soil exposure at one time shall be held to a minimum, and temporary control measures such as silt screens, berms, dikes and drains shall be provided.

2.5.2 Fills and waste areas shall be constructed by selective placement to eliminate surface silts and clays which will erode.

2.5.3 The Contractor shall periodically inspect earthwork to detect any evidence of the start of erosion, and shall apply corrective measures to control erosion as required by the Engineer at not additional cost to the Owner.

## **3. RECORDS**

The Contractor shall maintain a complete and accurate log of any control or survey work as it progresses. Upon completion of major items or upon request, the Contractor shall submit two (2) copies to the Engineer.

## **5. CONTRACT SPECIFICATIONS**

The Specifications governing the work under this Contract shall be those included hereinafter in Section K, Technical Specifications, together with any and all addenda.

## 6. ENGINEER

References in these contract documents to ENGINEER shall refer to **Benchmark Engineering & Surveying LLC**.

## 7. REVIEW OF THE WORK

Resident Project Representatives, who are representatives of the Engineer, will be appointed to review materials used and work performed. The Resident Project Representatives will not be authorized to revoke, alter, enlarge or relax the provisions of these Contract Documents, nor to delay the fulfillment of this Contract by failure to inspect materials and work with reasonable promptness. Resident Project Representatives are placed on the work to keep the Engineer informed as to the progress of the work and the manner in which it is being done; also to call the attention of the Contractor to nonconformity with the requirements of the Drawings and Specifications. The Resident Project Representatives will not have authority to approve or accept portions of the work, to insure instructions contrary to the Drawings, Specifications or other parts and sections of these Contract Documents, or to act as foreman for the Contractor. **The Resident Project Representatives will have authority to reject defective material.**

The presence of a Resident Project Representative shall in no way lessen the responsibility of the Contractor for full compliance with the requirements of these Contract Documents.

## 8. SUGGESTIONS TO CONTRACTOR

Means, process or method of work suggested by the Engineer or other representative of the Owner to the Contractor, if adopted or followed by the Contractor in whole or in part, shall be used at the risk and responsibility of the Contractor, and the Engineer and the Owner will assume no responsibility therefor.

## 9. CONTRACTOR'S OBLIGATIONS

The Contractor shall do and perform all work and furnish supplies and materials, machinery, equipment, facilities and means, except as herein otherwise expressly specified, necessary or proper to perform and complete the work required by the Contract, within the time herein specified, in accordance with the provisions of the Contract, Specifications, Drawings and supplemental Drawings, and in accordance with the directions of the Engineer as given from time-to-time during the progress of the work. He shall furnish, erect, maintain and remove such construction plant and such temporary works as may be required. The Contractor shall observe, comply with and be subject to terms, conditions, requirements and limitations of the Contract and Specifications, and shall do, carry on and complete the entire work to the satisfaction of the Engineer and the Owner.

The Contractor shall be responsible for any state and local permits.

## **10. TIME FOR COMPLETION**

It is hereby understood and mutually agreed, by and between the Contractor and the Owner, that the date of beginning and the time for completion as specified in the Contract for the work to be done hereunder are ESSENTIAL CONDITIONS of the Contract; and it is further mutually agreed that the work embraced in this Contract shall be commenced on or before a date to be specified in a written "NOTICE TO PROCEED".

The Contractor agrees that said work shall be prosecuted regularly and diligently without interruption at such rate of progress as will ensure full completion thereof within the time specified.

It is expressly understood and agreed, by and between the Contractor and the Owner, that the time for the completion of the work described herein is a reasonable time for the completion of same, taking into consideration the average climatic range and usual conditions prevailing in this locality.

If the said Contractor shall neglect, fail or refuse to complete the work within the time herein specified, or extension thereof granted by the Owner, the Contractor does hereby agree, as a part of consideration for the awarding of this Contract, to pay to the Owner the amount specified in the Contract, not as a penalty but as liquidated damages for such breach of Contract as hereinafter set forth, for each and every calendar day that the Contractor shall be in default after the time stipulated in the contract for completing the work.

## **11. SUPPLEMENTARY DRAWINGS**

Whenever required by the Specifications or the Drawings, as well as for all undetailed material to be fabricated and furnished by the Contractor, the Contractor shall make specialty or detailed shop drawings in amplification of the Drawings referred to in the Contract before commencing the work.

Six (6) copies of each drawing and necessary data shall be submitted to the Engineer. Each drawing or data sheet shall be clearly marked with the name of the Project, the Contractor's name and references to applicable Specification paragraphs and Drawing sheet.

After the Engineer has reviewed the Drawings and data, three (3) copies will be returned to the Contractor marked either (1) "Rejected", (2) "Reviewed", (3) "Furnish as Corrected", or (4) "Revise and Resubmit".

Unless otherwise directed by the Engineer, when Drawings and data are returned marked "Furnish as Corrected", the changes shall be made as noted thereon and six (6) corrected copies furnished to the Engineer.

When Drawings and data are returned marked "Revise and Resubmit", the corrections shall be made as noted thereon and as instructed by the Engineer and six (6) corrected copies resubmitted.

The Engineer's review of Drawings and data submitted by the Contractor will cover only general conformity to the Drawings and Specifications, external connections and dimensions which affect the layout. The Engineer's review of Drawings marked "Reviewed" or "Furnish as Corrected" does not indicate a through review of all dimensions, quantities and details of the material, equipment, device or item shown and does not relieve the Contractor from the responsibility for errors or deviations from the Contract Requirements.

Corrections or comments made on the drawings during the Engineer's review do not relieve the contractor from compliance with the requirements of the Drawings and Specifications. Checking will be only for review of general conformance with the information given in the contract Documents. The Contractor is responsible for: confirming and correlating quantities and dimension; selecting fabrication processes and techniques of construction; coordination his work in a safe and satisfactory manner.

Drawings and data, after final processing by the Engineer, shall become a part of the Contract Documents and the work shown or described thereby shall be performed in conformity therewith unless otherwise authorized by the Owner or the Engineer.

## **12. CORRECTION OF DEFECTIVE WORK AFTER FINAL ACCEPTANCE**

The Contractor hereby agrees to make, at his own expense, repairs or replacements necessitated by defects in materials or workmanship, supplied under terms of this Contract, which become evident within one (1) year after the date of substantial completion. The Contractor further assumes responsibility for a similar one (1) year guarantee for work and materials provided by subcontractors or manufacturers of packaged equipment components. The effective date for the start of the guarantee or warranty period is defined as the date of substantial completion established by the Engineer in the Certificate of Substantial Completion.

## **13. COOPERATION BETWEEN CONTRACTORS**

If separate contracts are let within the limits of a project, such Contractors shall arrange and conduct the performance of their work and handling of materials so as to minimize interference with work being performed by other Contractors within the limits of the same project.

## SECTION 4 INSURANCE REQUIREMENTS

Note: All references to "Owner" herein shall refer to the **City of Ridgeland, Mississippi**.

The Contractor shall carry insurance as prescribed herein and all policies shall be with companies satisfactory to the Owner.

If a part of this Contract is sub-let, the Contractor shall require each subcontractor to carry insurance of the same kinds and in like amounts as carried by the prime Contractor.

No Contractor or subcontractor will be allowed to start construction work on this Contract until certificates of all insurance required herein are filed and approved by the Owner. The certificates shall show the type, amount, class of operations covered, effective dates and the dates of expiration of policies.

The Contractor shall secure and maintain in effect for the period of the Contract and pay all premiums for the following kinds and amounts of insurance:

1. Workmen's Compensation and Employer's Liability Insurance:

This insurance shall protect the Contractor against all claims under applicable State Workmen's Compensation Laws. The Contractor shall also be protected and shall cause each subcontractor to be protected against claims for injury, disease, or death of employees which, for any reason, may not fall within the provisions of a Workmen's Compensation law. The liability limits shall not be less than the required statutory limits for Workmen's Compensation and Employer's Liability, in the minimum amount of Five Hundred Thousand Dollars (\$500,000) for each person. This policy shall include an "all states" endorsement.

2. Contractor's Comprehensive General Liability Insurance, covering all operations in connection with the performance of this Contract in amounts not less than the following:

- a. Each occurrence limit of \$1,000,000, and
- b. \$2,000,000 in the aggregate.

The Comprehensive General Liability policies carried by both the prime and the subcontractors shall provide coverage of the following hazards; but not limited to:

- a. Explosion, collapse, and underground property damage (XCU) to include any damage or destruction of property below the surface of the ground, such as wires, conduits, pipes, mains, sewers, etc. caused by the contractor's operations.
- b. The collapse of or structural injury to buildings, structures or property on or adjacent to the Owner's premises caused by the Contractor's operations in the removal of other buildings, structures, or supports, or by excavation below the surface of the ground.

- c. Contractual Liability Coverage for the "Hold Harmless" segments of the Contract Documents.
- d. Personal, Bodily Injury, Products, and Completed Operations coverages.

3. Automotive Liability:

The Contractor shall maintain automobile liability insurance in the amount of not less than \$1,000,000 combined single limit to protect from any and all claims arising from the use of the following:

- a. Contractor's own automobiles and trucks.
- b. Hired automobiles and trucks.
- c. Automobiles and trucks owned by sub-contractors.

The aforementioned is to cover use of automobiles and trucks on and off the site of the project.

4. Owner's Protective Liability Policy:

The Contractor shall maintain Owner's Protective Liability Insurance with the Owner as the named insured, and its servants and agents, including the Engineer and its employees, as additional insureds in amount not less than the following:

- a. Bodily Injury and Property Damage in the amount of \$1,000,000 per occurrence and \$2,000,000 in the aggregate.

5. Umbrella liability insurance with a limit of not less than five million dollars (5,000,000) providing additional coverage to the policies listed above.

Insurance policies shall remain in effect on portions of the work which have been completed and which may or may not be occupied or utilized by the Owner prior to the completion and acceptance of the entire work included in the Contract.



## **SECTION 5**

### **SHOP DRAWINGS, PRODUCT DATA AND SAMPLES**

#### **PART 1 - GENERAL**

##### **1-01 REQUIREMENTS INCLUDED**

- A. Submit Shop Drawings, Product Data and Samples required by Contract Documents.
- B. Submit three (3) bound copies to Engineer for review unless otherwise specified.

##### **1-02 SHOP DRAWINGS**

- A. Drawings shall be presented in a clear and thorough manner.
- B. Identify details by reference to sheet and detail, schedule or item numbers shown on Contract Drawings.

##### **1-03 PRODUCT DATA**

- A. Preparation:
  - 1. Clearly mark each copy to identify pertinent products.
  - 2. Show performance characteristics and capacities.
  - 3. Show dimensions and clearances required.
  - 4. Show wiring or piping diagrams and controls as necessary.
- B. Manufacturer's standard schematic drawings and diagrams: 1) Modify drawings and diagrams to delete information which is not applicable to the work; 2) Supplement standard information to provide information specifically applicable to the work.

##### **1-04 SAMPLES**

- A. Office samples shall be adequate to clearly illustrate: 1) Functional characteristics of the product, with integrally related parts and attachment devices; 2) Full range of color, texture, pattern, operation, use, etc.

##### **1-05 CONTRACTOR RESPONSIBILITIES**

- A. Review Shop Drawings, Product Data and Samples prior to submission to Engineer.
- B. Determine and verify:
  - 1. Field measurements where necessary.
  - 2. Field construction criteria from drawings or manufacturer's manuals.
  - 3. Catalog numbers and similar data from manufacturer.
  - 4. Conformance with specifications and detailed drawings.

- C. Coordinate each submittal with requirements of the Work and of the Contract Documents.
- D. Notify the Engineer in writing, at time of submission, of deviations in the submittals from requirements of the Contract Documents and provide an explanation for such deviation.
- E. Begin no fabrication of items or perform items of work which requires submittals until return of submittals indicating Engineer's review.

#### 1-06 SUBMISSION REQUIREMENTS

##### A. Transmittal Letter and Submittals:

- 1. Use transmittal forms acceptable to the Engineer.
- 2. One copy only, with each item completed, is required for each submittal.
  - a. Submittals tendered with incomplete "Transmittal Letters" will be returned for resubmission.
- 3. Make submittals promptly and in such sequence as to cause no delay in the work or in the work of other Contractors, should one or more Contractors be involved on a project.

##### B. Number of submittals required:

- 1. Shop Drawings: Submit the number of opaque reproductions which the Contract Documents require, but in no case less than six (6) copies. Three (3) copies of each will be retained by the Engineer for the project files. Three (3) copies will be stamped, indicating any additional requirements, and returned to the Contractor.

##### C. Submittals shall contain:

- 1. The date of submission and the dates of any previous unapproved submissions.
- 2. The project title and number.
- 3. The names of:
  - a. Contractor
  - b. Supplier
  - c. Manufacturer
- 4. Identification of the product or component, with reference to the applicable specification section number.

5. Field dimensions, clearly identified as such.
6. Relation to adjacent or critical features of the work or materials.
7. Applicable standards, such as ASTM, AWWA, AASHTO, or Federal Specification numbers, etc.
8. Identification of deviations from Contract Specifications.
9. Identification of revisions made on resubmittals.
10. Contractor's stamp, initialed or signed, certifying as to review of submittal, verification of products, field measurements and field construction criteria and coordination of the information within the submittal, with requirements of the work and of Contract Documents.

#### 1-07 RESUBMISSION REQUIREMENTS

- A. Make any corrections or changes in the submittals required and resubmit until approved.
- B. Shop Drawings and Product Data
  1. Revise initial drawings or data, and resubmit as specified for the initial submittal.
  2. Indicate changes which have been made other than those requested by the Engineer.
- C. Samples: Submit new samples as required for initial submittal.

#### 1-08 ENGINEER'S DUTIES

- A. Review submittals with reasonable promptness and in accord with project schedule.
  - . Affix stamp and initials or signature, and indicate requirements for resubmittal, or review of submittal.
- C. Return submittals to Contractor for distribution or for resubmission.

**END OF SECTION**

## SECTION 6 RECORD DOCUMENTS

### PART 1 - GENERAL

#### 1-01 REQUIREMENTS INCLUDED

- A. **The Contractor shall maintain, during the course of the work, and provide to the Engineer, upon project completion, record documents as specified herein.**

#### 1-02 MAINTENANCE OF DOCUMENTS

- A. Maintain in Contractor's field office in clean, dry condition the following: (1) Contract Drawings, (2) Specifications, (3) Addenda, (4) Approved Shop Drawings, (5) Change Orders, (6) Other Modifications of Contract, Test Records, Survey Data, Field Orders and (7) All other documents pertinent to the Contractor's Work.
- B. Provide files and racks for proper storage and easy access as needed.
- C. Make documents available at all times for inspection by the Engineer and the Owner.
- D. Record documents shall not be used for other purposes and shall not be removed from the field office without the Engineer's approval.

#### 1-03 MARKING SYSTEM

- A. Make changes, revisions, additions, deletions, etc., carefully and in legible form acceptable to the Engineer.
- B. Provide colored pencils for marking changes, revisions, additions, deletions, etc., to the record set of Contract Drawings.
- C. **Do not use ink or felt tip pens for marking documents.**

#### 1-04 RECORDING

- A. Label each document "PROJECT RECORD" in large red printed letters.
- B. Keep record documents current with work completed.
- C. Do not permanently conceal work until required information has been recorded on drawings.

- D. Contract Drawings: Legibly mark to record actual construction to include the following:
1. Depths or heights of various elements in relation to datum.
  2. Horizontal and vertical location of underground utilities and appurtenances referenced to permanent surface improvements or bench marks.
  3. Location of internal appurtenances concealed in construction referenced to visible and accessible features of the work.
  4. Field changes of dimensions and details.
  5. Changes made by Change Order or Field Order clearly identified as such.
  6. Details not on original Contract Drawings.
- E. Specifications and Addenda: Legibly mark up each Section and record the following:
1. Manufacturer, trade name, catalog number and supplier of each product and item of equipment actually installed.
  2. Changes made by Change Order or Field Order clearly identified as such.
  3. Other matters not originally specified.
- F. Shop Drawings: Maintain as record documents and legibly annotate Drawings to record changes made after review.

#### 1-05 SUBMITTAL

- A. At completion of project, deliver record documents to the Engineer.
- B. Accompany submittal with transmittal letter containing:
1. Date.
  2. Project title and number.
  3. Contractor's name and address.
  4. Title and number of each record document.
  5. Certification that each document as submitted is complete and accurate.
  6. Signature of Contractor, or his authorized representative.
- C. **Incomplete or illegible record documents will be returned to the Contractor for completion or correction.**
- D. **No final application for payment will be processed until the Project Record Documents and Drawings have been submitted and approved.**

**END OF SECTION**

## **SECTION 7**

### **CONTRACT CLOSEOUT**

#### **PART 1 - GENERAL**

##### **1-01 REQUIREMENTS INCLUDED**

- A. Comply with requirements stated in conditions of the Contract and Specifications for administrative procedures in closing out the work.
- B. Contractor shall submit all notices and certifications in a form acceptable to the Engineer.

##### **1-02 SUBSTANTIAL COMPLETION**

- A. When contractor considers the work is substantially complete, he shall submit to the Engineer:
  - 1. Written notice that the work, or designated portion thereof, is substantially complete.
  - 2. A list of items to be completed or corrected.
- B. Within a reasonable time after receipt of such notice, an inspection will be made by the Engineer to determine the status of completion.
- C. Should it be determined that the work is not substantially complete:
  - 1. Contractor will be notified in writing, giving the reasons for such determination.
  - 2. Contractor shall remedy the deficiencies in the work, and send a second written notice of substantial completion.
  - 3. Work will be re-inspected.
- D. When the Engineer concurs that the work is substantially complete, he will:
  - 1. Prepare a Certificate of Substantial Completion on an acceptable form accompanied by a list of items to be completed or corrected.
  - 2. Submit the Certificate to Owner and Contractor for their written acceptance of the responsibilities assigned to them in the Certificate.

##### **1-03 FINAL INSPECTION**

- A. When Contractor considers the work is complete, he shall submit written certifications to the Engineer that:
  - 1. Equipment and systems have been tested in the presence of the Engineer and Owner's representative and are fully operational.
  - 2. Work has been completed in accordance with Contract documents and is ready for final inspection.

- B. An inspection will be made by the Engineer to verify the status of completion with reasonable promptness after receipt of such certification.
- C. Should work be considered incomplete or defective:
  - 1. The Engineer will promptly notify the Contractor in writing, listing the incomplete or defective items of 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. Work will be re-inspected.
- D. When the work is acceptable under the contract documents, the contractor will be requested to deliver closeout submittals.

#### 1-04 CONTRACTOR CLOSEOUT SUBMITTALS

- A. Evidence of compliance with requirements of governing authorities:
  - 1. Certificate of Inspection:
    - a. Mechanical: City and/or County
    - b. Electrical: City and/or County
    - c. General: Applicable Building Code
- B. Waivers and Liens Affidavit.
- C. Surety Release.
- D. Labor and Material Warranty.
- E. Certification Statement that material incorporated into the project meets or exceeds specification requirements of the Contract.
- F. Project record documents and drawings.
- G. Operating and Maintenance Data, Instructions to Owner's Personnel: As specified in Contract Documents or ordered by the Engineer.
- H. Spare Parts and Maintenance Materials: As specified in Contract Documents or ordered by the Engineer.
- I. Receipt for keys, if any, to all locks, gates and doors.

#### 1-05 FINAL ADJUSTMENT OF ACCOUNTS

- A. Submit a final statement of accounting to Engineer.
- B. Statement shall reflect all adjustments to the contract sum:
  - 1. The original contract sum.
  - 2. Additions or deductions resulting from:
    - a. Previous change orders.
    - b. Allowances.
    - c. Unit Prices.
    - d. Deductions for uncorrected work.
    - e. Deductions for liquidated damages.
    - f. Other adjustments.
  - 3. Total contract sum, as adjusted.
  - 4. Previous payments.
  - 5. Sum remaining due.
- C. Final Change Order will be prepared reflecting approved adjustments to the Contract sum which were not made by previous Change Orders.

#### 1-06 FINAL APPLICATION FOR PAYMENT

- A. Contractor shall submit the final Application for Payment in accordance with procedures and requirements stated in the Conditions of the Contract.
- B. **No final application for payment will be processed until the Project Record Documents and Drawings have been submitted and approved.**

**END OF SECTION**



**SECTION 8**  
**SCHEDULE OF VALUES**  
**for LUMP SUM BID ITEMS**

**I. GENERAL**

- A. The successful Bidder, within five (5) days of the receipt of the "NOTICE OF AWARD", shall submit, a Schedule of Values for "lump sum bid items", for Owner's and Engineer's review. The Schedule of Values shall be an itemized list that establishes the various quantities and value or cost of each major part or component of Lump Sum Items. It shall be used as the basis for preparing progress payment applications and for use as a basis for negotiations concerning additional work or credits which may arise during the construction.

**II. PREPARATION**

- A. The Schedule shall be prepared in the form and supported by the data required herein.
- B. The Schedule shall show a breakdown of costs for labor, materials, equipment, delivery, installation, overhead, profit and other costs used in preparation of the Bid.
- C. Costs shall be in sufficient detail to indicate a separate amount for each major component of the item listed.
- D. Contractor may include items for bonds, insurance, and temporary facilities. Bonds and insurance may be claimed on the first application for payment. Any remaining items will be included for payment at the same percentage rate as total percent of the lump sum item completion.
- E. The Schedule shall be prepared on 8-1/2 inch by 11-inch white paper.
- F. Use items listed as Lump Sum on the Bid Form as basis for Schedule format and identify each item with number and description as shown on Bid Form.
- G. The sum of the individual values shown on the Schedule of Values for each item must equal the Total Price bid for that item on the Bid Form.

**END OF SECTION**

## TECHNICAL SPECIFICATIONS

### WHEATLEY STREET RECONSTRUCTION & SIDEWALK IMPROVEMENTS

#### CITY OF RIDGELAND, MS

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## **SECTION 02200 SITE CLEARING**

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### **PART 1 - GENERAL**

#### **1.01 DESCRIPTION OF WORK**

This section includes the following:

1. Protection of existing trees and vegetation to remain
2. Removal of trees and other vegetation in required work area
3. Topsoil stripping
4. Clearing and grubbing
5. Removing above-grade improvements
6. Removing below-grade improvements

#### **1.02 PROJECT CONDITIONS**

- A. Traffic: Conduct site-clearing operations to ensure minimum interference with roads, and other adjacent occupied or used facilities. Do not close or obstruct roads or other occupied or used facilities without permission from authorities having jurisdiction.
- B. Protection of Existing Improvements: Provide protection necessary to prevent damage to existing improvements indicated to remain in place.
  1. Protect improvements on adjoining properties and on Owner's property.
  2. Restore damaged improvements to their original condition, as acceptable to property owners.
- C. Protection of Existing Trees and Vegetation: Protect existing trees and other vegetation indicated to remain in place against unnecessary cutting, breaking or skinning of roots, skinning or bruising of bark, smothering of trees by stockpiling construction materials or excavated materials within drip line, excess foot or vehicular traffic, or parking of vehicles within drip line. Provide temporary guards to protect trees and vegetation to be left standing.

#### **1.03 EXISTING SERVICES**

- A. General: Indicated locations are approximate; Contractor shall be responsible for determining exact locations and elevations before commencing Work.
- B. Arrange and pay for disconnecting, removing, capping, and plugging utility services. Notify affected utility companies in advance and obtain approval before starting this Work.

#### **1.04 RELATED DOCUMENTS**

- A. Section 02210 – Soil Erosion And Sediment Control

## **PART 2 – PRODUCTS (NOT USED)**

## **PART 3 – EXECUTION**

### **3.01 SITE CLEARING**

- A. No Site Clearing operations are to begin prior to installing soil erosion and sediment control barriers as required to comply with Local, State & Federal Regulations.
- B. General: Remove trees, shrubs, grass, other vegetation, improvements, structures, or obstructions, as required, to permit installation of new construction. Remove similar items elsewhere on site or premises as specifically indicated. Removal includes digging out and off-site disposal of stumps and roots.
- C. Topsoil: Topsoil is defined as friable clay loam surface soil found in a typical depth of 12" and not less than 6 inches. Satisfactory topsoil is reasonably free of subsoil, clay lumps, stones, and other objects over 2 inches in diameter, and without weeds, roots, and other objectionable material.
  - 1. Strip topsoil to whatever depths encountered in a manner to prevent intermingling with underlying subsoil or other objectionable material. Remove heavy growths of grass from areas before stripping.

Where existing trees are indicated to remain, leave existing topsoil in place within drip lines to prevent damage to root system.
  - 2. Stockpile topsoil in storage piles in areas indicated or directed. Construct storage piles to provide free drainage of surface water. Cover storage piles if necessary to prevent wind erosion.
  - 3. Topsoil shall be kept from mixing with other classes of excavation so it can be spread during final grading and dressing for use in seeding or provided subbase for sodding.
  - 4. Dispose of unsuitable or excess topsoil as specified for disposal of waste material or as directed by the Engineer.
- D. Clearing and Grubbing: Clear site of trees, shrubs, and other vegetation that are within the limits of construction, except for those indicated to be left standing.
  - 1. Completely remove stumps, roots, and other debris protruding through ground surface.
  - 2. Fill depressions caused by clearing and grubbing operations with satisfactory soil material, unless further excavation or earthwork is indicated.
    - a. Place fill material in horizontal layers not exceeding 6 inches loose depth, and thoroughly compact each layer to a density equal to adjacent original ground.
- E. Removal of Improvements: Remove existing above-grade and below-grade improvements as indicated as necessary to facilitate new construction or as indicated on the drawings.

### **3.02 DISPOSAL OF WASTE VEGETATION IF BURNING IS ALLOWED**

- A. It will be noted on the plans or bid schedule if on-site burning of waste vegetation is allowed.

If no such notification exists then Contractor shall clarify with the Engineer prior to bidding.

- B. Includes all trees, shrubs, stumps, roots, and other vegetative materials that are encountered and are deemed waste vegetation.
- C. Burning will be allowed on-site but only in accordance with local governing regulatory authority and the EPA. It is the Contractor's responsibility to verify with such agencies that burning is, in fact, allowed at the project site prior to placing bid. Should burning not be allowed by governing agencies then material shall be disposed of off-site and Contractor shall bid accordingly.
- D. Starter and auxiliary fuels must not cause excessive visible emissions.
- E. The burning must be conducted at least 500 yards from an occupied dwelling but this restriction may be reduced to 50 yards if forced draft air is provided for combustion.
- F. The burning must be conducted at least 500 yards from commercial airport property, private airfields or marked aircraft approach corridors except when a lesser distance is authorized by the airport authority.
- E. Must not produce a traffic hazard.
- G. Burning will not be allowed during the High Fire Danger Alert issued by the Mississippi Forestry Commission or an Emergency Air Pollution Episode Alert issued by the Mississippi Department of Resources, Bureau of Pollution Control.
- H. Trees and shrubs shall be trimmed when doing so will avoid removal or damage. Trimmed or damaged trees shall be treated and repaired by persons with experience in this specialty who are approved by Engineer. Trees and shrubs intended to remain which are damaged beyond repair or removed, shall be replaced by the Contractor.

### **3.03 DISPOSAL OF WASTE VEGETATION IF BURNING ON-SITE IS NOT ALLOWED**

- A. It will be noted on the plans or bid schedule if on-site burning of waste vegetation is allowed. If no such notification exists then Contractor shall clarify with the Engineer prior to bidding.
- B. Contractor shall remove from the site and satisfactorily dispose of all trees, shrubs, stumps, roots, other vegetative materials that are encountered and are deemed waste vegetation, or otherwise required to permit construction of the new Work.
- C. All burning off the site shall be in complete accordance with rules and regulations of local authorities having jurisdiction.
- D. Trees and shrubs shall be trimmed when doing so will avoid removal or damage. Trimmed or damaged trees shall be treated and repaired by persons with experience in this specialty who are approved by Engineer. Trees and shrubs intended to remain which are damaged beyond repair or removed, shall be replaced by the Contractor.
- E. Control air pollution caused by dust and dirt in compliance with governing regulations.
- F. Contractor shall be responsible for removing dirt and mud from existing roadways (public or private) at the end of each work day or more frequently if directed by the engineer at no additional cost to the owner.
- G. Contractor shall be responsible to immediately remove any debris deposited from trucks onto existing roadways.

### **3.04 DISPOSAL OF WASTE MATERIALS**

- A. Contractor shall remove from the site and satisfactorily dispose of brush masonry, rubbish, scrap, debris, pavement, curbs, fences and miscellaneous other structures not covered under other Sections as shown, specified or otherwise required to permit construction of the new Work.
- B. Trees, stumps and other cleared and grubbed material may be burned on site.
- C. Burning on site shall comply with EPA standards and local codes. The use of fans shall be implemented
- D. All burning off the site shall be in complete accordance with rules and regulations of local authorities having jurisdiction.
- E. Trees and shrubs shall be trimmed when doing so will avoid removal or damage. Trimmed or damaged trees shall be treated and repaired by persons with experience in this specialty who are approved by Engineer. Trees and shrubs intended to remain which are damaged beyond repair or removed, shall be replaced by the Contractor.
- F. Control air pollution caused by dust and dirt in compliance with governing regulations.

**--END OF SECTION 02200--**

## SECTION 02205 REMOVAL OF OBSTRUCTIONS AND STRUCTURES

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### PART 1 - GENERAL

- 1.01 DESCRIPTION:** This work consists of the removal and satisfactory disposal of all buildings, fences, structures, old pavements, abandoned pipe lines and other obstructions which are not designated to remain. These items shall be removed and disposed of under other provisions of this work. This work also consists of necessary excavation incidental to the removal of structures and obstructions and backfilling the resulting cavity.

### PART 2 – PRODUCTS (NOT USED)

### PART 3 - EXECUTION

#### 3.01 CONSTRUCTION REQUIREMENTS.

- A. The Contractor shall preserve and protect all structures, fences, public and private utilities and improvements, above or below the ground, which are to remain or be removed by others. Unless specified, removal or adjustment of these items will not be the responsibility of the Contractor. However, the Contractor shall arrange and coordinate operations with the Owner for removal.
- B. The Contractor shall raze or remove and satisfactorily dispose of all buildings, structures, fences and other obstructions except those items indicated to remain or be otherwise removed and disposed of under other provisions. Basements or cavities left by structure removal shall be filled to the level of the surrounding ground, compacted as directed, or if within the limits of construction, compacted in accordance with section 02220.
- C. All materials not designated for salvage shall be legally disposed of by the Contractor at a location of the Contractor's choosing.
- D. The use of explosives is not permitted unless approved by the Engineer.
- E. Blasting, if permitted, or other operations necessary for the removal of an existing structure or other obstruction which may damage new construction shall be completed prior to constructing the new work.
- F. The Contractor shall employ methods of removal that will ensure new work, items to remain or materials to be salvaged will not be damaged.

- 3.02 SALVAGE:** All material designated for salvage shall be removed, without unnecessary damage, in sections or pieces which may be readily transported. The material shall be stored by the Contractor at designated sites within the project limits or at special locations as designated in the contract until the Owner is ready to receive materials.

#### 3.03 REMOVAL OF BRIDGES, CULVERTS AND OTHER STRUCTURES

- A. Bridges, culverts and other structures that are in use shall not be removed until the traffic is satisfactorily accommodated.
- B. Unless otherwise directed, existing structures shall be removed to at least one foot below the final ground line or mudline. The removal of a bridge located in a navigable stream shall be subject to the requirements set out in the permit authorizing construction of the new structure.

- C. Unless designated on the plans or in the contract documents to be removed and salvaged, all structural steel, timber and other bridge materials shall become the property of the Contractor. It shall be removed from the site before completion of the work and proper allowance for its value shall be taken into account in the bid price of the item involved. If the structure is to remain the property of the State, steel or timber bridges shall be carefully dismantled without unnecessary damage.
- D. Steel members shall be match marked and all salvaged material shall be stored at a location determined by the Owner.
- E. When required on the plans or in the proposal, concrete which is suitable for riprap shall be salvaged and stockpiled or otherwise legally disposed of by the Contractor at a location of the Contractor's choosing.

### **3.04 REMOVAL OF PIPE**

- A. All pipe lines designated to be salvaged or relaid shall be carefully removed and every reasonable precaution taken to avoid breaking or damaging.
- B. Pipes designated to be relaid shall be removed and stored when necessary to prevent loss or damage before relaying.
- C. Pipes designated to be salvaged shall be removed and stored at a location as determined by the Owner.
- D. The Contractor shall replace without extra compensation all sections lost from storage or damaged by negligence or improper methods to the extent its reuse is deemed by the Engineer to be unsatisfactory.
- E. Pipes not designated to be salvaged or relaid shall be legally disposed of by the Contractor at a location of the Contractor's choosing.

### **3.05 REMOVAL OF PAVEMENT, SIDEWALKS, CURBS, ETC.**

- A. When required on the plans or in the proposal, concrete pavement, sidewalks, curbs, gutters, etc. designated for salvage shall be broken into pieces not exceeding 150 pounds and stockpiled at locations designated by the Engineer within the project limits or at special locations as designated in the contract.
- B. All non-salvaged materials shall be legally disposed of by the Contractor at a location of the Contractor's choosing.
- C. In such case(s) that there are multiple pavement types (i.e. asphalt, concrete) in a given pavement structure designated to be removed, and when such information is not explicitly stated on the Plans or elsewhere in the Specifications, payment shall be made for only one (1) of the Removal of Pavement Pay Items, being the upper most pavement type (i.e. the pavement type that is visible from the surface prior to any other removal items being performed), at the contract unit and unit price.

### **3.06 REMOVAL OF STRIPING**

- A. Contractor shall remove striping by milling or other approved measures. Striping removal pay item shall be calculated on a per foot basis. Single, double, continuous or skipped striping is all measured for removal along a horizontal plane and treated as a single line in the removal quantity, i.e. the measured linear footage of a single line is measured for payment the same as a double line.



- B. Legend and detail striping such as turn arrows, stop bars, stripped islands, etc. is measured on the per linear foot basis at the longest point of the striping. Contractor shall put his own factor in his unit price to cover the full removal of such items.

### **3.07 REMOVAL OF OBSTRUCTIONS**

- A. Removal of obstruction lump sum pay item is intended to cover additional items that are encountered but are not listed as a pay item on the bid schedule. Contractor shall contact Engineer prior to removing any items that Contractor deems to fall into this category.

## **PART 4 - COMPENSATION**

### **4.01 GENERAL**

- A. Items which are not shown as separate pay items on the proposal form but are necessary for complete installation of the project in accordance with the Contract Documents shall be considered and absorbed cost and included in the Contract Price.
- B. Scheduled price for each individual pay item shall constitute full compensation for furnishing all labor, tools, equipment and incidentals in performing all work necessary for complete installation in accordance with the Contract Documents of that pay item.

### **4.02 METHOD OF MEASUREMENT**

- A. Removal of Obstructions - lump sum, will include all structures and obstructions encountered within the project limits except items which are noted to be measured on a unit basis.
- B. Where the proposal stipulates specific items on a unit basis, measurement will be made by the unit.
- C. The length of pipe removed will be the product of the number of commercial lengths and the nominal laying length.
- D. Traffic stripe removal will be measured by the linear foot from end-to-end of individual stripes. Measurement will be made along the surface of each stripe and will not include nominal skip intervals. Stripes more than six inches in width will be converted to equivalent lengths of six-inch stripe. Legend will be measured for payment by the square yard. When provisions are not included in the contract for legend removal by the square yard, the removal area will be converted to equivalent lengths of six-inch stripe.

### **4.03 BASIS OF PAYMENT**

- A. Removal of Obstructions will be paid for at the contract lump sum price which shall be full compensation for removing and disposing of the obstructions in accordance with the provisions of the contract.
- B. Specific obstruction items stipulated for removal and disposal will be paid for at the contract unit price which shall be full compensation for removing and disposing of the obstructions in accordance with the provisions of the contract.

Payment will be made under:

1. Removal of Obstructions - lump sum

2. Removal of \_\_\_\_\_ - per each, linear foot, square yard  
(item)

**--END OF SECTION 02205--**

## **SECTION 02207 REMOVAL AND RESTORATION OF IMPROVED SURFACES**

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### **PART 1 – GENERAL**

#### **1.01 WORK INCLUDED**

- A. Contractor shall provide all materials, labor, equipment, transportation, and other items required to restore existing improvements dislocated, damaged, or removed as indicated or as required to accomplish Work of other sections of these specifications. All restoration Work shall be in accordance with applicable regulations and as specified herein and shall restore to a condition which is equal in appearance and quality to the condition that existing prior to construction
- B. The surface of all improvements shall be constructed of the same material and match in appearance the surface of the improvements which is removed.
- C. Restoration of existing improvements includes, but is not limited to the following:
  - 1. General Restoration Requirements
  - 2. Restoration or replacement of gravel, asphaltic concrete, or portland cement concrete pavements, including base course and striping.
  - 3. Portland cement concrete curbs, gutters, sidewalks, and driveways
  - 4. Landscaping improvements
  - 5. Miscellaneous improvements

#### **1.02 RELATED WORK**

- A. Section 02210 – Soil Erosion and Sediment Control
- B. Section 02220 – Excavation and Embankment
- C. Section 02230 – Excavation and Backfill for Conduits and Structures
- D. Section 02240 – Crushed Stone, Gravel and Clay Gravel
- E. Section 02475 – Concrete Curbs and Walks
- F. Section 02500 – Asphalt Paving
- G. Section 02170 – High Density Polyethylene Pipe
- H. Section 02720 – Concrete Storm Drain Pipe and Precast Box Culverts
- I. Section 02730 – Storm Drain Structures
- J. Section 02931 – Establishment of Vegetation
- K. Section 03300 – Cast in Place Concrete

- 1.03 SUBMITTALS:** Contractor shall maintain accurate construction record drawings for items restored as part of this Work, but covered by subsequent landscaping, paving or as a result of Work of other sections of these specifications. These records shall be submitted to Engineer for approval prior to application for final payment.

## **PART 2 – PRODUCTS**

### **2.01 GENERAL**

- A. Materials shall be as required to complete the restoration of existing improvements, and shall be at least equal to original improvement at the time of damage or removal, as determined by the owner of said improvement, and shall match original construction in finish and dimension.
- B. Materials and construction procedures for restoration shall be in accordance with requirements of the project specifications for the particular product.

### **2.02 CLAY GRAVEL**

- A. Clay gravel for temporary trench surfacing and pavement base courses shall conform to the requirements of Section 02240.

### **2.03 CRUSHED LIMESTONE**

- A. Crushed limestone for temporary trench surfacing and pavement base courses shall conform to the requirements of Section 02240.

### **2.04 PORTLAND CEMENT CONCRETE**

- A. Portland cement concrete for curbs, gutters, sidewalks and driveways shall conform to the requirements of Section 03300.

### **2.06 SOD AND VEGETATION**

- A. All materials shall be from approved sources; however, such approval does not relieve the Contractor from responsibilities for growth, maintenance and replacement specified herein.
- B. Topsoil:
  - 1. Topsoil for backfill mixture for tree pits shall be fertile, friable, natural loam, surface soil, reasonably free of clay lumps, brush, weeds, and other litter, and free of rocks, stumps, stones larger than 2" in any dimension, and other extraneous or toxic matter harmful to plant growth. Obtain topsoil only from naturally well drained sites where topsoil occurs in a depth of not less than 4".
  - 2. Do not obtain from bogs or marshes.
- C. Manure:
  - 1. Well dried, rotted, unleached, pulverized cattle manure reasonably free from refuse and harmful materials.
- D. Mulch:
  - 1. Fine grind bark mulch.
- E. Tree staking and guying:
  - 1. Steel T post stakes 8 feet long and steel ground stakes 18 inches long.
  - 2. All T post stakes shall be primed and painted a dark green color.

3. Provide wire ties and guys of 2 strand, twisted, pliable, galvanized iron wire not lighter than 12 gauge.
  4. Provide new 2 ply garden hose not less than 5/8 inch diameter in size, cut to required lengths to protect tree trunks from damage by wires.
- F. Sod:
1. Strongly rooted blend of common Bermuda sod, not less than 2 years old and free of weeds and undesirable native grasses.
  2. Provide only sod capable of growth and development when planted (viable, not dormant).
  3. Recommended Kentucky Blue Grass mixture is: 50% Baron, 25% Glade and 25% Touchdown, or approved equal.
- G. Commercial fertilizer:
1. Agriform 20 10 5 21 gram fertilizer tablets for trees and shrubs. Provide three tablets per tree.
  2. Ammonium sulfate fertilizer in pellet form for lawn areas at 40 actual pounds of nitrogen per acre.
- H. Trees:
1. Trees shall be not less than indicated sizes, balled and burlapped or container grown, unless otherwise indicated, specified or required by Owner of tree removed.
- I. Shrubs:
1. Shall be as removed, minimum 5 gallon can.

## **PART 3 – EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that Work covered under other sections of these specifications is complete to the point that Work covered under this section may properly commence without hindering or damaging Work of other trades. Do not proceed with construction until unsatisfactory conditions have been corrected.
- B. Verify that Work performed under other sections of these specifications has been adequately inspected, tested and accepted prior to covering up that Work as part of the Work specified under this section.
- C. Carefully examine restoration areas, verifying dimensions, materials and other restoration requirements with Engineer and Owner prior to beginning Work covered under this section.

### **3.02 REMOVAL OF PERMANENT SURFACES**

- A. Whenever a pipeline is to be located along or across an improved surface, the width of the trench shall be held as nearly as possible to the minimum width allowable per OSHA regulations for the applicable condition. Walls of excavations less than 5' shall be vertical. Should the surrounding soil show characteristics of instability or the excavation

be greater than 5' the Contractor shall utilize a trench box to minimize the width of the top of the trench.

- B. Where brick or concrete pavement, sidewalk, driveway, curbing or other paved surface is cut, the width of the cut shall not exceed the actual width of the top of the trench by more than 12" on each side centered along the pipe.
- C. Exposed rigid surfaces shall be cut with a pavement saw before breaking. Care shall be taken in cutting to ensure that a straight joint is sawed.

### **3.03 REMOVAL OF LANDSCAPE VEGETATION**

- A. Developed areas, yards, lawns, shrubbery and other decorative plantings that must be removed shall be stored and growth maintained by watering and fertilizing. The work shall be accomplished in accordance with prevailing local nursery practices with consideration given to seasonal limitations.

### **3.04 TEMPORARY SURFACING OVER TRENCHES**

- A. Whenever storm water piping or improvements are required to be constructed under roadways, sidewalks or other paved surfaces, a temporary clay gravel or crushed limestone surfacing shall be placed over the full width of the trench as shown on the project drawings.
- B. Surfacing shall be a minimum of 6" thick and shall be placed over the top of the trench as soon as possible after placement and compaction of backfill has been satisfactorily completed.
- C. The top of the temporary surface shall be smooth and meet the grade of the adjacent undisturbed surface.
- D. The temporary surface shall be maintained at the desired level at the Contractor's expense until final restoration of the street surface is completed as specified.
- E. Excess material from the temporary surface shall be removed as placed at a location as directed by the Engineer prior to final restoration.
- F. The temporary surfacing and all associated items shall be considered an absorbed cost.

### **3.05 REPLACEMENT OF TRAVELED ROADWAY**

- A. Gravel Surfaced Areas
  - 1. Where trenches are excavated through gravel surfaced areas such as roads and driveways and other areas, the gravel surface shall be restored by clay gravel, crushed limestone, slag or other surface as required to match existing upon a prepared subgrade.
  - 2. Subgrade shall be compacted to 98% Standard Proctor Dry Density. One test group required for each crossing as required in section 02230.
  - 3. Thickness of road base surface shall be 6 inches or shall match existing, whichever is greater.
- B. Asphalt Surfaced Areas
  - 1. Where trenches are excavated through asphalt surfaced areas such as roads, driveways or parking areas, the surface shall be restored by preparing the subgrade, placing base course(s), placing tack and prime coats, and placing the asphalt surface course(s).

2. Thickness of base course shall be 6 inches or shall match existing, whichever is greater.
3. Base Course shall be placed on 6" of compacted clay gravel or crushed limestone subbase.
4. Tack Coat
  - a. Tack coat shall be applied at the rate of 0.05 to 0.15 gal/SY. A hand sprayer or brush shall be used to apply tack coat to vertical faces of previously constructed bituminous pavement (over 1/2 hour hence) prior to placing an adjacent or parallel pass, curbs, gutters, slab edges, and all structures to be in actual contact with the bituminous pavement. Tack coat shall also be applied uniformly at the same rate to the horizontal top surface of each lift of bituminous pavement prior to placing the next lift of bituminous pavement to promote a bond between the two courses of pavement. None of the material shall penetrate into the pavement and for this reason the application should be limited.
  - b. Prior to applying the material, the surface to be treated shall be swept or flushed free of dust or other foreign material.
  - c. Protect all surfaces not required to receive tack coat from any inadvertent application.
  - d. The temperature range of the tack coat at the time of application shall be such that the viscosity will be between 50 and 100 centistokes as determined in accordance with ASTM Designation D 2170.
  - e. Under no circumstances shall traffic be permitted to travel over the tacked surface. If detours cannot be provided, restrict operation to a width that will permit at least one-way traffic over the remaining portion of the roadbed. If one-way traffic is provided, the traffic shall be controlled in accordance with governing authority.
  - f. After application of tack coat, sufficient time shall be given to allow for complete separation of asphalt and water before paving operations begin. The tack coat shall be applied on only as many surfaces as will be paved against in the same day.
5. Mixing, placing, spreading and compaction of bituminous base and surface courses shall conform to applicable parts of Section 2500 of these specifications.

C. Concrete Curbs, Gutter, Sidewalks and Driveways

1. Shall be removed and replaced to the next joint or scoring lining beyond the actually damaged or broken sections; or in the event that joints or scoring lines do not exist or are three or more feet from the removed or damaged section, the damaged portions shall be removed by saw cutting full-depth.
2. All new concrete shall match, as nearly as possible, the appearance of adjacent concrete improvements. Where necessary, lampblack or other pigments shall be added to the new concrete to obtain the desired results.
3. Concrete thickness shall be 4 inches or shall match existing, whichever is greater for sidewalks and shall be 6 inches or shall match existing, whichever is greater for driveways or roadways.

4. Concrete forms shall be true to line and of sufficient strength to ensure against bulging or displacement.
5. Contraction and expansion joints shall match original construction in placement and size, unless otherwise required by local jurisdiction having authority.
6. Reinforcement shall be replaced as in original construction and shall meet requirements of Section 03300.
7. Concrete strength, finishing and curing shall be in accordance and shall meet requirements of Section 03300.

### **3.06 REPLACEMENT OF LANDSCAPED AREAS**

#### **A. Vegetated Areas**

1. Prior to placing sod or other final vegetative cover, examine and repair the subgrade as necessary to assure a smooth and even surface which will match grade and contours of surrounding undisturbed ground. Finish grade construction areas to match grade prior to construction activities. Assure that a positive slope away from all building walls is maintained for at least 10 feet to prevent runoff from approaching walls.
2. Prepare soil under areas to receive vegetation by placing topsoil to a depth equal to surrounding conditions or to 6", whichever is greater. Disk or till 3 cubic yards manure per 1000 square feet of surface area to a depth of 8 inches.
3. Roll and rake areas receiving vegetation to smooth, even surface, free of ridges, with loose, uniformly fine texture.
4. Allow for final vegetation thickness when preparing subgrade.
5. Restore raked areas to specified condition if eroded or otherwise disturbed after fine grading and prior to placing vegetative cover.
6. Remove stones over 1 1/2 inches in any dimension and sticks, roots, rubbish, and other extraneous matter.
7. Limit preparation to areas which will be planted promptly after preparation.
8. Moisten prepared lawn areas before planting if soil is dry. Water thoroughly and allow surface moisture to dry before sodding. Do not create a muddy soil condition.

#### **B. Trees and shrubs:**

1. Layout individual tree locations.
2. Secure approval of Engineer and Owner prior to planting.
3. Excavate tree and shrub pits with vertical sides. Dispose of subsoil removed from landscape excavations. Do not mix with backfill. If tree or shrub is to be planted on excavation area, remove all impervious fill from tree and shrub pit down to pervious material.
4. Place three Agriform fertilizer tablets evenly around the perimeter of, and immediately adjacent to the root ball at a depth which is between the middle and the bottom of the root ball.



5. When excavation is approximately 2/3 full, water thoroughly before placing remainder of backfill. Repeat watering until no more is absorbed. Water again after placing final layer of backfill.
  6. Stake or guy trees immediately after planting. Stakes and guys should be evenly distributed around tree. All stakes must be driven so as not to disturb the root ball.
- C. Sprinkling Systems:
1. Restore all sprinkling systems and fences disturbed, removed, or damaged by construction operations in a condition at least equal to that prior to construction.
- D. Sodding:
1. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod strips; do not overlap. Stagger strips to offset joints in adjacent courses. Work from boards to avoid damage to subgrade or sod. Tamp or roll lightly to ensure contact with subgrade. Work sifted soil into minor cracks between pieces of sod; remove excess to avoid smothering of adjacent grass.
  2. Secure sod on slopes with U-shaped wire clips as required to prevent slippage. Immediately after planting, sod shall be thoroughly watered with a fine spray. Watering shall occur as frequently as needed to keep sod constantly moist for a period of 14 days after planting. Two weeks after planting, apply ammonium sulfate in pellet form at 40 actual pounds of nitrogen per acre. Water thoroughly immediately after fertilizing.

### **3.07 MISCELLANEOUS AREAS**

- A. All other improvements interrupted or removed to permit the construction specified herein shall be restored. Miscellaneous improvements to be restored shall include, but shall not be limited to, the following:
1. Culverts
  2. Fences
  3. Utilities

### **3.08 PROTECTION**

- A. Provide barricades and restrict access as appropriate to prevent damage to Work in place.
- B. Contractor shall be responsible for protection of Work in place against displacement, damage, loss or theft until Owner's acceptance. Any Work installed and subsequently damaged, lost or displaced shall be repaired or replaced to the Owner's satisfaction at no additional cost.
- C. Planting Maintenance:
1. Begin maintenance immediately after planting, and continue until inspection and acceptance, in no case less than 30 days from the time of completion of Work.
  2. Maintain trees by pruning, cultivation and weeding as required for healthy growth. Restore planting saucers.

3. Tighten and repair stake and guy supports and reset trees to proper grades or vertical position as required. Spray as required to keep trees free of insects and disease.
4. Maintain lawns for not less than 30 days and longer as required to establish an acceptable lawn. To be acceptable, lawn must be past second mowing with no bare spots. Maintain lawns by watering, fertilizing, weeding, mowing, trimming, and other operations such as rolling, regrading and replanting as required to establish a smooth, acceptable lawn, free of eroded or bare areas.

### **3.09 CLEANING**

- A. Thoroughly clean, rake, wash and/or flush all restoration Work prior to submitting for Owner's acceptance.

## **PART 4 - COMPENSATION**

### **4.01 GENERAL**

- A. No separate payment shall be made for any item necessary for the completion of the work indicated on the Contract Drawings and in the Specifications but not shown as a pay item on the proposal form; therefore, full compensation for these items shall be considered absorbed in the Contract Lump Sum or related pay items.
- B. The prices thus paid shall be full compensation for completing the work. Materials or work for which a pay item is not included and are necessary to complete the work under this section shall be furnished or performed and shall be considered incidental to the completed construction.

### **4.02 MEASUREMENT AND PAYMENT**

- A. Permanent Surfaces: Except as shown otherwise, measurement for payment purposes for each specified item of work shall be computed by using the actual length of the trench and the minimum trench width allowable by OSHA regulations and as shown on the drawings. Additional removal and replacement due to the top of the trench being wider than necessary to install or remove improvements shall be at the Contractor's expense. The length of removal and replacement crossed by conduits shall be measured along the centerline of the pipe over which removal and replacement was made. Additional widths necessary at manholes and special structures shall not be measured.
- B. The cost of such additional removal and replacement shall be included in the Unit Price bid for manholes and special structures. The length of curb and gutter crossing a conduit shall be equal for payment purposes.
- C. Except as otherwise shown on the Plans or directed by the Engineer, payment quantities for sidewalks, driveways, curbs and curb and gutter removal and replacement (where such items are parallel or approximately parallel to the proposed pipe line) shall be included only when the distance from the centerline of the pipe to the edge of the permanent surface is less than one-half the maximum trench width for the applicable conditions specified on the plans. Any damages to permanent surface items that are at a greater distance from the centerline of the pipe than one-half the maximum specified trench width shall be replaced at the Contractor's expense. Where a sidewalk that is parallel to a proposed pipeline is to be removed and replaced, the Engineer shall determine the extent of such removal and replacement.

- D. Payment for removal and replacement of permanent type pavements and driveways shall be made at the Contract Unit Price per square yard for the type of pavement or driveway removed or replaced.
- E. Payment for removal and replacement of concrete sidewalks shall be made at the Contract Unit Price per square yard for sidewalk removal and replacement.
- F. Payment for removal and replacement of concrete curb and gutter shall be made at the Contract Unit Price per linear foot for curb and gutter removal and replacement.
- G. Payment on reinforced concrete items shall also constitute full compensation for the required steel reinforcement.
- H. Payment for removal and replacement of asphalt surfaces shall be made and the Contract Unit Price per square yard for the type and thickness specified.
- I. Payment for the removal and disposal of the temporary trench surfacing, the re-excavation of the pipe trench for placement of the 6" of compacted clay gravel subbase and placement of the subbase shall be included in the Pay Item provided in the proposal as "6" Clay Gravel Subbase" or "6" Crushed Limestone Subbase".
- J. Temporary Trench Surfacing: Measurement for payment of clay gravel or crushed limestone shall be computed by the actual length of the trench times the quantity in cubic yards per linear foot of trench based on the minimum allowable trench width. The cost of furnishing, placing and maintaining the 6" of compacted clay gravel for temporary surfacing shall be paid for at the Contract Unit Price per cubic yard (PM) for temporary trench surfacing.
- K. Landscaping Item: Items designated or directed to be removed and restored shall be measured for payment as follows: (1) grass sod and brick paving in square yards, (2) plants, shrubbery, small trees and decorative planting in units of each and (3) other specialty items as provided in the proposal. Specific landscaping items removed and restored or replaced in-kind shall be paid for at the respective Contract Unit Prices provided for in the proposal.

**--END OF SECTION 02207--**

## **SECTION 02210 SOIL EROSION AND SEDIMENT CONTROL**

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### **PART 1 - GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Erosion Control Measures
- B. Velocity and Flow Control Measures
- C. Sediment Control Measures
- D. Application/Installation of Measures
- E. Removal/Replacement of Measures

#### **1.02 DESCRIPTION OF WORK**

- A. Furnish all materials; install, construct, maintain, and remove specified temporary erosion control devices; at locations specified in the contract documents, or where specified by the Engineer. Permanent devices such as rip-rap, sod or grassing are covered in other sections.
- B. Complete the required construction work on this project, while minimizing soil erosion and controlling water pollution. Maintain these features as specified and as required by the Mississippi Department of Environmental Quality, from initial construction stages to final completion of the project.
- C. Minimizing nonpoint source (NPS) pollution from construction sites through good housekeeping and Best Management Practices (BMPs).

#### **1.03 SCHEDULING AND CONFLICTS**

- A. Implement erosion and sediment control measures as required by each phase of construction.
- B. Coordinate construction to minimize damage to erosion and sediment control devices.

#### **1.04 SPECIAL REQUIREMENTS**

- A. Comply with all requirements of local and state and federal agencies, i.e. City, County, MDEQ, & EPA regulations.
- B. Protection of Property: Prevent accumulation of soil, sediment, or debris from project site onto adjoining public or private property. Remove any accumulation of soil or debris immediately, and take remedial actions for prevention.
- C. Project Staging: Replacing erosion and sediment control practices that are damaged or removed by the contractor in a manner that is consistent with the current project staging or SWPPP is the Contractor's responsibility and will be at the Contractor's expense.

### **PART 2 – PRODUCTS**

#### **2.01 Erosion and sediment control materials and installation methods shall be in accordance with**

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requirements of the latest edition of the Mississippi Standard Specifications for Road and Bridge Construction and the Contract Drawings.

The following items are considered approved best management practices that Contractor may implement to control erosion and sediment. Items shown are not project specific.

## **2.02 WATTLES**

- A. Netting: Open weave, degradable netting. Nominal diameter of 9 inches, or as specified.
- B. Fill Material: Straw, wood excelsior, coir, or other natural materials approved by the Engineer.
- C. Stakes: 1 inch by 1 inch (minimum) wooden stakes, or stakes of equivalent strength a minimum of 24" in length.

## **2.03 CHECK DAMS**

- A. Check dams are used to slow the velocity of water thus reducing erosion of the drainage way. Although a check dam will trap small amounts of sediment, it should not be considered as a sediment control device. Maximum drainage area is 10 acres.
- B. Materials
  - 1. Contractor shall not use straw bales. The use of straw bales as check dams often involves incorrect placement and thus aggravates erosion problems rather than controlling them.
  - 2. Check dams shall be constructed of stone or logs.
- C. Do not use in a stream.

## **2.04 CONSTRUCTION ROAD**

- A. The temporary stabilization of construction access roads and parking areas.
- B. Purpose is to reduce erosion of temporary and permanent roadbeds between the time of initial clearing and grading and final stabilization.

## **2.05 DIVERSION**

- A. A temporary ridge and channel of compacted soil.
- B. Used to divert runoff coming from offsite areas adjacent to the construction site or divert runoff from sensitive areas, thus decreasing the erosion potential. A diversion can also be used on a construction site to carry sediment-laden runoff to a sediment trap.
- C. Maximum drainage area is 5 acres.
- D. Diversions placed at the bottom of very steep slopes may be overwhelmed (overtopped or washed out from flows coming down the slope).
- E. Diversions must be on proper grade to ensure water flows in the desired direction. Watch for abrupt changes or reversal of grade as failures will occur in these places.
- F. Ensure that equipment operators are informed about diversions. A common reason for failure of diversions is equipment being driven over the diversion.

## 2.06 LEVEL SPREADER

- A. A stable outlet for diversions, which collects runoff and discharges it as sheet flow onto an undisturbed, vegetated area.
- B. To collect concentrated runoff, convert it to sheet flow and release it to a stable area at low, non-erosive velocities.
- C. Runoff should be relatively sediment free.
- D. Drainage area is 5 acres or less.

## 2.07 SOIL BLANKETS (MULCH, MATS, BINDERS)

- A. Apply a protective blanket (usually plant residue) to bare soil where required. Blankets or mats shall be LandLok Turf Reinforcement Mats or approved equal.
- B. Protects soil from the force of rain. Protects seeds and soil amendments from being washed away. Aids vegetative growth by conserving moisture, suppressing weeds and insulating the soil and seed from temperature extremes.
- C. Mulches can be a source and method of introducing weeds.
- D. Too much mulch can suppress growth.
- E. Wood chip mulches can tie up nitrogen thus requiring additional fertilizer.
- F. Some erosion control blankets degrade after a time and some blankets are permanent. Make sure the correct one is specified for the job.

## 2.08 TEMPORARY SEEDING

- A. Establishing a temporary vegetative cover on disturbed sites by seeding with a fast growing annual grass.
- B. **Areas that will not receive any construction activity for 7 days are required to be stabilized with temporary seeding within 2 days.** Temporary seeding reduces erosion, thus reducing the need for more costly sediment control measures.
- C. Temporary seeding provides protection for only one growing season. After that time, more permanent measures should be initiated.
- D. Seed is subject to being washed away during establishment period. Contractor is responsible to seed as many times as required due to washing at the Contractor's expense.
- E. Be aware that certain annual grasses may still out-compete permanent seeding even after the end of their life expectancy. This will require the residue from the annuals to be disked up and the soil prepared for permanent seeding.

## 2.09 TREE PRESERVATION

- A. Protecting desirable trees from destruction or injury during clearing or other construction activities.

- B. To ensure the survival of desirable, existing trees during construction so that they can provide erosion control, stormwater runoff management, improved site aesthetics, and other environmental benefits.

## **2.10 DUST CONTROL**

- A. Controlling dust while land-disturbing activities are taking place.
- B. To prevent the movement of dust from exposed surfaces, thus preventing or reducing complaints about air quality, health hazards, and reducing vehicle and road maintenance.
- C. Contractor may use water or approved additives.

## **2.11 STORM DRAIN INLET PROTECTION**

- A. A filter or impounding area around a storm drain inlet.
- B. Prevent sediment from construction site from entering an existing storm drain system until disturbed area is permanently stabilized.
- C. Ponding will likely occur so ensure that damage will not occur to adjacent areas or structures.
- D. Use mulch around structure to reduce the sediment load.

## **2.12 TEMPORARY SEDIMENT TRAP**

- A. A small ponding area formed by excavation and/or a low embankment across a drainage-way.
- B. To detain sediment-laden runoff long enough for some sediment to settle out.
- C. Sediment traps should be in use for 18 months or less.
- D. Do not use in a stream.
- E. Do not place a drain pipe with the inlet at the bottom of the trap and a silt fence across the inlet or outlet to filter sediment.

## **2.13 SILT FENCE**

- A. Material for silt fence shall be type 1 or 2 in accordance with Section 714 of MDOT Standard Specifications.
- B. Post shall be metal T-posts, 48" minimum length.

## **2.14 RIP RAP**

- A. Rip-rap may be used as a temporary erosion control measure. Installation shall comply with Section 2272. Rocks may be used where permanent rip-rap is called for on the plans as long as they are cleaned to a new condition.

# **PART 3 – EXECUTION**

## **3.01 INSTALLATION**

Installation of all materials shall be in accordance with the requirements of the latest edition of the

Mississippi Standard Specifications for Road and Bridge Construction, manufacturer's recommendations, these specifications and the Contract Drawings.

### **3.02 WATTLES:**

**INSTALLATION:** Install per manufacturer's recommendations

**MAINTENANCE:** Replace when filter capacity has been reduced by 75%. Remove when surrounding area has been stabilized.

### **3.03 CHECK DAMS**

#### **INSTALLATION**

- A. Check dams should be constructed of stone or logs. Silt fence material may be used for check dams. Note: if using silt fence material be aware that the runoff will flow over not through the material. Ensure that the fabric height is set no higher than 18 inches, the center is lower than the ends, that the bottom of the fabric is trenched in and soil compacted and that splash protection is provided on the downhill side so that the water running over the center doesn't scour the soil and expose the bottom of the fabric.
- B. Make the check dam no more than 2 feet in height.
- C. Make the center of the check dam at least 6 inches lower than the outer edges.
- D. Cover the swale with the check dam and set the height of the outer edges so that runoff will not flow around either end.
- E. Space the check dams so that the center of each check dam is the same elevation as the bottom of the check dam immediately above it.
- F. If using logs, use 4-6 inch logs and drive them 18 inches deep. Pile brush on downstream side in order to prevent scouring.
- G. If using stone, use 3 to 6 inch stone (min.) or as called out in contract drawings placed on filter fabric.
- H. If using a prefabricated device such as Triangular Silt Dikes, then follow manufacturer's guidelines for installation.
- I. Spacing between check dams is the same for all types.

#### **MAINTENANCE**

- A. Check for sediment accumulation after each significant rainfall. Remove accumulated sediment when it reaches  $\frac{1}{2}$  of the dam's original height.
- B. Check for erosion around edges of dam and extend dam if erosion is taking place.
- C. Remove dam when surrounding area has been stabilized. Immediately stabilize area under dam.

### **3.04 CONSTRUCTION ROAD**

#### **INSTALLATION**

- A. Follow the existing contour as much as possible. Slopes should not exceed 10 percent.



- B. Plan for temporary parking on naturally flat areas.
- C. Stabilize the side slopes of all cuts and fills by grading all slopes to 2:1 or flatter for clay soils and 3:1 or flatter for sandy soils. All exposed slopes should be seeded and/or mulched as soon as possible
- D. Lay down a 6-inch deep bed of coarse aggregate (1.5-3.5 inch stone) immediately after grading. Apply a tackifier or binder (see Dust Control).
- E. Ensure that proper drainage is provided for and that all drainage along construction roads is directed to sediment control BMPs (temporary sediment basins, buffer zones, sediment barriers, etc.).

#### **MAINTENANCE**

- A. Top dress roads and parking areas as needed.
- B. Check drainage after rain events and ensure drainage is going to sediment control BMPs. Any bypasses shall be stopped and redirected to proper BMPs.
- C. Replace aggregate as needed to maintain 6" deep bed.

### **3.05 DIVERSION**

#### **INSTALLATION**

- A. Minimum height of ridge (measured from bottom of channel to top of ridge) is 18 inches.
- B. Make the top width of the ridge a minimum of 2 feet with 3:1 slopes.
- C. Determine path of channel, ensuring that channel has a positive grade and ends at a stabilized outlet (see Level Spreader, Slope Drain or Temporary Sediment Basin for example).
- D. Excavate channel, place dirt on downslope side, shape to specified dimensions and compact.
- E. If diversion will be in place for more than 30 days, then seed after ridge has been shaped and before compaction.
- F. On fill slopes, form channel at end of working day and do not compact until final grade is reached.

#### **MAINTENANCE**

- A. Inspect after every storm and repair any breaches.
- B. If channel continues to erode, then velocities are too high and channel must be stabilized with erosion control netting or other stabilization practices.
- C. If diversion is at foot of steep slope and breaches continue to occur after successive storm events, then move diversion away from slope (if possible) and stabilize slope with mulch (see Soil Blankets).

### **3.06 LEVEL SPREADER**

## **INSTALLATION**

- A. Construct on undisturbed soil (not fill).
- B. Set last 20 feet of diversion slope to 1% grade before flow enters level spreader.
- C. Size the level spreader at zero grade.
- D. Slope sides at 2:1 or flatter.
- E. Seed the level spreader with grass seed or sod within 7 days of construction.

## **MAINTENANCE**

- A. Inspect after each storm event to ensure that flow is not concentrating and causing erosion at outlet. Repair if necessary.
- B. Remove any leaves and debris.
- C. Prevent construction traffic across the structure.

### **3.07 SOIL BLANKETS (MULCH, MATS, BINDERS)**

**INSTALLATION** – All Mulch, Mats, and Binders shall be installed in locations as required by the ENGINEER and per the manufacturer's recommendations. Improper product location or installation shall be removed and replaced by an approved material by the CONTRACTOR at no expense to the OWNER.

#### **A. MULCH**

- 1. The most common mulch is straw. When spreading by hand, divide the area to be mulched into 1000 square foot blocks and spread 2 square bales per block. When using equipment to spread mulch over larger areas use 2 tons per acre. When applying mulch to slopes equal to or steeper than 3:1, slopes with runs longer than 50 feet, areas of concentrated flow and in large open areas where wind is not blocked, mulch shall be anchored. Other mulch materials such as wood cellulose fibers, composted vegetation, recycled materials for mulch, and hay are acceptable. Apply enough material to obtain good coverage.
- 2. Anchor straw or hay mulch by crimping, by overlaying with an erosion control blanket, or by using a tackifier.
- 3. All other mulches should be anchored with an erosion control blanket or a tackifier.
- 4. When crimping use a mulch crimper (packer disc) or equivalent anchoring tool. The crimper should have discs that can be set straight, are 20 inches or more in diameter, 8 to 12 inches spacing between discs, and the disc edges are dull enough to press the stalks into the ground without cutting them. Ensure that the mulch stalks (or fibers) are pushed into the soil approximately 3 inches.
- 5. For any mulch material used, ensure that good coverage is obtained. Good coverage is where the mulch completely covers bare soil but is no more than 1 – 2 inches thick.

- B. EROSION CONTROL BLANKETS (TRMs) - This type of product is known by several different names: erosion control blankets, erosion control matting, erosion control nets,

rolled erosion control products, and turf reinforcement mat or materials. Mats shall be used to anchor organic mulches on steep slopes and areas with concentrated flows.

1. SITE PREPARATION

- a. Grade and compact area of installation and remove all rocks, clods, vegetation or other obstructions so that the installed blanket//mat will have direct contact with soil surface.
- b. Prepare seedbed by loosening 2-3 in of topsoil above final grade.
- c. Incorporate amendments such as lime and fertilizer into soil, as required by ENGINEER.
- d. Do not mulch areas where may is to be placed.

2. SEEDING – Apply see per seeding schedule to the soil surface before installing blanket/mat unless required otherwise by manufacturer.

3. INSTALLATION ON BANKS AND SLOPES

- a. Extend blanket/mat 2-3 ft over crest of slope and excavate a 12x6 in terminal anchor trench
- b. Anchor blanket/mat in trench on 1 ft spacings, backfill and compact soil.
- c. Unroll blanket/mat down slope.
- d. Overlap adjacent rolls at least 3 in, and anchor every 18 in minimum across the overlap. The higher elevation blanket/mat should be placed over the lower blanket/mat.
- e. Overlap blanket/mat edges approximately 2 in and staple according to anchor pattern guide from manufacturer. Make sure that the edge overlaps are shingled away from prevailing winds.
- f. Lay blanket/mat loose to maintain direct contact with soil.
- g. Secure blanket/mat to ground surface using U-shaped wire staples.

4. INSTALLATION IN STORM WATER CHANNELS

- a. Excavate an initial anchor trench in 12 in deep and 6 in wide across the channel at the lower end of the project area.
- b. Construct check slots along the channel in the following manner:  
Excavate intermittent check slots 6 in deep and 6 in wide across the channel at 30 ft intervals.
- c. Cut longitudinal channel anchor slots 4 in deep and 4 in wide along both sides of the installation to bury edges of blanket/mat.
- d. Beginning at the center of downstream end of the channel, place the end of the first roll in the anchor trench and secure with fastening devices at 1 ft intervals.

- e. In the same manner, position adjacent rolls in anchor trench, overlapping the preceding roll a minimum of 3 in.
  - f. Again, staple at 1 ft intervals, backfill and compact soil.
  - g. Unroll blanket/mat over the compacted trench. Stop at next check slot or terminal anchor trench.
  - h. Unroll adjacent rolls upstream in order to maintain a minimum 3 in overlap. Anchor every 18 in minimum across the overlap.
  - i. Fold and secure blanket/mat rolls snugly into intermittent check slots. Lay blanket/mat in the bottom and fold back against itself. Anchor through both layers of blanket or mat at 1 ft intervals then backfill and compact soil. Continue rolling upstream over the compacted slot to the next check slot or terminal anchor trench.
  - j. In low velocity channels of < 8.2 ft/sec excavated in cohesive soils, an alternate method may be used: place two rows of anchor on 6 in centers at 30 ft intervals in lieu of excavated check slots.
  - k. Overlap roll ends a minimum of 1 ft with upstream blanket/mat on top. Begin all new rolls in a check slot. Anchor overlapped area by placing two rows of anchors 1 ft apart on 1 ft intervals.
  - l. Place outer edge of blanket/mat in previously excavated longitudinal slots, anchor using prescribed staple pattern. Backfill and compact soil.
  - m. Secure blanket/mat to ground surface using U-shaped wire staples.
  - n. Seed and fill with soil for enhanced performance.
5. GROUND ANCHORING DEVICES – U-shaped wire staples or metal geotextile pins can be used to anchor blanket/mat to the ground surface. Wire staples should be a minimum thickness of 8 gauge. Metal pins should be at least 3/16 in diameter steel with a 1 ½ in steel washer at the head of the pin. Wire staples and metal pins should be driven flush to the soil surface. All anchors should be between 6-18 in long and have sufficient ground penetration to resist pullout. Longer anchors may be required for loose soils. Heavier metal stakes may be required in rocky soils.

#### C. INSTALLING ON SLOPES

- 1. On slopes netting shall be laid parallel to slope (parallel to primary direction of flow).
- 2. Dig a 6-inch by 6-inch trench at the top of the slope. Unroll 4 feet of the netting, line trench with netting while leaving 3 feet of netting extended past the trench.
- 3. Anchor netting in trench with staples, backfill and tamp soil firmly. Take remaining 3 foot strip that is extended past the trench and fold over the trench. Fasten strip to netting with staples. Unroll netting down the slope.
- 4. Start at top of slope or grade, anchor net, and work down.

5. Where strips are laid side by side, overlap edges 3 inches and staple together.
6. When joining ends, anchor new net in trench, overlap with old net 18 inches and staple together below trench.

#### D. INSTALLING IN CHANNELS

1. In areas of concentrated flows (ditches, swales, storm water conveyance channels, etc.) lay netting in direction parallel to flow. Use turf reinforcement mats for greater strength.
2. Dig a 6-inch by 6-inch across the beginning of the channel (upstream end) where netting will be laid.
3. Anchor and unroll netting as described above.
4. Do not join strips of netting in the center area of concentrated flows.

#### E. SOIL BINDERS

1. If using manufactured mulches such as erosion control netting, straw blankets, wood fiber blankets, wood fiber mulch with tackifier, bonded-fiber matrix, etc., refer to manufacturer's recommendation.

### MAINTENANCE

- A. Inspect periodically and after rainstorms.
- B. Check for rills, dislocation, or failures, and repair.
- C. If washout occurs, then regrade, reseed and remulch.
- D. If washout continues, check to see if flow velocities or if contributing area are too great and install additional measures to slow velocities and/or divert a portion of the flow

## 3.08 TEMPORARY SEEDING

### INSTALLATION

- A. Loosen all soil that has been compacted, crusted, or hardened.
- B. Test soil to determine liming and fertilization requirements. In the absence of a soil test, apply according to local soil conservation district's or a local nursery's direction.
- C. Spread available topsoil over unfavorable soil conditions, especially exposed subsoil.
- D. On slopes, the surface will require roughening, mulching, or both, depending on grade (see Mulching and Surface Roughening).
- E. Apply seed uniformly.
- F. Plant grass seed 1/4 inch deep (normal depth).
- G. Water as needed.

## **MAINTENANCE**

- A. Inspect for germination and growth after 7 days from planting.
- B. If seed is not germinating or growth is sparse, perform soil test, fertilize and reseed according to directions.
- C. Inspect after rainstorms. Reseed wherever seed has been washed away (absorbed). Consider the use of erosion control netting, mulch, or other BMPs in areas where seed continues to be washed away and channels are forming.

### **3.09 TREE PRESERVATION**

#### **INSTALLATION**

- A. Select trees to be preserved shall be flagged by Owner prior to beginning construction.
- B. Install barrier at or outside the dripline.
- C. Do not use heavy equipment, vehicles, or stockpiles within the dripline.
- D. Do not store any toxic materials within 100 feet of trees to be preserved.
- E. Ensure that crew, especially operators of earth-moving equipment, know where the trees are and what the purpose of the fencing is.
- F. Do not trench through the dripline. Tunnel or reroute utilities.
- G. Do not nail anything to trees to be preserved.

#### **MAINTENANCE**

- A. Note: If roots are cut, then prune tree by a proportionate amount (example, if 1/3 of the roots are cut, then prune tree by 1/3). Remove any damaged root area and paint the pruned area with tree paint.
- B. Repair any damage to trunk by trimming around damaged area (tapering the cut), and paint with tree paint.
- C. Cut off any damaged branches with a three cut process, and paint with tree paint

### **3.10 DUST CONTROL**

#### **INSTALLATION**

- A. Saturate surface as needed with any standard method to control dust.
- B. Follow manufacturer's recommendations if using additives.

#### **MAINTENANCE**

- A. Prohibit traffic on treated surface until curing time is complete.
- B. Re-water as needed to control dust as required by Owner, Engineer or regulatory requirements.

### **3.11 STORM DRAIN INLET PROTECTION**

#### **INSTALLATION**

##### **A. SILT FENCE DROP INLET SEDIMENT FILTER**

1. Use where drop inlet is surrounded by relatively flat ground and sheet flows are expected. Excavate a shallow depression around the inlet to allow for some ponding.
2. Construct a frame around the drop inlet using 2"x 4" stakes. Drive stakes into ground around drop inlet and no more than 3 feet apart. Drive stakes into the ground at least 12 inches. Attach a top rail of 2"x 4" to the stakes to stabilize the frame. Diagonally cross brace the stakes to prevent the water from pushing over the fabric. Ensure that water will fall directly into the inlet opening, not onto the unprotected soil around the inlet box.
3. Excavate a trench 6" x 6" around the outside edge of the frame.
4. Measure out filter fabric needed to ensure that fabric can be wrapped around frame with one overlap panel in order to ensure that there are no joints to separate.
5. Staple fabric to frame with 12 inches lying in the trench. The height of the fabric shall be at least 15 inches above ground but no more than 18 inches high.
6. Backfill trench and compact over fabric.

##### **B. BLOCK AND GRAVEL DROP INLET PROTECTION**

1. Use this where excavation cannot be done (i.e. to protect a storm drain in pavement) and/or where heavier concentrated flows are expected. Do not use where ponding will damage adjacent area or structures. Ensure that approaches are fairly flat to allow temporary ponding.
2. Place concrete blocks on their side, lengthwise around the inlet. Place blocks so that all ends are abutting. Height can be varied by stacking blocks but should be between 12 and 24 inches in height. Cover outside face of blocks with wire mesh.
3. Pile coarse aggregate (3/4 – 1.5") against wire mesh.

##### **C. GRAVEL AND WIRE MESH DROP INLET SEDIMENT FILTER**

1. Use where excavation can't be done and surrounding soils are sandy. Use where concentrated flows may be expected but ponding won't damage adjacent areas
2. Place wire mesh (1/2" openings) over drop inlet. Wire mesh must extend one foot past inlet on every side. Pile coarse aggregate (3/4"-1/2") on the wire mesh. Pile it 12 inches high and slope the pile 18 inches past the inlet on all sides.

##### **D. BLOCK AND GRAVEL CURB INLET SEDIMENT FILTER**

1. Use around curb inlets where an overflow capability is needed to prevent excessive ponding.

2. Place two concrete blocks, on their side, on either side of the curb inlet. These are spacer blocks.
3. Place a 2x4 stud through the outer holes of the spacer blocks. This is used to hold the front blocks in place.
4. Place concrete blocks on their sides in front of the curb inlet and spacer blocks.
5. Place wire mesh (1/2" openings) over the outside face of the blocks.
6. Place 1.5" coarse aggregate against the wire mesh.

#### **E. PREFABRICATED STORM INLET PROTECTION**

1. Install according to manufacturer's specifications.
2. Can be used either to divert flows away from the inlet or create a very small ponding area to trap small amounts of sediment.

#### **F. GRAVEL CURB INLET SEDIMENT FILTER**

1. Use where ponding won't cause damage.
2. Place wire mesh (1/2" opening) over curb opening and top of curb.
3. Place 1.5" coarse gravel in front of and on top of wire mesh.

#### **G. GRAVEL FILTER BAGS FOR CURB INLET PROTECTION**

1. Install per manufacturer's recommendations

### **MAINTENANCE**

- A. Inspect the structure after each rain event and repair as needed.
- B. Remove accumulated sediment when it has reached ½ of the height of filter. Clean filter.
- C. Remove filter when drainage area has been permanently stabilized.
- D. If there are unacceptable levels of flooding around inlet protection then remove accumulated sediment; or convert sediment barrier to an excavated sediment trap; or reroute runoff to a more suitable area

### **3.12 TEMPORARY SEDIMENT TRAP**

- A. A small ponding area formed by excavation and/or a low embankment across a drainage-way.
- B. To detain sediment-laden runoff long enough for some sediment to settle out.
- C. Sediment traps should be in use for 18 months or less.
- D. Do not use in a stream.
- E. Do not place a drain pipe with the inlet at the bottom of the trap and a silt fence across the inlet or outlet to filter sediment.



## **INSTALLATION**

- A. Embankment height shall be 5 feet or less.
- B. Ensure that embankment fill material is free of roots, organic material, or any other objectionable material.
- C. Construct embankment by placing fill material in 8-inch layers. Compact each layer. Side slopes shall be 2:1.
- D. Set outlet crest at 1 foot to 18 inches below the crest of the embankment.
- E. Install outlet protection
- F. Seed embankment with temporary seeding within 7 days of construction (see Temporary Seeding).
- G. Performance of sediment trap can be improved by seeding and/or mulching drainage area (see Soil Blanket).
- H. Remove trap and regrade when drainage area is stabilized.
- I. Sediment traps can also be constructed using gravel-filled sand bags as an embankment.
- J. Excavating around a storm drain inlet will also create a sediment trap.

## **MAINTENANCE**

- A. Remove accumulated sediment when sediment has filled in  $\frac{1}{2}$  the original volume.
- B. Check embankment after each storm event for erosion. Repair as necessary.

### **3.13 SILT FENCES**

## **INSTALLATION**

- A. Temporary silt fences shall be placed at the bottom of fill slopes, in ditches, around stockpiled soils, or downstream of any area where ground has been disturbed. Contractor is responsible for placement of silt fence in locations and quantities as needed to control erosion.
- B. Bottom of fences shall be embedded a minimum of 6 into the soil and backfilled.
- C. Additional rows of fencing or other measures shall be added as needed to control erosion.

## **MAINTENANCE**

- A. The Contractor shall maintain the silt fence in a satisfactory condition for the duration of the project. Silt fencing may not be removed until approval has been given by the Engineer.
- B. Any silt fence that has deteriorated shall be replaced.
- C. Silt shall be removed from behind silt fence when sediment has reached  $\frac{1}{2}$  the height of the fence. If fence is damaged from cleanout or has deteriorated it shall be replaced.

### **3.14 RIP RAP: See Section 02272**

## **PART 4 – COMPENSATION**

### **4.01 GENERAL**

- A. No separate payment shall be made for any item necessary for the completion of the work indicated on the Contract Drawings and in the Specifications but not shown as a pay item on the proposal form; therefore, full compensation for these items shall be considered absorbed in the Contract Lump Sum or related pay items.
- B. No additional compensation will be made for additional temporary erosion control measures that are implemented or required.

### **4.02 MEASUREMENT AND PAYMENT**

It shall be understood that measurement and payment for erosion control will be an absorbed cost or will be made only when a pay item is included on the Proposal Form.

**--END OF SECTION 02210--**

## SECTION 02220 EXCAVATION AND EMBANKMENT

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### PART 1 – GENERAL

#### 1.01 DESCRIPTION OF WORK

- A. This work shall consist of excavation and embankment required for the roadway, ditches, channel changes, and borrow material, and includes the preparation of sub-grade and foundations, the construction of embankments and other utilization or disposal of materials excavated, and the compaction and dressing of excavated materials and embankments.
- B. The Contractor shall furnish all labor, materials, and equipment to perform all work as described above in accordance with the details and requirements of the contract drawings and in accordance with these Specifications and completely coordinated with all other trades.

#### 1.02 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Supplementary Conditions applicable to this specification.
- B. Section 01410 – Testing Laboratory Services
- C. Section 02200 – Site Clearing
- D. Section 02210 – Soil Erosion and Sediment Control
- E. **Geotechnical Report if one is made available. Geotechnical report requirements shall govern over specifications if there are discrepancies.**

#### 1.03 DEFINITIONS

- A. Fill (in terms of volume): In terms of volume, fill is defined as a compacted post-construction volume in-place.
- B. Select Fill/Borrow Material: Material obtained from roadway cuts, borrow areas, or commercial sources used as foundation for sub-base, shoulder surfacing, fill, backfill, or other specific purposes. Such material shall meet project requirements as described in further detail in Article 2.01.D or elsewhere in the contract documents. This material may also be referred to as Borrow Excavation, Select Borrow Excavation, Select Fill, Select Material or similar.
- C. Structures: Incidental buildings, footings, foundations, retaining walls, slabs, tanks, curbs, drainage structures, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
- D. Sub-grade: Surface or elevation remaining after completing the excavation, or top surface of a fill or backfill immediately below sub-base or topsoil materials, as applicable.
- E. Topsoil: Topsoil shall consist of friable clay loam, free from roots, stones, and other undesirable material and shall be capable of supporting a good growth of grass.
- F. Unauthorized excavation: Shall consist of removing materials beyond indicated sub-grade elevations or dimensions without direction by the Engineer. Unauthorized excavation, as well as remedial work directed by the Engineer, shall be at the Contractor's expense.

- G. Objectionable materials: These materials include organic matter, debris, rubble, existing asphalt, stumps and roots. Earthwork operations, clearing and grubbing and ~~S~~site preparation shall include, as a minimum, the removal of any objectionable materials encountered (absorbed).
- H. Unsuitable materials: These materials include soils that are classified as expansive clay soils (CH), soils containing organic material, soils with excessive water content that are not feasible to be processed (per the Owner's geotechnical representative/testing agency) and used on the project and soils as mentioned in Article 2.03.B – Unsatisfactory Soils.
- I. Proof Roll: Proof roll shall mean the Contractor providing a fully loaded dump truck or other approved vehicle having an axle weight of at least 20,000lbs (10 tons) and said vehicle being driven across the site as directed by the Engineer and under the supervision of the Engineer or Owner's representative. The intent of the proof roll is to determine the strength of the soil (existing or placed fill) and identify locations of soft or unsuitable soil materials or conditions if they exist so that additional earthwork measures may be performed to stabilize these locations.
- J. Undercutting: Undercutting shall take place when objectionable or unsuitable materials are encountered on the project site or stability is not present. The Contractor shall excavate such areas and replace with compacted select fill materials or as recommended by the Engineer/Testing Agency. No undercutting shall be allowed without prior approval from the Engineer and if such work is performed without approval, this work shall be considered unauthorized excavation.
- K. Classifications of excavation: Excavations shall be classified and paid for as unclassified, rock, muck, borrow, channel, excess, surplus, stripping, common, or undercut as shown on the bid schedule. Definitions of these classifications are shown below.
- L. Preparing Subgrade: Preparing subgrade shall mean shaping and preparing the top surface of the design soil upon which the pavement structure and shoulders or curb are constructed to finished grade and slope as required per the plans once all other earthwork operations have been completed. This shall include performing proof rolls on the prepared subgrade, remediation of any areas that fail the proof roll, and related work required to achieve stability on the top surface of the design soil as required by the Engineer.

#### **1.04 SUBMITTALS**

- A. Submit product data of geotextile fabric and fully document each with specific location or stationing information, date and other pertinent information.
- B. Material Test Reports: Provide from a qualified testing agency test results and interpretation for compliance of the following requirements indicated:
  - 1. Classification according ASTM D2487 of each on-site or borrow soil proposed for backfill, unless otherwise directed by the City Engineer.

#### **1.05 TESTING SERVICES**

- A. The Testing Laboratory shall be approved by the Engineer and will be responsible for conducting and interpreting tests. The Testing Laboratory shall state in each report whether or not the test specimens conform to all requirements of the Contract Documents and specifically note any deviation.
- B. Specific test and inspection requirements shall be as specified herein and in related sections.

## 1.06 PROJECT CONDITIONS

- A. The Contractor shall examine the site prior to his bid taking into consideration all conditions that may affect his work.
- B. Traffic: Conduct site-clearing operations to ensure minimum interference with roads, and other adjacent occupied or used facilities. Do not close or obstruct roads or other occupied or used facilities without permission from authorities having jurisdiction.
- C. Protection of Existing Improvements: Provide protection necessary to prevent damage to existing improvements indicated to remain in place.
  - 1. Protect improvements on adjoining properties and on Owner's property.
  - 2. Restore damaged improvements to their original condition, as acceptable to property owners.
- D. Protection of Existing Trees and Vegetation: Protect existing trees and other vegetation indicated to remain in place against unnecessary cutting, breaking or skinning of roots, skinning or bruising of bark, smothering of trees by stockpiling construction materials or excavated materials within drip line, excess foot or vehicular traffic, or parking of vehicles within drip line. Provide temporary guards to protect trees and vegetation to be left standing.
- E. Demolition: Demolish and completely remove from the site existing utilities, structures or surface features indicated on the plans to be removed. Coordinate with applicable utility companies to shut off services if lines are active.
- F. Environmental: Before crossing or entering into any jurisdictional wetlands or streams, Contractor shall verify whether or not a wetlands permit has been obtained for the encroachment and whether special restrictions have been imposed. Care shall be taken to prevent draining or otherwise destroying non-permitted wetlands. Restore as stated on either the project drawings, the contract documents, and/or as noted in the permit.
- G. Geotechnical Investigation
  - 1. Requirements for Excavation and Embankment shall meet the requirements of the Geotechnical Report should one be available for project site. **Geotechnical Report will govern on any discrepancies between the requirements of the project specifications/plans on earthwork related items (i.e. acceptable material, depth of fill lifts, compaction requirements, etc). Contractor shall notify Engineer immediately of any discrepancies found.**
  - 2. Where a Geotechnical report has been provided to the Contractor, the data on sub-surface soil conditions is not intended as a representation or warranty of the continuity of such conditions between borings or indicated sampling locations. It shall be expressly understood that the OWNER and/or ENGINEER will not be responsible for any interpretations or conclusions drawn there from by the Contractor. Data is made available for the convenience of the Contractor.
  - 3. In addition to any report that may be made available to the Contractor, the Contractor is responsible for performing any other soil investigations he/they feel(s) is necessary for proper evaluation of the site for the purposes of planning and/or bidding the project, at no additional cost to the Owner.

## 1.07 EXISTING UTILITIES

- A. Locate existing underground utilities in the areas of work prior to construction. If utilities are to remain in place, provide adequate means of protection during earthwork operations.
- B. Do not interrupt existing utilities serving facilities occupied by the Owner or others except when permitted in writing by the Owner(s) and then only after acceptable temporary utility services have been provided. Provide a minimum 48-hours notice to the Owner(s) and receive written notice to proceed before interrupting any utility.
- C. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies to shutoff services if lines are active. Contractor will be responsible
- D. 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. The Contractor shall contact the appropriate utility company for location of their underground service a minimum of 48 hours prior to beginning construction in each area. Existing utilities are shown on the Drawings in accordance with the maps and plans supplied by each utility company and it is the Contractor's responsibility to verify and locate all utilities in the field at no additional cost to the Owner.
- E. 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.
- F. Examine the areas and conditions under which excavating, filling, and grading are to be performed. Do not proceed with the work unless unsatisfactory conditions have been corrected.
- G. 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.

## **PART 2 – PRODUCTS**

**2.01 CLASSIFICATIONS OF EXCAVATION:** Where classification is provided by separate pay items in the proposal, the excavation specified under this section may be classified by any of the following classes:

- A. **Unclassified Excavation:** When no pay item is included in the contract for other classes of excavation, unclassified excavation will consist of the excavation and processing or disposal of all materials on-site of whatever character encountered in the work. When pay items are included for other classes of excavation unclassified excavation will consist of the excavation and processing or disposal of all materials except those for which additional pay items are provided.
- B. **Rock Excavation:** When shown as a pay item, rock excavation shall consist of removal of material which cannot be excavated without blasting and shall also include boulders and detached stones having a volume of 1/2 cubic yard or more each. The use of the words "rock", "boulders", or "stone" or synonyms of these words appear elsewhere in these specifications does not imply that these materials may be included under this classification unless so indicated on the contract document.
- C. **Muck Excavation:** When shown as a pay item, muck excavation shall consist of the excavation, removal and disposal of natural deposits of saturated or unsaturated mixtures of soils and organic matter unsuitable for foundation materials. The Engineer, after

consideration of the material and the conditions involved at the time of excavation, will be the sole judge as to whether the material involved will be classified as muck excavation.

- D. **Borrow Excavation:** Borrow excavation (also referred to as Select Borrow Excavation, Select Fill, Select Material or similar) shall consist of approved material required for the construction of embankments or other portions of the work that comes from a location beyond the project limits. The Contractor shall make arrangements for obtaining borrow, including any required permits and shall pay all costs involved. Contractor and/or Owner furnished borrow shall meet the requirements of the geotechnical report should one be available or, if not, as described elsewhere in the plans and this specification.
- E. **Channel Excavation:** When shown as a pay item, channel excavation shall consist of excavation and disposal of all material required for the widening, deepening or straightening of an existing channel or construction of a new channel. Material from channel excavation used in the roadbed will be classified as unclassified excavation.
- F. **Excess Excavation:** When shown as a pay item, excess excavation shall consist of excavation which cannot be satisfactorily used or disposed of within the project limits and must be hauled off-site and disposed of by the Contractor. Except for muck excavation, excess excavation may include any type, kind or class of excavation which the Engineer determines must be removed from the site including undercut. It will not include any excess caused by the Contractor importing too much excavation from outside sources. In this case the excess excavation will be removed at no cost to the owner. Should the Engineer decide, during construction, to spoil the excess excavation within the project limits, this shall be paid for as Unclassified or Common Excavation.
- G. **Surplus Excavation:** When shown as a pay item, surplus excavation will consist of required excavation within the project limits which is in excess of or unsuitable for that required for embankments and which can be satisfactorily used or disposed of within the project limits. Should the Engineer decide, during construction, that the surplus excavation is unable to be spoiled within the project limits as planned, this material shall be hauled off-site and disposed of by the Contractor and paid for as Excess Excavation.
- H. **Stripping Excavation:** When shown as a pay item, stripping excavation shall consist of the excavation, stockpiling, and on-site disposal of topsoil material. If there is no pay item for stripping then it shall be paid for as "Common Excavation". There will be no additional payment for on-site disposal of topsoil after stockpiling.
- I. **Common Excavation:** Common excavation shall consist of the removal, hauling and placing on-site of any class of material encountered at any location where excavation is required to achieve planned grades or as directed by the Engineer. Grading for proposed swales and overall drainage of the project is included in this item unless otherwise noted.
- J. **Undercut Excavation:** When shown as a pay item, undercut excavation shall consist of the excavation, removal and disposal of materials that have been deemed objectionable or unsuitable by the Engineer for use as a sub-base or sub-grade material. Undercut excavation will also include "Excess Excavation" if there is no pay item for such. Material may be spoiled on-site or hauled off-site as noted on the contract drawings, bid proposal or as directed by the Engineer. Voids left from Undercut Excavation shall be replaced by Select Borrow Material or as recommended by the Engineer/Testing Agency and paid for per the excavation classification on the bid proposal.

**2.02 SOIL MATERIALS:** Provide borrow material when sufficient satisfactory soil material is not available from on-site excavations. Additionally, see other sections for related work for description of materials suitable for borrow.

### **2.03 SOIL CLASSIFICATION**

- A. Satisfactory Soils: Material for fills shall consist of material obtained from the excavation of on-site banks, borrow pits or approved off-site sources. The material used shall be free from vegetable matter and other deleterious substances and shall not contain large rocks or lumps. Borrow materials shall consist of select, non-organic and debris free silty clays (CL) or sandy clays (CL) having a plasticity index (PI) within the range of 10 to 20 and a liquid limit less than 40, unless otherwise noted in the Contract Documents or Geotechnical Report. Should a geotechnical report be provided then the geotechnical report will govern and satisfactory soils will be as described in the report. No soils may be deemed as "satisfactory" by the Contractor without the Engineer's approval.
- B. Unsatisfactory soils: Plastic soils as defined by ASTM D 2487 soil classification group (such as ML, CL not meeting requirements above, CH, MH, OH, OL and PT); soils which contain rock or gravel larger than 3 inches in any dimension, debris, organic matter, waste frozen materials, vegetation, and other deleterious matter. Unsatisfactory soils also include satisfactory soils not maintained within 3.0% (percent) of optimum moisture content at time of compaction, unless otherwise approved by either the Engineer or a Geotechnical Engineer. In such case, it is the Contractor's responsibility to obtain proper moisture content at no additional cost to the Owner. If a geotechnical report is provided then the geotechnical report will govern and unsatisfactory soils will be as described in the report. No soils may be deemed as "unsatisfactory" by the Contractor without the Engineer's approval.

## **2.04 ACCESSORIES**

- A. Filter Fabric: Manufacturer's standard non-woven perilous geo-textile fabric of polypropylene, nylon or polyester fibers, or a combination.
  - 1. Provide filter fabrics that meet or exceed the listed minimum physical properties determined according to ASTM D4759 and the referenced standard test method in parentheses:
    - a. Grab Tensile Strength (ASTM D4632): 100 lb.
    - b. Apparent Opening Size (ASTM D4751): #100 U.S. Standard sieve.
    - c. Permeability (ASTM D4491): 150 gallons per minute per sq. ft.

## **PART 3 – EXECUTION**

### **3.01 GENERAL**

- A. Earthwork operations may be started at the location and in the sequence approved by the Engineer when:
  - 1. Sufficient clearing and grubbing has been completed and accepted.
  - 2. The site has been cross sectioned after clearing if requested by owner to confirm existing conditions for quantity purposes.
- B. Once Engineer has given Contractor written permission to begin earthwork operations, Contractor shall strip the site of topsoil and stockpile at a location of Contractor's choosing. Contractor shall then set up a proof roll with the Engineer/Testing Agency to roll and inspect areas that are to receive fill materials to determine if there are any weak soils present that need to be remedied. Once this proof roll and site inspection has been performed, the Contractor may then begin to cut the site to rough grade and may place cut material in fill areas if that material meets specifications. Once the site is cut to rough grade, another proof roll shall be performed by the Engineer/Testing Agency to determine



if there are any weak soils present that need to be remedied. Recommended remedies will come from Testing Agency or Engineer.

- C. Contractor shall plan construction to minimize disturbance to properties adjacent to the project site and be within the construction limits shown on the plans.
- D. Any grading or excavation required for equipment travel during the course of construction as well as erosion control, access or haul road installation and removal, restoration, seeding and ground cover shall be provided by the Contractor.
- E. The Contractor shall be responsible for damage to areas or items designated by the Engineer to be protected. Repairs to, replacement of, or reparations for areas or items damaged shall be made at the Contractor's expense and to the satisfaction of the Engineer before acceptance of the completed project.
- F. Any fences disturbed by the Contractor shall be repaired to a condition equal to or better than their original condition or to the satisfaction of the Engineer at no additional cost.
- G. Contractor shall obtain written permission from property owners for use of any access other than ones located within rights-of-way. Written permission shall contain conditions for use and restoration agreements between property owner and Contractor. No additional compensation will be made for such access.
- H. All areas disturbed shall be restored to a condition equal to or better than their original condition and shall be graded to promote drainage or as directed by Engineer.
- I. The Contractor shall replace or repair all damaged or destroyed hedgerows, property corners, flowerbeds, etc.

### **3.02 DEWATERING**

- A. Prevent surface water and subsurface or ground water from entering excavations, from ponding on prepared sub-grades, and from flooding Project site and surrounding area.
- B. Protect sub-grades and foundation soils from softening and damage by rain or water accumulation.
- C. Remove water to prevent softening of roadway subgrades and foundation bottoms.
- D. Provide and maintain pumps, well points, sumps, suction and discharge lines and other dewatering system components necessary to convey water away from excavations.
- E. Establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey rain water and water removed from excavations to collecting or run-off areas. Do not use trench excavations as temporary drainage ditches.
- F. The Contractor shall be responsible for all damage incurred in handling of water conditions at no additional cost to the Owner.

### **3.03 STRIPPING EXCAVATION**

- A. Stripping excavation shall be performed once clearing and grubbing has been performed and approval of the areas has been given by the Engineer.
- B. Stripped materials shall be stockpiled and subsequently used as topsoil or wasted as specified herein or as directed by the Engineer. Roots and other floatable materials removed by the stripping operations shall be disposed of in the same manner as clearing and grubbing material.

- C. Stripped materials designated to be wasted shall be hauled to disposal areas on-site or shall be disposed of off-site at a site to be furnished by the Contractor. If the plans or bid proposal does not specify that topsoil disposal shall be off-site then Contractor shall intend to spoil on-site. In cases where materials are classified as topsoil but cannot be spoiled on-site (which will be determined solely by the Engineer), such material shall be hauled off-site and paid for as Excess Excavation.

### **3.04 EXCAVATION**

- A. Explosives: Use of explosives is not allowed.
- B. Each excavation classification includes excavation of pavements and other obstructions visible on surface; underground structures, utilities, and other items or materials encountered that are not an itemized pay item.
- C. Excavation operations shall be conducted so that the material outside the limits of slopes will not be unnecessarily disturbed.
- D. No material shall be wasted without the permission of the Engineer.
- E. Excavation operations shall be conducted in a manner that material outside the construction limits will not be unnecessarily disturbed.
- F. Unless otherwise specified, rock larger than three inches shall be removed from the roadbed to a minimum depth of eight inches below sub-grade and backfilled with select borrow.
- G. Borrow material shall not be placed until all suitable, on-site, excavated material has been placed in the embankment, unless authorized by the Engineer. Unless otherwise designated on the plans and contract documents, the Contractor shall make his own arrangements for obtaining select fill material for borrow and pay all costs involved. If the Contractor places more borrow than is required, and thereby causes a waste of excavation, the amount of such waste, unless authorized, will not be included for payment.
- H. Obliteration of old roadways shall include all operations necessary to incorporate the old roadway into the new roadway or into the surrounding project site in a way that will provide a pleasing appearance from the new roadway. Unless other pay items are provided, roadway obliteration will be paid for as unclassified excavation.
- I. Unauthorized excavation consists of removal of materials beyond the limits needed to establish required grade and sub-grade 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.
- J. No undercutting shall be allowed without prior approval from the Engineer and if such work is performed without approval, this work shall be considered unauthorized excavation..
- K. Excavation shall be performed as indicated on the plans or as directed by the Engineer to the lines, grades, and elevations, and shall be finished to a reasonably smooth and uniform surface. During the process of excavation, the grade shall be maintained and surface shall be rolled so that it will be well drained at all times.
- L. When solid rock is incurred in the excavation, the rock shall be removed to a minimum depth of 12 inches below the surface of the sub-grade. Material unsatisfactory for sub-grade foundation shall be removed to a depth specified to provide a satisfactory foundation. The portion so excavated shall be refilled with suitable material obtained from the grading operations or borrow area and thoroughly compacted by rolling. Material

obtained from on site grading operation must be approved by the Engineer. For areas that do not require fill, scarify and compact to a depth of 6 inches.

- M. Any removal, manipulation, aeration, replacement, and re-compaction of suitable materials necessary to obtain the required density shall be considered as incidental to the construction operations, and shall be performed by the Contractor at no additional cost to the Owner.
- N. Should weak soils be present above and beyond the recommended excavation limits (including undercutting for soil buffer) then a layer of geotextile fabric shall be placed to bridge over the underlying soft area. The geotextile fabric shall be non-woven and shall conform to Mirafi 600X or equal. An 18-inch layer of sand having no more than 15% passing the No. 200 sieve shall be placed over the fabric. The sand shall be spread and compacted to at least 70% relative density (ASTM D 4254) or as directed by Engineer. Select fill material may then be placed on top of sand to bring site to planned grades.

### **3.05 EMBANKMENTS**

- A. Prior to placement of compacted fill, the Engineer or his representative shall carefully inspect the exposed sub-grade. The Contractor shall then proof-roll the exposed sub-grade, in the presence of the Engineer or his representative. The inspection shall include, but not be limited to, proof-rolling the prepared sub-grade with a rubber-tired fully loaded dump truck that has a minimum gross weight of at least 20,000 pounds (10 tons) per axle. No other method will be acceptable. Any unsatisfactory materials thus exposed shall be removed and replaced with satisfactory select material as approved by the Engineer. Provide the necessary amount of select fill compacted to the density requirements outlined in this specification.
- B. Before fill is placed, scarify existing grade to a minimum depth of 6 inches. In areas where the existing or proposed ground surface is steeper than one vertical to four horizontal, plow surface in a manner to bench and break up surface so that fill material will bind with the existing surface.
- C. Embankments shall be made of satisfactory soil material and shall be built in successive horizontal layers of not more than 8 inches in loose depth for the full width of the cross sections.
- D. The material entering the embankment in each of the layers shall be within a tolerance of plus or minus 3% of the optimum moisture content before rolling to obtain the prescribed density. Wetting or drying of the material and manipulation when necessary to secure uniform moisture content throughout the layer shall be required. Should the material be too wet to permit proper compaction or rolling, all work on the embankment shall be delayed until such time as the material has dried to the required moisture content. If high moisture is due to negligence of contractor due to improper drainage, the Engineer may require removal and replacement of material.
- E. Fill material shall not be placed on frozen ground or areas covered with ice and/or snow or areas with a moisture content above optimum.

### **3.06 STABILITY OF EXCAVATIONS**

Comply with local ordinances, state and OSHA requirements to maintain stable excavations. All costs required to meet such requirements shall be the contractor's responsibility and an absorbed cost. This includes but is not limited to shoring, bracing, sheet piles, additional excavation, etc. and providing materials, equipment, and other incidentals to install, remove and/or repair disturbed areas to pre-excavated condition or final grade.

### **3.07 EXCAVATION FOR STRUCTURES**

Excavate surfaces under roadway, walks and pavements to indicated cross sections, elevations, and grades. See contract drawings and specific sections for more detail on structure installation.

### **3.08 EXCAVATION FOR CONDUIT OR PIPE TRENCHES**

Excavate trenches to indicated slopes, lines, depths, and invert elevations. Trench limits shall comply with details. See contract drawings and specific sections (such as 02230, 02710, 02720, 02800, 02900 and others), for more information on pipe trenches.

### **3.09 STORAGE OF SOIL MATERIALS**

- A. Stockpile excavated materials acceptable for backfill and fill soil materials, including acceptable borrow materials. Stockpile soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent wind-blown dust.
  - 1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

### **3.10 BACKFILL UNDERCUT EXCAVATION**

- A. Backfill undercut excavations promptly, but not before completing the following:
  - 1. Removal of trash and debris from excavation.
  - 2. Contacting the Engineer for proof-roll limits and visual inspection.

### **3.11 FILL\SELECT FILL**

- A. Preparation: Remove vegetation, topsoil, debris, wet and unsatisfactory soil materials, obstruction, and deleterious materials from ground surface prior to placing fills.
  - 1. Plow strip, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing surface.
- B. When sub-grade or existing ground surface to receive fill has a density less than that required for fill, break up ground surface to depth required, pulverize, moisture-condition or aerate soil and re-compact to required density.
- C. Place fill material in even layers that are not to exceed 8" loose unless otherwise directed by Engineer to required elevations for each location listed below.
- D. 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.
- E. Fill shall be dumped and spread in layers by a bulldozer or other approved method. During the processes 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.
- F. 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.

### **3.12 MOISTURE CONTROL**

- A. Uniformly moisten or aerate sub-grade and each subsequent fill or backfill layer before compaction to within 3 percent of optimum moisture content for the silty-clays (CL) and to within 2 percent of optimum moisture content for silt (ML).
  - 1. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
  - 2. Remove and replace, or scarify and air-dry satisfactory soil material that is too wet to compact to specified density.
  - 3. Stockpile or spread and dry removed wet satisfactory soil material.

### **3.13 COMPACTION**

- A. Place all backfill and fill materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compact by hand-operated tampers.
- B. Place backfill and fill materials evenly on all sides of structures to required elevations. Place backfill and fill uniformly along the full length of each structure.
- C. Percentage of Maximum Dry Density Requirements: Compact soil to not less than the percentages required in Section 3.19

### **3.14 LIME-TREATED SUB-GRADE**

Sub-grade soils will be treated with lime to improve soil conditions where required on the plans or as directed by the Engineer. The sub-grade soils shall be treated to a depth as specified in the plans with hydrated lime by dry weight at the percentage required in the drawings. The lime and installation procedures shall be done in accordance with the latest edition of the Mississippi Standard Specifications for Road And Bridge Construction.

### **3.15 PREPARATION OF AREAS TO RECEIVE ASPHALT PAVEMENT OR CONCRETE**

- A. Areas to be Paved: After all excavation, undercutting, and backfilling has been completed, the sub-grade shall be properly shaped and thoroughly compacted. The compactive effort shall include all areas beneath pavement and shall extend at least a minimum of 2 foot behind the paving limits. Compaction shall be in accordance with Table 02220-1.
- B. The sub-grade for roadway sections, curb and gutter, sidewalks, and driveway aprons shall be constructed true to grade and cross section as may be shown on the drawings. Compaction shall be in accordance with Table 02220-1.
- C. All sub-grade shall be graded and protected as to prevent an accumulation or standing water, and consequent sub-grade saturation, in the event of rain.
- D. A proof-roll of the sub-grade shall be scheduled with the Engineer and Owner prior to curb and gutter or asphalt installation. Contractor shall give Engineer a minimum of 36 hours notice of proof-roll. Contractor shall perform his own proof-roll to verify that sub-grade will pass inspection prior to scheduling a proof-roll with the Engineer. Contractor will be responsible for digging out and recompacting, removing materials, or other means as necessary to pass the proof-roll inspection. No additional payment will be made for materials or work required due to failure of proof-roll or for additional work required by weather. Should it rain after the local governing authority (or Engineer) has passed the proof roll, another passing proof roll shall be required prior to pouring curb or paving unless authorized by the local governing authority (or Engineer).

- E. Contractor shall at his own expense reconstruct sub-grades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by the Engineer.

### 3.16 GRADING TOLERANCES OF FINISHED SURFACE

Earthwork shall conform to the lines, grades, and typical cross sections shown on the plans or as established by the Engineer. Changes in grade shall be accomplished by smooth curves.

1. Shape sub-grade under pavement and curb and gutter to within ½ inch of required sub-grade elevations.
2. Finish pavement and curb and gutter to within ½ inch of required finish elevations.
3. Shape sub-grade under sidewalks to within 0.10 foot of required sub-grade elevations.
4. Finish sidewalks to within 0.10 foot of required finish elevations.
5. For all other areas, sub-grade and finish elevations shall be within 0.10 foot of required corresponding elevations.
6. Uniformly grade areas to a smooth surface, free from irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
7. Provide a smooth transition between existing adjacent grades and new grades.
8. Cut out soft spots, fill low spots, and trim high spots to conform to required surface tolerances.
9. All grading shall be done as required to promote positive drainage in all phases and all aspects of construction.

**3.17 BACKFILL OF CURB AND GUTTER AND SIDEWALKS:** Immediately after the removal of forms for curb and gutter, sidewalks and driveways, the space between the back of the curb, sidewalks, and driveways shall be backfilled and smoothed off in a manner to prevent the accumulation of standing water.

### 3.18 SUB-GRADE COMPACTION TESTING AND CONTROL

- A. All testing shall be performed as required by Contract Documents by a testing agency licensed to practice in Mississippi for the particular testing methods.

B. **MINIMUM COMPACTION TESTING FREQUENCY**

One test group consists of compaction tests on each layer of fill and backfill material.

Location	Frequency
Buildings and structures	1 test group for every 2,500 square feet
Road	1 test group for every 300 feet of road
Parking Lots	1 test group for every 5,000 square feet
Unpaved areas	1 test group for every 20,000 square feet
*Pipe Trench Under Paved Surface	1 Test group for each pipe run (200' max length)
**Pipe Trench Within 2' of Back of Curb	1 Test group for each portion of pipe run meeting location requirement (200' max length)
Pipe Trench In Open Grass Area	Not Required but compaction requirements shall be met

\*Required testing frequency for a roadway shall be a test where pipe intersects any edge of pavement and another at the centerline of same roadway section. When under a parking lot or a pipe run of over 80', testing frequency shall be 1 test for every 40' of pipe.

\*\*Required testing frequency shall be a 1 test for every 40' of pipe where location requirement is met.

- C. When testing agency reports that sub-grades, fills, or backfills are below specified density, Contractor shall be responsible for implementation of any acceptable procedure necessary to bring material up to requirements. Contractor will be due no additional compensation or time for his additional efforts.
- D. In the absence of a pre-construction Geotechnical investigation, the Geotechnical testing firm is to perform laboratory Proctor tests to establish a moisture-density relationship for all materials that are proposed to be used as fill.
- E. Contractor shall give a 48-hour notice to Geotechnical testing firm when ready for Proctor, compaction, or sub-grade testing and inspection.
- F. Should any moisture-density test fail to meet specification requirements, the Contractor shall perform corrective work necessary (such as scarify and moisten or aerate, or remove and replace soil to the depth required, re-compact and retest until required density is obtained) to bring the material in compliance and retest the failed area at no additional cost to the Owner.
- G. Proctors shall be run as frequently as necessary to assure consistency of material and wherever changes in material are encountered.

### 3.19 SUB-GRADE PREPARATION AND COMPACTION REQUIREMENTS

- A. Minimum Compaction Requirements: Compaction percentages are percentages of maximum dry density as determined by indicated ASTM Standards. Unless otherwise directed by a Geotechnical Engineer, the material shall be placed at plus or minus 3% of optimum moisture content.

**Table 2220-1**

<b>Minimum Compaction Limits</b>	
<b>Location</b>	<b>Density</b>
Beneath and within 10 feet of buildings	100% of the maximum dry density by ASTM D 698 (Standard Proctor), AASHTO T-99.
Areas under roadway pavement surfaces, shoulders, sidewalks, and curb and gutter	98% of the maximum dry density by ASTM D 698 (Standard Proctor), AASHTO T-99.
Under turf, sodded, planted, or seeded non-traffic areas	90% of the maximum dry density by ASTM D 698 (Standard Proctor), AASHTO T-99.

- B. Failure of Compactive Efforts: If compaction efforts should fail to provide a stable sub-grade, after sub-grade materials have been shaped and brought to optimum moisture, such unstable materials shall be removed to the extent directed by either the Geotechnical Engineer or the Engineer and replaced and compacted using new select material.

### **3.20 PROTECTION**

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and re-establish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or lose compaction due to subsequent construction operations or weather conditions.
  - 1. Scarify or remove and replace material to depth directed by the Engineer; reshape and re-compact at optimum moisture content to the required density.
- C. Settling: Where settling occurs during the Project warranty period, remove finished surfacing, backfill with additional approved material, compact, and reconstruct surfacing.
  - 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to the greatest extent possible.

### **3.21 DISPOSAL OF SURPLUS AND WASTE MATERIALS**

- A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off the Owner's property at a location approved by the owner.

## **PART 4 – METHOD OF MEASUREMENT AND PAYMENT**

### **4.01 GENERAL**

No separate payment shall be made for any item necessary for the completion of the work indicated on the Contract Drawings and in the Specifications but not shown as a pay item on the proposal form; therefore, full compensation for these items shall be considered absorbed in the Contract Lump Sum or related pay items.

### **4.02 MEASUREMENT AND PAYMENT**

- A. PREPARING SUBGRADE: Preparing subgrade shall be measured and paid for at the Contract Unit Price bid per square yard which shall be full compensation for furnishing all equipment, tools, labor and incidentals necessary to complete the work.
- B. CLASSIFICATIONS OF EXCAVATION: Excavation shall be measured and paid for at the Contract Unit Price bid per cubic yard final measure (FM) which shall be full compensation for furnishing all materials, including pit production and royalties if Contractor furnished borrow, loading, hauling, spreading, mixing, shaping sub-grade and finished product, compacting, watering, and maintenance and for all equipment, tools, labor and incidentals necessary to complete the work for the classification of excavation listed on the Bid Proposal Form to the grades required.

**--END OF SECTION 02220--**



## **SECTION 02230**

### **EXCAVATION AND BACKFILL FOR CONDUITS AND STRUCTURES**

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#### **PART 1 - GENERAL**

##### **1.01 DESCRIPTION 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 roadways or in open areas, under and around precast and cast in place structures to attain the sub-grades and grades indicated on the Drawings, trenching operations to install conduit (water, sewer, storm drain), box culverts, manholes, vaults, and other structures, including all backfilling, grading, disposal of surplus and unsuitable materials, and all related work such as sheeting, bracing and water handling. See other Sections of these specifications for requirements for additional requirements for storm, water and sewer pipe lines and structures installation requirements.

##### **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 Contractor will engage and pay for soil testing and inspection services for quality control testing during earthwork operations as provided in Section 01410, Testing Laboratory Services.

##### **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.
- 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. The Contractor shall contact Mississippi One Call or the appropriate utility company for location of their underground service a minimum of 48 hours prior to beginning construction in each area. Existing utilities are shown on the Drawings in accordance with the maps and plans supplied by each utility company and it is the Contractor's responsibility to verify and locate all utilities in the field at no additional cost to the Owner.
  - 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 sub-grade vary from elevations shown on 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 material excavated. 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 rammed.
  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 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 Bid 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 Specification, 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, and his 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 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. 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 Engineer 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.
7. Establish requirements for trench shoring and bracing to comply with OSHA regulations and any applicable local codes and ordinances.
8. Maintain shoring and bracing in excavations regardless of time period excavations will be open. Carry down shoring and bracing as excavation progresses.
9. As an alternate to sheeting, the Contractor is authorized to utilize a mechanical trench box, the size and construction of which shall be submitted to the Engineer for review.

C. Dewatering, Drainage and Flotation:

1. Contractor shall make every effort to prevent surface water from flowing into excavations and from flooding the project site and surrounding area.
2. 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 (absorbed). These drainage systems shall include but not be limited to pumps, well points, sumps, suction and discharge lines and other dewatering system components necessary to convey water away from excavations.
- 3.. Contractor shall establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey rain water and water removed from excavations to collecting or run-off areas. Do not use trench excavations as temporary drainage ditches.

4. 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.
5. 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 sub-grade foundation condition, 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.
6. Dewatering shall at all times be conducted in such a manner as to preserve the natural undisturbed bearing capacity of the sub-grade soils at proposed bottom of excavation.
7. Well-points may be required for pre-drainage of the soils prior to final excavation for some of the deeper below ground structures of 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. Well-points shall be surrounded by suitable filter sand and no fines shall be removed by pumping. Pumping from well-points shall be continuous and standby pumps shall be provided.
8. 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 observations wells shall be at structures and along pipelines as approved by the Engineer prior to their installation.
9. 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 or natural bearing of soils or damage to structures caused by an inadequate dewatering system or by interruption of the continuous operation of the system as specified.
10. As part of the submittal of his dewatering system, the Contractor may be required to demonstrate the adequacy of the proposed system and well-point filter sand by means of a test installation. Discharge water shall be clear, with no visible soil particles in a one-quart sample.
11. During backfilling and construction, water levels shall be measured in observation wells located as directed by the Engineer.
12. Continuous pumping will be required as long as water levels are required to be below natural levels.
13. 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.

14. The Contractor shall be responsible for all damage incurred in handling of water conditions at no additional cost to the Owner.
- D. Protection of Persons and Property:
1. Barricade open excavations occurring as part of this work and post with warning light 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 2 – PRODUCTS**

### **2.01 SOIL MATERIALS**

- A. Definitions (unless otherwise noted in Geotechnical Report or on Contract Drawings):
1. Backfill materials in paved areas or under buildings shall be meet applicable specifications mentioned herein.
  2. Select Fill Material – Select Fill Material (also referred to as Select Borrow Excavation, Select Fill, Select Material or similar) shall be composed of a natural or manufactured mixture of sand, silt and clay combinations or combinations of san, silt, clay, gravel or stone. The material shall have satisfactory cementing qualities, shall be reasonably free of vegetable matter or other deleterious substances that cannot be classed as serviceable, and shall be such that when properly compacted will form a dense mass. Select fill material shall consist of one of the following depending on availability:
    1. Select, non-organic and debris-free silty clays (CL) having a plasticity index within the range of 10 and 24 and a liquid limit less than 45. To be classified as silty clays (CL) the fill materials must have more than 70% fines passing the number 200 sieve.
    2. Material meeting requirements of Class B9 from the latest edition of the Mississippi Standard Specifications for Road and Bridge Construction.
  2. Bedding Materials - Bedding materials shall conform to Mississippi Department of Transportation Department Specifications, Section 703, unless otherwise noted or specified. Shell will not be allowed as bedding material. 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 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 sub-grade and as structural fill/backfill.
  3. Stabilization Materials - Stabilization materials shall be a blended, manufactured aggregate conforming to the requirements for concrete aggregate as stated in ASTM C 33 except for gradation which shall be between sizes 78 and 57 (inclusive) as specified in ASTM D 448.

4. Granular Materials - Granular materials shall conform to Mississippi Department of Transportation Department Specifications Section 703. These materials shall be used for backfilling around the pipes from the bedding materials up to at least 12 inches above the top of the pipes or to sub-grade and in confined areas around structures; these materials may also be used as structural fill/backfill.
5. Usable Excavated Soils - Usable excavated soils, referred to as “usable soils” in Mississippi Department of Transportation Department Specifications, shall conform to silty clays (CL) or silts (ML). These materials can be used for backfill from 12 inches above the top of the pipe up to the surface in unimproved areas.
6. Soil classifications (types) 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 Mississippi Department of Transportation Department designation TR423 or in accordance with the requirements of ASTM D 2321.

B. General:

1. Materials for use as fill and backfill shall be described above. The Contractor shall notify the Engineer of the source of material and shall furnish to the Engineer for testing and approval, a representative sample of each material weighing approximately 20 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 is specified in this Section, see Paragraph 3.08.

## **PART 3 – 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 Classifications: The following clarifications 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 pavements and other obstructions visible on ground surface, underground structures and utilities indicated in soil boring data on subsurface conditions and other materials encountered that are not classified unauthorized excavation.
  2. Unauthorized excavation consists or removal of materials beyond the limits needed to establish required grade and sub-grade 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 materials as specified above shall be used for backfill under 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 un-reinforced as required by the site conditions and as required by the Engineer.

C. Excavation for Piping Under Roadways

1. Sub-grade Requirements for Piping under roadways and trench bottoms:
  - a. Strong, dense, and thoroughly compacted and consolidated per specifications.
  - b. Free from mud, muck and other soft or unsuitable materials.
  - c. Remain firm and intact under all construction operations.
2. Soft Sub-grades: For sub-grades which are otherwise solid, but which become soft or mucky on top due to construction operations, overlay with geotextile fabric prior to placement of crushed stone or gravel. Fabric shall meet requirements of Section 02271.
3. Finished Elevation of Stabilized Sub-grades: Do not place above sub-grade elevations shown.

D. Excavation for Structures:

1. 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.
2. In excavation 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.
3. 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.

E. Additional Structural Excavation:

1. If unsuitable, unsatisfactory bearing materials are encountered at the required sub-grade 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.

F. Pipe Trench Preparation:

1. No more than 200 feet of trench may be opened in advance of pipe laying.
2. Trench width shall be minimized to greatest extent practical but shall conform to the following:

1. Sufficient to provide room for installing, jointing and inspecting piping, but in no case **wider at top of pipe than pipe barrel O.D. plus 3 feet.**
  2. Enlargements at pipe joints may be made if required and approved by Engineer.
  3. Sufficient for sheeting, bracing, sloping, and dewatering.
  4. Sufficient to allow thorough compacting of backfill adjacent to bottom half of pipe.
  5. Do not use excavating equipment which requires the trench to be excavated to excessive width.
3. Depth of trench shall be as shown. If required and approved by Engineer depths may be revised.

### 3.02 FILL PLACEMENT

#### A. General:

1. Material placed in fill areas under and around structures within the pipe trench limits shall be meet the requirements of fill material for the use and 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, stable 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 borrow material 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 will bond with exiting 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. Each layer shall be compacted meeting compaction specifications. During the processes 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 "in-the-dry". The Contractor shall dewater excavated areas and is required to perform the work in such manner as to preserve the undisturbed state of the natural inorganic soils.



### 3.03 COMPACTION

- A. 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. Contractor shall ask Engineer for clarification if there is a conflict between compaction requirements shown on the plans or other contract documents and the compaction requirements shown herein.
- B. 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.
- C. 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. 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.
- D. All testing shall be performed as required by Contract Documents by a testing agency licensed to practice in Mississippi for the particular testing methods.
- E. MINIMUM COMPACTION TESTING FREQUENCY

One test group consists of compaction tests on each layer of fill and backfill material.

Location	Frequency
Buildings and structures	1 test group for every 2,500 square feet
Road	1 test group for every 300 feet of road
Parking Lots	1 test group for every 5,000 square feet
Unpaved areas	1 test group for every 20,000 square feet
*Pipe Trench Under Paved Surface	1 Test group for each pipe run (200' max length)
**Pipe Trench Within 2' of Back of Curb (200' max length)	1 Test group for each portion of pipe run meeting location requirement
Pipe Trench In Open Grass Area	Not Required but compaction requirements shall be met

\*Required testing frequency for a roadway shall be a test where pipe intersects any edge of pavement and another at the centerline of same roadway section. When under a parking lot or a pipe run of over 80', testing frequency shall be 1 test for every 40' of pipe.

\*\*Required testing frequency shall be a 1 test for every 40' of pipe where location requirement is met.

- G. When testing agency reports that sub-grades, fills, or backfills are below specified density, Contractor shall be responsible for implementation of any acceptable procedure necessary to bring material up to requirements. Contractor will be due no additional compensation for his additional efforts.
- H. In the absence of a pre-construction Geotechnical investigation, the Geotechnical testing firm is to perform laboratory Proctor tests to establish a moisture-density relationship for all materials that are proposed to be used as fill.
- I. Contractor shall give a 48-hour notice to Geotechnical testing firm when ready for Proctor, compaction, or sub-grade testing and inspection.

- J. Should any moisture-density test fail to meet specification requirements, the Contractor shall perform corrective work necessary (such as scarify and moisten or aerate, or remove and replace soil to the depth required, re-compact and retest until required density is obtained) to bring the material in compliance and retest the failed area at no additional cost to the Owner.
- K. Percentage of Maximum Density Requirements:
1. Compact soil to not less than the following percentages of maximum dry density as determined in accordance with AASHTO T-180 (ASTM D698).
    - a. Compaction of Backfill for pavements: Where the trench limit falls under the curb/roadway pavement, within two (2) feet of the back of curb/edge of pavement, under areas requiring granular backfill and in other areas designated on the plans where future roadways are to be constructed, the 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 loose compacted thickness and compacted with mechanical tampers or by and satisfactory method or methods that will obtain the density hereinafter specified. The density of compacted material in each layer of backfill shall not be less than ninety-eight percent (98%) of the Standard Proctor maximum dry density.
    - b. Construction of the building pad and 10 feet beyond should be compacted to not less than 100% of the Standard Proctor maximum dry density.
    - c. Bedding Material: Shall be compacted to a minimum of ninety-six percent (96%) of the maximum dry density.
    - d. 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 may 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 but not less than 90%. If the Contractor has to dry the excavated soil to a moisture content below the *in-situ* 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.
- L. Moisture Control: Condition sub-grade 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 sub-grade 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 disking, harrowing or pulverizing to reduce the moisture content to a satisfactory value.

- M. Structural fill and base course in open areas shall be placed in layers not to exceed the thicknesses specified above. 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.
- N. 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. Compaction of the fill by such means shall be to the same degree of compaction as obtained by roller type equipment. Unless Contractor provides tests that indicate otherwise, the fill compacted by mechanical compactors shall be placed in 6-inch layers and thoroughly tamped over their 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 supports 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 are to be laid in bedding or encased in concrete, the trench may be excavated by machinery to or just below the designed sub-grade provided that the material remaining in the bottom of the trench is no more than slightly disturbed.
- C. Where the pipes are to be laid directly on the trench bottom, the lower part of the trenches shall be excavated to grade by machinery. The excavation shall be done in such a manner that will result in a flat bottom true to grade so that pipe or such can be evenly supported on undisturbed material. Bell holes shall be made as required.
- D. Backfilling over the top of 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.
- E. Backfilling over ducts shall begin not less than three (3) 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 by hand shovel with bedding material and thoroughly compacted with a tamper 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. The remainder of the trench shall be compacted per the details and specifications as described above shall be filled with required material and thoroughly compacted to the required density by approved methods to prevent subsequent settling.

### 3.05 SELECT BEDDING/SELECT FILL MATERIAL

- A. General: Furnish, place and compact all backfill with materials as required for embankments and trenches as required per specifications and drawings to provide the finished grades shown and as described herein.
- B. Provide select backfill in the following locations:
  - 1. Support below and around piping and foundations as noted on the Drawings.
  - 2. Sub-grade for roads and pavements.
  - 3. Where shown or directed by ENGINEER.
- C. Restrictions: Backfill excavations as promptly as Work permits, but not until completion of the following:
  - 1. Removal of concrete formwork.
  - 2. Removal of shoring and bracing, and backfilling of voids with satisfactory materials. Cut off temporary sheet piling driven below bottom of structures and remove in manner to prevent settlement of the structure or utilities, or leave in place if required.
  - 3. Removal of trash and debris.
  - 4. Permanent or temporary horizontal bracing is in place on horizontally supported walls.
- D. Placement:
  - 1. Keep excavation dry during backfilling operations. At no time shall water be permitted to stand in the bottom of a trench for more than 24 hours.
  - 2. Bring up backfill evenly on all sides around structures and piping.
  - 3. For embankments it is intended that the elevations, lines, grades and typical sections (after settlement and compaction during construction) shall be those shown on the Drawings.
- E. Pipe Trenches:
  - 1. Place all backfill in pipe trenches in horizontal layers not exceeding 6 inches in depth (loose thickness) and thoroughly compacted before the next layer is placed.
  - 2. Comply with requirements as applicable of Sections that are specific to all types of utility pipe installation (i.e. water, sewer and storm drain).
- F. Moisture:
  - 1. The water content of the fill being compacted shall be within the range of plus/minus 3 percentage points from the optimum moisture content of the material unless otherwise specified.
  - 2. Wet the fill materials during placement to achieve water contents needed for effective compaction.

- G. Unacceptable Material:
1. Do not place or compact fill in a frozen condition or on top of frozen material.
  2. Remove fill containing organic materials or other unacceptable material and replace with approved fill material.
- H. Equipment:
1. Compact fill with equipment suitable for the type of material placed and which is capable of providing the densities required.
  2. Select compaction equipment and submit it and proposed procedure to the Engineer for approval.
- I. Coverage:
1. Compact fill by at least two coverages of all portions of the surface of each lift by compaction equipment.
  2. One coverage is defined as the condition obtained when all portions of the surface of the fill material have been subjected to the direct contact of the compactor.
- J. Compaction: See compaction requirements on drawings and 3.03 of this section.
- K. Inadequate Compaction:
1. If the specified densities are not obtained because of improper control of placement or compaction procedures, or because of inadequate or improperly functioning compaction equipment, Contractor shall perform whatever work is required to provide the required densities at no additional cost to the Owner.
  2. This work includes complete removal of unacceptable fill areas and replacement and re-compaction until acceptable fill is provided.
- L. Settlement:
1. 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.
  2. Make all repairs and replacements necessary within 30 days after notice from the Engineer or Owner.
- M. Disturbed Materials:
1. Provide, place and compact select fill necessary to replace sub-grade materials disturbed and softened as a result of the Contractor's operations or to backfill unauthorized excavation.
  2. Furnish additional fill at Contractor's expense.

### **3.06 BACKFILLING UNDER PAVEMENT AND WALKS**

- A. Compact sub-base and sub-grade courses at optimum moisture content to required grades, lines, cross sections and thickness to not less than 98 percent of ASTM D 698 maximum dry density.

- B. Shape sub-base and base to required crown elevations and cross-slope grades.
- C. When thickness of compacted sub-base or base course is 6 inches or less, place materials in a single layer.
- D. When thickness of compacted sub-base or base course exceeds 6 inches, place materials in equal layers, with no layer more than 6 inches thick or less than 3 inches thick when compacted.

### **3.07 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 variations are shown, or between such points and existing grades as are required or shown on the Drawings.
- B. Compaction: After grading, Compact sub-grade surfaces to the depth and percentage of maximum dry density for each area classification.
- C. 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 Paragraph 3.08. During the process of excavations 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 which may affect the prosecution or condition of the work.
- D. 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.
- E. 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.
- F. All fill slopes shall be uniformly dressed to the slope, cross section and alignment shown on the Drawings, or as directed by the Engineer.
- G. In cuts, all loose material on the back slopes shall be 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.
- H. 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.

### **3.08 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 at no additional cost to the OWNER.
- B. Usable, excavated material may be used for fill or backfill if it meets the specifications and is approved by the Engineer. Excavated materials 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.

### **3.09 SPECIAL FOUNDATIONS (NOT USED)**

### **3.10 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.

## **PART 4 – MEASUREMENT AND PAYMENT**

No separate payment shall be made for Excavation and Backfill for pipes and structures. Payment shall be considered an absorbed cost in the per foot or unit cost of the piping or structure unless noted on the Contract Drawings, on the Proposal or noted in Specific Sections for the particular utility piping or structure that is being installed.

**--END OF SECTION 02230--**

## SECTION 02240 CRUSHED LIMESTONE AND CLAY GRAVEL

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### PART 1 - GENERAL

#### 1.01 SECTION INCLUDES

Work includes providing a gravel surface on a prepared subbase as required for roadways and parking areas.

#### 1.02 REGULATORY REQUIREMENTS

Comply with all applicable codes and with the requirements of agencies having jurisdiction over work in this Section.

#### 1.03 SUBMITTALS

Contractor shall furnish representative samples of the crushed stone or gravel to the Engineer and shall advise of the source location.

#### 1.04 QUALITY ASSURANCE

Tests:

- A. Source Quality Control: Contractor shall be responsible for payment for all testing required to determine acceptability of crushed stone and gravel at the locations where the material is obtained.
- B. Field Quality Control Testing: The Contractor shall retain the services of a qualified testing laboratory to make tests and determine acceptability of the crushed stone and gravel upon delivery to the job site.
- C. Contractor shall give full cooperation to the testing lab personnel so that the required tests can be taken in an efficient and timely manner.

### PART 2 – PRODUCTS

#### 2.01 MATERIALS

- A. Crushed Limestone Base:
  - 1. Crushed Limestone Base: Crushed limestone base shall consist of clean, tough, durable, uncoated fragments free from excess of soft disintegrated pieces.
    - a. The limestone shall meet the gradation and density requirements of Size No. 610 crushed limestone base as defined by the Mississippi Department of Transportation Standard Specifications for Road and Bridge Construction, latest edition, unless otherwise noted on the plans.
  - 2. Clay Gravel: Comply with Mississippi Department of Transportation (MDOT) Standard Specifications for Road and Bridge Construction, latest edition. Clay gravel shall be Class 5, Group C as outlined in Section 703.07 of the MDOT Standard Specifications for Road and Bridge Construction, latest edition.



## **PART 3 – EXECUTION**

### **3.01 EXAMINATION**

Visually determine that project is ready for the work of this Section; beginning work shall indicate acceptance of the conditions.

### **3.02 INSPECTION**

Examine the subgrade on which the aggregate shall be installed and notify the Engineer in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Engineer.

### **3.03 ROADWAY INSTALLATION**

Construct in accordance with the MDOT Standard Specifications for Road and Bridge Construction, latest edition.

## **PART 4 – METHOD OF MEASUREMENT AND PAYMENT**

### **4.01 GENERAL**

No separate payment shall be made for any item necessary for the completion of the work indicated on the Contract Drawings and in the Specifications but not shown as a pay item on the proposal form; therefore, full compensation for these items shall be considered absorbed in the Contract Lump Sum or related pay items.

### **4.02 MEASUREMENT AND PAYMENT**

- A. CRUSHED STONE: Crushed Limestone shall be measured and paid for at the Contract Unit Price bid per square yard for the specified thickness complete in place or when called for in the proposal by plan measure (PM), which shall be full compensation for furnishing all materials, including pit production and royalties, loading, hauling, spreading, mixing, shaping sub-grade and finished product, compacting, watering, and maintenance and for all equipment, tools, labor and incidentals necessary to complete the work.
- B. GRAVEL: Gravel shall be measured and paid for at the Contract Unit Price bid per square yard for the specified thickness complete in place or when called for in the proposal by plan measure (PM), which shall be full compensation for furnishing all materials, including pit production and royalties, loading, hauling, spreading, mixing, shaping sub-grade and finished product, compacting, watering, and maintenance and for all equipment, tools, labor and incidentals necessary to complete the work.
- C. CLAY GRAVEL: Clay Gravel shall be measured and paid for at the Contract Unit Price bid per square yard for the specified thickness complete in place or when called for in the proposal by plan measure (PM), which shall be full compensation for furnishing all materials, including pit production and royalties, loading, hauling, spreading, mixing, shaping sub-grade and finished product, compacting, watering, and maintenance and for all equipment, tools, labor and incidentals necessary to complete the work.

**--END OF SECTION 02240--**

## SECTION 02271 GEOTEXTILE FABRIC

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### PART 1 - GENERAL

- 1.01 DESCRIPTION OF WORK:** The work required under this Section will consist of furnishing and installing geotextile fabric (non-woven or woven as specified) for stabilization of embankments and subgrades as shown on the Plans and in conformance with these Specifications.
- 1.02 SHIPPING AND STORAGE:** During shipping and storage the geotextile fabric shall be protected from direct sunlight, ultraviolet rays, temperatures greater than 140 degrees Fahrenheit, mud, dirt, dust and debris. The fabric shall be wrapped and maintained in a heavy duty protective covering, including both ends of the roll.

### PART 2 – PRODUCTS

- 2.01 GENERAL:** Geotextiles shall conform to the requirements of Section 714.13 , Geotextile Fabrics, of the latest edition of the Mississippi Standard Specifications for Road and Bridge Construction.

### PART 3 – EXECUTION

- 3.01 STORAGE:** Before use, the geotextile shall be stored in a clean, dry location out of direct sunlight, not subject to extremes of either hot or cold temperatures, and with the manufacturer's protective cover undisturbed. Receiving, storage, and handling at the job site shall be in accordance with the requirements listed in ASTM D 4873.
- 3.02 SURFACE PREPARATION:** The surface on which the geotextile is to be placed shall be graded to the neat lines and grades as shown on the drawings. It shall be reasonably smooth and free of loose rock and clods, holes, depressions, projections, muddy conditions, and standing or flowing water.
- 3.03 PLACEMENT**
- A. Before the geotextile is placed, the soil surface will be reviewed for quality assurance of the design and construction. The geotextile shall be placed on the approved prepared surface at the locations and in accordance with the details shown on the drawings and specified in Section 7 of this specification. It shall be unrolled along the placement area and loosely laid, without stretching, in such a manner that it conforms to the surface irregularities when material or gabions are placed on or against it. The geotextile may be folded and overlapped to permit proper placement in designated area(s).
  - B. The geotextile shall be joined by overlapping a minimum of 18 inches (unless otherwise specified) and secured against the underlying foundation material. Securing pins, approved and provided by the geotextile manufacturer, shall be placed along the edge of the panel or roll material to adequately hold it in place during installation. Pins shall be steel or fiberglass formed as a **U**, **L**, or **T** shape or contain "ears" to prevent total penetration through the geotextile. Steel washers shall be provided on all but the **U**-shaped pins. The upstream or upslope geotextile shall overlap the abutting downslope geotextile. At vertical laps, securing pins shall be inserted through the bottom layers along a line through approximately the mid-point of the overlap. At horizontal laps and

across slope labs, securing shall be inserted through the bottom layer only. Securing pins shall be placed along a line about 2 inches in from the edge of the placed geotextile at intervals not to exceed 12 feet unless otherwise specified. Additional pins shall be installed as necessary and where appropriate to prevent any undue slippage or movement of the geotextile. The use of securing pins will be held to the minimum necessary. Pins are to remain in place unless otherwise specified.

- C. Should the geotextile be torn or punctured, or the overlaps or sewn joint disturbed, as evidenced by visible geotextile damage, subgrade pumping, intrusion, or grade distortion, the backfill around the damaged or displaced area shall be removed and restored to the original approved condition. The repair shall consist of a patch of the same type of geotextile being used and overlaying the existing geotextile. When the geotextile seams are required to be sewn, the overlay patch shall extend a minimum of 1 foot beyond the edge of any damaged area and joined by sewing as required for the original geotextile except that the sewing shall be a minimum of 6 inches from the edge of the damaged geotextile. Geotextile panels joined by overlap shall have the patch extend a minimum of 2 feet from the edge of any damaged area.
- D. The geotextile shall not be placed until it can be anchored and protected with the specified covering within 48 hours or protected from exposure to ultraviolet light. In no case shall material be dropped on uncovered geotextile from a height of more than 3 feet.

## **PART 4 – METHOD OF MEASUREMENT AND PAYMENT**

### **4.01 GENERAL**

- A. No separate payment shall be made for any item necessary for the completion of the work indicated on the Contract Drawings and in the Specifications but not shown as a pay item on the proposal form; therefore, full compensation for these items shall be considered absorbed in the Contract Lump Sum or related pay items.
- B. The following provisions apply to all methods of measurement and payment. Compensation for any item of work described in the contract, but not listed in the bid schedule, is included in the payment for the item of work to which it is made subsidiary.

### **4.02 MEASUREMENT AND PAYMENT**

- A. For items of work for which specific unit prices are established in the contract, the quantity of geotextile for each type placed within the specified limits is determined to the nearest specified unit by measurements of the covered surfaces only, disregarding that required for anchorage, seams, and overlaps. Payment is made at the contract unit price. Such payment constitutes full compensation for the completion of the work.
- B. For items of work for which specific lump sum prices are established in the contract, the quantity of geotextile is not measured for payment. Payment for geotextiles is made at the contract lump sum price and constitutes full compensation for the completion of the work.

**--END OF SECTION 02271--**

## SECTION 02280 ESTABLISHMENT OF VEGETATION

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### PART 1 - GENERAL

- 1.01 DESCRIPTION OF WORK:** The work required under this Section will consist of furnishing and sowing seeds of designated types over previously sprigged areas, or on other areas, all in reasonably close conformity with these Specifications and at locations shown on the Plans or as directed. This operation shall include the necessary ground preparation, inoculating leguminous seeds and treating all other seeds with disinfectant protectant, sowing, raking, rolling and compaction seeding to assure the successful germination and growth of the seeds.

The Contractor shall also furnish and incorporate into the soil all designated fertilizers or other soil treatment chemicals necessary to develop and maintain a healthy growth of grass.

### PART 2 – PRODUCTS

#### 2.01 MATERIALS

A. Topsoil:

1. Fertile, friable, natural loam, surface soil, capable of sustaining vigorous plant growth, free of any admixture of subsoil, clods of hard earth, plants or roots, pests or pest larvae, sticks or other extraneous material harmful to plant growth.
2. Organic content shall not be less than 5 percent, as determined by ignition loss.

B. Seed:

1. General: All seed shall meet the requirements of the seed laws of the State of Mississippi in effect at the time of Bidding. All seed shall be tested in accordance with the methods prescribed in the US Department of Agriculture's Circular Number 156" and subsequent revisions thereto. The seed shall be of the best grade and of known vitality, purity and germination. Seed shall be delivered in bags required by law each bag being tagged showing the percent of germination, purity of the seed and the percent of the noxious weeds and inert litter. All seed shall be free of wild onion, Canada thistle and Johnson grass. One pound of seed shall not contain more than three hundred noxious weed seeds. No seed more than one year old shall be used.
2. Purity and Germination: All seeds shall meet the requirements set forth in the US Department of Agriculture's "Circular Number 156" and subsequent revisions thereto. Exceptions will not be allowed except by written permission of the Engineer and then only when sufficient evidence has been obtained that current seed crops will not meet germination requirements. The Contractor shall acquire seed from seed men registered with the Mississippi Department of Agriculture and Commerce. The quantities and kinds of seed to be sown shall be varied with the seasons and the soil types encountered. The Engineer will determine the mixture to be used. The seed mixture shall be in accordance with the Mississippi State Aid Standard Specifications for Road and Bridge Construction. A balanced mixture of legume and grass seed shall be selected on the basis of the type soil encountered. The minimum application rate shall be forty to sixty pounds of seed per acre. Approved seeds shall be treated with leguminous inoculants or disinfectant protectant as hereinafter described. Seeds may either be treated in the field under the supervision of the Engineer or may be purchased in a pretreated condition from a reputable seed house. In the latter case, the vendor will furnish an additional certificate attesting that inoculants and disinfectants use conform to the requirements of the following paragraphs and show the date and time of treating.

3. Leguminous Inoculants: The inoculants for treating seeds shall be standard, pure culture of nitrogen fixing bacteria. The seeds shall be treated according to the directions shown on the container of inoculants and before the expiration date for use of the inoculants also shown on the container.
  4. Seed Disinfectant and Protectant: All seed shall be treated with a seed disinfectant protectant containing active ingredients of not less than seventy-five percent of Thiram. The treatment shall be at the rate of five and one-third ounces of Thiram per one hundred pounds of seed (all types).
- C. Limestone: Agricultural limestone shall contain not less than eighty percent soluble of calcium and magnesium carbonate and shall be ground to a fines so that at least eighty percent will pass a Number 10 mesh sieve or at least ninety percent will pass a Number 8 mesh sieve.
- D. Fertilizers: Fertilizer shall be manufactured standard commercial products complying with the fertilizer law of the State of Mississippi in effect at the time of Bidding and with the requirements and directives issued by the properly constituted authorities.
- E. Vegetative Mulch: The vegetative materials used for mulch shall be clean, seed-free salt hay or threshed straw of wheat, rye, oats or barley, free from noxious weeds. Vegetative straw material shall be bright in color, shall not be musty, moldy, caked or of otherwise low quality. If baled straw is on project and stored for some time before use it shall be covered with a waterproof tarpaulin or approved plastic sheeting to prevent damage. Should a bituminous material be used with the straw mulch as a protective covering on shoulders and slopes the bituminous material shall be emulsified asphalt, grade EA-4. The emulsion may be diluted in ratios of two or three parts water to one part of asphalt emulsion.
- F. Water: Potable.

## **PART 3 – EXECUTION**

### **3.01 INSPECTION**

- A. The Contractor shall notify the Engineer at least forty-eight hours in advance of the time the Contractor begins sowing seed. The Contractor shall not proceed with such work until permission has been received by the Engineer.

### **3.02 SOIL PREPARATION**

- A. Ground preparation shall consist of plowing and pulverizing the area to be planted or seeded. The ground shall be plowed to a depth of not less than four inches for shoulders and fill slopes and not less than six inches for front and back slopes of cuts and borrow pits. After plowing the area shall be thoroughly disked and harrowed until well pulverized to the full depth and shall present a smooth, uniform, loose, well-broken and fine-grained soil with all clods, earth balls, boulders, stumps, large roots or other particles which will interfere with work removed. The Engineer may at his discretion authorize the elimination of ground preparation on shoulders and fill slopes or other areas where the soil is sufficiently loose and pulverized.

When topsoil is to be applied to the area under preparation, the depth of the preparation may be reduced to two inches or, when permitted by the Engineer, the necessary disking and harrowing may be performed after the topsoil has been placed.

If wetting the soil is necessary for proper ground preparation, the Contractor shall supply

sufficient water therefore.

Contractor to take full advantage of the weather and soil conditions as construction schedule allows for obtaining best results.

- B. Apply ground limestone, by machine, at a rate of 1000 lbs/acre over all areas to be planted or seeded, as required, to bring the soil to the required pH. Work lightly into the top 3 inches of topsoil at least five days before applying the commercial fertilizers.
- C. Apply combination fertilizer by machine over all areas to be planted or seeded at a rate as specified below. Fertilizer shall be well pulverized and free of lumps.
- D. Apply commercial fertilizers within 10 days of planting.
- E. Thoroughly and evenly incorporate the fertilizer with the soil to a depth of 3 inches by disking, or other approved method.
  - 1. In areas inaccessible to power equipment, use hand tools.
  - 2. Adjacent to existing trees, adjust depth to avoid disturbing roots.
- F. Grade planting areas to smooth, even surface with loose, uniformly fine texture. Remove all stones and extraneous foreign material in excess of 1-inch diameter. Roll and rake and remove ridges and fill depressions, as required to meet finish grades. Limit fine grading to areas which can be planted immediately after grading.
- G. Moisten prepared planting areas before seeding if soil is dry. Water thoroughly and allow surface moisture to dry before planting. Do not create a muddy soil condition.
- H. Restore planting areas to specified condition if eroded or otherwise disturbed after fine grading and prior to seeding.

### 3.03 INSTALLATION

- A. General: Maintain grade stakes until removal is mutually agreed upon by all parties concerned.
- B. Seeding:
  - 1. Temporary and permanent seeding shall adhere to the following table:

Species	Seeding Rate/Ac	Planting Time	Desired pH Range	Fertilization Rate/Ac
Common Bermuda	15 lbs. alone 10 lbs. in mixture	Mar 1 – July 15 Sept 1 – Nov 30	6-7	600 lbs. 13-13-13
Bahia	40 lbs. alone 30 lbs. in mixture	Mar 1 – July 15 Sept 1 – Nov 30	6-7	600 lbs. 13-13-13
Fescue	40 lbs. alone 30 lbs. in mixture	Sept 1 – Nov 30	6-7	600 lbs. 13-13-13
Sericea Lespedeza	40 lbs.	Mar 1 – July 15 Sept 1 – Nov 30	6-7	400 lbs. 6-24-24
*Ryegrass	30 lbs.	Sept 1 – Nov 30	6-7	600 lbs. 13-13-13

*Crimson Clover	15 lbs.	Sept 1 – Nov 30	6-7	400 lbs. 6-24-24
*Browntop Millet	40 lbs. alone 15 lbs. in mixture	Sept 1 – Nov 30	6-7	600 lbs. 13-13-13
Notes: 1 - * Represent Annual/Temporary seeding 2 – For permanent seeding, annuals can only be used in a mixture with perennials 3 – Mulching is the only option allowed during the months of Dec. through Feb. 4 – See section 02933 for solid sod requirements.				

2. Sow seed using a spreader or seeding machine.
3. Distribute seed evenly over entire area by sowing equal quantity in 2 directions at right angles to each other.
4. Sow not less than the quantity of seed specified.
5. Cultipacker, or approved similar equipment, may be used to cover the seed and to firm the seedbed in one operation. In areas inaccessible to cultipacker:
  - a. Rake the seed lightly into top 1/8 inch of soil, roll in two directions with a water ballast roller, weighing not less than 100 pounds per linear foot.
  - b. Take care during raking that seed is not raked from one spot to another.
6. Protect seeded areas against erosion by spreading specified vegetative mulch within 24 hours of completion of seeding operations.
  - a. Spread anti-erosion vegetative mulch at a rate of 2 tons per acre to form a continuous blanket over seeded areas. The approved equipment for vegetative mulching shall be capable of maintaining a constant air stream which will blow or eject controlled quantities of asphalt coated vegetative material in a uniform pattern. A jet spray nozzle shall be located at or near the discharge spout to apply uniform, controlled amounts of asphalt emulsion to the vegetative material as it is ejected. The amount of asphalt emulsion applied shall be sufficient to provide a spotty tack at the time of mulch placement. A regular pressure type distributor may be used to apply liquid asphalt mulch to the shoulders and slopes. One spray bar may be set to cover area desired and the pump adjusted to distribute 2/10 to 3/10 of a gallon per square yard.
  - b. Mulching shall be uniformly placed. Placement shall begin on the windward side of areas and from top of slopes. In its final placement the mulch shall be loose enough to allow air to circulate but compact enough to partially shade the ground and reduce erosion. Baled material shall be loosened and thoroughly broken before it is fed in the machine to avoid the placement of unbroken clumps.
  - c. Ninety to one hundred and fifty gallons of Emulsified Asphalt will be applied per ton of vegetative mulch and one-tenth per gallon in water build up areas.
7. Prevent damage or staining of construction or other plantings adjacent to mulched areas.
8. Prevent foot or vehicular traffic, or the movement of equipment, over the mulched

area. Reseed areas damaged as a result of such activity.

9. Water seeded areas thoroughly with a fine spray.

C. Reconditioning Existing Turf:

1. Recondition existing turf areas damaged by CONTRACTOR'S operations including storage of materials or equipment and movement of vehicles. Also recondition existing turf areas where minor re-grading is required.
2. Water newly planted areas and keep moist until new turf is established.

### **3.04 MAINTENANCE**

- A. Begin maintenance immediately after planting.
- B. Inspect for germination and growth 7 days after planting. If seed is not germinating or growth is sparse the test soil, fertilize and reseed as directed following same steps as specified.
- C. Contractor shall inspect site after each rainfall and re-grade and reseed all areas where seed has been washed away.
- D. Maintain turf for not less than 60 days and longer as required to establish an acceptable stand, 90% coverage as determined by the Engineer.
- E. Maintain turf by watering, fertilizing, weeding, mowing, trimming and other operations such as rolling re-grading and replanting as required to establish smooth, acceptable turf, free of eroded or bare areas.
1. Cutting Height: Mow turf as soon as there is enough top growth to cut with mower set at the specified height for the principal species planted. Repeat mowing as required to maintain specified height. Do not remove more than 1/3 of grass height. Do not mow when grass is wet. Time initial and subsequent mowings as required to maintain grass at 1-1/2-inch to 2-inch height. Do not mow lower than 1-1/2 inches.
  2. Apply manufactured fertilizer eight weeks after germination at a rate of 100 pounds ammonium nitrate per acre.
  3. After grass has started, reseed repeatedly all areas greater than 8 inches square which fail to show a uniform stand of grass for any reason whatsoever until all areas are covered with a satisfactory stand of grass is achieved, as determined by the Engineer.
- F. Watering: Provide and maintain temporary piping hosing and watering equipment as required to convey water from water sources and to keep turf areas uniformly moist as required for proper growth.

### **3.05 CLEANUP AND PROTECTION**

- A. During landscape work, store materials and equipment where directed. Keep pavements clean and work area in an orderly condition.
- B. Protect landscape work and materials from damage due to operations by other contractors and trades and trespassers. Maintain protection during installation and maintenance periods. Treat, repair or replace damaged turf work as directed.



- C. Remove all rubbish, equipment and rejected materials from the site.
- D. Protection includes all temporary fences, barriers and signs and other work incidental to proper maintenance.

### **3.06 INSPECTION AND ACCEPTANCE**

- A. When the landscape work is completed, including maintenance, the Engineer will make an inspection to determine acceptability.
- B. Seeded turf will be acceptable provided all requirements, including maintenance, have been complied with, and a healthy, uniform, close stand of the specified grass is established, free of weeds, bare spots and surface irregularities. Grassed areas shall have 95% coverage with grasses that were approved to be considered acceptable at time of inspection.
- C. Where inspected landscape work or grassing does not comply with the requirements, Contractor shall replace rejected work and continue specified maintenance until re-inspected by the Engineer and found to be acceptable. Remove rejected plants and materials promptly from the Project site.

## **PART 4 – METHOD OF MEASUREMENT AND PAYMENT**

### **4.01 GENERAL**

No separate payment shall be made for any item necessary for the completion of the work indicated on the Contract Drawings and in the Specifications but not shown as a pay item on the proposal form; therefore, full compensation for these items shall be considered absorbed in the Contract Lump Sum or related pay items.

### **4.02 MEASUREMENT AND PAYMENT**

- A. SEEDING: Seeding shall be measured and paid for at the Contract Unit Price bid per acre which shall be full compensation for furnishing, inoculating, planting and maintaining the seeds until final acceptance of the Contract, for ground preparation, watering, all materials, equipment tools, labor and incidentals necessary to complete the work.
- B. COMMERCIAL FERTILIZER: Commercial Fertilizer shall be measured and paid for at the Contract Unit Price bid per ton (acres covered x specified rate) which shall be full compensation for furnishing and uniformly applying the material over the specified area.
- C. AGRICULTURAL LIMESTONE: Agricultural Limestone shall be measured and paid for at the Contract Unit Price bid per ton (acres covered x specified rate) which shall be full compensation for furnishing and uniformly applying the material over the specified area.

**--END OF SECTION 02280--**

## SECTION 02282 SOLID SODDING

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### PART 1 - GENERAL

- 1.01 DESCRIPTION OF WORK:** The work required under this Section will consist of furnishing and planting Bermuda Grass sod, Centipede sod, Zoysia sod, St. Augustine sod or other approved grass sod to provide complete cover of solid turf having satisfactory growth on all areas shown on the Plans or as designated by the Engineer to be solid sod. Such areas may include ditches, side slopes, back slopes, berms, shoulders, islands, lawns and other designated areas. When sod is to be furnished in areas adjacent to existing grass, the sod type shall always match the existing grass regardless of type. Under typical conditions when not laying adjacent to existing grass Bermuda sod shall be used.

### PART 2 – PRODUCTS

#### 2.01 SOD

- A. Solid sod shall be native Bermuda (common), Centipede, Zoysia, St. Augustine or other approved species and shall be live, fresh, growing grass with at least one and one-half inches of soil adhering firmly to the roots when placed. When sod is to be furnished in areas adjacent to existing grass, the sod type shall always match the existing grass regardless of type. The sod shall be reasonably free from obnoxious weeds or other grasses and shall not contain any matter deleterious to its growth or which might affect its subsistence or hardiness when transplanted. The sod shall be in blocks at least 1' x 1' x 2" and reasonably free from ragged edges.
- B. All sod shall be procured from areas where topsoil is fertile. Such areas shall have been sufficiently grazed or mowed to form a dense turf. After approval, the area from which the sod is to be harvested shall be closely mowed and raked to remove excessive top growth and debris.

- 2.02 FERTILIZER:** Fertilizer used shall be in accordance with Section 02280.

### PART 3 – EXECUTION

#### 3.01 PROCURING AND HANDLING SOD

- A. Approved mechanical devices shall be used for cutting the sod into strips or blocks. Care shall be exercised at all times to retain the native soil on the roots of the sod during the process of excavating, hauling and planting.
- B. The sod blocks or strips shall be transplanted within twenty-four hours from the time of cutting unless they are stacked in a manner satisfactory to the Engineer. All sod in stacks shall be kept moist and protected from exposure to wind, sun and freezing.
- C. In no event shall more than three days elapse between the cutting and planting of the sod.

#### 3.02 GRADING OF THE AREA TO RECEIVE SOLID SODDING

- A. Prior to ground preparation for solid sodding upon any area, all excavating, shaping and dressing of such area shall have been completed in such a manner that the foundation for the sod will have the proper cross section, line and grade. Contractor is to take into account the thickness of the native soil attached to the sod in his grading work to where the sod placement will tie at proper elevation to all structures that will promote positive drainage. After placement, the sod will be flush with or slightly below the adjacent final ground line or structures.

### **3.03 GROUND PREPARATION**

- A. Ground preparation shall consist of plowing or disk-harrowing and thoroughly pulverizing the area to designated to receive solid sodding to a depth of approximately four inches.
- B. Aeration, moistening or otherwise bringing the soil to a suitable condition to receive ground preparation shall be considered as incidental to the Work and will not be measured for separate payment. Areas not containing satisfactory moisture will not be approved by the Engineer for planting.

**3.04 FERTILIZING:** The specified amount of fertilizer shall then be uniformly applied over the surface and raked or harrowed lightly to incorporate it into the prepared soil. After approval by the Engineer of the prepared and fertilized area, sodding shall immediately follow.

**3.05 PLANTING SOD:** The sod shall be placed on the prepared surface with the edges in close contact starting at the lowest point and working upward. All cracks between blocks or rolls of sod shall be closed with small pieces of fresh sod cut to fit. All cracks to small for sod shall receive a light dressing of approved soil. The entire sodding area shall then be compacted with a light roller, hand tamper or other approved equipment and then watered to the satisfaction of the Engineer.

**3.06 LIMITATIONS:** Solid sodding shall be performed only when the weather and soil conditions are suitable for proper placement of sod.

### **3.07 PLANT ESTABLISHMENT**

- A. Plant establishment shall consist of preserving, protecting, replacing, watering, mowing and such other work which may be deemed necessary to keep the sod in satisfactory condition at all times until final acceptance.
- B. The Contractor shall be responsible for the establishment of a satisfactory growth of grass. The Contractor shall water the sod as needed to promote healthy living and growing sod turf.
- C. A satisfactory growth of solid sodding shall be understood to mean a healthy, living and growing grass turf which has been planted on an approved prepared foundation and established in accordance with the requirements of these specifications. Solid sodding so planted and established (which is determined to be dormant at the time of final inspection) will not be expected to show evidence of growing at the time.

## **PART 4 – METHOD OF MEASUREMENT AND PAYMENT**

### **4.01 GENERAL**

No separate payment shall be made for any item necessary for the completion of the work indicated on the Contract Drawings and in the Specifications but not shown as a pay item on the proposal form; therefore, full compensation for these items shall be considered absorbed in the Contract Lump Sum or related pay items.

### **4.02 MEASUREMENT AND PAYMENT**

- A. **SOLID SOD:** Solid Sod shall be measured and paid for at the Contract Unit Price bid per square yard which shall be full compensation for all trenching out, fine grading, ground preparation, for seating the solid sod to the specified location, for backfilling and disposal of surplus materials, for furnishing transporting and planting the sod, for replanting as deemed necessary, for furnishing water and watering, for all other materials, equipment tools, labor and incidentals necessary to complete the work.

**--END OF SECTION 02282--**

## **SECTION 02475 CONCRETE CURBS AND WALKS**

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### **PART 1 - GENERAL**

#### **1.01 DESCRIPTION OF WORK**

The extent of concrete curbs and walks is shown on the drawings.

#### **1.02 QUALITY ASSURANCE**

Comply with local governing regulations, codes and standards if more stringent than herein specified.

### **PART 2 – PRODUCTS**

#### **2.01 FORMS**

- A. Steel, wood, or other suitable material of size and strength to resist movement during concrete placement and to retain horizontal and vertical alignment until removal. Use straight forms, free of distortion and defects. Use flexible spring steel forms to form radius bends as required.
- B. Coat forms with a non-staining form release agent that will not discolor or deface the surface of the concrete.

#### **2.02 WELDED WIRE MESH**

Welded plain cold-drawn steel wire fabric, ASTM A 185. Furnish in flat sheets, not rolls, unless otherwise acceptable to the Engineer.

#### **2.03 REINFORCING BARS**

Deformed steel bars, ASTM A 615, Grade 60, unless otherwise indicated.

#### **2.04 CONCRETE MATERIALS**

Comply with requirements of Section 03300 for concrete materials, admixtures, bonding materials, curing materials, and others as required.

#### **2.05 EXPANSION JOINTS MATERIALS**

Comply with requirements of Section 03300 for pre-formed expansion joint fillers and sealers.

#### **2.06 CONCRETE MIX, DESIGN AND TESTING**

- A. Comply with requirements of Section 03300 for concrete mix design, sampling and testing, and quality control and as herein specified. Design the mix to produce standard weight concrete consisting of Portland cement, aggregate, air-entraining admixture and water to produce the following properties:
  - 1. Compressive Strength: 3500 psi, minimum at 28 days, unless noted otherwise
  - 2. Slump Range: 3" to 5"

3. Air Content: 4% to 7%

## **PART 3 – EXECUTION**

### **3.01 INSPECTION**

Examine areas and conditions under which concrete curbs and walks are to be installed; notify the Contractor in writing of conditions detrimental to proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in an acceptable manner.

### **3.02 SURFACE PREPARATION**

Remove loose material from the compacted sub-base surface immediately before placing concrete. Check for unstable areas and the need for additional compaction. Do not begin concrete work until such conditions have been corrected and are ready to receive concrete.

### **3.03 FORM CONSTRUCTION**

A. Set forms to the required grades and lines, rigidly braced and secured. Install sufficient quantity of forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement. Check completed formwork or grade and alignment to the following tolerances:

1. Top of forms not more than 1/8" in 10'.
2. Vertical face on longitudinal axis, not more than 1/4" in 10'.

B. Clean forms after each use, and coat with form release agent as often as required to ensure separation from concrete without damage.

### **3.04 REINFORCEMENT**

Locate, place and support reinforcement as specified in Section 03300, unless otherwise indicated.

### **3.05 CONCRETE PLACEMENT**

- A. Comply with the requirements of Section 03300 for mixing and placing concrete, and as herein specified.
- B. Do not place concrete until sub-base and forms have been checked by Contractor for line and grade. Moisten sub-base if required to provide a uniform dampened condition at the time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.
- C. Place concrete using methods which prevent segregation of the mix. Consolidate concrete along the face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocation of reinforcing, dowels, and joint devices. Deposit and spread concrete in a continuous operation between transverse joints, as far as possible. If interrupted for more than 1/2 hour, place a construction joint.

### **3.06 JOINTS**

Construction, expansion, and contraction joints shall be true-to-line with face perpendicular to surface of the concrete, unless otherwise indicated. Construct joints at right angles to the center line, unless otherwise indicated. When joining existing concrete structures, place joints to align with previously placed joints, unless otherwise indicated. Where load transfer-slip dowel devices are used, install so that one end of each dowel bar is free to move, as shown on drawings.

#### **3.06.01 CONSTRUCTION JOINTS**

Place construction joints at the end of all pours and at locations where placement operations are stopped for a period of more than 1/2 hour, except where such pours terminate at expansion joints. Construct joints as shown or, if not shown, use standard metal keyway-section forms.

#### **3.06.02 EXPANSION JOINTS**

- A. Provide pre-molded joint filler for expansion joints along curb lines and also where abutting existing concrete curbs or sidewalks, existing pavements (asphalt or concrete), catch basins, manholes, inlets, structures, walks and other fixed objects, unless otherwise indicated. Expansion joints shall be placed at ends of radius points and at intervals not to exceed 40' for straight line curb in between and gutter and at 15' intervals for sidewalks unless otherwise noted on the drawings.
- B. Extend joint fillers full width and depth of joint, and not less than 1/2" or more than 1" below finished surface where joint sealer is indicated. If no joint sealer is specified, place top of joint filler flush with finished concrete surface. Furnish joint fillers in one piece lengths for the full width being placed wherever possible.
- C. Where more than one length is required, lace or clip joint filler sections together. Protect the top edge of the joint filler during concrete placement with a metal cap or other temporary material. Remove protection after concrete has been placed on both sides of joint.

#### **3.06.03 CONTRACTION JOINTS**

- A. Contraction joints (also referred to as control joints) shall be required at 10' intervals along curb and gutter and 5' minimum intervals along sidewalks unless otherwise shown on the drawings or as directed by the Engineer.
- B. Contraction joints shall be installed at the proper curing time with proper equipment to leave the finished surface along the joints looking smooth and free from chipping or other defects.
- C. Contraction joints shall be true-to-line and at right angles to the centerline of roadway or back of cured for sidewalks (if present) unless otherwise indicated.
- D. Contraction joints shall be tooled 1/4" wide and 1" deep for curbs and 1/4" wide and 1/4 of the thickness of the sidewalk. Contractor shall request permission from Engineer if his intent is to sawcut joints.
- E. Contraction joints that are not straight, are chipped or have other irregularities that compromise the look of the finished surface in the opinion of the owner shall be rejected by the Owner/Engineer and replaced by Contractor at the Contractor's expense.

#### **3.07.03 ISOLATION JOINTS**

- A. Provide pre-molded joint filler for isolation joints where abutting existing concrete curbs or sidewalks, existing pavements (asphalt or concrete), catch basins, manholes, inlets, structures, walks and other fixed objects, unless otherwise indicated.
- B. Extend joint fillers full width and depth of joint, and not less than 1/2" or more than 1" below finished surface where joint sealer is indicated. If no joint sealer is specified, place top of joint filler flush with finished concrete surface. Furnish joint fillers in one piece lengths for the full width being placed wherever possible.
- C. Where more than one length is required, lace or clip joint filler sections together. Protect the top edge of the joint filler during concrete placement with a metal cap or other temporary material. Remove protection after concrete has been placed on both sides of joint.

### **3.07 FILLERS AND SEALANTS**

Comply with the requirements of Section 03300 of these specifications for preparation of joints, materials, installation, and performance, and as herein specified.

### **3.08 CONCRETE FINISHING**

- A. After striking-off and consolidating concrete, smooth the surface by screeding and floating. Use hand methods only where mechanical floating is not possible. Adjust the floating to compare the surface and produce a uniform texture. After floating, test surface for trueness with a 10' straight edge. Distribute concrete as required to remove surface irregularities, and re-float repaired areas to provide a continuous smooth finish.
- B. Work edges of slabs, gutters, back top edge of curb, and formed joints with an edging tool, and round to 1/2" radius, unless otherwise indicated. Eliminate any tool marks on concrete surface.
- C. After completion of floating and when excess moisture or surface sheen has disappeared, complete surface finishing, as follows: Broom finish, by drawing a fine-hair broom across concrete surface, perpendicular to line of traffic. Repeat operation if required to provide a fine line texture acceptable to Engineer.
- D. Do not remove forms for 24 hours after concrete has been placed. After form removal, clean ends of joints and point-up any minor honeycombed areas. Remove and replace areas or sections with major defects, as directed by Engineer.

### **3.09 CURING**

Protect and cure finished concrete, complying with applicable requirements of Section 03300. Use moist-curing methods for initial curing whenever possible.

### **3.10 REPAIRS AND PROTECTION**

- A. Repair or replace broken or defective concrete as directed by Engineer.
- B. Protect concrete from damage until acceptance of work.

**--END OF SECTION 02475--**



## SECTION 02500 ASPHALT PAVING

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### PART 1 - GENERAL

#### 1.01 DESCRIPTION OF WORK

- A. In accordance with the requirements of this section, the Contractor shall manufacture, haul, place, compact and test bituminous base, leveling and surface courses to the lines, grades, typical cross-sections and thicknesses shown on the Plans.
- B. Prepared sub-base as specified Section 02220 "Excavation and Embankment".
- C. Proof rolling of prepared sub-base is included in this Section.
- D. It is the intent that all paving materials and installation procedures comply with applicable sections of the following:
  - 1. For millimeter (mm) mixes – The latest edition of the Mississippi Standard Specifications for Road and Bridge Construction.
  - 2. For BB-1 & SC-1 mixes – The 1990 edition of the Mississippi Standard Specifications for Road and Bridge Construction.
- E. Traffic control for all paving operations shall be the responsibility of the contractor and shall be placed in accordance with the latest edition of the MUTCD and MDOT Standard Details. Traffic Control shall be an absorbed cost unless otherwise noted or there is a pay item for Traffic Control on the Bid Schedule/Proposal Form.

#### 1.02 SUBMITTALS

- A. At least ten (10) days prior to the start of work the Contractor shall submit for approval to the Engineer a proposed job mix formula (JMF) signed by an MDOT Certified Mixture Design Technician and a letter accommodating mixture design stating that the proposed material meets the requirements of these specifications
- B. The contractor shall provide the Engineer Material Certificates signed by material producer and Contractor, with a statement for certifying that each material item complies with or exceeds specified requirements.

#### 1.03 SITE CONDITIONS

- A. Weather Limitations: Construct hot mix asphalt surface and base courses per Section 401.03.1.1 of the Mississippi Standard Specifications for Road and Bridge Construction, latest edition.
- B. Construct hot-mixed asphalt surface course and leveling course when base is dry.
- C. Grade Control: Establish and maintain required lines and elevations as indicated on the drawings.
- D. Traffic Control: The work shall be carried out at all times in a manner causing a minimum interference with traffic. The Contractor shall provide necessary barricades, warning signs, lights, and flag persons in accordance with the guidelines of the latest edition of

the MUTCD to safely expedite the movement of traffic. The Contractor shall barricade or divert traffic from all paving laid until it has cooled for a sufficient period of time to prevent scuffing or flushing of the asphalt surface where possible.

#### 1.04 CLASSIFICATION OF BITUMINOUS COURSES

- A. Base Course: Defined as the initial layer or layers placed on a prepared subgrade or subbase. The Base Course Mix shall be as described on the Proposal Form.
- B. Leveling Course: Defined as a layer of variable thickness used to eliminate irregularities in contour of an existing surface prior to superimposed treatment or construction. The Leveling Course Mix shall be as described on the Proposal Form. Leveling Course may also be described as pre-leveling.
- C. Surface Course: Defined as the finishing or wearing course of the asphalt pavement. The surface course must have the following characteristics and perform the following functions: 1) provide smooth, quiet surface for travel, 2) be resistant to the wear of traffic, 3) be highly stable to resist rutting, shoving or other surface deformations, 4) have a high coefficient of friction to resist skidding and provide proper traction and 5) be of sufficient density to be waterproof to retard weathering and prevent damage from freezing and thawing cycles. The Surface Course Mix shall be as described on the Proposal Form.

#### 1.05 TESTING

The Owner will pay for the services of an independent commercial laboratory (selected by the Engineer) to perform all testing required per the Contract Documents.

### PART 2 – PRODUCTS

#### 2.01 MATERIALS

- A. Plant Mix: The bituminous mixture shall comply with Sections 301, 400 and 403 (and all referenced sections thereto) of the Mississippi Department of Transportation's Standard Specifications. The applicable provisions governing materials furnished and incorporated into each type of bituminous course shall adhere strictly to the approved submittal for the job mix formula. Plant mix asphalt mixtures will meet the following production and testing requirements:

- 1. Plant Mix (Hot Mix) Asphalt Gradations Master Design Requirements:

SIEVE SIZE	BASE COURSE (BB-1, TYPE 6)	WEARING COURSE (SC-1, TYPE 8)
1-1/2 INCH		100
1 INCH	83-100	
1/2 INCH	56-95	100
3/8 INCH		87-100
NO. 4	29-70	54-80
NO. 8	19-54	32-63
NO. 30	8-30	12-33
NO. 50	4-20	6-20
NO. 200	2-10	2-10

- 2. Hot Mix Asphalt Design Requirements:

Marshall Compaction Blows – 75 blows (MT-35)

3. Hot Mix Asphalt Mixture Requirements:

	BASE COURSE (BB-1, TYPE 6)	WEARING COURSE (SC-1, TYPE 8)
STABILITY (LBS)	1400 (MIN)	1500 (MIN)
TOTAL AIR VOIDS (%)	3.0-5.0	3.0-5.0
VMA (%)	12.0 (MIN)	15.0 (MIN)
TENSILE STRENGTH RATIO (%)	85 (MIN)	85 (MIN)
HYDRATED LIME (%)	1	1
MINIMUM ASPHALT CONTENT (%)	4	4
CRUSHED LIMESTONE CONENT (%)	0	20-30
FRACTURED FACES + NO. 4 SIEVE	70 (MIN)	90 (MIN) (2 FACES)
NATURAL SAND CONTENT (%)	20 (MAX)	20 (MAX)
RAP MATERIAL (%)	30 (MAX)	15 (MAX)

- B. Prime Coat: The bituminous material used as a prime coat shall comply with Section 408 (and all referenced Sections thereto) of the Mississippi Department of Transportation's Standard Specifications.
- C. Tack Coat: The bituminous material used as a tack coat shall comply with Section 407 (and all referenced Sections thereto) of the Mississippi Department of Transportation's Standard Specifications.
- D. Herbicide Treatment: Apply chemical weed control agent in strict compliance with manufacturer's recommended dosages and application instructions. Apply to compacted, dry sub-base prior to application of prime coat.

## PART 3 – EXECUTION

### 3.01 SURFACE PREPARATION

- A. General: Remove loose material from compacted sub-base surface immediately before application of herbicide treatment or prime coat.
- B. A proof-roll of the prepared sub-base to check for unstable areas and areas requiring additional compaction shall be performed under the supervision of the Engineer. Proof-roll shall be performed by a fully loaded dump truck or other approved vehicle such as a motor grader. Should proof rolling indicate soft conditions (pumping) then the Contractor, at his expense, shall excavate these areas as directed by the Engineer and replace with compacted material meeting the requirements of select borrow material for the project. Contractor shall perform his own proof-roll inspection on prepared areas and fix soft areas prior to contacting Engineer for inspection. Contractor to notify Engineer a minimum of 48 hours prior to proof roll for scheduling.
- C. Do not begin paving work until all deficient sub-base areas to receive paving have been corrected and the Engineer has given the Contractor a verbal or written notice to proceed.
- D. Herbicide Treatment: Apply chemical weed control agent in strict compliance with manufacturer's recommended dosages and application instructions. Apply to compacted, dry sub-base prior to application of prime coat. Herbicide must be re-applied should it rain within 8 hours of installation.

- E. Prime Coat: Apply at rate of 0.20 to 0.50 gallons per square yard, over compacted sub-base in compliance with Section 408 (and all referenced Sections thereto) of the Mississippi Department of Transportation's Standard Specifications, unless otherwise noted.
- F. Tack Coat: Apply to contact surfaces of previously constructed asphalt or Portland cement concrete and surfaces abutting or projecting into hot-mixed asphalt pavement. Distribute at rate of 0.05 to 0.10 gallons per square yard of surface. Apply in compliance with Section 407 (and all referenced Sections thereto) of the Mississippi Department of Transportation's Standard Specifications, unless otherwise noted. Pools of primer material after application shall be removed. All traffic not essential to the work shall be kept off the tack coat. Care shall be taken when applying tack coat to prohibit the spray from adhering to any objects other than the surface to be paved. The Contractor will be held responsible for removing the tack coat from such objects. Tack coat shall only be applied to surfaces which are to receive paving that day.
- G. Allow all treatments to dry until at proper condition to receive paving.
- H. Exercise care in applying bituminous materials to avoid smearing of adjoining concrete surfaces. Remove or clean damaged surfaces.

### **3.02 MILLING**

Cold milling of old bituminous or concrete surfaces may be necessary for any of the following reasons: get existing roadway to grade required of the plans in preparation for new pavement lifts; accommodate a smooth transition at hard surface driveways; to remove material up against structures which are to remain in place to maintain the existing distance between the finished surface and top of the structure; remove deteriorated pavement; or to remove a high spot in existing asphalt. The Contractor shall mill a minimum of 1-1/2" or as required per the plans or as designated by the Engineer.

### **3.03 PLACING MIX**

- A. Construct leveling course, binder course, base course and surface course as required on Contract Drawings in accordance with Section 401, 403 and all other applicable sections of the Mississippi Standard Specifications for Road and Bridge Construction, latest edition.
- B. Place each course to required grade, cross-section, and compacted thickness as required on the contract drawings. Leveling course shall be applied as necessary to raise grade of existing pavements to allow for uniform thickness and width of the next paving course.
- C. Immediately correct surface irregularities in finish course behind paver. Remove excess material forming high spots with shovel or lute.
- D. Joints: Make joints between old and new pavements, or between successive days work, to ensure continuous bond between adjoining work. Construct joints to have same texture density, and smoothness as other sections of hot-mixed asphalt course. Clean contact surfaces and apply tack coat.
- E. Paving equipment includes bituminous pavers, rolling equipment and hand tools.
- F. Placing the mixes including paver placing, hand placing, spreading, tamping and jointing.
- G. Compacting the mixes includes breakdown rolling, second rolling and finishing rolling.

### **3.04 ROLLING**

- A. Perform rolling in accordance with the Mississippi Standard Specifications for Road and Bridge Construction, latest edition.
- B. Begin rolling when mixture will bear roller weight without excessive displacement.
- C. Compact mixture with hot hand tampers or vibrating plate compactors in areas inaccessible to rollers.
- D. Breakdown Rolling: Accomplish breakdown or initial rolling immediately following rolling of joints and outside edge. Check surface after breakdown rolling and repair displaced areas by loosening and filling, if required, with hot material.
- E. Second Rolling: Follow breakdown rolling as soon as possible, while mixture is hot. Continue second rolling until mixture has been evenly compacted.
- F. Finish Rolling: Perform finish rolling while mixture is still warm enough (180 degrees F) for removal of roller marks. Continue rolling until roller marks are eliminated and course has attained 95 percent laboratory density based on AASHTO Designation T209 and the surface is smooth.
- G. Protection: After final rolling, do not permit vehicular traffic until mixture has cooled sufficiently to prevent damage.

### **3.05 PATCHING FAILED/DETERIORATED AREAS**

- A. Remove and replace all areas deemed as failed or deteriorated by the Engineer.
- B. Areas removed shall be saw cut along edges at least 2' beyond the limits of the marked defective area.
- C. Once pavement material has been removed, excavate material to grade that is 18" below the previous finished road grade or 12" below the bottom of the remaining pavement structure, whichever is greater.
- D. Engineer may require Contractor to excavate below required minimum if stable surface is not reached and replaced with crushed limestone or select borrow material. In this case, the Contractor shall be paid for his extra work in this case only under some combination of the following pay items to the benefit of the Owner: Undercut Excavation, Unclassified Excavation, Common Excavation, Select Borrow Material, Crushed Limestone, or Granular Material depending on the pay items associated with the project.
- E. Fill excavated or remaining void with No. 610 crushed limestone to bottom of existing paved surface or 6" below previous finished road grade.
- F. Fill to existing surface with hot bituminous surface course. Surface course shall be either SC-1, Type 8 or 12.5mm mix as required to match proposed surface course or existing adjacent final surface material.
- G. If there will be traffic on the area of removal prior to asphalt pavement being installed the Contractor shall install a temporary layer of crushed limestone up to the grade of the adjacent pavement. Contractor shall place additional material as necessary to maintain

grade until asphalt pavement can be installed.

- H. All material removed (pavement, crushed stone, soil, etc.) shall be disposed of by the Contractor off-site and shall be absorbed cost unless otherwise noted on the plans.
- I. All materials and placement of such shall meet the requirements shown on the plans, in the project specifications and if not listed in either, per the Mississippi Standard Specifications for Road and Bridge Construction, latest edition.
- J. Contractor shall restore all existing paved areas that are to remain but are damaged by his operations in a manner acceptable to the Engineer.

### **3.06 PAVEMENT QUALITY REQUIREMENTS**

- A. In addition to other requirements the Contractor will comply with the following minimum requirements.
  - 1. Provide final surfaces of uniform texture, conforming to the required grades and cross sections
  - 2. Repair holes from test specimens as specified for patching defective work
- B. Density
  - 1. Contractor will compare the density of in-place material against laboratory specimen or certificates on same bituminous concrete mixture using nuclear devices.
  - 2. Minimum acceptable density of in-place course material will be 90 percent of the recorded laboratory specimen or certified density. Maximum acceptable density will be 98 percent.
- C. Thickness: In-place compacted thicknesses shall average not less than the thicknesses shown on the Drawings.
- D. Rideability and Surface Smoothness
  - 1. Owner's acceptance of finished paved surfaces shall be determined by the overall rideability of the paved surface (in the Owner's opinion) and by surface smoothness testing. This testing shall be as follows and is independent of any requirements of the Mississippi Standard Specifications for Road and Bridge Construction unless otherwise noted.
  - 2. Surface smoothness testing and smoothness requirements shown below shall apply to all final surface lifts of new pavements and overlays (including single lift overlays). Contractor shall analyze each lift of underlying pavement or existing pavements if single lift overlay to either: a) perform corrective measures so that finished roadway surface will provide a smooth ride (rideability) and smoothness requirements herein can be met, or b) ensure that underlaying pavement placement does not prohibit conformance with requirements herein for rideability and smoothness.
  - 3. Engineer shall only test final surface course for smoothness. This test shall be performed using a 10-foot straightedge applied parallel to and at right angles to

the centerline of paved areas. Initial tests shall be performed at 200' intervals and any additional areas suspected by Engineer to not meet specification. Once initial testing is complete, Engineer shall determine:

- a. If the project appears to meet smoothness specification, or
  - b. If additional straight edge testing shall be performed at smaller intervals, or
  - c. If a more detailed smoothness test is warranted such as High Speed Inertial Profiling System (IPS) or some other MDOT approved method at the Contractor's expense. Smoothness in such cases shall be determined using MDOT requirements for type of paving installed.
4. Surfaces will not be acceptable if exceeding the following when tested with the straight edge test: Surface Course: 1/8 inch in 10 feet
  5. Surfaces that do not meet rideability and smoothness requirements shall be rejected by Owner and corrected by the Contractor at no cost to the owner. Corrective methods shall be as required by Engineer. Corrective measures may include diamond grinding of high spots and sealed to closely match color of remaining roadway or some combination of mill and overlay.

### **3.07 CLEANING AND PROTECTION**

- A. After completion of pavement operations, clean surfaces of excess or spilled bituminous materials and all foreign matter.
- B. Protect newly finished pavement until it has become properly hardened by cooling.
- C. Cover openings of any drainage structures located in the pavement until the permanent covers are installed.

### **3.08 TRAFFIC AND LANE MARKINGS**

- A. Contractor shall be responsible to temporary stripe all areas where new asphalt has been placed with paint. Markings shall match the existing markings in type, width and color.
- B. Traffic and lane markings materials and installation procedures shall be in accordance with Section 625 if specified as "painted traffic markings" and 626 if specified as "thermoplastic traffic markings" of the Mississippi Standard Specifications for Road and Bridge Construction, latest edition.

### **3.09 FIELD QUALITY CONTROL**

- A. General: Testing in-place hot-mixed asphalt courses for compliance with requirements for thickness and density will be done by the selected testing laboratory at intervals required per specifications or as directed by Engineer. Repair or remove and replace unacceptable paving as directed by Engineer at no cost to the Owner.
- B. Thickness: Shall comply with the project drawings and Sections 301 and 403 of the Mississippi Standard Specifications for Road and Bridge Construction, latest edition.
- C. Surface Smoothness for Underlying Pavements: Shall be as required to meet requirements for final surface smoothness.

- D. Surface Smoothness for Final Surface Course: Shall be as required in Section 02500.03.06.D above.
- E. Bituminous asphalt materials testing requirements include, at a minimum, determination of mixture gradation, total voids, VNA, asphalt content, maximum specific gravity of the mixture, Marshall Stability and roadway density tests. These test samples shall be randomly taken at the HMA production plant or at the placement site during production. An MDOT Certified Asphalt Technician 1 shall run this quality control test. At least one quality control sample shall be obtained and tested bi-weekly or at intervals determined by the County. The Contractor shall report all quality control tests to the Engineer. While the Contractor is responsible for production quality control of the bituminous asphalt; the Owner/Engineer may obtain and test asphalt samples on a random basis during production.
- F. A minimum of 5 roadway density tests shall be conducted for each day's production. Acceptance procedures for asphalt densities be per Section 401 Mississippi Standard Specifications for Road and Bridge Construction, latest edition.

## **PART 4 - COMPENSATION**

### **4.01 GENERAL**

- A. Items which are not shown as separate pay items on the proposal form but are necessary for complete installation of the project in accordance with the Contract Documents shall be considered and absorbed cost and included in the Contract Price.
- B. Scheduled price for each individual pay item shall constitute full compensation for furnishing all labor, tools, equipment and incidentals in performing all work necessary for complete installation in accordance with the Contract Documents of that pay item.

### **4.02 MEASUREMENT AND PAYMENT**

- A. Bituminous Pavement Courses: Measurement and Payment for bituminous courses (leveling course, binder course, base course, surface course, etc.) shall be made at the Contract Unit Price per square yard or ton. In computing the square yards the width shall be from the outside of the completed surface as shown on the plans. In computing the tons the following formula is used:  $\text{s.y. (measured as described)} \times \text{thickness (in.)} \times (110\text{lbs/sy/in}) / 2000\text{lbs./ton}$ . No additional payment will be made for material applied in excess of the quantity when bids are taken on a square yard basis unless there is an increase in the area to receive asphalt by the Owner or Engineer. No allowances will be made for unacceptable material, for material used in excess of the amount indicated or directed, for material used in replacing defective or condemned construction, for material wasted in handling, hauling or otherwise, and for maintaining the work in accordance with the provisions and requirements set forth herein.
- B. Cold Milling of Bituminous Pavement: Measurement and payment for Cold Milling of Bituminous Pavements shall be made at the Contract Unit Price per square yard and shall include removal and disposal of all thicknesses required.
- C. Base Repair or Failed Pavement Repair.: Measurement and payment for Base Repair or Failed Pavement Repair shall be made at the contract unit price per square yard and shall include saw-cutting, removal and disposal of existing pavement, excavation to get to required grade and disposal of such, crushed limestone (permanent and extra if required), and asphalt.
- D. Pavement Markings: Measurement and payment for Pavement Markings (paint and thermoplastic) shall be made at the Contract Unit Price per mile, linear foot or square yard, as applicable, for the type, color and width required per the plans and contract documents.



**--END OF SECTION 02500--**

## **SECTION 02580 PAVEMENT MARKINGS**

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### **PART 1 – GENERAL**

#### **1.01 RELATED DOCUMENTS**

Drawings and general provisions of the Contract, including the General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

#### **1.02 SUMMARY**

Application of permanent reflective pavement marking traffic paint, thermoplastic, glass beads, and reflective markers as indicated on the Drawings.

#### **1.03 REGULATORY REQUIREMENTS**

Comply with all applicable codes and with the requirements of agencies having jurisdiction over the work in this Section.

### **PART 2 – PRODUCTS**

#### **2.01 QUALITY ASSURANCE**

- A. Use material and application methods complying with Mississippi Department of Transportation (MDOT) Standard Specifications for Road and Bridge Construction, latest edition, (hereinafter referred to as the MDOT Standard Specifications) and the Manual on Uniform Traffic Control Devices.
- B. Submit certificates stating materials meet the MDOT Standard Specifications 625, 626, 710 and 720 depending on the type of pavement markings required per the plans.

#### **2.02 MATERIALS**

- A. Painted pavement markings shall meet the requirements of Sections 625 & 710 of the MDOT Standard Specifications.
- B. Pavement markings shall meet requirements for thermoplastic markings as set forth in Section 626 & 720 of the MDOT Standard Specifications.
- C. Markers: Reflectorized pavement markers meeting the requirements of Section 720 of the MDOT Standard Specifications.

### **PART 3 – EXECUTION**

#### **3.01 EXAMINATION**

Visually determine that the project is ready for the work of this Section; beginning work shall indicate acceptance of the conditions.

#### **3.02 INSTALLATION**

- A. Pavement markings shall be installed in accordance with the MDOT Standard Specifications.
- B. Do not apply traffic and lane markings until layout and placement have been verified by the Engineer.
- C. Temporary pavement markings shall be required on roadways where the asphalt curing time required by MDOT specifications is not able to be met prior to allowing traffic on the new paving. Temporary pavement markings and removal of such if required prior to permanent striping shall be considered an absorbed cost unless shown as a separate pay item.

**--END OF SECTION 02580—**

## **SECTION 02620 TRAFFIC SIGNAL INSTALLATION**

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### **PART 1 - GENERAL REQUIREMENTS**

This part of the special provisions consists of the general requirements necessary when furnishing a traffic signal installation complete, in place and operative as described in the project and plans and these special provisions. Any reference in this specification to a particular section of the Mississippi Standard Specifications for Road and Bridge Construction, Latest Edition, shall also include any special provisions which may apply to the associated item of work, and no specific specification reference shall relieve the Contractor of obligations to any other specifications within the Mississippi Standard Specifications for Road and Bridge Construction, Latest Edition which may apply.

#### **1.01 TRAFFIC SIGNAL SYSTEMS**

All traffic signal systems should be in accordance with the Mississippi Standard Specifications for Road and Bridge Construction, Latest Edition, Section 634.

#### **1.02 LOCAL AND STATE REQUIREMENTS**

Local and state requirements such as requiring the Contractor to be a licensed electrical contractor in accordance with a City Ordinance, State of Mississippi laws, etc. shall be met. Also, adherence to the local building code will be required.

#### **1.03 RIGHT OF WAY**

The Contractor shall confine his construction operations to the right-of-way, and shall use due care in placing construction tools, equipment, excavated materials, construction materials and supplies, so as to cause the least possible damage to property. The Contractor shall promptly repair at his own expense any such damages which may occur.

### **PART 2 - MATERIALS AND EQUIPMENT REQUIREMENTS**

#### **2.01 GENERAL**

- A. All materials used in the fabrication or assembly of the items listed below shall comply with the applicable parts of Section 722 "Materials for Traffic Signal Installation" of the Mississippi Standard Specifications for Road and Bridge Construction, Latest Edition, with the additions as stated herein.
- B. The traffic signal system shall be complete, and the Contractor shall furnish and install all equipment necessary for the satisfactory operation of electrical apparatus and for the complete operation of the traffic signal system whether specifically mentioned or not.

#### **2.02 VEHICLE LOOP ASSEMBLIES**

Vehicle loop assemblies shall be provided in accordance with Section 640 of the Mississippi Standard Specifications for Road and Bridge Construction, Latest Edition.

#### **2.03 SHIELDED CABLE**

Shielded Cable of the type specified shall be provided in accordance with Section 640 of the Mississippi Standard Specifications for Road and Bridge Construction, Latest Edition.

## **2.04 EQUIPMENT CABINETS**

Equipment cabinets required for the normal operation of the proposed traffic signal equipment, including the controller and radio equipment required for communication with existing adjacent traffic signals as specified on the Project Drawings, shall be provided in accordance with Section 632 of the Mississippi Standard Specifications for Road and Bridge Construction, Latest Edition.

## **2.05 LOOP DETECTOR AMPLIFIERS**

Loop detector amplifiers of the type specified shall be provided in accordance with Section 640 of the Mississippi Standard Specifications for Road and Bridge Construction, Latest Edition.

## **2.06 TRAFFIC SIGNAL EQUIPMENT POLES**

- A. Traffic signal equipment poles of the type specified shall be provided in accordance with Section 634 of the Mississippi Standard Specifications for Road and Bridge Construction, Latest Edition.
- B. Traffic signal equipment poles shall be painted. Paint colors shall match existing traffic signal equipment poles within the City of Flowood and shall be approved by the Owner. Paint color and specifications, in accordance with the Standard Specifications for Road and Bridge Construction, Latest Edition, shall be submitted to the Engineer prior to the ordering of the equipment poles.
- C. Mast arms shall be installed to provide a minimum of 18 feet clearance between the bottom of the traffic signal heads and the top of the road surface.

## **2.07 TRAFFIC SIGNAL HEADS**

- A. Traffic signal heads of the type specified shall be provided in accordance with Section 635 of the Mississippi Standard Specifications for Road and Bridge Construction, Latest Edition.

## **2.08 SOLID STATE TRAFFIC ACTUATED CONTROLLERS**

- A. Solid state actuated controllers of the type specified shall be provided in accordance with Section 632 of the Mississippi Standard Specifications for Road and Bridge Construction, Latest Edition.

## **2.09 OPTICAL EMERGENCY VEHICLE PRIORITY CONTROL SYSTEM**

- A. Equipment required for optical emergency vehicle priority control systems, including optical emitter assemblies, optical detectors, optical detector cable and traffic signal phase selection system of the types specified shall be provided in accordance with Section 639 of the Mississippi Standard Specifications for Road and Bridge Construction, Latest Edition.

## **2.10 REMOVAL OF EXISTING TRAFFIC SIGNAL EQUIPMENT**

- A. Any work required consisting of removing existing traffic control equipment shall comply with Section 647 of the Mississippi Standard Specifications for Road and Bridge Construction, Latest Edition.

## **2.11 PULL BOXES**

- A. Pull boxes of the type specified shall be provided in accordance with Section 637 of the Mississippi Standard Specifications for Road and Bridge Construction, Latest Edition.

## **2.12 RADIO INTERCONNECT**

- A. Equipment and work performed for adding radio interconnect capabilities to local and master controller locations shall be provided in accordance with Section 662 of the Mississippi Standard Specifications for Road and Bridge Construction, Latest Edition.

## **2.13 TRAFFIC AND STREET NAME SIGNS**

- A. Traffic and street name signs of the type specified shall be provided in accordance with Section 646 of the Mississippi Standard Specifications for Road and Bridge Construction, Latest Edition.

## **2.14 FIBEROPTIC CABLE (OSP)**

- A. Fiber optic cable of the type specified shall be provided in accordance with Section 661 of the Mississippi Standard Specifications for Road and Bridge Construction, Latest Edition.

## **2.15 ELECTRIC CABLE**

- A. Electric cable of the type specified shall be provided in accordance with Section 636 of the Mississippi Standard Specifications for Road and Bridge Construction, Latest Edition.

## **2.16 TRAFFIC SIGNAL CONDUIT**

- A. Traffic signal conduit of the type specified shall be provided in accordance with Section 637 of the Mississippi Standard Specifications for Road and Bridge Construction, Latest Edition.

# **PART 3 – MEASUREMENT AND PAYMENT**

## **3.01 GENERAL**

- A. All items related to furnishing, labor, installing and completing all work related to the traffic signal installation shall be measured in accordance with the respective sections of the Mississippi Standard Specifications for Road and Bridge Construction, Latest edition, as identified herein.
- B. All equipment, labor and other means required for the traffic signal installation that are not included in the bid form shall be cost absorbed. These items include, but are not limited to, equipment cabinets, radio interconnects, radio equipment/controllers, antennas, phone lines, modems, excavation and materials for equipment pole foundations, etc. and shall be provided in accordance with the Mississippi Standard Specifications for Road and Bridge Construction, Latest edition.
- C. Items listed on the bid form shall be paid for in accordance with the basis of payment for each respective section of the Mississippi Standard Specifications for Road and Bridge Construction, Latest edition, and shall be paid for at the contract unit price per unit of measurement, including the following:
  - 1. Vehicle loop assemblies – per linear foot.
  - 2. Shielded cable – per linear foot.
  - 3. Loop detector amplifier – per each
  - 4. Traffic signal equipment poles – per each
  - 5. Traffic signal heads – per each
  - 6. Actuated traffic controller – per each

7. Optical detector – per each
8. Optical detector cable – per linear foot
9. Phase selector, 4 channel – per each
10. Pull boxes – per each
11. Traffic sign, encapsulated lens – per square foot
12. Street name sign, encapsulated lens – per square foot
13. Electrical cable, all types – per linear foot

**--END OF SECTION 02620--**

## **SECTION 02680 CURED-IN-PLACE PIPE (CIPP)**

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### **PART 1 - GENERAL**

#### **1.01 SUMMARY**

It is the intent of this specification to provide for the reconstruction of pipelines and conduits by the installation of a resin-impregnated flexible tube, which is formed to the original conduit using installation procedures that comply with relevant industry standards. The resin is cured using hot water under hydrostatic pressure or the application of steam pressure within the tube. The Cured-In-Place Pipe (CIPP) shall extend the full length of the original pipe and shall provide a structurally sound, joint-less, close fitting, and corrosion resistant CIPP.

#### **1.02 REFERENCES**

This specification references ASTM test methods which are made a part hereof by such reference and shall be the latest edition and revision thereof.

- A. ASTM F1216 – Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube
- B. ASTM F1743 – Standard Practice for Rehabilitation of Existing Pipelines and Conduits by Pulled-in-Place Installation of Cured-in-Place Thermosetting Resin Pipe
- C. ASTM D790 – Test Methods for Flexural Properties of Non-Reinforced Plastics.

In case of conflicting requirements between this specification and these referenced documents, this specification will govern.

#### **1.03 SUBMITTALS**

- A. Product Data: Provide catalog materials for CIPP products.
- B. Manufacturer's Installation Instructions: Indicate special procedures required to install products specified.
- C. Manufacturer's Certificate: Certify that products meet or exceed ASTM Designations.
- D. Third party test results supporting the long term structural performance of the Manufacturer's product shall be submitted to the Engineer for review and approval. Test samples shall be prepared so as to simulate installation methods and trauma of the product. No product will be approved without testing verification.



- E. Installer Qualifications: Documentation the Installer meets the following requirements and qualifications:
1. License or Certification that the proposed installer is approved to install the proposed CIPP system.
  2. A minimum of five (5) years of continuous experience and satisfactory performance installing CIPP Lining in pipe of similar size, length and configuration as proposed in the project on a minimum of five (5) projects.
  3. Contractor has installed a minimum of 15,000 linear feet of pipe using the specific pipe lining equipment to be used for the construction specified. This experience shall include at least one project where the same pipe materials as are required on this project were used, and at least one project where similar pipe sizes as required by this project were used.
- F. Contractor shall provide the City of Brandon with information regarding previous pipe lining projects at the time of bid. This information shall include:
1. Total Linear feet of pipe installed
  2. Diameter of pipe
  3. Materials used
  4. Contact Name, address, and phone number of the Owner to whom the service was provided

The City of Brandon may, at its discretion adjust or waive the aforementioned pre-qualifications.

G. Product Qualifications/References

The CIPP Lateral Lining system proposed for this contract must meet the following minimum requirements. The Contractor or Subcontractor shall provide a list of references verifying the compliance with these qualifications.

1. A five (5) year history of satisfactory performance of sanitary sewer use.
2. A minimum of 15,000 CIPP lateral installations in the United States.

## **PART 2 - MATERIALS**

### **2.01 MATERIALS**

A. Tube

1. The sewn Tube shall consist of one or more layers of absorbent non-woven felt fabric and meet the requirements of ASTM F1216 or ASTM F1743, Section 5. The tube shall be constructed to withstand installation pressures, have sufficient strength to bridge missing pipe, and stretch to fit irregular pipe sections.

2. The wet out Tube shall have a uniform thickness that when compressed at installation pressures will meet or exceed the Design thickness.
3. The Tube shall be sewn to a size that when installed will tightly fit the internal circumference and length of the original pipe. Allowance should be made for circumferential stretching during inversion.
4. The outside layer of the manufactured Tube (before wet out) shall be coated with an impermeable, flexible membrane that will contain the resin and facilitate monitoring of resin saturation during the resin impregnation (wet out) procedure.
5. The Tube shall be homogeneous across the entire wall thickness containing no intermediate or encapsulated elastomeric layers. No dry or unsaturated layers shall be evident.
6. The wall color of the interior pipe surface of CIPP after installation shall be a light reflective color so that a clear detailed examination with closed circuit television inspection equipment may be made.
7. Seams in the Tube shall be stronger than the non-seamed felt.
8. The outside of the Tube shall be marked for distance at regular intervals along its entire length, not to exceed 5 ft. Such markings shall include the Manufacturer's name or identifying symbol. The tubes must be manufactured in the USA.
9. A water tight seal is required at each manhole connection. A hydrophilic sealant (or equivalent) should be applied to the backside of the connections to enhance this watertight seal. Said material can be made up of a paste or O-ring type water swelling material to prevent water tracking between CIPP and host pipe. Other methods may be considered after submittal to the Engineer.

#### B. Resin

1. The resin system shall be a corrosion resistant polyester, vinyl ester, or epoxy and catalyst system that when properly cured within the tube composite meets the requirements of ASTM F1216 and ASTM F1743, the physical properties herein, and those which are to be utilized in the Design of the CIPP for this project. The resin shall produce CIPP which will comply with the structural and chemical resistance requirements of this specification.
2. The resin used shall be high-grade corrosion resistant isophthalic polyester specifically designed for the cured-in-place pipe (CIPP) being installed. Only PREMIUM, NON-RECYCLED resin shall be used. PET resins or those containing fillers, additives or enhancement agents shall not be used.

3. The Engineer at this discretion shall have the right to inspect the designated wet out facility and randomly draw samples of the resin used to wet-out the CIPP used under this contract.

## 2.02 STRUCTURAL REQUIREMENTS

- A. The CIPP shall be designed as per ASTM F1216, Appendix X.1. The CIPP design shall assume no bonding to the original pipe wall.
- B. The Contractor must have performed long-term testing for flexural creep of the CIPP pipe material installed by his Company. Such testing results are to be used to determine the Long-term, time dependent flexural modulus to be utilized in the product design. This is a performance test of the materials (Tube and Resin) and general workmanship of the installation and curing. A percentage of the instantaneous flexural modulus value (as measured by ASTM D-790 testing) will be used in design calculations for external buckling. The percentage, or the long-term creep retention value utilized, will be verified by this testing. The materials utilized for the contracted project shall be of a quality equal to or better than the materials used in the long-term test with respect to the initial flexural modulus used in Design.
- C. The Enhancement Factor 'K' to be used in 'Partially Deteriorated' Design conditions shall be assigned a value of 7. Application of Enhancement (K) Factors in excess of 7 shall be substantiated through independent test data.
- D. The layers of the cured CIPP shall be uniformly bonded. It shall not be possible to separate any two layers with a probe or point of a knife blade so that the layers separate cleanly or the probe or knife blade moves freely between the layers. If separation of the layers occurs during testing of field samples, new samples will be cut from the work. Any recurrence may cause rejection of the work.
- E. The cured pipe material (CIPP) shall conform to the structural properties, as listed below:

### MINIMUM PHYSICAL PROPERTIES

Composite Property	Test Method	Cured Composite	Cured
		min. per ASTM F1216	(400,000 psi Resin)
Modulus of Elasticity	ASTM D-790 (short term)	250,000 psi	400,000 psi
Flexural Stress	ASTM D-790	4,500 psi	4,000 psi

The required structural CIPP wall thickness shall be based as a minimum, on the physical properties in Section 5.5 and in accordance with the Design Equations in the appendix of ASTM F 1216, and the following design parameters:

Design Safety Factor	= <u>2.0</u>
Retention Factor for Long-Term Flexural Modulus to be used in Design	= <u>1% - 50%</u>
<i>(as determined by Long-Term tests described in paragraph 5.2)</i>	
Ovality*	= <u>2%</u>
Enhancement Factor, k	= <u>See Section 5.3</u>
Groundwater Depth (above invert)*	= <u>ft.</u>
Soil Depth (above crown)*	= <u>ft.</u>
Soil Modulus**	= <u>Psi</u>
Soil Density**	= <u>120 pcf</u>
Live Load**	= <u>H20</u>
Highway	
Design Condition (partially or fully deteriorated)***	= <u>***</u>

\* Denotes information which can be provided here or in inspection video tapes or project construction plans. Multiple line segments may require a table of values.

\*\* Denotes information required only for fully deteriorated design conditions.

\*\*\* Based on review of video logs, conditions of pipeline can be fully or partially deteriorated.

(See ASTM F1216 Appendix) The Owner will be sole judge as to pipe conditions and parameters utilized in Design.

- F. Refer to the attached Dimensional Ratio table for specific pipe section requirements, based on the pipe condition, depth, ovality, etc. as computed for the conditions shown, using ASTM F 1216 Design Equations.
- G. Any layers of the tube that are not saturated with resin prior to insertion into the existing pipe shall not be included in the structural CIPP wall thickness computation.

## **2.03 TESTING REQUIREMENTS**

- A. Chemical Resistance - The CIPP shall meet the chemical resistance requirements of ASTM F1216, Appendix X2. CIPP samples for testing shall be of tube and resin system similar to that proposed for actual construction. It is required that CIPP samples with and without plastic coating meet these chemical testing requirements.
- B. Hydraulic Capacity - Overall, the hydraulic profile shall be maintained as large as possible. The CIPP shall have a minimum of the full flow capacity of the original pipe before rehabilitation. Calculated capacities may be derived using a commonly accepted roughness coefficient for the existing pipe material taking into consideration its age and condition.
- C. CIPP Field Samples - When requested by the Owner, the Contractor shall submit test results from field installations in the USA of the same resin system and tube materials as proposed for the actual installation. These test results must verify that the CIPP physical properties specified in Section 5.5 have been achieved in previous field applications. Samples for this project shall be made and tested as described in Section 10.1.

## **PART 3 - EXECUTION**

### **3.01 INSTALLATION RESPONSIBILITIES FOR INCIDENTAL ITEMS**

- A. It shall be the responsibility of the Owner to locate and designate all manhole access points open and accessible for the work, and provide rights of access to these points. If a street must be closed to traffic due to the orientation of the sewer and is approved by the Engineer, the Contractor shall institute the actions necessary to do so in accordance with the Manual for Uniform Traffic Control Devices, latest edition. Contractor shall notify the Engineer 48 hours prior to any road closures so emergency responders can be notified.
- B. The Owner shall provide free access to water hydrants for cleaning, inversion and other work items requiring water. Contractor shall maintain a log of the water used.

- C. Cleaning of Sewer Lines - The Contractor, shall remove all internal debris out of the sewer line that will interfere with the installation of CIPP. The Owner shall also provide a dump site for all debris removed from the sewers during the cleaning operation.
- D. Bypassing Sewage - The Contractor, when required, shall provide for the flow of sewage around the section or sections of pipe designated for repair. The bypass shall be made by plugging the line at an existing upstream manhole and pumping the flow into a downstream manhole or adjacent system. The pump and bypass lines shall be of adequate capacity and size to handle the flow. The Owner may require a detail of the bypass plan to be submitted.
- E. Inspection of Pipelines - Inspection of pipelines shall be performed by experienced personnel trained in locating breaks, obstacles and service connections by close circuit television. The interior of the pipeline shall be carefully inspected to determine the location of any conditions, which may prevent proper installation of CIPP into the pipelines, and it shall be noted so that these conditions can be corrected. A video tape and suitable log shall be kept for later reference by the Owner. Prior to submission, all video must be reviewed by a PACP certified technician who is not the original field operator. All segments must be labeled with appropriate PACP ID number for the reviewer.
- F. Line Obstructions - It shall be the responsibility of the Contractor to clear the line of obstructions such as solids and roots that will prevent the insertion of CIPP. If pre-installation inspection reveals an obstruction such as a protruding service connection, dropped joint, or a collapse that will prevent the inversion process, that was not evident on the pre-bid video and it cannot be removed by conventional sewer cleaning equipment, then the Contractor shall make a point repair excavation to uncover and remove or repair the obstruction. Such excavation shall be approved in writing by the Owner's representative prior to the commencement of the work and shall be considered as a separate pay item.
- G. Public Notification - The Contractor shall make every effort to maintain service usage throughout the duration of the project. In the event that a service will be out of service, the maximum amount of time of no service shall be 8 hours for any property served by the sewer. A public notification program shall be implemented, and shall as a minimum, require the Contractor to be responsible for contacting each home or business connected to the sanitary sewer and informing them of the work to be conducted, and when the sewer will be off-line. The Contractor shall also provide the following:
  - 1. Written notice to be delivered to each home or business the day prior to the beginning of work being conducted on the section, and a local telephone number of the Contractor they can call to discuss the project or any problems which could arise.
  - 2. Personal contact with any home or business, which cannot be reconnected within the time stated in the written notice.
- H. The Contractor shall be responsible for confirming the locations of all branch service connections prior to installing and curing the CIPP.

### 3.02 INSTALLATION

CIPP installation shall be in accordance with ASTM F1216, Section 7, or ASTM F1743, Section 6, with the following modifications:

- A. Resin Impregnation - The quantity of resin used for tube impregnation shall be sufficient to fill the volume of air voids in the tube with additional allowances for polymerization shrinkage and the loss of resin through cracks and irregularities in the original pipe wall. A vacuum impregnation process shall be used. To insure thorough resin saturation throughout the length of the felt tube, the point of vacuum shall be no further than 25 feet from the point of initial resin introduction.
- B. After vacuum in the tube is established, a vacuum point shall be no further than 75 feet from the leading edge of the resin. The leading edge of the resin slug shall be as near to perpendicular as possible. A roller system shall be used to uniformly distribute the resin throughout the tube. If the Installer uses an alternate method of resin impregnation, the method must produce the same results. Any alternate resin impregnation method must be proven.
- C. Hydrophilic Material – Prior to the mainline installation of the CIPP, a hydrophilic material shall be applied to any manhole and lateral line connection to create a water tight seal once the CIPP is in place. Contractor shall consult with the Engineer on which type of hydrophilic material they have chosen in order to determine if said material is adequate enough to use.
- D. Tube Insertion – The wet out tube shall be positioned in the pipeline using either inversion or a pull-in method. If pulled into place, a power winch should be utilized and care should be exercised not to damage the tube as a result of pull-in friction. The tube should be pulled-in or inverted through an existing manhole or approved access point and fully extend to the next designated manhole or termination point.
- E. Temperature gauges shall be placed inside the tube at the invert level of each end to monitor the temperatures during the cure cycle.
- F. Curing shall be accomplished by utilizing hot water under hydrostatic pressure or steam pressure in accordance with the manufacturer's recommended cure schedule.

### 3.03 REINSTATEMENT OF BRANCH CONNECTIONS

It is the intent of these specifications that branch connections to buildings be reopened without excavation, utilizing a remote-controlled cutting device, monitored by a video TV camera. The Contractor shall certify he has a minimum of 2 complete working cutters plus spare key components on the site before each inversion. Unless otherwise directed by the owner or his

authorized representative, all laterals will be reinstated. No additional payment will be made for excavations for the purpose of reopening connections and the Contractor will be responsible for all costs and liability associated with such excavation and restoration work.

### **3.04 INSPECTION AND TESTING**

- A. CIPP samples shall be prepared and physical properties tested in accordance with ASTM D5813, Section 7, ASTM F1216 or ASTM F1743, Section 8, using either method proposed. The flexural properties must meet or exceed the values listed in Table 1 of the applicable ASTM.
- B. Wall thickness of samples shall be determined as described in paragraph 6.3.3 of ASTM D5813 or paragraph 8.1.6 of ASTM F1743. The minimum wall thickness at any point shall not be less than 100% of the design thickness as calculated in paragraph 5.6 of this document.
- C. Visual inspection of the CIPP shall be in accordance with ASTM F1743, Section 8.6.
- D. One (1) sample per day per diameter shall be tested to determine if lining materials meet minimum requirements specified in this section. Testing shall be performed by an independent testing laboratory, under contract to the Contractor, in accordance with applicable ASTM Standards.
- E. Final Inspection- Upon Completion of installation, sewers shall be CCTV inspected, providing both a video recording and log which identifies all service connections and openings. The entire pipe sections rehabilitated shall be recorded and delivered to the Engineer.

### **3.05 CLEAN-UP**

Upon acceptance of the installation work and testing, the Contractor shall restore the project area affected by the operations to a condition at least equal to that existing prior to the work.

## **PART 4 - COMPENSATION**

### **4.01 GENERAL**

- A. No separate payment shall be made for any item necessary for the completion of the work indicated on the Contract Drawings and in the Specifications but not shown as a pay item on the proposal form; therefore, full compensation for these items shall be considered absorbed in the Contract Lump Sum or related pay items.
- B. The prices thus paid shall be full compensation for completing the work. Materials or work for which a pay item is not included and are necessary to complete the work under this section shall be furnished or performed and shall be considered incidental to the completed construction.

### **4.02 MEASUREMENT AND PAYMENT**



- A. Measurement for the work included in this section will be in accordance with the units set forth in the proposal. Unit prices shall include all labor, materials and equipment required to complete the work as specified. The unit prices shall also include CCTV prior to and after lining, cleaning, and bypass pumping of main pipe flow.
- B. Payment for accepted quantities of service pipe lined shall be paid for at the contract unit price bid per linear foot. Said unit price shall constitute full compensation for furnishing of all labor, materials, and any incidental items necessary to complete the work.

**4.03 BASIS OF PAYMENT:** Payment will be made at the Contract Unit Prices bid per Unit (Each) for the various types of drainage structures as itemized on the proposal. Differing sizes and depths of drainage structures shall be considered absorbed cost with other work shown unless itemized.

**--END OF SECTION 02680--**

## SECTION 02720

### CONCRETE STORM DRAIN PIPE AND PRECAST BOX CULVERTS

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#### PART 1 - GENERAL

##### 1.01 DESCRIPTION OF WORK

A. Scope:

1. This work shall consist of the construction or reconstruction of pipe culverts, precast box culverts, storm drains, collars, special sections and headwalls. It shall also consist of furnishing all materials and joining the work to other conduit, catch basins, manholes, inlets, etc. as may be required to complete the work as designed.
2. Contractor shall furnish all labor, materials, equipment and incidentals required to construct the work and shall perform all trenching, excavation, backfilling and cleanup required to perform the work.
3. The extent of piping is shown on the Drawings and schedules.

B. Related Work Specified Elsewhere:

1. Section – 01410 Testing
2. Section – 02200 Site Clearing
3. Section – 02220 Embankment and Excavation
4. Section – 02230 Excavation and Backfill for Conduit and Structures
5. Section – 02730 Storm Drain Manholes, Inlets & Catch Basins

##### 1.02 QUALITY CONTROL

A. Source Quality:

1. Obtain each type of pipe and fittings from only one manufacturer.
2. Move no concrete pipe or fittings from the casting yard until such pipe or fittings have been cured a minimum of seven days for pipe 6 to 27 inches in diameter and fourteen days for pipe 30 inches in diameter or larger. Pipe meeting 115% of the 0.01 inch crack test may be moved before expiration of the stated minimum yard curing time.
3. Special fittings shall be produced by the pipe manufacturer to comply with all respects to the applicable requirements of the specifications.
4. The interior of all pipe shall have true section complying with the internal size(s) specified. All pipe shall be free from fins, bulges, ridges, offsets, projections, defects or roughness of any kind.
5. Pipe rejected by the ENGINEER shall be removed from the site.

B. Reference Standards:

1. ASTM C 76, Reinforced Concrete Culvert, Storm Drain and Sewer Pipe.
2. ASTM C 506, Reinforced Concrete Arch Culvert, Storm Drain and Sewer Pipe
3. ASTM C 1433, Precast Reinforced Box Culverts

4. ASTM C 150 Portland Cement
5. ASTM A 185 Welded Steel Wire Fabric for Concrete Reinforcement
6. ASTM A 496 Deformed Steel Wire for Concrete Reinforcement
7. ASTM A 497, Welded Deformed Steel Wire Fabric for Concrete Reinforcement
8. ASTM A 615, Deformed and Plain Billet Steel Bars for Concrete Reinforcement

- C. Inspection: Raw materials, manufacturing processes and finished concrete piping products are subject to review by the ENGINEER at the manufacturer's plant.

### **1.03 SUBMITTALS**

- A. Shop Drawings: Submit detailed drawings and data on pipe, fittings, gaskets, and appurtenances.
- B. Certificates: Submit certificates of compliance with referenced standards.

### **1.04 PRODUCT DELIVERY, STORAGE AND HANDLING**

Comply with the manufacturer's recommendations.

### **1.05 PROJECT CONDITIONS**

- A. The Contractor shall examine the site prior to his bid taking into consideration all conditions that may affect his work.
- B. Traffic: Contractor shall be responsible for providing traffic control if necessary during installation. Traffic control operations shall meet the requirements of the latest edition of the MUTCD.
- C. Protection of Existing Improvements: Provide protection necessary to prevent damage to existing improvements indicated to remain in place.
1. Protect improvements on adjoining properties and on Owner's property.
  2. Restore damaged improvements to their original condition, as acceptable to property owners.
- D. Locate existing structures and piping to be closed, relocated and/or abandoned.
- E. Existing Utilities: Do not interrupt existing utilities serving facilities occupied by the Owner or other except when permitted under the following conditions and only after arranging to provide acceptable temporary utility services.
1. Notify Contracting Officer not less than 48 hours in advance of proposed utility interruptions.
  2. Do not proceed with utility interruptions without receiving Contracting Officer's written permission.
- F. See Section 02230 Excavation and Backfill for Conduit and Structures for requirements on dewatering.

## **PART 2 – PRODUCTS**

### **2.01 GENERAL:**

- A. The Contractor shall furnish all materials necessary for or incidental to the installation of all drainage pipes and box culverts. All materials shall be new with certified tests for all fittings made at the manufacturer's plant to assure conformance with these specifications. A copy of the tests shall be submitted to Engineer.
- B. The kinds and classes of materials incorporated into the work shall be as shown on the Drawings. The Contractor shall not interpret or construe the several kinds of materials described herein as being equal in their application for the project.

## **2.02 CONSTRUCTION AND MATERIALS**

- A. Construction of pipes and fittings shall meet the requirements of 1.02 of this specification.
- B. Pipe Ends: Normal to the walls and center of pipe.
- C. Joints:
  - 1. Joint shall be bell and spigot or tongue and groove type design to provide continuous line or pipe with a smooth interior free from irregularities in the flow line.
  - 2. Joint materials shall be a combination of "O" ring rubber gasket and preformed mastic sealant or a profile gasket.
  - 3. "O" ring rubber gasket material shall meet requirements of ASTM C 443, latest edition.
  - 4. Preformed mastic shall meet Federal Spec. SS-S-210A.
- D. Materials of Construction Standards:
  - 1. Cement for Concrete Work: ASTM C 150 or ASTM C 595.
  - 2. Aggregates: ASTM C 33.
  - 3. Steel Wire Bar Reinforcement: ASTM A 82 or ASTM A 496.
  - 4. Steel Wire Fabric Reinforcement: ASTM A 185 or ASTM A 997.

## **2.03 IDENTIFICATION**

- A. Clearly mark all items furnished under this Section by waterproof paint, indentation, or as reviewed by the ENGINEER to include the following information:
  - 1. Manufacturer's name or trademark.
  - 2. Pipe class.
  - 3. Specification designation.
  - 4. Size.
  - 5. Length.
  - 6. Date and place of manufacture.
- B. Mark pipe 24-inches and larger on exterior and interior.

## **PART 3 – EXECUTION**

### **3.01 INSTALLATION**

The work shall consist of the excavation and trenching for open cut construction, installation and jointing of pipe and specials, backfilling, testing, repair and restoration of property and final cleanup. All work shall be performed per the specifications of the Mississippi Standard Specifications for Road and Bridge Construction, Latest Edition.

### **3.02 EXCAVATION**

- A. Trenches shall be excavated in accordance with the requirements of Section 2230 to a width sufficient to allow for proper jointing of the conduit and thorough compaction of the bedding and backfill material under and around the conduit. Where feasible, trench walls shall be vertical.
- B. The completed trench bottom shall be firm for its full length and width. Where required, in the case of cross drains, the trench shall have the camber specified.
- C. Where conduit is to be placed in embankment, the excavation shall be made after the embankment has been completed to the specified height above the flow line of the conduit.
- D. In all cases the height above flow line shall be at least one foot.
- E. Excavation includes removal, handling, rehandling, refill or backfilling and disposal of any and all materials encountered in the work and shall include all pumping, bailing, drainage, sheeting and bracing.
- F. If a pipe of box section is not laid in a trench, a uniformly firm bed shall be made in the same manner as above specified for the preparation of the bottom of the trench.

### **3.03 BEDDING**

- A. Except for conduit placed in a vertical position or jacked or bored, the conduit bedding shall conform to one of the classes specified. When no bedding class is specified the requirements for Class C bedding or Class C modified bedding, as applicable shall apply.
  - 1. CLASS A bedding consists of a continuous concrete cradle conforming to plan details and constructed on an approved foundation.
  - 2. CLASS B bedding consists of bedding the conduit to a depth of at least 30 percent of the vertical outside dimension of the conduit. The thickness of bedding material beneath the pipe shall be at least four inches. The bedding material shall be sand or selected sandy soil, all of which passes a 3/8 inch sieve and not more than 10 percent of which passes a No. 200 sieve. The layer of bedding material shall be shaped to fit the conduit for at least 15 percent of its total height. Recesses in the trench bottom shall be shaped to accommodate the bell when bell and spigot type conduit is used.
  - 3. CLASS C bedding consists of bedding the conduit to a depth of at least 10 percent of its total height. The bed shall be shaped to fit the conduit and shall have recesses shaped to receive the bell if bell and spigot type pipe is used.

4. CLASS C MODIFIED bedding consists of bedding corrugated conduit to a depth of at least 10 percent of its total height. A bedding blanket of approved silty loam, sandy loam, concrete sand, or other approved sand or sandy soil shall be roughly shaped to fit the bottom of the pipe. Minimum thickness before placing pipe shall be as follows:
  - a. 1 inch for 1/2 inch deep corrugations
  - b. 2 inches for 1 inch deep corrugations
  - c. 3 inches for 2 inches or 2 1/2 inches corrugations
- B. For structural plate pipe the length of bedding arc need not exceed the width of the bottom plate.
- C. Bedding for precast concrete box culverts shall consist of at least two inches of Class 9, Group C, or better, granular material placed between graded forms set at least one foot outside each outside wall of the box culvert. The granular material shall be shaped to fit the bottom of the precast box culvert sections by screeding off the graded forms. After placement of the precast box culvert sections on the graded bedding, the forms may be removed and reused.

### **3.04 LAYING CONDUIT**

- A. General Locations and Arrangements: Drawings (plans and details) indicate the general location and arrangement of underground sewerage and drainage systems piping. Location and arrangement of piping layout take into account many design considerations. Install piping as indicated, to extent practical.
- B. The conduit laying shall begin at the staked location of the downstream end of the conduit line. The lower segment of the conduit shall be in contact with the shaped bedding throughout its full length. Bell or groove ends of rigid conduits and outside circumferential laps of flexible conduits shall be placed facing upstream. Flexible conduits shall be placed with longitudinal laps or seams at the sides. Transverse joints for all types of coated flexible conduits shall maintain pipe alignment during construction and prevent infiltration of backfill material during the life of the structure.
- C. Install gravity-flow-systems piping at constant slope between points and elevations indicated. Install straight piping runs at constant slope, not less than that specified, where slope is not indicated.
- D. Paved or partially lined conduit shall be laid so that the longitudinal center line of the paved segment coincides with the flow line. Elliptical and elliptically reinforced conduits shall be placed with the major axis within five degrees of a horizontal plane through the longitudinal axis of the conduit.
- E. Construction requirements for end sections shall conform to the requirements for placing the pipe to which they are joined.
- F. At the Contractor's option, subject to the written approval of the Engineer, concrete headwalls conforming to the Department's Standard Drawings may be substituted for premanufactured end sections without change in compensation.
- G. Flared end section construction requirements shall conform to the requirements for placing the pipe to which they are joined.
- H. All lifting holes shall be plugged with an approved manufactured lifting hole plug and covered with Type V Geotextile Fabric.

### **3.05 JOINING STORM DRAINAGE.**

- A. Rigid conduits may be either bell and spigot or tongue and groove design unless one type is specified. The method of joining conduit sections shall be such that the ends are fully entered, and the inner surfaces are reasonably flush and even. Unless otherwise specified, joints shall be sealed with rubber type gaskets, bituminous plastic sealer, or flexible plastic gaskets.
- B. Joints for precast concrete box culverts shall be made with bituminous plastic sealer.
- C. Rubber type gaskets shall be installed per the manufacturer's recommendations so as to form a flexible watertight seal.
- D. For joints to be sealed with bituminous plastic, the joining ends shall be wiped clean and dry. The plastic compound shall be applied cold to the entire surface of tongues and grooves, the entire surface of bells and spigots, and the entire area of metal pipes to be covered by connecting bands. Sections of concrete pipe shall be forced together, and sections of metal pipe banded together, with excess compound extruding both inside and outside the pipe. Excess compound shall be removed from interior surfaces, and the exterior shall be finished reasonably flush. After pipe has been joined with bituminous plastic compound, suitable kraft or other approved paper shall be placed over the outside joints to avoid mixing of soil with the compound.
- E. For joints to be sealed with flexible plastic gasket material, the pipe shall be installed in a dry trench. Joints shall be made in such a manner that a slight internal extrusion of the plastic gasket will occur for the full circumference when the sections of pipe are forced together. Installation shall be in accordance with these specifications and the manufacturer's instructions. Plastic gasket material shall be applied only to surfaces which are dry. A primer of the type recommended by the manufacturer of the plastic gasket shall be applied to the tongue and groove and to the end surfaces, and the surface to be primed shall be clean and dry when the primer is applied. During cold weather the joint surfaces and the gasket shall be lightly heated, without damage to the pipe or joint material, immediately prior to forcing the sections of pipe together. During hot weather the Contractor shall place kraft or other approved paper over the joints to avoid mixing soil with the plastic gasket material.
- F. For joints constructed of either bituminous plastic sealer or flexible plastic material, special care shall be taken to provide an equal uniform joint between pipe sections and to prevent one section from supporting the other. Backfilling operations may follow immediately.
- G. All Joints shall be completely wrapped with overlapping ends of Type V geotextile fabric a minimum of 24" in width.

### **3.06 RELAID PIPE**

- A. These construction specifications shall equally apply to relaid conduits. In addition, conduit salvaged for relaying shall be cleaned of all foreign material prior to reinstallation. All pipe damaged through carelessness or negligence on the part of the Contractor shall be replaced by new pipe or approved pipe at no additional cost to the Client.
- B. Pipe and end sections designated for removal and relaying shall be removed in accordance with the provisions of Section 02205.

### **3.07 BACKFILLING**

- A. Conduit shall be inspected before backfill is placed. Conduit found to be out of alignment, unduly settled, or damaged shall be taken up and relaid or replaced. After approval of conduit, it shall be backfilled with specified material in accordance with Section 02230.

### **3.08 TEMPORARY SURFACING OVER TRENCHES**

- A. Whenever storm water piping or improvements are required to be constructed under roadways, sidewalks or other paved surfaces, a temporary clay gravel or crushed limestone surfacing shall be placed over the full width of the trench as shown on the project drawings.
- B. Surfacing shall be a minimum of 6" thick and shall be placed over the top of the trench as soon as possible after placement and compaction of backfill has been satisfactorily completed.
- C. The top of the temporary surface shall be smooth and meet the grade of the adjacent undisturbed surface.
- D. The temporary surface shall be maintained at the desired level at the Contractor's expense until final restoration of the street surface is completed as specified.
- E. Excess material from the temporary surface shall be removed as placed at a location as directed by the Engineer prior to final restoration.
- F. The temporary surfacing and all associated items shall be considered an absorbed cost.

### **3.09 FIELD QUALITY CONTROL**

- A. Clear interior of piping and structures of dirt and superfluous materials as the work progresses. Maintain swab or drag in piping and pull past each joint as it is completed.
  - 1. Place plug in end of incomplete piping at end of day and whenever work stops.
  - 2. Flush piping between manholes and other structures, if required by authorities having jurisdiction, to remove collected debris.
- B. Inspect interior of piping to determine whether line displacement or other damage has occurred.
  - 1. Submit separate reports for each system inspection.
  - 2. Defects requiring correction include the following:
    - a. Alignment: Less than full diameter of inside of pipe is visual between structures.
    - b. Deflection: Flexible piping with deflection that prevents passage of a ball or cylinder of a size not less than 92.5 percent of piping diameter.
    - c. Crushed, broken, cracked, or otherwise damaged piping.
    - d. Infiltration: Water leakage into piping.
    - e. Exfiltration: Water leakage from or around piping.



3. Trenches improperly backfilled in the opinion of the Engineer shall be reopened to the depth required for proper inspection, then refilled and recompact as specified. There shall be no extra compensation for such corrective work.
4. Prior to final approval of the system, the Contractor and Engineer shall conduct a thorough inspection of the entire installation. Any indication of defects on material or workmanship or any obstruction to the flow in the pipe system shall be corrected.
5. All defects shall be corrected by the Contractor without additional compensation and in a manner acceptable to the Engineer.
6. Replace defective piping using new materials and repeat inspections until defects are within allowances specified.
7. Re-inspect and repeat procedure until results are satisfactory.

## **PART 4 - COMPENSATION**

### **4.01 GENERAL**

- A. No separate payment shall be made for any item necessary for the completion of the work indicated on the Contract Drawings and in the Specifications but not shown as a pay item on the proposal form; therefore, full compensation for these items shall be considered absorbed in the Contract Lump Sum or related pay items.
- B. The prices thus paid shall be full compensation for completing the work. Materials or work for which a pay item is not included and are necessary to complete the work under this section shall be furnished or performed and shall be considered incidental to the completed construction.

### **4.02 MEASUREMENT AND PAYMENT**

- A. The lengths of pipe and precast box culverts will be measured by the linear foot actually required. Where running from a structure to a structure the linear footage is from center of structure to center of structure.
- B. Unless otherwise indicated on the plans, sections of lines of conduits placed by conventional methods will not be measured as pipe jacked or bored.
- C. End sections, headwalls, elbows, branch connections, and other appurtenances for which pay items are listed will be measured by the number of units of the kind and size specified.
- D. Pipe removed and relaid will be measured by the linear foot. End sections removed and relaid will be measured by the unit.
- E. Excavation or disposal of excavation for conventionally installed conduits will not be measured for separate payment but shall be absorbed in the per foot cost of each itemized culvert.
- F. Excavation for conduits placed by jacking or boring will not be measured for separate payment.
- G. Excavation or disposal of excavation for box culverts, precast or cast in place will be absorbed in the per linear foot cost of the box culverts.

### **4.03 BASIS OF PAYMENT**

- A. Accepted quantities of pipe and precast box culverts will be paid for at the contract unit price per linear foot.
- B. End sections, headwalls, elbows, branch connections, and other appurtenances for which pay items are listed in the contract will be paid for at the contract unit price per each.
- C. Pipe removed and relaid will be paid for at the contract unit price per linear foot.
- D. End sections removed and relaid will be paid for at the contract unit price per each.

Payment will be made under:

#### **CONCRETE CONDUIT**

- A. \_\_\_\_" Reinforced Concrete Pipe, Class \_\_\_\_ - per linear foot
- B. \_\_\_\_" Reinforced Concrete End Section - per each
- C. \_\_\_\_" Non-Reinforced Concrete Pipe, Class \_\_\_\_ - per linear foot
- D. \_\_\_\_" x \_\_\_\_" Concrete Arch Pipe, Class \_\_\_\_ - per linear foot
- E. \_\_\_\_" x \_\_\_\_" Concrete Arch Pipe End Section - per each

#### **PRECAST BOX CULVERTS**

- A. \_\_\_\_' x \_\_\_\_' Precast Concrete Box Culvert - per linear foot
- B. \_\_\_\_' x \_\_\_\_' Precast Concrete Box Culvert End Section - per each

#### **RELAI D PIPE**

- A. \_\_\_\_" Pipe Removed and Relaid - per linear foot
- B. \_\_\_\_" End Section Removed and Relaid - per each

#### **SPECIALS AND CONCRETE HEADWALLS**

- A. Size & Angle Elbow, Materials per Pay Item No. \_\_\_\_ - per each
- B. Size Branch Connection Type & Description - per each
- C. Size & Type Headwall, Per Plans - per each

**--END OF SECTION 02720--**

## **SECTION 02730 STORM DRAIN STRUCTURES**

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### **PART 1 - GENERAL**

#### **1.01 DESCRIPTION OF WORK**

- A. In accordance with the requirements of this section the Contractor shall construct or install all drainage manholes, curb inlets, grate inlets, catch basins, junction boxes, etc. in reasonably close conformity with the details, lines, grades and dimensions shown on the plans or as established by the Engineer. For the purpose of this specifications the term drainage structure refers to any of the following: drainage manholes, curb inlets, grate inlets, catch basins, junction boxes, etc or other structures similar in nature.
- B. The work shall consist of the necessary concrete work or masonry work as required together with the necessary frames, castings, grates, fittings, pipes, pipe specials and connection in reasonably close conformity with the details, lines, grades and dimensions shown on the plans or as established by the Engineer.
- C. Contractor shall furnish all labor, equipment, materials and incidentals required to construct the work and shall perform all trenching, excavation, backfilling and cleanup required to perform the work.
- D. Related Work Specified Elsewhere:
  - 1. Section – 01410 Testing
  - 2. Section – 02200 Site Clearing
  - 3. Section – 02220 Embankment and Excavation
  - 4. Section – 02230 Excavation and Backfill for Conduit and Structures
  - 5. Section – 02720 Concrete Storm Drain Pipe and Precast Box Culverts

#### **1.02 SUBMITTALS**

- A. Shop drawings for precast concrete catch basins, inlets, manholes, junction boxes and other structures. Include frames, covers, and grates.
- B. Shop drawings for cast-in-place catch basins, inlets, manholes, junction boxes and other structures. Include frames, covers, and grates.
- C. Certification from pipe manufacturer's that piping provided meets or exceeds the requirements of the project specifications.
- D. Reports and calculations for design mixes for each class of cast-in-place concrete.
- E. Inspection and test reports as specified in these project specifications.

#### **1.03 DELIVERY, STORAGE, AND HANDLING**

- A. Handle protect all precast structure and castings according to manufacturer's recommendations.

#### **1.04 PROJECT CONDITIONS**

- A. The Contractor shall examine the site prior to his bid taking into consideration all conditions that may affect his work.
- B. Traffic: Contractor shall be responsible for providing traffic control if necessary during

installation. Traffic control operations shall meet the requirements of the latest edition of the MUTCD.

- C. Protection of Existing Improvements: Provide protection necessary to prevent damage to existing improvements indicated to remain in place.
  - 1. Protect improvements on adjoining properties and on Owner's property.
  - 2. Restore damaged improvements to their original condition, as acceptable to property owners.
- D. Locate existing structures and piping to be closed, relocated and/or abandoned.
- E. Existing Utilities: Do not interrupt existing utilities serving facilities occupied by the Owner or other except when permitted under the following conditions and only after arranging to provide acceptable temporary utility services.
  - 1. Notify Contracting Officer not less than 48 hours in advance of proposed utility interruptions.
  - 2. Do not proceed with utility interruptions without receiving Contracting Officer's written permission.

## **PART 2 – PRODUCTS**

### **2.01 GENERAL**

- A. The Contractor shall furnish all materials necessary for or incidental to the installation of all drainage structures. All materials shall be new with certified tests for all items made at the manufacturer's plant to assure conformance with these specifications. A copy of the tests shall be submitted to Engineer.
- B. The kinds and classes of materials incorporated into the work shall be as shown on the Drawings. The Contractor shall not interpret or construe the several kinds of materials described herein as being equal in their application for the project.

**2.02 CONCRETE:** All concrete and steel reinforcement for concrete shall conform to the requirements of Section 03300.

### **2.03 PRECAST CONCRETE MANHOLES**

- A. Precast manholes shall conform to the details shown. Manhole bases may be precast.
- B. Except where otherwise specified, manhole sections shall conform to ASTM C 478.
- C. Precast manhole bases shall be of approved design and of sufficient strength to withstand the loads to be imposed upon them. An approved joint shall be provided to receive the riser sections forming the barrel.
- D. Mark date of manufacture and name or trademark of manufacturer on inside of barrel.
- E. Unless a larger size is required by the pipe size and/or configuration, the barrel of precast manholes shall be constructed of 48-inch diameter standard reinforced concrete manhole sections. The barrel shall be constructed of various lengths in combination to provide the correct height with the fewest joints. Wall sections shall not be less than five inches thick. For 72-inch and larger manholes, a transition slab is required for manholes greater than 12 feet deep.

- F. Joints shall be tongue and groove with preformed mastic joint compound. Preformed joint compound shall be Preformed Asphalt and Butyl Gasket Material, a product of the Blue Ridge Rubber Company, or "Ram-Nek" as manufactured by K.T. Snyder Company, Inc. of Houston, Texas, or "Kent-Seal" as manufactured by Hamilton-Kent Manufacturing Company or equal.
- G. A precast slab or precast eccentric cone, as shown or approved, shall be provided at the top of the manhole barrel to receive the cast iron frame and cover. The slab or cone shall be of acceptable design and of sufficient strength to safely support an H-20 loading. Concrete slabs shall be not less than 8 inches thick.
- H. Manhole sections shall contain manhole steps, uniformly spaced, 12 inches minimum, 16 inches maximum on centers, accurately positioned and embedded in the concrete when the structure is greater than 48" in height. Manhole steps shall be M.A. Industries, Model PS1-PF or equal.
- I. Rubber gaskets shall be the "0" ring type conforming to the requirements of the latest edition of ASTM Standard Specification A-443. The gaskets shall be as manufactured by the Blue Ridge Company of Flecher, North Carolina, or the Tylox "0" Ring Gasket produced by Hamilton-Kent Manufacturing Company of Kent, Ohio, or approved equal. Lubricants used with the selected gaskets shall be as furnished or recommended by the gasket manufacturer.

#### **2.04 PRECAST INLETS & CATCH BASINS**

- A. Precast inlets & catch basins shall be precast and shall conform to the details shown and shall meet the requirements of ASTM C 913 and MDOT Standards.
- B. Mark date of manufacture and name or trademark of manufacturer on inside of barrel.
- C. Concrete for precast units shall be a minimum of 4,000psi compressive strength at 28 days.
- D. Reinforcing steel for bottom and walls may be welded wire fabric, ASTM 1 185.
- E. Reinforcing steel for the cover shall be ASTM A 615 and per the size shown on the details.
- F. Catch basins and inlets shall be manufactured with sufficient strength to withstand the loads to be imposed upon them
- G. Joints shall be tongue and groove and sealed with flexible plastic gaskets for joint conduit and shall be Ram-Nek or pre-approved equal.
- H. All units shall be sound and free from cracks, broken corners or other defects that would interfere with proper performance

#### **2.05 CASTINGS, GRATING AND FITTINGS**

- A. All castings and gratings shall be carefully handled. Injurious cracks, chips, surface mars, etc. which render them unsuitable for use or unsightly after being placed will be cause for rejection and replacement at the expense of the Contractor.
- B. The castings, gratings and fittings shall be placed as indicated on the plans or as directed to line and grade and in such a manner that subsequent adjustments will not be necessary.

- C. When castings or gratings are to be set in concrete or cement mortar, all anchors or bolts shall be in the correct place and position before the concrete or mortar is placed, and they shall not be disturbed while the concrete or mortar is hardening.
- D. Castings and gratings placed on previously constructed masonry shall be set in mortar beds or anchored to the masonry as shown on the plans or as directed. The bearing surface of the original masonry shall present an even surface and conform to line and grade so that the entire face or back of the casting will come to rest with the masonry.
- E. Castings and gratings shall be set firm and snug so that they will not rattle, shake or move unnecessarily.
- F. Gray iron castings shall conform to ASTM A 48 "Gray Iron Castings, Class 25".
- G. Casting shall be manufactured to the sizes and shapes illustrated on the Drawings or as specified by the manufacturer's model number.

## **PART 3 – EXECUTION**

### **3.01 GENERAL**

- A. The requirements set forth in this section shall govern the installation of storm drain manholes, inlets, catch basins and other similar drainage structures.
- B. The work shall consist of the excavation, installation, backfilling, repair and restoration of property and final cleanup.

### **3.02 EXCAVATION**

- A. Trenches shall be excavated in accordance with the requirements of Section 2230 to a width sufficient to allow for proper installation of the structure per the Drawings. Where feasible, trench walls shall be vertical.
- B. The completed trench bottom shall be firm for its full length and width.
- C. Where drain structures are to be placed in embankment, the excavation shall be made after the embankment has been completed to the specified height above the flow line of the conduit.
- D. Excavation includes removal, handling, rehandling, refill or backfilling and disposal of any and all materials encountered in the work and shall include all pumping, bailing, drainage, sheeting and bracing.
- F. If a drainage structure is not laid in a trench, a uniformly firm bed shall be made in the same manner as above specified for the preparation of the bottom of the trench.

### **3.03 MANHOLE, INLET AND CATCH BASIN INSTALLATION**

- A. Install complete with accessories, as indicated on plans.
- B. Form continuous concrete channels and benches between inlets and outlet.
- C. Set tops of frames and covers of manholes flush with finished surface where occur in pavements. Set tops 3 inches (76 mm) above finished surface elsewhere, except where otherwise indicated.
- D. Place precast concrete manhole section as indicated.

- E. Set tops of frames and covers of curb inlets flush with the top of the curb and grate inlets flush with finished surface where occur in pavements. Curb inlet tops shall be poured in place and match the grade and longitudinal slope of the roadway. Set grate inlet tops 3 inches (76 mm) below finished surface elsewhere, except where otherwise indicated.
- F. Place precast concrete inlet section as indicated.

### **3.04 INLET AND OUTLET PIPES**

- A. Unless otherwise directed, inlet and outlet pipes shall extend through the walls of the drainage structure for a sufficient distance beyond the outside surface to allow for connections and shall be cut flush with the wall on the inside surface and neatly pointed.
- B. The concrete, brick or mortar shall be constructed around the pipes to so as to prevent leakage and to form a neat connection.

## **PART 4 - COMPENSATION**

### **4.01 GENERAL**

- A. No separate payment shall be made for any item necessary for the completion of the work indicated on the Contract Drawings and in the Specifications but not shown as a pay item on the proposal form; therefore, full compensation for these items shall be considered absorbed in the Contract Lump Sum or related pay items.
- B. The prices thus paid shall be full compensation for completing the work. Materials or work for which a pay item is not included and are necessary to complete the work under this section shall be furnished or performed and shall be considered incidental to the completed construction.

### **4.02 MEASUREMENT AND PAYMENT**

- A. All storm drain structures shall be measured for payment as indicated in the proposal. The measurement shall be in units and includes all castings, gratings, frames and other incidental items required to construct a complete unit. No separate payment will be made for structure excavation, structure backfill, sheeting, shoring or for disposal of surplus material

- 4.03 BASIS OF PAYMENT:** Payment will be made at the Contract Unit Prices bid per Unit (Each) for the various types of drainage structures as itemized on the proposal. Differing sizes and depths of drainage structures shall be considered absorbed cost with other work shown unless itemized.

**--END OF SECTION 02730--**

## SECTION 02758 INSPECTION AND EVALUATION OF GRAVITY PIPELINES

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### PART 1 - GENERAL

#### 1.01 DESCRIPTION OF WORK

- A. It is the intent of this work to assess the internal structural and service condition of the sewer line. Assessment will be performed using visual inspection and pan and tilt color camera-CCTV.
- B. Qualifications of Contractor: If requested by the Engineer, the proposed contractor shall submit a verifiable reference list documenting the successful completion of a minimum of 250,000 linear feet of internal sewer condition assessment on projects of similar size and scope to this project. The reference list along with a list of available equipment and resumes of key personnel shall be submitted to the Engineer a minimum of two weeks prior to bid.
- C. It is the intent of this work to survey individual sewer lines that have been installed as part of this contract, to assess internal structural condition, service condition and identify and locate miscellaneous construction features.
- D. It is the responsibility of the Contractor to comply with applicable OSHA regulations. The Contractor shall provide written documentation that all workers have received the training required under these regulations and guidelines.
- E. Two forms of internal condition assessment are addressed by these specifications:
  - 1. Sewer survey – Detailed viewing of the sewer (“survey”), with the aid of CCTV equipment, to assess internal structural condition, service condition, and identify and locate miscellaneous construction features as well as assess the structural and service condition of laterals.
  - 2. Sewer inspection – Viewing the sewer system pursuant to investigative work following other operational activity including:
    - a. Locating manhole(s) and/or lateral(s) with or without radio-sonde
    - b. Sewer preconditioning and cleaning activities
    - c. Sewer rehabilitation, including point repairs
    - d. Such other similar purposes as may be required by the Owner.



3. Sewer inspection shall be carried out manually or with the aid of CCTV equipment, to assess overall condition.

## **1.02 SUBMITTALS**

- A. As requested by the Engineer, the Contractor shall provide to the Engineer the following information in writing prior to the set deadline, or at the indicated frequency, whichever is applicable.
  1. Project Schedule (At Pre-Construction Conference)
  2. Listing of Cleaning Equipment & Procedures (At Commencement)
  3. Listing of Flow Diversion Procedures (At Commencement)
  4. Listing of Preconditioning Procedures (At Commencement)
  5. Listing of Safety Precautions and Traffic Control Measures (At Commencement)
  6. Listing of CCTV Equipment (At Commencement)
  7. Listing of Backup and Standby Equipment (At Commencement)
  8. Manufacturers Details of CCTV Equipment (At Commencement)
  9. Location where Debris from Cleaning will be Disposed (At Commencement)
  10. Updated Schedule of Planned Inspections/Cleaning of Sewer Reaches (Post Commencement, Weekly)
  11. Two (2) Copies of CCTV Thumb Drives
  12. Two (2) Copies of Inspection Report incorporating a summary statistical breakdown of defects and main findings
  13. Daily Logs and Progress Reports (Daily)
  14. Confined Space Entry Logs (Daily)
- B. The Contractor shall complete a daily written record (diary) detailing the work carried out and any small items of work which were incidental to the contract. The Contractor shall include in his daily record, reference to:

1. Delays: e.g. dense traffic, lack of information, sickness, labor or equipment shortage.
  2. Weather: conditions, e.g. rain, etc.
  3. Equipment: on site, e.g. specialist cleaning, by-pass equipment, etc.
  4. Submittals: to the designated representative
  5. Personnel: on site by name, e.g., all labor, Specialist Services, etc.
  6. Accident: report, e.g. all injuries, vehicles, etc.
  7. Incident: report, e.g. damage to property, property owner complaint, etc.
  8. Major defects encountered, including collapsed pipe, if any: e.g. cave-ins, sinkholes, etc.
  9. Visitors: on site
- C. The Engineer's designated representative on site shall certify receipt of the daily record noting any items and adding any observations with reference to claims for payment to the Contractor. The Owner may at his discretion, for which the Contractor must receive direction in writing, make an exception to this requirement for weekly submission of progress rather than for daily submission.

### **1.03 REQUIREMENTS AND EXTENT OF SURVEY/INSPECTION**

- A. The Contractor shall inspect sewer lines with a color pan and tilt CCTV imagery as specified in order to record all relevant features and confirm their structural and service condition.
- B. Inspections of sewer systems shall be carried out in compliance with the NASSCOPACP reporting format and coding standards.
- C. CCTV operator(s) responsible for direct reporting of sewer condition shall have a minimum of 3 years previous experience in surveying, processing, and interpretation of data associated with CCTV surveys/inspections. If requested by the Engineer, the Contractor shall provide the designated representative with written documentation that all CCTV survey operators meet these experience requirements which shall include a list of projects undertaken as well as client name and telephone number for reference.

- D. Approved Contractors will be required to provide evidence acceptable to the Engineer that all CCTV technicians performing work under this contract have satisfactorily completed NASSCO Pipeline Assessment Certification Program (PACP) training and possess valid PACP Certification documents. All defect coding, as well as material, shape and lining coding used throughout the project will conform to NASSCO's Pipeline Assessment Certification Program, PACP. Required training to meet these requirements will be carried out at the Contractor's expense.
- E. The Contractor shall complete a daily written record (diary) detailing the work carried out and any small items of work which were incidental to the contract as previously described in Item 1.03.

#### **1.04 CCTV SURVEY/INSPECTION AND OPERATIONAL EQUIPMENT REQUIREMENTS**

- A. The surveying/inspecting equipment shall be capable of surveying/inspecting a length of sewer up to at least 500 feet.
- B. Each survey/inspection unit shall contain a means to transport the CCTV camera in a stable condition through the sewer under survey and/or inspection. Such equipment shall ensure the maintained location of the CCTV camera when used independently on or near to the central axis of a circular shaped sewer.
- C. Where the CCTV camera is towed by winch and drum through the sewer, all winches shall be stable with either lockable or ratcheted drums. All drums shall be steel or of an equally non-elastic material to ensure the smooth and steady progress of the CCTV camera equipment. All winches shall be inherently stable under loaded conditions.
- D. Each unit shall carry sufficient numbers of guides and rollers such that, when surveying or inspecting, all bonds are supported away from pipe and manhole structures and all CCTV cables and/or lines used to measure the CCTV camera's location within the sewer are maintained in a taut manner and set at right angles where possible, to run through or over the measuring equipment.
- E. Each unit shall carry a range of flow control plugs or diaphragms for use in controlling the flow during the survey/inspection. A minimum of one item of each size of plug or diaphragm – within the range of pipe sizes set out in the contract - shall be carried
- F. Each survey/inspection unit shall have on call equipment available to carry out the flushing, rodding and jetting of sewers as and when such procedures are deemed to be necessary.

#### **1.05 FIELD SUPERVISION BY CONTRACTOR**

The Contractor shall maintain on site at all times a competent field supervisor in charge of the survey/inspection. The field supervisor shall be responsible for the safety of all site workers and site conditions as well as ensuring that all work is conducted in conformance with these specifications and to the level of quality specified.

#### **1.06 APPLICATION OF INSPECTION TYPE**

- A. The following guidelines concerning the use of CCTV shall be followed, subject to the

review and approval of the designated Engineer:

1. Generally, CCTV alone shall be used for internal condition assessment where the depth of flow of sewage is less than 25% of overall sewer diameter at the start of the survey. The Contractor will make an informed decision to continue should the depth of flow increase beyond the 25% level but no greater than 40% of overall sewer diameter at any time throughout the length.
2. Generally, CCTV combined with plugging and/or bypassing shall be used for internal condition assessment where depth of flow of sewage varies from 25% to 75% of overall sewer diameter for sewers greater than 24-inches in diameter. Where depth of flow of sewage exceeds 25% and is less than 75% of overall sewer diameter the designated Engineer shall instruct Contractor to either:
  - a. Continue using CCTV (where depth of flow is only marginally greater than 25% of overall diameter) or
  - b. Use plugging/bypass pumping to reduce flow levels below 25%.

#### **1.07 RESPONSIBILITY FOR OVERFLOWS OR SPILLS**

- A. It shall be the responsibility of the Contractor to schedule and perform his work in a manner that does not cause or contribute to incidence of overflows or spills of sewage from the sewer system.
- B. In the event that the Contractor work activities contribute to overflows or spills, the Contractor shall immediately take appropriate action to contain and stop the overflow, clean up the spillage, disinfect the area affected by the spill, and notify the designated representative in a timely manner.
- C. Contractor will indemnify and hold harmless the Owner for any fines or third-party claims for personal or property damage arising out of a spill or overflow that is fully or partially the responsibility of the Contractor, including the legal, engineering and administrative expenses of the Owner in defending such fines and claims.

## **PART 2 - PRODUCTS (NOT USED)**

## **PART 3 - EXECUTION**

### **3.01 CLEANING PRIOR TO INTERNAL CONDITION INSPECTION**

When necessary, the Contractor shall clean the sewer prior to internal condition inspection. For this contract, cleaning is required prior to any CIPP work.

### **3.02 SEWER CLEANING UNITS AND EQUIPMENT**

- A. The Contractor shall provide sufficient sewer cleaning units and equipment in order to complete cleaning operations as specified.
- B. The Contractor shall exert all reasonable care to avoid damage to the sewer or manhole during the cleaning operation.

### **3.03 REMOVAL OF DEBRIS WITH CLEANING**

The Contractor shall provide all equipment and personnel necessary to safely remove and extract silt and debris from the sewer through existing manhole access.

### **3.04 CCTV - GENERAL**

- A. CCTV Camera Prime Position: The CCTV camera shall be positioned to reduce the risk of picture distortion. In circular sewers the CCTV camera lens head shall be positioned centrally (i.e. in prime position) within the sewer. In non-circular sewers, picture orientation shall be taken at mid-height, unless otherwise agreed, and centered horizontally. In all instances, the camera lens head shall be positioned looking along the axis of the sewer when in prime position. A positioning tolerance of  $\pm 10\%$  of the vertical sewer dimension shall be allowed when the camera is in prime position.
- B. CCTV Camera Speed: The speed of the CCTV camera in the sewer shall be limited to 30 LF per minute for surveys to enable all details to be extracted from the ultimate recording. Similar or slightly higher speed as agreed by the designated Engineer shall be provided for inspections.
- C. CCTV Color Camera: The Contractor shall provide a color span and tilt camera(s) to facilitate the survey and inspection of all laterals, including defects such as hydrogen sulfide corrosion in the soffit of sewers and benching or walls of manholes over and above the standard defects that require reporting, where required by the designated

Engineer. These will be carried out as part of the normal CCTV assessment as the survey or inspection proceeds when instructed by the designated representative.

D. Linear Measurement:

1. The CCTV monitor display shall incorporate an automatically updated record in feet and tenths of a foot of the footage of the camera or center point of the transducer, whichever unit is being metered, from the cable calibration point. The relative positions of two center points should also be noted.
2. The Contractor shall use a suitable metering device, which enable the cable length to be accurately measured; this shall be accurate to  $\pm 1\%$  or 3 inches whichever is the greater.
3. The Contractor shall demonstrate compliance with the tolerance listed above, using one or both of the following methods in conjunction with a linear measurement audit form which shall be completed each day during the survey:
  - a. Use of a cable calibration device
  - b. Tape measurement of the surface between manholes
4. A quality control form will be completed and submitted by the contractor depicting the level of accuracy achieved.
5. If the Contractor fails to meet the required standard of accuracy, the designated representative shall instruct the Contractor to provide a new device to measure the footage. The designated Engineer retains the right to instruct the Contractor in writing, to re-survey those lengths sewer first inspected with the original measuring device using the new measuring device.

E. Data Display, Recording and Start of Survey/Inspection:

1. At the start of each sewer length being surveyed or inspected and each reverse set-up, the length of pipeline from zero footage, the entrance to the pipe, up to the cable calibration point shall be recorded and reported in order to obtain a full record of the sewer length. Only one survey shall be indicated in the final report. All reverse set-ups, blind manholes and buried manholes shall be logged on a separate log. Video digits shall be recorded so that every recorded feature has a correct tape elapsed time stamp. Each log shall make reference to a start and finish manhole unless abandonment took place because of blockage. Manhole number shall be indicated in the remark's column of the detail report.

2. The footage reading entered on to the data display at the cable calibration point must allow for the distance from the start of the survey/inspection to the cable calibration point such that the footage at the start of the survey is zero.
  3. In the case of surveying through a manhole where a new header sheet must be completed, the footage shall be set at zero with the camera focused on the outgoing pipe entrance.
  4. At the start of each manhole length a data generator shall electronically generate and clearly display on the viewing monitor and subsequently on the record of data in alphanumeric form containing all fields required by the PACP information standard.
  5. The size and position of the data display shall be such as not to interfere with the main subject of the picture.
  6. Once the survey of the pipeline is under way, the following minimum information shall be continually displayed:
    - a. Automatic update of the camera's footage position in the sewer line from adjusted zero.
    - b. Sewer dimensions in feet.
    - c. Manhole or pipe length reference number (PLR). General convention allows upstream manhole number to be designated PLR.
    - d. Direction of survey, i.e. downstream or upstream.
  7. Correct adjustment of the recording apparatus and monitor shall be demonstrated by use of the test tape or other device approved by the Contractor. Satisfactory performance of the camera shall be demonstrated of each day for a minimum period of 30 seconds.
  8. Footage and corresponding time elapsed video digit shall be given throughout survey/inspection for all relevant defects and construction features encountered unless otherwise agreed.
  9. Where silt encountered is greater than 10 percent of the diameter of the pipe, the depth of silt shall be recorded at approximately 50-foot intervals.
  10. All continuous defects shall incorporate a start and finish abbreviation in the log report.
- F. Coding: Defect coding, as well as Material, Shape, and Lining Coding, and conventions used throughout the project will be PACP-compliant. The CCTV Contractor must ensure that all surveyors conform to the detailed requirements of the

reporting procedure concerning feature description and feature definition as well as the computer file format.

### **3.05 CODE AND MAN ENTRY SURVEY DATA SPECIFICATION**

- A. Survey Reporting: The Contractor shall submit to the Engineer two (2) printed reports, two (2) DVD's with copies of all descriptive data in digital format and two (2) Thumb Drives of recordings. The supplied data and information shall remain the property of the Engineer.
- B. Site Coding Sheets: Each sewer length, i.e. the length of sewer between two consecutive manholes, shall be entered on a separate coding sheet or entered separately electronically. Thus, where a Contractor elects to "pull through" a manhole during a CCTV Survey or "walk through" during a Man Entry survey, a new coding sheet shall be started at the manhole "pulled or walked through" and the footage re-set to zero on the coding sheet. Where a length of sewer between consecutive manholes is surveyed from each end (due to an obstruction), two coding sheets should be used. Where a length of sewer between two consecutive manholes cannot be surveyed or attempted for practical reasons, a (complete header) coded sheet shall be made out defining the reason for abandonment. At uncharted manholes, a new coding sheet must be started and the footage re-set to zero.
- C. Measurement Units: All dimensions shall be in feet and tenths of a foot. Measurement of sewers shall be to the nearest tenth of a foot.
- D. CCTV and Man Entry Photographs:
  - 1. Still photographs (JPEG format) shall be taken of all pipeline defects. Where a defect is continuous or repeated, the photographs shall be taken at the beginning and end of the defect.
  - 2. CCTV Photographs must clearly and accurately show what is displayed on the monitor, which shall be in proper adjustment.
- E. CCTV Picture Quality:
  - 1. An approved test device shall be provided and be available on site throughout the Contract, enabling the test specified in this clause to be checked.
  - 2. The test card shall be Marconi Regulation Chart No. 1 or its approved derivatives with a color bar, clearly differentiating between colors, with no tinting, to show the following: White, Yellow, Cyan, Green, Magenta, Red, Blue and Black.



3. The electronic systems, television camera and monitor shall be of such quality as to enable the following to be achieved:
    - a. Shades of Gray: The gray scale shall allow equal changes in brightness ranging from black to white with a minimum of five clearly recognizable stages
    - b. Color: With monitor adjusted for correct saturation, the six colors plus black and whites shall be clearly resolved with the primary and complementary colors in order of decreasing luminance. The gray scale shall appear in contrasting shades of gray with no tinge.
    - c. Linearity: The background grid shall show squares of equal size, without convergence/divergence over the whole of picture. The center circle shall appear round and have the correct height/width relationship ( $\pm 5\%$ ).
    - d. Resolution: The live picture must be clearly visible with no interference and capable of registering a minimum number of TV lines/picture height lines. The resolution shall be checked with the monitor color turned down. In the case of tube cameras, this shall be 600 lines.
    - e. Color Constancy: To ensure the camera shall provide similar results when used with its own illumination source, the lighting shall be fixed in intensity prior to commencing the survey. In order to ensure color constancy, no variation in illumination shall normally take place during the survey.
  4. The Contractor shall note that the designated Engineer may periodically check both the live and picture consistency against the color bar. Any differences will require re-survey of the new length or lengths affected, at the Contractor's expense.
- F. CCTV Focus/Iris/Illumination: The adjustment of focus and iris shall allow optimum picture quality to be achieved and shall be remotely operated. The adjustment of focus and iris shall provide a minimum focal range from 6-inches in front of the camera's lens to infinity. The distance along the sewer in focus from the initial point of observation shall be a minimum of twice the vertical height of the sewer. The illumination must allow an even distribution of the light around the sewer perimeter without the loss of contrast picture, flare out or shadowing.
- G. Contractor's Data Quality Control Procedure:
1. The Contractor shall operate a quality control system, to be approved by the designated Engineer, which will effectively gauge the accuracy of all survey reports produced by the operator.

2. The system shall be such that the accuracy of reporting is a function particularly of:
  - a. The number of faults not recorded (omissions)
  - b. The correctness of the coding and classification of each fault recorded.

### **3.06 PHYSICAL INSPECTION OF MANHOLES**

#### **A. General**

Manholes shall be inspected to assess general physical condition and to locate leaks which are causing or could cause soil erosion and degradation to the sanitary systems, and/or other underground utilities or surface structures, and which are allowing leaks into, or out of, the sewer system.

#### **B. Documentation of Inspection**

1. Observations shall be recorded on a manhole physical inspection report form. Information recorded on these forms shall include but not be limited to location of the structure, relationship of a structure's incoming and outgoing lines, size of lines, depth of structure, condition of cover, ring, wall, bench and invert, type of material, and any other pertinent information which would allow sources of Infiltration/Inflow.
2. Color photographs shall be taken of the interior and exposed exterior of all manholes, and shall portray any defects as best as possible. The main purpose of the photographs is to assist management in decisions for future testing or rehabilitation purposes. The "Manhole Inspection Report" form will be used to record the inspection results. The Engineer shall approve the form to be used.
3. Besides any hard copy in the reports, photographs shall be provided to the Owner in a digital electronic version on thumb drives in the JPEG format. Each digital photo file and photograph, shall have a unique I.D. applied to it that will indicate which manhole is pictured, and will correspond to that features I.D. in the data.

- C. Contractor shall furnish all data and photographs gathered in the field investigation, and it shall be incorporated into a report listing all findings and recommendations for future inspection or rehabilitation.

### **3.07 COLLAPSED SEWERS/DEFECTIVE MANHOLES**

- A. Any sewer found with greater than 10% deformation (i.e. collapsed or near to collapse) must be reported to the designated representative immediately for remedial action.
- B. Any manhole found broken, cracked, with missing covers or surcharges, must be reported to the designated representative immediately for remedial action.
- C. Any sewer found with existing conditions that pose a threat of personal injury to the public, such as a collapsed sewer with attendant depression roadway, must be protected by the Contractor until the designated representative arrives at the job site

- D. Any manhole found where the existing conditions pose a threat of personal injury to the public, such as broken, cracked or missing covers or covers found in traveled portions of any sidewalk or roadway must be protected by the Contractor until the designated representative arrives at the job site.

## **PART 4 - COMPENSATION**

### **4.01 GENERAL**

- A. No separate payment shall be made for any item necessary for the completion of the work indicated on the Contract Drawings and in the Specifications but not shown as a pay item on the proposal form; therefore, full compensation for these items shall be considered absorbed in the Contract Lump Sum or related pay items.
- B. The prices thus paid shall be full compensation for completing the work. Materials or work for which a pay item is not included and are necessary to complete the work under this section shall be furnished or performed and shall be considered incidental to the completed construction.

### **4.02 MEASUREMENT AND PAYMENT**

- A. When listed on the proposal as a separate pay item, payment shall be made under the unit bid item CCTV Inspection. If not listed separately, CCTV shall be absorbed in the cost of other pay items.
- B. CCTV of main lines shall be paid for in the respective CIPP pay items for each pipe size.
- C. CCTV of service laterals prior to CIPP lining shall be paid for under the "CCTV Service Laterals" pay item when a camera is launched into the lateral.
- D. CCTV of service laterals after lining shall be paid for under the respective CIPP Service Lateral pay item.

**--END OF SECTION 02758--**

**SECTION 02762**  
**MANHOLE STRUCTURE REHABILITATION LINING**

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**PART 1 – GENERAL**

**1.01 SCOPE**

- A. It is the intent of this contract to install a high quality protective or restoration coating system to the interior surfaces of identified manholes, wetwells, or other structures. For existing structures, the structures will be identified after the manhole inspection is completed in order to determine which manholes require (if any) which type of coating system. This specification covers work, materials, equipment, and tools including specially developed application equipment as required for installation of a field applied interior surfacing system. The use of specialized equipment combined with rigorous surface preparation requirements shall be used to apply the products without the use of solvents. Product application requirements and procedures described herein include surface preparation, mixing application, material handling and storage, qualification of the applicator, and application quality control.
- B. The condition of the structures to receive the protective coating will be classified in accordance with the following criteria:

CONDITION	DESCRIPTION
New	New structures or structures that have not been exposed to sanitary sewer. No evidence of infiltration.
A	Minimal damage. Minimal evidence of exposure to sanitary sewer gases. No evidence of infiltration.
B	Moderate damage such as some missing mortar between bricks in brick manholes, some exposed aggregates in concrete structures. Moderate evidence of exposure to sanitary sewer gases. Evidence of minimal to moderate infiltration.
C	Severe damage such as significant missing bricks in brick manholes, severe exposed aggregates or exposed reinforcing steel in concrete structures. Severe evidence of exposure to sewer gases. Evidence of moderate to heavy infiltration.

- C. The minimum coating system type shall be as described in the following table:

STRUCTURE CONDITION	STRUCTURE MATERIAL	NON-STRUCTURAL / STRUCTURAL	SYSTEM TYPE
New	Precast	Non-Structural	1
New	Brick	Non-Structural	2
A	Precast	Non-Structural	2
A	Brick	Non-Structural	3
B	Precast	Structural	4
B	Brick	Structural	5
C	Precast	Structural	6
C	Brick	Structural	7

## 1.02 DESCRIPTION OF SYSTEMS

A. The following systems have been designated as the minimum acceptable requirements for the conditions listed in the above table.

1. System 1
  - (a) Epoxy System
    - i. Minimum 125 mils DFT of approved epoxy coating
2. System 2
  - (a) Epoxy System
    - i. Minimum 125 mils DFT of approved epoxy coating
3. System 3
  - (a) Cementitious System
    - i. Minimum  $\frac{1}{2}$ " of approved Geopolymer coating
  - (b) Epoxy System
    - i. Minimum 180 mils DFT of approved epoxy coating
  - (c) Composite System
    - i. Minimum  $\frac{1}{2}$ " of approved Portland cement underlayment with 80 mils of approved epoxy coating
  - (d) CIPM System
    - i. Minimum 0.099 in. thickness of approved CIPM liner
4. System 4
  - (a) Cementitious System
    - i. Minimum  $\frac{3}{4}$ " of approved Geopolymer coating
  - (b) Epoxy System
    - i. Minimum 180 mils DFT of approved epoxy coating
  - (c) Composite System
    - i. Minimum  $\frac{3}{4}$ " of approved Portland cement underlayment with 100 mils of approved epoxy coating
  - (d) CIPM System
    - i. Minimum 0.099 in. thickness of approved CIPM liner
5. System 5
  - (a) Cementitious System
    - i. Minimum  $\frac{3}{4}$ " of approved Geopolymer coating
  - (b) Epoxy System
    - i. Minimum 200 mils DFT of approved epoxy coating
  - (c) Composite System
    - i. Minimum  $\frac{3}{4}$ " of approved Portland cement underlayment with 100 mils of approved epoxy coating
  - (d) CIPM System
    - i. Minimum 0.117 in. thickness of approved CIPM liner
6. System 6
  - (a) Cementitious System
    - i. Minimum  $\frac{3}{4}$ " of approved Geopolymer coating
  - (b) Epoxy System
    - i. Minimum 250 mils DFT of approved epoxy coating
  - (c) Composite System
    - i. Minimum  $\frac{3}{4}$ " of approved Portland cement underlayment with minimum 100 mils of approved epoxy coating
  - (d) CIPM System
    - i. Minimum 0.122 in. thickness of approved CIPM liner

7. System 7
  - (a) Cementitious System
    - i. Minimum 1" of approved Geopolymer coating
  - (b) Epoxy System
    - i. Minimum 350 mils DFT of approved epoxy coating
  - (c) Composite System
    - i. Minimum 1" of approved Portland cement underlayment with minimum 100 mils of approved epoxy coating
  - (d) CIPM System
    - i. Minimum 0.158 in. thickness of approved CIPM liner

### 1.03 REFERENCES AND STANDARDS

A. All references and standards listed shall be the latest revisions.

B. References

1. American Society for Testing and Materials (ASTM)
2. International standard Organisation (ISO)
3. National Association of Corrosion Engineers (NACE)
4. SSPC
5. International Concrete Repair Institute (ICRI)
6. American Concrete Institute

C. ASTM Standards

1. ASTM D638: Tensile Properties of Plastics
2. ASTM D790: Flexural Properties of Un-reinforced and Reinforced Plastics
3. ASTM D695: Compressive Strength of Rigid Plastics
4. ASTM D4541: Pull-off Strength of Coatings Using a Portable Adhesion Tester
5. ASTM D2584: Volatile Matter Content
6. ASTM D2240: Durometer Hardness, Type D
7. ASTM D1653: Water Vapor Transmission of Organic Coating Films
8. ASTM D543: Resistance of Plastics to Chemical Reagents
9. ASTM C297: Flatwise Tensile Strength of Sandwich Constructions.
10. ASTM E-1907: Calcium Chloride Test for Moisture Vapor Transmission.
11. ASTM D-4263: Test Method for Indicating Moisture in concrete by Plastic Sheet Method.
12. ASTM E-337: Test Method for Measuring Humidity with a Psychomotor.
13. ASTM D-6132: Test Method for Nondestructive Measurement of Dry Film Thickness of Applied Organic Coatings Using an Ultrasonic Gauge.
14. ASTM D-4138: Test Method for Measurement of Dry film Thickness of Protective Coating Systems by Destructive Means.
15. ASTM D-4787: Standard Practice for Continuity Verification of Liquid or Sheet Linings Applied to Concrete Substrates.

16. ASTM C39/C39M: Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
  17. ASTM C666/C666M: Standard Test for Resistance of Concrete to Rapid Freezing and Thawing.
- D. SSPC Standards
1. SSPC Publication No. 91-08: Surface Preparation Specifications
  2. SSPC TU-13: Surface Preparation of Concrete
  3. SSPC TU-2: Design, Installation and Maintenance of Coating Systems for Concrete
- E. NACE Standards
1. NACE Standard SP 0188: discontinuity (Holiday) Testing for Protective Coatings
  2. NACE Standard SP 0892: Linings Over Concrete for Immersion Service
  3. NACE No. 6: Surface Preparation of Concrete
  4. NACE 6/SSPC 13: A Joint Standard for Surface Preparation of Concrete
- F. Other Standards
1. ICRI Technical Guidelines 03730: Surface Preparation Guidelines for the Repair of Deteriorated Concrete Resulting from Reinforced Steel Corrosion
  2. ICRI Technical Guidelines 03731: Guide for Selecting Application Methods for the Repair of Concrete Surfaces
  3. ICRI Technical Guidelines 03732: Guide for Selecting and Specifying Surface Preparation for Sealers, Coatings and Membranes

#### **1.04 SUBMITTALS**

- A. All submittals shall be submitted in accordance with the applicable portions of these specifications.
- B. The Contractor shall submit the following information to the Engineer for approval prior to beginning the installation of the protective coating:
1. Manufactures data sheets for the coating materials
  2. Third party test results verifying the physical properties of the coating materials meet or exceed the requirements of these specifications.
  3. Applicator's procedures for preparing the surface of the structure and installing the coating system.
  4. Documentation that the Applicator of the coating has been trained and certified by the Manufacturer.
  5. Material Safety Data Sheets (MSDS) for each product used.
  6. Certification that the equipment to be used for applying the products has been manufactured or approved by the protective coating manufacturer and Applicator personnel have been trained and certified for proper use of the equipment.
  7. Five (5) recent references of Applicator (projects similar size and scope) indicating successful application of coating process proposed to be used for this application.

## 1.05 QUALITY ASSURANCE

- A. Applicator shall initiate and enforce quality control procedures consistent with applicable ASTM, NACE and SSPC standards and the protective coating manufacturer's recommendations.
- B. Installer shall use an adequate number of skilled workmen who are thoroughly trained and experienced in the necessary crafts. These workmen shall be completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- C. Installer shall use approved specialty equipment adequate in size, capacity and number sufficient to accomplish the work of this Section in a timely manner.
- D. Testing and Inspection
  - 1. Thickness of coatings should be measured using non-destructive methods as recommended by the system manufacturer to ensure a uniform thickness during application.
  - 2. The Engineer and Installer shall make a final visual inspection. Any deficiencies in the finished system shall be marked and repaired according to the procedures set forth herein by Applicator.
- E. Owner Reserves the right to:
  - 1. View surface preparation prior to installation of any primer or surfacer.
  - 2. View primer and/or surface installation prior to installation of topcoat.
  - 3. View installation of surfacer during application to determine wet film thickness.
  - 4. View installation of topcoat during application to determine wet film thickness.
- F. Contractor shall make each manhole available to Owner or Owner's representative to make the viewings.
- G. Any visible "blistering" in any coat will be considered a failure of that coat and contractor shall remove the failed coat before proceeding to the next coat.
- H. After the protective coating has set hard to the touch it shall be inspected with high-voltage holiday detection equipment. Surface shall first be dried, then an induced holiday shall be made on to the coated concrete surface and shall serve to determine the minimum/maximum voltage to be used to test the coating for holidays at that particular area. The spark tester shall be initially set at 100 volts per 1 mil (25 microns) of film thickness applied but may be adjusted as necessary to detect the induced holiday (refer to NACE RPO188-99). All detected holidays shall be marked and repaired by abrading the coating surface with grit disk paper or other hand tooling method. After abrading and cleaning, additional protective coating material can be hand applied to the repair area. All touch-up/repair procedures shall follow the protective coating manufacturer's recommendations.
- I. The municipal sewer system may be put back into non-severe operational service as soon as the final inspection has taken place. However, for severe corrosion duty such as high concentrations of acids, bases or solvents, 3 to 7 days and/or force cure by heat induction to the coated surfaces may be necessary prior to returning to service. Consult coating manufacturer for further details.



- J. After the system has set hard to the touch it shall be inspected by the Engineer verifying the following:
1. Groundwater infiltration of the system shall be zero.
  2. All pipe connections shall be open and clear.
  3. No cracks, voids, pinholes, uncured spots, dry spots, lifts, delamination, or other type defects shall be evident in the system.

## **1.06 SITE CONDITIONS**

- A. Applicator shall conform with all local, state and federal regulations including those set forth by OSHA, RCRA and the EPA and any other applicable authorities.

## **1.07 WARRANTY**

- A. The contractor shall warranty all materials of construction and repair and all workmanship for a period of five years from the date of acceptance of final work. The five-year warranty of the installed product shall cover the following (but not be limited to):
1. Stop deterioration of the lined surfaces by sewer gas induced corrosion
  2. Prevent infiltration of ground water into the collection system through the lined surfaces.
  3. Stop root intrusion through the lined surfaces.
- B. Should defects of failures occur during the period of warranty, the contractor shall promptly take whatever steps are necessary to return the work to first class condition.

## **PART 2 – PRODUCTS**

### **2.01 PORTLAND CEMENT UNDERLAYMENT PRODUCTS**

- A. Portland Cement Underlayment - A Portland cement based, single component, high strength, fiber reinforced, shrinkage compensated cement mortar enhanced with a monocrystalline quartz aggregate.
- B. Typical Physical Properties
- |    |                                   |                                    |
|----|-----------------------------------|------------------------------------|
| 1. | Compressive Strength (ASTM C 579) | >9000 psi                          |
| 2. | Tensile Strength (ASTM C 496)     | > 850 psi                          |
| 3. | Freeze-Thaw                       | No visible damage after 300 cycles |
| 4. | Shrinkage (ASTM C 531)            | <0.0220% linear shrinkage          |
| 5. | Set Time (ASTM C 191)             | Final Set time: 80 minutes         |

### **2.02 GEOPOLYMER LINING PRODUCTS**

- A. Geopolymer Lining - A geopolymer formulated to provide corrosion resistant protection in a high hydrogen sulfide environment, restore structural integrity and eliminate the infiltration of groundwater in deteriorated structures.

B. Typical Physical Properties

- |    |                           |                                    |
|----|---------------------------|------------------------------------|
| 1. | Compressive Strength, PSI | >8000                              |
| 2. | Freeze-Thaw               | No visible damage after 300 cycles |
| 3. | Shrinkage                 | <0.02%                             |

**2.03 100% SOLIDS EPOXY PRODUCTS**

A. Epoxy Coating - The coating system shall be a spray-applied 100% solids epoxy monolithic surfacing system for use in coating new or existing manholes, wetwells, lift stations, treatment plants, and other structures.

B. Typical Physical Properties

- |    |  |                         |
|----|--|-------------------------|
| 1. | Minimum Compressive Strength (ASTM D695)                                   | 13,000 psi              |
| 2. | Minimum Tensile Strength (ASTM D 2370)                                     | 8,500 psi               |
| 3. | Minimum Flexural Strength (ASTM D790)                                      | 12,000 psi              |
| 4. | Minimum Bond Strength (ASTM D4541)   | 900 psi                 |
| 5. | Minimum corrosion resistance suitable for environments pH of 0.5 or higher |                         |
| 6. | Chemical Immersion: NACE TM 0174   |                         |
|    | (a)  | 5% Acetic Acid          |
|    | (b)  | 10% Sulfuric Acid       |
|    | (c)  | 5% Calcium Hydroxide    |
|    | (d)  | 5% Calcium Hypochlorite |
|    | (e)  | 50% Citric Acid         |
|    | (f)  | 20% Lactic Acid         |
|    | (g)  | 5% Phosphoric Acid      |
|    | (h)  | 5% Potassium Hydroxide  |
|    | (i)  | 5% Nitric Acid          |

Minimum requirement shall be no blistering, cracking, erosion of film, swelling, loss of adhesion or gloss loss after six months continuous immersion.

**2.04 CURED IN PLACE MANHOLE (CIPM) LINER PRODUCTS**

A. The following products have been pre-approved for use on this project.

1. Poly-Triplex Liner by Envirocort Technologies
2. Triplex® Liner System by McNeil Technologies
3. Pre-Approved Equal(s)

B. Cured-in-Place Lining System - The lining system shall be a cured-in-place liner method for use in new or existing manholes, wetwells, liftstations, treatment plants, and other structures.

C. Materials

1. Liner shall be of the type that allows rehabilitation of a concentric, eccentric, or flat top round structure without removing the access hatch frame, top section or corbel.
2. As a minimum the liner is composed of two outer layers of fiberglass with an impermeable membrane as the middle layer. Various weights of fiberglass are used to accommodate structural needs.
3. The layers of the liner will be impregnated with a modified epoxy resin. For additional liner thickness, additional layers of resin and fiberglass can be incorporated

**2.05 WATER “PLUG” / HYDRAULIC CEMENT**

- A. Manufactured specifically for use to stop active water leaks in concrete structures
- B. 60-90 second set time per ASTM C 403
- C. 1000 psi minimum compressive strength after 1 hour per ASTM C 109

**PART 3 – EXECUTION**

**3.01 QUALITY ASSURANCE**

- A. Installer shall be trained and certified by the manufacturer of the individual products and use surface preparation and product installation procedures and methods as directed by the manufacturer.
- B. Installer shall initiate and enforce quality control procedures consistent with applicable ASTM standards.
- C. Installer shall use an adequate number of skilled workmen who are thoroughly trained and experienced in the necessary crafts. These workmen shall be completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- D. Installer shall use approved specialty equipment adequate in size, capacity and number sufficient to accomplish the work of this Section in a timely manner.

**3.02 SAFETY**

- A. Installer shall perform his work in a manner to protect the health and safety of all workmen and the public.
- B. All work shall be in accordance with standard industry safety practices.
- C. All work, including entry into confined spaces shall be performed in strict compliance with current OSHA regulations.

**3.03 PRE-COAT INSPECTION**

- A. The Installer's vehicles and equipment must be able to access the structures to be coated under their own power.
- B. Active flows shall be dammed, plugged or diverted as required to ensure that the liquid flow is maintained below the surfaces to be coated.

- C. Installation of the protective coating shall not commence on any surfaces containing freshly poured concrete until the concrete substrate has properly cured, and in no case less than 28 days.
- D. Installer shall identify all services between each manhole to be lined and the first manhole upstream of each manhole to be lined and coordinate with each customer for uninterrupted service.
- E. Installer to keep sewer system active during rehabilitation of each structure.

### **3.04 SURFACE PREPARATION**

- A. Installer shall inspect all surfaces specified to receive the surfacing system prior to surface preparation. Installer shall promptly notify Owner of any noticeable disparity in the surfaces that may interfere with the proper preparation or application of the surfacing system.
- B. All concrete that is not sound or has been damaged by chemical exposure shall be restored to a sound concrete surface. All contaminants including all oils, grease, incompatible existing coatings, waxes, form release, curing compounds, efflorescence, sealers, salts, or other contaminants shall be removed.
- C. Surfaces to receive protective coating shall be cleaned to produce a sound concrete or masonry surface with adequate profile and porosity to provide a strong bond between the surfacing system and the substrate. Surface preparation methods shall be based upon the conditions of the substrate and the requirements of the surfacing system to be applied, but as a minimum, shall be in accordance with the manufacturer's guidelines.
- D. All surfaces including benches, inverts, joints, lift holes and walls shall be made smooth and suitable for application of the interior surfacing system. All benches and inverts shall be in place and complete.
- E. Temperature of the surface to be coated should be maintained between 40 deg F and 120 deg F during application. Prior to and during application, care should be taken to avoid exposure of direct sunlight or other intense heat source to the structure being coated. Where varying surface temperatures do exist, care should be taken to apply the coating when the temperature is falling versus rising (ie. late afternoon into evening vs. morning into afternoon).
- F. The applicator shall follow all regulations for contained space entry. The first procedure upon entering each structure will be to blast all specified surfaces by low pressure water cleaning as defined by NACE Standard 5. When all loose and/or contaminated debris has been removed, the surface shall be water blasted by the use of a held wand again. The wash water shall include a dilute solution of chlorine to diminish microbiological bacteria growth and to kill any bacteria residing on or in the surface. The surface will be tested at this point to ensure that the pH is within acceptable limits (not to exceed 8.5). These tests will be performed with litmus paper on various areas within the structure. All test results will be retained for review by the Engineer.

### **3.05 APPLICATION**

- A. The interior surfacing system shall be applied to the specified surfaces of all other structures.
- B. The interior surfacing system shall be continuously bonded to all brick, mortar, concrete, chemical sealant, grout, pipe and other surfaces inside the manhole according to ASTM C882 testing and therefore shall be designed for hydrostatic loading.

- C. The cured surfacing shall have proper sealing connections to all un-surfaced areas and shall be placed and cured in conformance with the recommendations of the system manufacturer.
- D. When cured, the system shall form a continuous, tight-fitting, hard, impermeable surfacing that is suitable for sewer system service and chemically resistant to any chemicals, bacteria or vapors normally found in domestic sewage.
- E. The system shall effectively seal the interior surfaces of the structure and prevent any penetration or leakage of groundwater infiltration.
- F. The system shall be compatible with the thermal conditions of the existing sewer structure surfaces.
- G. Application procedures shall conform to the recommendations of the interior surfacing system manufacturer, including material handling, mixing, and environmental controls during application, safety, and equipment.
- H. The equipment shall be specially designated to accurately ratio and apply the specified materials and shall be regularly maintained and in proper working order.
- I. The specified materials must be applied by an approved installer of the surfacing system.
- J. The walls of the structure shall be lined with the surfacing system to provide a thickness as previously specified based on the condition of the existing structure. The cured surfacing shall have proper sealing connections to all un-surfaced areas and shall be placed and cured in accordance with the recommendations of the system manufacturer.
- K. Repair materials shall be used to fill voids, structurally reinforce and/or rebuild surfaces, etc. as determined necessary by the engineer and protective coating applicator. Repair materials must be compatible with the specified epoxy coating and shall be applied in accordance with the manufacturer's recommendations to a minimum thickness of ¼ inch.

## **PART 4 – MEASUREMENT AND PAYMENT**

### **4.01 MEASUREMENT**

Measurement for new and rehabilitated structures shall be per square foot and shall be measured as the total area that receives the protective coating. No separate payment shall be made for any item necessary for the completion of the work indicated on the Contract Drawings and in the Specifications but not shown as a pay item on the proposal form; therefore, full compensation for these items shall be considered absorbed in the Contract Lump Sum or related pay items.

### **4.02 PAYMENT**

- A. Payment will be made under the following pay items and shall include all items necessary for completion of the installation:
  - 1. Coating of Structure (New) - per SF
  - 2. Rehabilitation of Structure (Type A) - per SF
  - 3. Rehabilitation of Structure (Type B) - per SF
  - 4. Rehabilitation of Structure (Type C) - per SF

**--END OF SECTION 02762--**

## **SECTION 02800 WATER DISTRIBUTION SYSTEM**

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### **PART 1 - GENERAL**

#### **1.01 DESCRIPTION**

- A. The Work to be performed under these specifications consists of furnishing all materials and performing all work necessary for or incidental to completing and making ready for the operation of the water distribution system as indicated on the Contract Drawings.
- B. The Work shall also include the furnishing, transporting and stringing of pipe; furnishing, transporting, storage and protection of valves, meters, fittings and all other materials that may be required for construction of the facility; ditching, shoring, backfill, installation of pipe, valves, fire hydrants, fittings, other appurtenances, and operations necessary to complete the work in accordance with the requirements of these specifications.

#### **1.02 COORDINATION WITH INTERESTED PARTIES**

The Contractor shall duly notify and coordinate any work with interested parties such as the Mississippi Department of Transportation, the Mississippi State Department of Health and the governing water association. No work which affects these interested parties will commence until satisfactory coordination has been achieved.

#### **1.03 SUBMITTALS**

- A. Shop Drawings:
  - 1. Submit size, class and other details of the pipe to be used.
  - 2. Submit information on typical joint and harnessing details.
- B. Tests: Submit a description of the proposed testing methods, procedures, and apparatus. Submit copies of all test reports.
- C. Record Drawings: During progress of the Work, keep an up to date set of drawings showing field modifications. Submit drawings at a scale satisfactory to the Engineer that show the actual in-place installation of all piping and appurtenances installed under this section. The drawings shall show all piping on the plans with all reference dimensions and elevations required for complete record drawings of the piping systems. The drawings shall be furnished no later than 30 days after Substantial Completions of the Work.

#### **1.04 PRODUCT DELIVERY, STORAGE AND HANDLING**

- A. Delivery, storage and handling of pipes, fittings and accessories shall be in complete compliance with the manufacturer's recommendations and instructions.
- B. Handle all pipes, fittings and accessories carefully with approved handling devices. Do not drop or roll pipes off of trucks. Do not otherwise drop, roll or skid pipes. Materials cracked, gouged, chipped, dented or otherwise damaged will not be approved.
- C. Pipes, fittings and accessories shall be unloaded opposite to or as close to the place where they are to be laid as is practicable to avoid unnecessary handling. Interiors shall be kept free from dirt and foreign matter.

## **1.05 CLEARANCE BETWEEN WATER AND SEWER LINES**

- A. Water mains shall be laid at least 10 feet horizontally from any sanitary sewer line or manhole.
- B. Where this 10 feet horizontal separation cannot be maintained, the water line shall be ductile iron with water line joints located at least 10 feet from the sewer line or the water line shall be totally encased in concrete.
- C. Water mains crossing sewers shall be laid to provide a minimum vertical distance of 18 inches between the outside of the water main and the outside of the sewer (water over sewer). The crossing shall be arranged so that the sewer joints will be equidistant and as far as possible from the water main joints. Where this separation cannot be met the sewer line shall be constructed to the same specifications as the water line and be water until such a point where the separation can be met.

## **1.06 CONFLICTS WITH OTHERS UTILITIES**

- A. Where construction conflicts with underground utilities which are to remain in place, or are indicated to be removed and/or relocated by the Contractor, the Contractor shall at his own expense, protect these facilities, restore the portions of those lines which are damaged or severed as a result of his operations, and remove and/or relocate existing facilities as indicated on the Contract Drawings.
- B. Where existing lines in conflict are indicated to be removed by others, the Contractor shall cooperate with the Owner of these utilities to the end that these conflicts are removed prior to excavation for the waterlines.

## **1.07 RAILROAD AND HIGHWAY CROSSING**

All work incidental to the construction of water lines under railroads and highways shall be done in strict compliance with the regulations prescribed by the owners of these properties and shall be done with extreme care to safeguard life and property. After the necessary permits and agreements for these crossings have been approved and executed. The Contractor shall confer with the representatives of the Railroad Company, the Mississippi Department of Transportation or the County owning these properties and arrange schedules, and the manner for constructing the work in accordance therewith.

## **1.08 MAINTENANCE**

- A. The Contractor shall be responsible for, without extra compensation, the maintenance of all water lines and structures, for the stability of all backfills and the finished grades above the water line and around the structures and for the repair, replacement, and restoration of all items which were damaged or removed during construction.
- B. The Contractor shall be responsible for, without extra compensation, the restoration of all permanent surfaces and landscaped areas such as pavements, sidewalks, driveways, curbs, gutters, shrubbery, decorative plantings, fences, poles and other property and surface structures removed, disturbed and/or damaged during or as a result of construction operations to a condition which is equal in appearance and quality to the condition that existed before the work began.
- C. The Contractor shall take such measures necessary to prevent, control and correct any dust nuisance or muddy conditions developing on roadways as a result of his operation. Direct payment for maintenance of the site shall not be provided as such but shall be considered a subsidiary obligation of the Contractor.

## **1.09 TRAFFIC CONTROL**

Traffic control shall be the responsibility of the Contractor and should be implemented in accordance with the Manual on Uniform Traffic Control Devices.

## **1.10 WARRANTY**

- A. The contractor shall warranty all materials of construction and repair and all workmanship for a period of one year from the date of acceptance of final work.
- B. Should defects of failures occur during the period of warranty, the contractor shall promptly take whatever steps are necessary to return the work to first class condition.

# **PART 2 - MATERIALS & EQUIPMENT**

## **2.01 GENERAL**

- A. The Contractor shall furnish all materials necessary for or incidental to constructing the water distribution system. All materials shall be new and of first quality with certified tests for all pipe and pipe fittings made at the manufacturer's plant to assure conformance with these technical specifications. Two (2) certified copies of each test result shall be furnished to the Engineer. Certification shall state that material or products meet or exceed project specifications.
- B. The kinds and classes of materials incorporated into the work shall be as indicated on the Contract Drawings or the Bid Form. The Contractor shall not construe or interpret the several kinds of materials described herein as being equal in their application.

## **2.02 WATER FOR CONSTRUCTION AND TESTING**

- A. The Contractor shall be responsible for all water needed in constructing the work, flushing the completed system, testing and other incidental needs. All water used shall be from an approved source free of pollution and shall be of a satisfactory bacteriological quality.
- B. Water used in mixing concrete and mortar shall be fresh, clean and free from injurious amounts of sewage, oil, acid, alkalis, salts or organic matter.

## **2.03 DUCTILE CAST IRON PIPE AND FITTINGS**

- A. Ductile iron pipe shall be water pipe manufactured in accordance with AWWA C 151 (ANSI A21.51).
- B. Fittings can be either AWWA C110 (full size fittings) or AWWA C153 (compact fittings).
- C. All fittings shall be ductile iron and shall conform to the latest edition of AWWA specifications for ductile iron fittings.
- D. All ductile iron pipe and fittings shall be factory-coated on the outside with coal tar enamel conforming to the latest edition of AWWA C105 (ANSI A21.5) and lined inside with a minimum of 1/16 inch cement-mortar lining in accordance with the latest edition of AWWA C104 (ANSI A21.4).
- E. All pipe and fittings shall be tested for minimum 150 PSI water working pressure, laying conditions Type 2, flat bottom trench without blocking, tamped, backfilled and under five (5) feet of cover.



- F. All pipe and fittings shall be encased with an 8 mil thick loose polyethylene encasement in accordance with the latest edition of AWWA C-105 (ANSI A21.5).
- G. Joints for ductile cast iron pipe shall be slip-on type unless otherwise specified. Slip-on joint shall conform to the latest edition of AWWA C 111 (ANSI A21.11) except that the joints shall be made with a special gasket seal Super-Bel Tite as manufactured by the Clow Corporation or approved equal. Lubricants shall be non-toxic, odorless, tasteless and shall not support bacteria and shall be specifically manufactured for the pipe utilized.
- H. Mechanical joint pipes shall conform to the latest edition of AWWA C 111 (ANSI A21.11).
- I. All joints for fittings, valves and specials shall be mechanical joints unless otherwise specified. Meg-a-lug or approved equal required on all fittings.
- J. If flexible joint or river crossing pipe is required and/or indicated in the project plans or specifications the joint shall be designed for a maximum deflection of 15 degrees, and a maximum working pressure rating of 250 psi. The type shall be the USIFLEX joint as manufactured by U.S. Pipe or an approved equal.
- K. All fittings shall be cast from ductile iron in accordance with ANSI/AWWA C153/A21.53. Fittings shall be listed by an approved certifying agency as conforming to the requirements of ANSI/NSF 61. The working pressure rating shall be 350 psi.

## **2.04 POLYVINYL CHLORIDE (PVC) PIPE**

- A. All PVC pipe and fittings four (4) inches to twelve (12) inches in diameter shall conform to the latest edition of AWWA C-900 and shall be made from Class 12454-A or B materials per the latest edition of ASTM D-1784. Pipe shall be a minimum of SDR 18 unless otherwise specified, for a minimum working pressure rating of 235 PSI. All pipes shall conform to the outside diameter (OD) dimensions of ductile iron pipe to facilitate use of DIP fittings, standard cast iron valves and specials. All joints shall be elastomeric sealed conforming to the latest edition of ASTM F-477. Gasketed joint assembly shall meet the requirements of ASTM D 3139. All pipe that is noted to have nitrile gasket shall be clearly marked to ensure pipe can be easily identified for installation in the proper location.
- B. All PVC pipe three (3) inches and smaller in diameter shall conform to the latest edition of ASTM D-2241 and shall be made from Type 1120 material. Pipe shall be a minimum of SDR 26 unless otherwise specified, for a working pressure of 150 PSI. All joints shall be solvent welded in accordance with the latest edition of ASTM D-2855 with the solvent cement conforming to the latest edition of ASTM D-2564.
- C. All jointing shall be made in accordance with the manufacturer's recommendations.
- D. All pipes shall bear the National Sanitation Foundation (NSF) seal of approval.
- E. Fittings for PVC pipe shall be ductile iron as per section 2.03.

## **2.05 PIPE MARKING**

- A. Pipe Marking:
  - 1. General:
    - a. Each piece of pipe or fitting shall be clearly marked with a designation which shall conform to designations shown on the shop drawings.
    - b. Class designation shall be cast or painted on each piece of pipe or fitting

four inches in diameter or larger.

- c. Piping smaller than 4 inches in diameter shall be clearly marked by the manufacturer as to material, type and rating.

2. Tracer Wire – SEE SECTION 02825

- B. See Contract Drawings for required pipe material.

**2.06 SERVICE PIPING**

- A. Service piping shall be as specified on the Bid Form and shall be designed for working pressure compatible with the water mains specified above:

- 1. Copper Service Line: Copper service line shall be seamless copper tubing suitable for underground water services. This material shall be supplied in conformance with ASTM Specification B-88-62 "Type K".
- 2. PVC Service Line: PVC service pipe shall be Schedule 40 pipe unless otherwise noted, made in accordance with ASTM D1785 and ASTM D2665 from a PVC compound conforming to a cell classification of 12454 as defined by ASTM D 1784. Belled end of solvent weld pipe shall meet the requirements of ASTM D2672. Solvent weld belled end pipe shall be tested and approved for contact with potable water in accordance with ANSI/NSF 61 and NSF 14 for use with potable water.
- 3. CTS Service Tubing: Service tubing shall be high-density polyethylene tubing (CTS) pipe SDR 9 for use in potable water service applications. Potable water service tubing shall meet the requirements of ASTM D2737, AWWA C901 and NSF Standards 14 and 61. Pipe dimensions shall meet Copper Tubing Size (CTS) standards. Tubing material shall be high-density polyethylene conforming with the minimum requirements of cell classification 345464E as defined and described in ASTM D3350. The resin shall have a material designation code of PE3608 (formerly PE3408) by the Plastic Pipe Institute.

**2.07 VALVES AND VALVE BOXES**

- A. Butterfly Valves: All butterfly valves shall be designed for buried service and in accordance with AWWA C504. The valve shall be rubber seated and operate under a 100 psi working pressure and a test pressure of 250 psi. All valves shall be as manufactured by Mueller.
- B. Check Valves: Check valves shall be iron body, spring loaded, swing type with straight-away passage of full pipe area and renewable bronze seat ring with resilient faced disc. Check valves shall be as manufactured by Mueller.
- C. Gate Valves: Gate valves shall meet requirements of AWWA C-509, non-rising forged bronze stem, iron body epoxy coated inside and outside (10 mils min. thickness), and shall withstand a maximum working pressure of 350 psi and be tested to a minimum of 700 psi. Valves shall open by turning counter clockwise, be equipped with "O" Ring Seals at the top of the stem, and a 2" operating nut. The valves shall be equipped with mechanical joint connections unless otherwise specified. Gate valves shall be series 2360 as manufactured by Mueller.
- D. Pressure Relief Valves: Pressure relief valves shall be installed where shown on the plans or as directed by the Engineer, and shall be a Model 66-D, as manufactured by GA Industries or an approved equal.
- E. Air Release Valves: Air release valves, shall be installed at high points on the lines as

shown on the plans or as directed by the Engineer and shall be ARI D-040-C, or an approved equal.

- F. Blow-Off Valves: Blow-off valves shall be placed on all dead end lines or as directed by the Engineer and shall employ an American made 1-1/2" AWWA approved bronze gate valve, pressure rated at 125 psi, a meter box, marker, and all fittings and piping as shown on the typical detail sheets.
- G. Pressure Reducing Valves: Pressure reducing valves shall be installed as shown on the Contract Drawings or as directed by the Engineer and shall be:
  - 1. Clayton Model 90, G.A. Industries Model No. 4500 D, adjustable within the range shown on the Contract Drawings or approved equal.
  - 2. Individual service size valves shall be Model No. 43-D, complete with strainer, as manufactured by G.A. Industries or approved equal. The entire individual pressure reducing assembly will be installed in a separate meter box as shown on the typical detail sheet. In addition to the pressure reducer and strainer, the assembly shall also include a 3/4" union and a 3/4" AWWA approved gate valve as manufactured by Crane Valve Company (No. 410), or approved equal. The entire reducer assembly shall be installed as a unit in front of the meter assembly and set to discharge at 60 psi.
- H. Valve Operating Wrench: Contractor shall supply two operating wrenches in lengths to be approved by the Engineer. Wrenches shall be No. 24610 as manufactured by Mueller Company.
- I. Valve Boxes: Valve boxes shall be installed on valves 2" and larger. Boxes shall be cast iron, two piece screw type with a 5-1/4" shaft adjustable to appropriate height to be flush with ground, and with the correct base for each size valve. The boxes shall be as manufactured by East Jordan Iron Works or approved equal with a cast iron drop-in lid marked "water".

## **2.08 FIRE HYDRANTS**

- A. Fire hydrants shall be Mueller A-423. Hydrants shall be of the compression type with a 5-1/4 inch main valve opening. All hydrants shall be nominal 6" size, 3-way construction with one 4-1/2" pumper nozzle and two 2-1/2" hose connections. Pumper nozzle and hose connection sizes to be verified with water service provider prior to ordering. Nozzle threads shall be National Standard unless otherwise specified. The depth of bury shall be 4 feet unless otherwise specified.
- B. Hydrants shall be furnished with a sealed oil reservoir located in the bonnet so that all threaded and bearing surfaces are lubricated when the hydrant is operated. Hydrant shall be furnished with a breakable feature that will break cleanly on impact and shall consist of two part breakable flange with a breakable stem coupling.
- C. Hydrants shall be coated interior and exterior above and below ground line with high performance 2-part epoxy. Exterior above ground of the hydrant shall be coated with UV resistant high gloss 2 part polyurethane enamel, color as specified, by the manufacturer.

## **2.09 WATER METERS AND METER BOXES**

- A. Water meters shall be magnetic-drive with hermetically sealed registers indicating gallons, 5/8" X 3/4" for residential service and 1" X 1-1/2" for commercial and heavy farm use. They shall be positive displacement meters as manufactured by Rockwell Manufacturing, Neptune Meter Company, Hershey Products, Inc. or an approved equal.

- B. Meter boxes shall be cast iron, concrete or plastic and be approximately 12" X 18" X 12" deep. Prior approval by the Engineer will be required.

## **2.10 COPPER METER YOKES**

Copper meter yokes shall be as manufactured by the Mueller Company or equal, with lock-wing stop.

## **2.11 CORPORATION STOPS**

Corporation stops shall be as manufactured by the Mueller Company or equal.

## **2.12 BRANCH CONNECTION**

Branch connections shall be as manufactured by Mueller Company or equal.

## **2.13 SERVICE CLAMPS**

Service clamps shall be double strap design as manufactured by Mueller Corporation or approved equal. All service connection on PVC mains shall be equipped with service clamps unless otherwise noted.

## **2.14 SPECIALS**

Specials shall be of the same material as the pipe material being used or as approved by the Engineer. The term specials shall include plugs, caps, and other items as needed. Specials shall conform to the applicable AWWA/ASTM/ANSI Standards and shall be designed for the working pressure of the water mains on which they are being installed.

## **2.15 OTHER MATERIAL**

- A. Concrete: Concrete shall be in accordance with Section 03300, Concrete, and shall develop a minimum compressive strength of 3,000 pounds per square inch at twenty-eight (28) days unless otherwise noted on the drawings.
- B. Steel Casing: The steel casing pipe shall conform to requirements of Section 2300.
- C. Pipe Embedment: Pipe Embedment (Select Bedding Material pay item) shall consist of the following per ASTM D 2321:
  - 1. Foundation Material: Foundation material is required where unsuitable material is encountered at the bottom of the trench or over-excavation has occurred.
  - 2. Bedding Material
  - 3. Haunching Material
  - 4. Initial Backfill
- D. Select material for foundation, bedding and haunching zones shall:
  - 1. Meet the requirements to be classified as a Class I, or II per ASTM Standard Specification D 2321 (Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications) Table 1 according to particle size, shape and gradation; or
  - 2. Be a mixture of coarse concrete aggregate and coarse river run sand. The

mixture shall consist of two (2) parts coarse aggregate conforming with ASTM C-33 to one (1) part coarse sand. The embedment material shall be thoroughly blended by the Contractor to produce a well-graded uniform mixture prior to placement in the trench. Prior to blending, the coarse concrete aggregate shall conform to the gradation sizing number 467 specified in Table 2 of ASTM C-33 as follows:

<u>SIEVE SIZE</u>	<u>PERCENT PASSING BY WEIGHT</u>
2 inch	100
1-1/2 inch	95 - 100
3/4 inch	35 - 70
3/8 inch	10 - 30
No. 4	0 - 5

The grading limits for fine aggregate shall be as follows:

<u>SIEVE SIZE</u>	<u>PERCENT PASSING BY WEIGHT</u>
3/8 inch	100
No. 4	95 - 100
No. 8	80 - 100
No. 16	50 - 90
No. 30	30 - 70
No. 50	3 - 30
No. 100	0 - 5

E. Initial Backfill Material: Select material for initial backfill zone shall be Class I, II, or III or IVA conforming to the requirements of ASTM Standard Specification D 2321 (Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications). Class IVA materials will require geotechnical evaluation prior to acceptance.

F. Final Backfill Material:

1. Native material will be considered as an acceptable final backfill material in unpaved areas. For native material to be considered as final backfill material under the roadway or within 5' of the pavement edge/back of curb the Contractor at his expense shall provide the Engineer with geotechnical evaluation of the native material for consideration as required by Engineer.
2. Select material for backfilling trenches and other designated excavations shall meet the requirements of the geotechnical report. If a geotechnical report is not available, select material shall be composed of a natural or artificial mixture of sand silt and clay or soil binder or shall be a select well-graded sand-gravel material as specified and approved by the Engineer. The following limits (percentage, by weight, passing square mesh sieves) shall apply to the sand-clay material:

- a. 30-100% passing the No. 10 sieve

The material passing the No. 10 sieve shall meet the following:

- a. 100% passing the No. 10
- b. 20-85% passing the No.40
- c. 15-70% passing the No. 60
- d. 8-40% passing the No. 200

The material passing the number 40 sieve shall meet the following:

Liquid Limit (LL)-----Not more than 25  
Plasticity Index (PI)-----Not more than 6

The fraction passing the number 200 sieve shall not be greater than two-thirds (2/3) the fraction passing the number 40 sieve.

- G. All testing costs associated with verifying that off-site material or material from trench excavations or on-site excavations meet the requirements of select material are the responsibility of the Contractor. This includes additional testing should it be required by the OWNER or ENGINEER.

## **PART 3 – EXECUTION**

### **3.01 GENERAL**

- A. The Contractor shall duly notify and coordinate all work with the governing water association as well as the local Health Department, Mississippi Department of Transportation and all other interest parties. No work which affects these interested parties will commence until satisfactory coordination has been achieved.
- B. Any time that the interruption of water service in the existing system is necessary because of operations under this Contract, the Contractor shall notify the Owner at least 48 hours in advance. Interruptions of water service shall not extend over night or through the weekend unless approved by the Owner and the Engineer.
- C. The work required shall consist of excavation and trenching for open cut construction, installation of pipe, fittings and appurtenances, backfilling, testing, repair and restoration of property, and final cleanup.

### **3.02 TEMPORARY SURFACES OVER TRENCHES**

Whenever the water lines are constructed under traveled roadways, driveways, sidewalks or other traveled surfaces, a temporary surface shall be placed over the top of the trench as soon as possible after placement and compaction of the backfill has been satisfactorily completed. The temporary surface shall consist of a minimum of six inches (6") of clay gravel or crushed limestone (#610). The top of the temporary surface shall be smooth and meet the grade of the adjacent undisturbed surface. The temporary surface shall be maintained at the Contractor's expense until final restoration of the street surface is completed as specified. See Section 02207 for more information and requirements.

### **3.03 EXCAVATION**

- A. The Contractor shall perform all excavation of every description and of whatever substances encountered to the depth specified in the Contract Drawings or as directed by the Engineer. All trenches shall be excavated to a depth to maintain the following minimum cover over the installed pipe:
1. 36" for ordinary conditions
  2. 42" for farm areas or under existing creeks or ditches
  3. As shown on the drawings
  4. Trenching within highway and railway right-of-way will be in strict accordance with the permit on file with the Engineer.

- B. Trench width shall be minimized to greatest extent practical but shall conform to the following:
1. Sufficient to provide room for installing, jointing and inspecting piping, but in no case wider at top of pipe than pipe barrel O.D. plus 3 feet.
  2. Enlargements at pipe joints may be made if required and approved by Engineer.
  3. Sufficient for sheeting, bracing, sloping, and dewatering.
  4. Sufficient to allow thorough compacting of backfill adjacent to bottom half of pipe.
  5. Do not use excavating equipment which requires the trench to be excavated to excessive width.
- C. The bottom of all trenches shall be carefully shaped, graded and aligned. Care shall be taken not to excavate below the depth specified; however, in the event this should occur, the bottom of the trench shall be filled back to grade with approved material and thoroughly compacted in a manner satisfactory to the Engineer. No additional compensation will be provided for over excavation unless prior approval for excavation has been received by Engineer.
- D. The bed for each piece of pipe is to be shaped either by trimming the bottom of the trench or by placing excavated earth therein and tamping so that each piece of pipe will have uniform bearing and be in continuous contact with the supporting ground for its entire length. The trench shall be further excavated around each bell or hub, if necessary, so that it will entirely be clear of the ground and leave ample room for making up joints.
- E. When rock is encountered, the Contractor shall excavate to a depth at least 4 inches below the required grade and a minimum clearance of 12 inches on each side of pipe and backfilled to grade with 4 inches of sand cushion.
- F. Water will not be permitted in the trenches while the pipe is being laid. The Contractor shall not open up more trench than the available pumping facilities are able to dewater to the satisfaction of the Engineer.
- G. A tolerance of six inches (6") from the established grade may be permitted, if approved by the Engineer, in order to prevent excessive breaks in alignment at the joints to such an extent that the joints cannot be properly made.
- H. Should conflicts in grade occur with other utilities, the water line grade shall be changed to avoid the conflict in a manner acceptable to the Engineer.
- I. Excavated material from trench and structure excavation suitable for backfill shall be placed compactly on the sides of the excavation and kept up so as not to endanger the work and be of as little inconvenience as possible to the public travel and abutting property, and so that free access is provided at all times to fire hydrants and water valves in the vicinity of the work. Any material encountered in the excavation which, in the opinion of the Engineer, is of such unsuitable nature as to be incapable of proper consolidation or is otherwise unsuitable for use in the work, shall be removed and wasted as directed and not stockpiled along the side of the excavation.
- J. The disposal of all surplus and unsuitable excavation shall be the responsibility of the contractor at his own expense. The surplus and unsuitable material not to be used in the construction of the project shall not be left on the right-of-way or easement of the project, or adjacent thereto.
- K. No more than 200 feet of trench may be opened in advance of pipe laying.

- L. Contractor shall excavate only the length of trench as needed for same day pipe installation. No open trenches shall be left at the end of each work day.

### **3.04 SHEETING, SHORING AND BRACING**

- A. The Contractor shall furnish and place such sheeting and bracing as required by OSHA or as may be required to support the sides of the trench and to protect the workmen and pipe or adjacent structures from injury by the sloughing off or caving in of the trenches.
- B. When using movable trench support, care shall be exercised not to disturb the pipe location, jointing or embedment.
- C. Any voids left in the embedment material by support removal shall be carefully filled with granular material and adequately compacted.
- D. The sheeting and bracing may be removed as the trench is backfilled, or may be left in place where necessary to prevent damage. In the event the sheeting or bracing is left in place, it shall not extend nearer than three feet (3') to the surface of the ground.
- E. In no case will extra compensation be allowed for furnishing, placing or removing any sheeting and bracing, but the cost of this work shall be included in the unit price bid for installing the pipe.

### **3.05 DEWATERING, DRAINAGE AND FLOTATION**

- A. 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.
- B. 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.
- C. 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 sub-grade foundation condition, 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.
- D. Dewatering shall at all times be conducted in such a manner as to preserve the natural undisturbed bearing capacity of the sub-grade soils at proposed bottom of excavation.
- E. Well-points may be required for pre-drainage of the soils prior to final excavation for some of the deeper below ground structures of 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. Well-points shall be surrounded by suitable filter sand and no fines shall be removed by pumping. Pumping from well-points shall be continuous and standby pumps shall be provided.
- F. 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 observations wells shall be at structures and along pipelines as approved by the Engineer prior to their installation.



- G. 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 or natural bearing of soils or damage to structures caused by an inadequate dewatering system or by interruption of the continuous operation of the system as specified.
- H. As part of the submittal of his dewatering system, the Contractor may be required to demonstrate the adequacy of the proposed system and well-point filter sand by means of a test installation. Discharge water shall be clear, with no visible soil particles in a one quart sample.
- I. During backfilling and construction, water levels shall be measured in observation wells located as directed by the Engineer.
- J. Continuous pumping will be required as long as water levels are required to be below natural levels.
- K. 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.

### **3.06 PROTECTION OF PERSONS AND PROPERTY:**

- A. Barricade open excavations occurring as part of this work and post with warning light in accordance with local requirements. Operate warning lights as recommended by authorities having jurisdiction.
- B. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.

### **3.07 PIPE EMBEDMENT**

- A. Select embedment material used around and under pipes is as specified in 2.15 of this section.
- B. Pipe embedment shall be an absorbed cost for each pipe specified on a per foot basis.
- C. Contractor will be compensated for removal of unsuitable foundation material and import of select bedding to bring back to plan grade where unsuitable material is encountered. Pay items will be shown on proposal as "Muck Excavation" for removal and "Select Bedding" for import. Contractor shall contact Engineer prior to declaring any foundation material unsuitable and removing.
- C. Pipe embedment shall be compacted to 96% Standard Proctor Dry Density in accordance with ASTM D-698.
- C. No pipe shall be brought into position until the preceding length has been embedded and secured in its final position.
- D. Place embedment materials so that the pipe after installation will be true to line and to grade.
- E. If Contractor proposes to use native material as pipe embedment the he shall provide the Engineer with soil tests showing that it meets specifications of 2.15 of this section.

### 3.08 PIPE LAYING

- A. Pipes, specials and fittings shall be carefully laid to the line and grade established on the Contract Drawings or as directed by the Engineer. All pipes shall be laid in compliance with the manufacturer's instructions, technical specifications and details on contract drawings and at such depths that a minimum cover is maintained as specified previously. Extra depth will not be measured unless noted on the Bid Form.
- B. Install all pipes accurately to the line and grade shown unless otherwise approved by the Engineer. Remove and relay pipes that are not laid correctly.
- C. PVC pipe shall be installed in accordance with the latest edition of ASTM D-2321 assuming the use of materials as described above. Ductile iron pipe shall be installed in accordance with the latest edition of AWWA C-151 using Type 2 bedding and native material.
- D. Pipe laying will not be permitted when trench contains water.
- E. Place bell and spigot so that bells face the direction of laying, unless otherwise approved by the Engineer.
- F. Excavate around the joints in bedding and lay pipes so that only the barrel receives bearing pressure from the trench bottom.
- G. Blocking is not allowed to bring pipe to grade.
- H. Permissible deflections at joints shall not exceed the amount allowed by the manufacturer.
- I. Take every precaution that no foreign material enters the piping prior to and during installation.
- J. All pipes and fittings shall be carefully examined for cracks, damage or other defects while suspended above the trench before installation. Defective materials shall be immediately removed from site.
- K. Interior of all pipes and fittings shall be inspected and all dirt, gravel, sand, debris or other foreign materials shall be completely removed from pipe interior before it is moved into the trench.
- L. Bell and spigot mating surfaces shall be thoroughly wire brushed and wiped clean and dry immediately before pipe is laid.
- M. Where pipe laying is stopped at the end of the day or for any other cause, the open end of the pipe shall be securely closed in order to prevent the entrance of water, mud or any other objectionable matter.
- M. Thrust blocks shall be installed at all bends, and at all tees, caps and plugs. Thrust blocks will be of concrete as shown on the Contract Drawing Detail Sheets.
- N. At the end of all lines (dead ends), the line shall be equipped with a reducer and 1-1/2" Blow-Off valve.
- O. Every time that pipe laying is not actively in progress the open ends of pipe shall be closed by a watertight plug.
- P. Field cutting pipe, where required, shall be made with a machine specially designed for cutting piping. Cuts shall be carefully done, without damage to pipe or lining, so as to

leave a smooth end at right angles to the axis of pipe. Cut ends shall be tapered and sharp edges filed off smooth. Flame cutting will not be allowed.

- Q. Touch up protective coatings in a satisfactory manner prior to backfilling.

### **3.09 MAKING JOINTS**

- A. Joints shall be constructed in accordance with the recommendations of the manufacturer.
- B. Clean completely all jointing surfaces and adjacent areas immediately before matting joint.
- C. After gaskets are compressed and before pipe is brought fully home, each gasket shall be checked for proper position around full circumference of the joint.

### **3.10 TRANSITION FROM ONE TYPE OF PIPE TO ANOTHER**

Provide all necessary adapters, specials and connection pieces required when connecting different types and sizes of pipe or when connecting pipe made by different manufacturers.

### **3.11 SETTING FITTINGS, VALVES, HYDRANTS AND SPECIALS**

- A. All fittings, valves, valve boxes, hydrants and other appurtenances shall be set at the location indicated on the Contract drawings or as directed by the Engineer.
- B. All valves, including by-pass valves, shall be provided with a valve box. The valve box shall not transmit shock or stress to the valve and shall be centered and plumb over the operating nut with the cover flush with the pavement surface or such other level as directed.
- C. Valve box slabs and/or marker posts shall be provided where indicated on the Contract Drawings or as directed by the Engineer as an absorbed cost to the Contractor.
- D. Hydrants shall be located as shown on the Contract Drawings and in a manner that will provide complete accessibility and will prevent damage from vehicles. All hydrants shall stand plumb and shall have their pumper connections at right angles to the curb line. The Center of steamer nozzle shall be 18" above top of finished ground or top of curb where applicable. Where necessary, hydrant extensions shall be furnished at no additional cost to the Owner, to meet this requirement.
- E. Each fire hydrant shall set truly vertical and securely braced with concrete or stone blocks until it is self-standing. It shall be set on a stone or concrete slab not less than four (4) inches thick and not less than one square foot of surface area placed on well compacted soil surrounded by a minimum of seven (7) cubic feet of sound broken stone or clean gravel to permit free draining of the hydrant. The gravel or stone shall reach from the bottom of the trench to at least six (6) inches above the waste opening of the hydrant.
- F. All hydrants, valves and fittings shall be anchored with steel all-thread rods (3/4" minimum) or with anchor couplings as required per the details in the Contract Drawings.

### **3.12 SERVICE ASSEMBLES AND SERVICE LINE INSTALLATION**

- A. Assemblies shall consist of a corporation stop, service clamp, curb stop and other appurtenances needed to complete the assembly in accordance with the Contract Drawings. They shall be installed in a good and workmanlike manner in the places designated on the Plans or as directed by the Engineer.
- B. Meter boxes, meters and service line shall be as specified herein and will be measured

and paid for separately as detailed herein.

- C. Service lines to be marked as shown in the Contract Drawings.

### **3.13 CONNECTION TO EXISTING MAINS**

- A. Where indicated on the Contract drawings, cut-ins must be made by the Contractor in order to make connection to existing water mains. The Contractor shall furnish all labor and materials and service required for the excavating, cutting the existing mains, removal and relocation of sections of old pipe, de-watering the trench, connection main with the existing main and the setting of necessary fittings, specials and valves as shown on the Contract Drawings.
- B. The Contractor shall provide temporary blocking and bracing properly placed to prevent movement or blowing off of any pipe, valves or fittings due to water pressure on the main. All connections shall be made in a most expeditious and workmanlike manner to cause the least inconvenience to water customers and to traffic, and shall be made at a time coordinated with the utility provider.

### **3.14 BACKFILLING TRENCHES**

- A. Backfilling material used around and under pipes is as specified in 2.15 of this section.
- B. Backfilling shall be carefully performed and the original surface restored, to the full satisfaction of the Engineer. The trenches shall be backfilled with fine, loose earth, free from large clods, stones or rocks, frozen material or debris.
- C. Proper compaction procedures should be exercised to provide the required soil densities. The backfill procedures shall be as follows:
  - 1. Open areas or cross-country: Backfill material suitable for this method shall be machine-placed in successive layers not to exceed 8" and compacted until a density of at least the adjacent undisturbed ground is obtained. This operation will continue until all settlement has occurred and trench is to the full satisfaction of the Engineer.
  - 2. Across driveways, parking lots, paved areas, yards and within all road rights--of-way: The trenches shall be backfilled carefully and rammed until enough has been placed to provide a cover of not less than one foot (1') above the pipe. The remainder of the backfill material shall be placed in successive layers, not to exceed six inches (6"). Each lift shall be thoroughly compacted with mechanical tampers in paved area as well as road shoulder, so that at least 98% of the density determined by the Proctor Method, ASTM D-698, shall be obtained before the next lift is placed.
  - 3. Backfill in unpaved areas, shall be made as above specified, except the backfill lifts above the pipes may be deposited in layers not to exceed 6 inches and thoroughly tamped until a density of at least that of the adjacent soil is obtained.
- D. Each lift of the backfill material shall have the proper moisture content to permit compaction to the required density.
- E. Contractor shall test trench backfill as required in section 02230.
- F. Whenever the trenches have not been properly filled, or if settlement occurs they shall be refilled, smoothed off, and finally made to conform to the surface of the ground. Surplus material shall be disposed of as directed by the Engineer. Contractor shall reseed trenches that require additional work due to settling.

### **3.15 WORK AFFECTING EXISTING PIPING**

#### **A. Location of Existing Piping:**

1. Locations of existing piping shown should be considered approximate.
2. Contractor is responsible for determining exact location of existing piping to which connections are to be made, or which may become disturbed during earth moving operations, or which may be affected by the work in anyway.

#### **B. Work on Existing Pipelines:**

1. Cut pipes as shown or required with machines specifically designed for this work.
2. Install temporary plugs to keep out all mud, dirt, water and debris.
3. Provide all necessary adapters, fittings, pipes and appurtenances required.

### **3.16 TESTING OF PIPING**

#### **A. General:**

1. Contractor shall conduct high-pressure & leakage test for all filtered and potable water lines and provide Engineer a written record showing the results (pass or failure) of all testing for each section of the line. The following information will be included as a minimum:
  - a. Name of Owner, Engineer, and Contractor performing the work
  - b. Identification of the section being tested
  - c. Date of the test
  - d. Length of the section being tested and the nominal diameter of the pipe
  - e. Test pressure in p.s.i.g.
  - f. Duration of the test in hours
  - g. Amount of water added during the leakage test in gallons
  - h. Total number of leaks on the section being tested
  - i. Date leaks were repaired
  - j. Brand name of pipe used
  - k. Pressure rating (SDR and p.s.i.)
  - l. A similar set of data for any section of line which is re-tested
2. Tests shall be completed in accordance with the latest edition of AWWA C 600 except as modified herein
3. Notify Engineer 48 hours in advance of testing.
4. Contractor shall furnish all apparatus necessary to perform required tests.
5. Pipelines which fail to hold specified test pressure or which exceed the allowable leakage rate shall be repaired and retested.
6. Test pressures required are at the lowest elevation of the pipeline section being tested unless otherwise specified.
7. Unless otherwise approved, conduct all tests in the presence of the Engineer.

#### **B. High Pressure & Leakage Test for Water Lines:**

1. After the pipe has been laid and backfilled, all newly laid pipe or any valved section thereof shall be subjected to a hydrostatic pressure of 150 psi, test pressure shall not vary by more than plus/minus 5psi. The duration of each pressure test shall be at least 6 hours.
2. Each valved section of pipe 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 connection, gauges and all necessary apparatus shall be furnished by the Contractor. The Contractor shall furnish all necessary assistance for conducting the tests.
3. Before applying the specified test pressure, all air shall be expelled from the pipe. If permanent air vents are not located at all high points, the Contractor shall install corporation stops at such points, so that the air can be expelled as the line is filled with water. After all air has been expelled, the corporation stops shall be closed and the test pressure applied.
4. All exposed pipes, fittings, valves, hydrants and joints shall be carefully examined during the test. Any cracked or defective pipes, fittings, valves or hydrants discovered in consequence of this pressure test shall be removed and replaced by the Contractor with sound material. The test shall be repeated until satisfactory to the Engineer.
5. A leakage test shall be conducted by the Contractor along with the pressure test. The duration of each leakage test shall be 6 hours. During the test, the main shall be subjected to a pressure of 150 psi unless shown to be different in piping schedule.
6. Leakage shall be defined as the quantity of water that must be supplied into the newly laid pipe or any valved section thereto to maintain the specified leakage test pressure after the air in the pipe line has been expelled and the pipe has been filled with water.
7. No pipe installation will be accepted if the leakage is greater than that determined by the formula " $L = (SD\sqrt{P})/148,000$ ".
8. Where "L" is the allowable leakage in gallons per hour, "S" is the length of pipe tested in feet, and "D" is the nominal diameter of the pipe measured in inches and P is the average test pressure during the hydrostatic test, in pounds per square inch.
9. Water which is introduced into the water line to determine leakage may be measured by pumping water from a vessel of known volume or by using a calibrated water meter. If a meter is used it must have the capability of accurately measuring the low flows which may be required to maintain the test pressure on the line. A displacement type meter with sweep hand dial is recommended. One complete revolution of the sweep hand should represent not more than ten gallons.

### **3.17 CLEANING AND DISINFECTION**

- A. All piping shall be thoroughly cleaned and flushed in a manner approved by the Engineer prior to placing in service. Piping 48 inches in diameter and larger shall be inspected from the inside and all debris, dirt and foreign matter removed.
- B. Disinfection:

1. Disinfect potable all water piping on potable water lines prior to placing in service.
2. Completely clean interior of all piping and flush piping prior to disinfection with warm water at a minimum velocity of 2-1/2 feet per second.
3. Conform to procedures described in AWWA C 651 entitled "Disinfecting Water Mains" unless otherwise approved by the Engineer.
4. Water for flushing, testing and chlorination shall be furnished and paid for by the Contractor. Contractor shall provide all temporary piping, hose, valves, appurtenances and services required.
5. Chlorine will be supplied by contractor.
6. Chlorine concentration in the water entering the piping shall be 50 parts per million and allowed to remain in the pipe line section for not less than 24 hours. The line will then be flushed thoroughly until a chlorine residual not exceeding 0.2 parts per million is obtained.
7. Bacteriological samples will be taken by a representative of the Mississippi Department of Health, the Engineer or a Certified Operator of the system and analyzed by the Mississippi State Department of Health from every dead-end line and every major looped line. Water collected for testing shall not have a chlorine residual higher than is normally maintained in other parts of the distribution system. No chlorine shall be present which is the result of line disinfection. The samples shall be collected in bottles approved by the Mississippi Department of Health. If the submitted samples are not approved the Contractor (at no additional expense to the owner) is to disinfect the system in accordance with the requirements of the Mississippi State Department of Health until the system is free of contamination. All materials, testing and labor required for complete sterilization of the system shall be furnished by the Contractor at no expense to the Owner.
8. Complete disinfection shall be defined as total coliform absent and no confluent growth for samples on two consecutive days.
9. The Contractor shall be responsible for the disposal of the chlorinated water used for disinfecting mains under this contract. Chlorinated waters shall be dechlorinated to a residual concentration of no greater than 0.5 mg/l total residual chlorine prior to disposal to water courses, on land or through storm or sanitary sewers. The method of disposal shall be in conformance with requirements of the Mississippi Office of Pollution Control, the Mississippi Department of Health, and other state, federal or local agencies holding jurisdiction. The Contractor will provide written confirmation from these agencies that the method of disposal is acceptable and will provide licenses or permits required for the discharge of the dechlorinated water. The Contractor will comply with requirements of agencies having jurisdiction whether additional to or different from those included herein, at no additional cost to the Owner. Cost associated with disposal of chlorinated disinfecting water shall be considered incidental to the cost of the pipeline and shall be absorbed in the cost of the pipeline.

### **3.18 CLEAN-UP**

- A. In areas where the water mains have been backfilled, the Contractor shall clear the right-of-way and surrounding ground and shall dispose of all waste materials and debris resulting from his operations. He shall fill and smooth holes and ruts and shall repair all miscellaneous and unclassified ground damage done by him and shall restore the ground to such a stable and suitable condition as may be reasonably required, consistent with

the condition of the ground prior to construction.

- B. Clean-up, including grading, disposal, dress work and other incidentals shall be completed by the Contractor at no additional cost to the Owner to the extent directed by the Engineer.

## **PART 4 - COMPENSATION**

### **4.01 GENERAL**

Where items are not indicated separately on the proposal form, no separate payment shall be made for completion of work indicated on the Contract Drawings and in the Specifications; therefore, full compensation for these items shall be considered absorbed in the Contract Lump Sum.

### **4.02 MEASUREMENT AND PAYMENT**

- A. Measurement and Payment for the water system piping, including service piping, will be made at the Contract Unit Price per linear foot, which price shall constitute full compensation for furnishing, installing all pipe, joints, accessories, specials and all other materials not particularly specified for separate payment, for furnishing all labor, tools, equipment and incidentals and performing all work including excavation, dewatering, installation of pipe, backfill, testing, disinfection, clean-up and any other operations essential to completing the water system as specified herein and as shown on the PLANS.
- B. Measurement and Payment for valves and fire hydrants will be made at the Contract Unit Price per each, which price shall constitute full compensation for furnishing all boxes, concrete blocking, fire hydrant assemblies, valves, gravel and miscellaneous materials, for furnishing all labor, tools, equipment and incidentals and performing all operations essential in completing the installations of valves, boxes and fire hydrants in accordance with the SPECIFICATIONS and PLANS.
- C. Measurement and Payment for Service Assemblies will be made at the Contract Unit Price per each, which price shall constitute full compensation for furnishing all taps, corporation stops, curb stops, meter boxes, service clamps, meters, gravel, concrete and miscellaneous material and for furnishing all labor, tools, equipment and incidentals and performing all operations essential to completing the installation in accordance with these SPECIFICATIONS and PLANS.
- D. Measurement and Payment for connection to existing water mains will be made on a per each unit cost basis and shall constitute full compensation for furnishing all materials, bedding, labor, tools, equipment, and incidentals and performing all operations essential to installation of the fittings in accordance with these SPECIFICATIONS and PLANS.
- E. Measurement and Payment for fittings (ductile or PVC) will be made at the Contract Unit Price per each or per pound as specified on the proposal, which price shall constitute full compensation for furnishing all fittings, glands, bolts, bedding, concrete blocking, labor, tools, equipment and incidentals and performing all operations essential to installation of the fittings in accordance with these SPECIFICATIONS, PLANS and manufacturer's recommendations.

**--END OF SECTION 02800--**



## SECTION 02825 TRACER WIRE

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### PART 1 – GENERAL

- 1.01 SCOPE:** Install electrically continuous tracer wire with access points as described herein to be used for locating pipe with an electronic pipe locator after installation. Tracer wire shall be installed on all water mains and services and sewer mains and services.
- 1.02 SUBMITTALS:** Submit shop drawings and manufacturer's literature to the Engineer for approval.

### PART 2 – PRODUCTS

#### 2.01 TRACER WIRE MATERIAL

- A. Tracer wire shall have HDPE insulation intended for direct bury.
- B. Tracer wire color shall be blue for all water construction and green for all wastewater construction.
- C. Copper Clad Steel (CCS) Trace Wire
  - a. Open Trench – 12 Gauge Copper Clad Steel Equal to Copperhead 1230-SF or 1230-HS or approved equal
  - b. Directional Drilling/Boring - 12 Gauge Copper Clad Steel Equal to Copperhead 1245-EHS or approved equal
  - c. Pipe Bursting/Slip Lining – Stranded 7 x 7 Equal to Copperhead PBX-50 or approved equal
- D. Connectors
  - a. 2-Way Splice-Connector with Strain Relief: Equal to Copperhead SCB-01-SR or approved equal
  - b. 3-Way Connector: Equal to Copperhead 3WB-01 or approved equal
- E. Termination/Access/Test Stations
  - a. Non-Roadway: Equal to Copperhead LD14TP
  - b. Concrete / Driveway: Equal to Copperhead CD14TP
  - c. Roadway: Equal to Copperhead RB14TP
  - d. Fire Hydrant: Equal to Copperhead T2-01
- F. Grounding
  - a. Drive in Magnesium Anode: Equal to Copperhead ANO-1005
- G. Tracer wire connectors shall be watertight and installed to provide electrical continuity and shall be accessible.

#### 2.02 TRACER WIRE ACCESS BOXES:

- A. For locations where valve boxes are not present, the tracer wire access point shall be composed of one SnakePit Tracer Wire Access Box, or approved equal, installed at each proposed access point. All tops shall be cast iron.
- B. All trace wire termination points must utilize an approved trace wire access box, specifically manufactured for this purpose

- C. All grade level/in-ground access boxes shall be appropriately identified with “sewer” or “water” cast into the cap and be color coded.
- D. Test stations at dead ends shall be two-terminal.
- E. Test stations in between dead ends shall be single terminal.
- F. A minimum of 2 ft. of excess/slack wire is required in all trace wire access boxes after meeting final elevation.
- G. Grounding anode wire shall be connected to the identified (or bottom) terminal on all access boxes.
- H. Hydrants – Trace wire must terminate at an approved above-ground trace wire access box, properly affixed to the hydrant grade flange.

**2.03 TESTING REQUIREMENTS:** Contractor shall perform a continuity test on all tracer wire in the presence of the Engineer or the Engineers’ representative. If the tracer wire is found to be not continuous after testing, Contractor shall repair or replace the failed segment of the wire at their own expense.

## **2.04 GROUNDING**

- A. Tracer wire must be properly grounded at all dead ends/stubs.
- B. Grounding of tracer wire shall be achieved by use of a drive-in magnesium grounding anode rod with a minimum of 20ft of #14 red HDPE insulated copper clad steel wire connected to anode specifically manufactured for this purpose, and buried at the same elevation as the utility.
- C. Where the anode wire will be connected to a tracer wire access box, a minimum of 2ft. of excess/slack wire is required after meeting final elevation.

## **PART 3 – EXECUTION**

### **3.01 INSTALLATION - GENERAL REQUIREMENTS**

- A. Tracer wire shall be installed on all PVC water and pressurized sewer lines. The wire shall be installed in such a manner as to be able to properly trace all mains without loss or deterioration of signal or without the transmitted signal migrating off the tracer wire.
- B. The tracer wire shall be securely bonded together at all wire joints or splices with a watertight connector as described above to provide electrical continuity, and it shall be accessible at all tracer wire access points.
- C. Tracer wire access points shall in general be no more than five-hundred (500) feet and at every proposed concrete valve box collar (or manhole where required). Concentrations of multiple proposed valves near pipe intersections, i.e. tees or crosses, may require more than one access point assembly in each concrete valve box collar. Tracer wire access points shall be within public right-of-way or public utility easements.
- D. Tracer wire shall be installed at the top half of the pipe and secured (taped/tied) at 5' intervals.

- F. Tracer wire on all service laterals/stubs must terminate at an approved trace wire access box located directly above the utility, at the edge of the road right-of-way, but out of the roadway.
- G. Tracer wire shall be laid flat and shall be protected from damage during the execution of the work. No breaks or cuts in the tracer wire or tracer wire insulation shall be permitted. At service saddles, the tracer wire shall not be allowed to be placed between the saddle and the main.
- H. Except for approved spliced-in connections, tracer wire shall be continuous and without splices from each tracer wire access point. Where any approved spliced-in connections occur connectors as described above shall be used to provide electrical continuity.
- I. At all main end caps, a minimum of 6 feet of tracer wire shall be extended beyond the end of the pipe, coiled and secured for future connections. The end of the tracer wire shall be spliced to the wire of a six pound zinc anode and is to be buried at the same elevations as the water main.
- J. All service lateral trace wires shall be a single wire, connected to the mainline trace wire using a mainline to lateral lug connector, installed without cutting/splicing the mainline trace wire.
- K. Spliced connections between the main line tracer wire and branch connection tracer wire shall only be allowed at water main tees, crosses or at iron or copper water services where a portion of the branch connection water main or water service is replaced with a non iron or non copper material. The branch connection tracer wire shall be a single tracer wire properly spliced to the main line tracer wire.
- L. At all repair locations where there is existing tracer wire, the tracer wire shall be properly reconnected and spliced as outlined above.
- M. Above-ground tracer wire access boxes will be installed on all fire hydrants.
- N. In occurrences where an existing trace wire is encountered on an existing utility that is being extended or tied into, the new trace wire and existing trace wire shall be connected using approved splice connectors, and shall be properly grounded at the splice location as specified.

**--END OF SECTION 02825--**

**SECTION 02900**  
**WASTEWATER COLLECTION (SANITARY SEWER) SYSTEM**

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**PART 1 - GENERAL**

**1.01 DESCRIPTION**

- A. The Work to be performed under these specifications consists of furnishing all materials and performing all work necessary for or incidental to completing and making ready for the operation of the wastewater collection system as indicated on the Contract Drawings.
- B. The Work shall include the excavation, trenching and backfilling; furnishing and installing all trench sheeting and bracing; furnishing and installing all pipe, specials, services, manholes, and related appurtenances; storage and protection of materials; testing, cleanup, and all other operations necessary to complete the work in accordance with the detailed plans and project specifications contained herein.
- C. Structures shall conform in shape, size, dimensions, materials and other respects to the Contract Drawings or as ordered by the Engineer.

**1.02 COORDINATION WITH INTERESTED PARTIES**

The Contractor shall duly notify and coordinate any work with interested parties such as the Mississippi Department of Transportation, the Mississippi Department of Environmental Quality and the appropriate City or County Officials. No work which affects these interested parties will commence until satisfactory coordination has been achieved.

**1.03 SUBMITTALS**

- A. Contractor shall furnish a certified affidavit of compliance from the manufacturer/supplier for all materials, fittings and structures furnished confirming that the materials supplied fully conform to the requirements specified herein.
- B. Shop Drawings:
  - 1. Pipes and Fittings
    - a. Submit size, class and other details of the pipe to be used.
    - b. Submit information on typical joint and harnessing details.
  - 2. Manholes
    - a. Submit design and construction details of all precast concrete manholes.
    - b. Submit manufacturer's data on interior lining material, preformed mastic joint material and rubber manhole boots, manhole water stops, and/or lateral connectors.
    - c. Submit an affidavit from the coating applicator that each manhole section and special has been coated in accordance with these specifications.
- C. Tests: Submit a description of the proposed testing methods, procedures, and apparatus. Submit copies of all test reports.
- D. Record Drawings: During progress of the Work, keep an up to date set of drawings

showing field modifications. Submit drawings at a scale satisfactory to the Engineer that show the actual in-place installation of all piping and manholes installed under this section. The drawings shall show all piping and manholes on the plans with all reference dimensions and elevations required for complete record drawings of the piping systems. The drawings shall be furnished no later than 30 days after Substantial Completions of the Work. See Section 01720 for more detailed information on Record Drawings and requirements.

#### **1.04 PRODUCT DELIVERY, STORAGE AND HANDLING**

- A. Delivery, storage and handling of pipes, fittings and accessories shall be in complete compliance with the manufacturer's recommendations and instructions.
- B. Handle all pipes, fittings and accessories carefully with approved handling devices. Do not drop or roll pipes off of trucks. Do not otherwise drop, roll or skid pipes. Materials cracked, gouged, chipped, dented or otherwise damaged will not be approved.
- C. Pipes, fittings and accessories shall be unloaded opposite to or as close to the place where they are to be laid as is practicable to avoid unnecessary handling. Interiors shall be kept free from dirt and foreign matter.

#### **1.05 QUALITY ASSURANCE**

- A. Quality assurance procedures shall be performed by the product manufacturer fully in accordance with the requirements of this Specification and industry standards for all materials required of this contract. The certification shall include certified laboratory data confirming that said tests have been performed on a sample of the material to be provided under this contract, or material from that production run, and that satisfactory results were obtained prior to any installation of said pipe.
- B. Pipe joining and other procedures necessary for correct assembly of PVC or HDPE pipe shall be done only by personnel trained in those skills to the satisfaction of the Engineer and the pipe supplier.
- C. Only those tools designed for the required procedures and approved by the product manufacturer/supplier and the Engineer shall be used for assembly of the required improvements.

#### **1.06 CLEARANCE BETWEEN WATER AND SEWER LINES**

- A. Sewer lines and manholes shall be laid at least 10 feet horizontally from any water line.
- B. Where this 10-foot horizontal separation cannot be maintained, the sewer line shall be ductile iron with the joints located at least 10 feet from the water line or the sewer line shall be totally encased in concrete.
- C. Sewer lines crossing water mains shall be laid to provide a minimum vertical distance of 18 inches between the outside of the sewer line and the outside of the water main (water over sewer). The crossing shall be arranged so that the sewer joints will be equidistant and as far as possible from the water main joints. Where this separation cannot be met the sewer line shall be constructed to the same specifications as the water line and be water tight until such a point where the separation can be met.

#### **1.07 CONFLICTS WITH OTHERS UTILITIES**

- A. Where construction conflicts with underground utilities which are to remain in place or are indicated to be removed and/or relocated by the Contractor, the Contractor shall at his

own expense, protect these facilities, restore the portions of those lines which are damaged or severed as a result of his operations, and remove and/or relocate existing facilities as indicated on the Contract Drawings.

- B. Where existing lines in conflict are indicated to be removed by others, the Contractor shall cooperate with the Owner of these utilities to the end that these conflicts are removed prior to excavation for the sewer lines.

## **1.08 RAILROAD AND HIGHWAY CROSSING**

All work incidental to the construction of sewer lines under railroads and highways shall be done in strict compliance with the regulations prescribed by the owners of these properties and shall be done with extreme care to safeguard life and property. After the necessary permits and agreements for these crossings have been approved and executed. The Contractor shall confer with the representatives of the Railroad Company, the Mississippi Department of Transportation or the City or County owning these properties and arrange schedules, and the manner for constructing the work in accordance therewith.

## **1.09 MAINTENANCE**

- A. The Contractor shall be responsible for, without extra compensation, the maintenance of all sewer lines and structures, for the stability of all backfills and the finished grades above the sewer lines and around the structures and for the repair, replacement, and restoration of all items which were damaged or removed during construction.
- B. The Contractor shall be responsible for, without extra compensation, the restoration of all permanent surfaces and landscaped areas such as pavements, sidewalks, driveways, curbs, gutters, shrubbery, decorative plantings, fences, poles and other property and surface structures removed, disturbed and/or damaged during or as a result of construction operations to a condition which is equal in appearance and quality to the condition that existed before the work began.
- C. The Contractor shall take such measures necessary to prevent, control and correct any dust nuisance or muddy conditions developing on roadways as a result of his operation. Direct payment for maintenance of the site shall not be provided as such but shall be considered a subsidiary obligation of the Contractor.

## **1.10 TRAFFIC CONTROL**

Traffic control shall be the responsibility of the Contractor and should be implemented in accordance with the Manual on Uniform Traffic Control Devices.

## **1.11 TEMPORARY SURFACES OVER TRENCHES**

Whenever the sewer lines are constructed under traveled roadways, driveways, sidewalks or other traveled surfaces, a temporary surface shall be placed over the top of the trench as soon as possible after placement and compaction of the backfill has been satisfactorily completed. The temporary surface shall consist of a minimum of twelve inches (12") of clay gravel or crushed limestone. The top of the temporary surface shall be smooth and meet the grade of the adjacent undisturbed surface. The temporary surface shall be maintained at the Contractor's expense until final restoration of the street surface is completed as specified.

## **1.12 WARRANTY**

- A. The contractor shall warranty all materials of construction and repair and all workmanship for a period of one year from the date of acceptance of final work.
- B. Should defects or failures occur during the period of warranty, the contractor shall

promptly take whatever steps are necessary to return the work to first class condition.

### **1.13 APPLICABLE DOCUMENTS**

- A. The following publications form a part of this Specification and where referred to by basic designation only, are applicable to the extent indicated. Reference is to the latest edition of each unless specified otherwise.
1. American Society of Testing and Materials (ASTM)
    - a. C-76 Reinforced Concrete Culvert, Storm Drain and Sewer Pipe.
    - b. C-443 Joints for Circular Concrete Sewer and Culvert Pipe.
    - c. C-478 Precast Reinforced Concrete Manhole Sections.
    - d. D1784 Rigid PVC Compounds and CPVC Compounds
    - e. D-3034 Type PSM - PVC Sewer Pipe and Fittings.
    - f. D-3212 Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.
    - g. D-2321 Underground Installation of Flexible Thermoplastic Sewer Pipe.
    - h. F-477 Elastomeric Seals for Joining Plastic Pipe.
    - i. F-679 PVC Large Diameter Plastic Gravity Sewer Pipe and Fittings
  2. American Water Works Association (AWWA)
    - a. C-151 Standard for Ductile Iron Pipe, Centrifugally Cast in Metal Molds.
    - b. C-111 Joints for Ductile Iron Pipe, Rubber Gasket.
    - c. C-110 Gray Iron and Ductile Iron Fittings.
    - d. C-301 Prestressed Concrete Pressure Pipe, Steel-Cylinder Type, for Water and Other Liquids.
    - e. C-304 Design of Prestressed Concrete Cylinder Pipe.
- B. Local Building Codes: City, County, State or Federal Codes applying to the work.
- C. Mississippi Department of Transportation Standard Specifications for Road and Bridge Construction, latest edition: Sections as referenced herein.

## **PART 2 - MATERIALS & EQUIPMENT**

### **2.01 GENERAL**

- A. The Contractor shall furnish all materials necessary for or incidental to constructing the wastewater collection system. All materials shall be new and of first quality with certified tests for all pipe and pipe fittings made at the manufacturer's plant to assure conformance with these technical specifications. Two (2) certified copies of each test result shall be furnished to the Engineer.
- B. The kinds and classes of materials incorporated into the work shall be as indicated on the Contract Drawings or the Bid Form. The Contractor shall not construe or interpret the several kinds of materials described herein as being equal in their application.

### **2.02 WATER FOR CONSTRUCTION AND TESTING**

- A. The Contractor shall be responsible for all water needed in constructing the work, flushing the completed system, testing and other incidental needs. All water used shall be from an approved source free of pollution and shall be of a satisfactory bacteriological quality.
- B. Water used in mixing concrete and mortar shall be fresh, clean and free from injurious amounts of sewage, oil, acid, alkalis, salts or organic matter.

## **2.03 DUCTILE CAST IRON PIPE AND FITTINGS**

- A. Ductile iron pipe shall be as designed by AWWA C150 (ANSI A21.50) and manufactured in accordance with AWWA C 151 (ANSI A21.51). Pipe shall be supplied in minimum Pressure Class (PC) 350 for 4" through 12", PC 250 for 14" through 20", PC 200 for 24" and PC 150 for 30" and larger.
- B. Ductile iron pipe thickness shall conform in all respects to the AWWA C150 standard based on a minimum of 200psi working pressure.
- C. Joints for ductile cast iron pipe shall be rubber gasket, push-on type unless mechanical joint or flanged joint type is specified on the drawings or proposal. Push-on joint shall conform to the latest edition of AWWA C 111 (ANSI A21.11). Lubricants shall be non-toxic, odorless, tasteless and shall not support bacteria and shall be specifically manufactured for the pipe utilized.
- D. Mechanical joint pipes shall conform to the latest edition of AWWA C 111 (ANSI A21.11).
- E. Flanged pipe shall conform to AWWA C115 and be based on a minimum of 200 psi working pressure.
- F. All fittings shall be full-bodied, ductile iron and shall be manufactured in accordance with the latest requirements of ANSI Standard Specification A-21.11 and shall have a working pressure of 250psi for 12" and smaller. Fitting joints shall be push-on, mechanical or flanged type and shall be determined by the pipe joint type.
- G. All mechanical joint fittings shall be connected with MEGALUGS.
- H. All ductile iron pipe and fittings shall be factory-coated on the outside with bituminous coating conforming to the latest edition of AWWA C151 (ANSI A21.51) and lined inside with a 40 mil. epoxy coating, 2 coats of 20 mil. each in accordance with the latest edition of AWWA C116. Epoxy coating shall be one of the following:
  - 1. Induron Ceramapure PL90
  - 2. Permite Permox CTF
  - 3. Tnemec Series 431, Perma-Shield PL
- I. All pipe and fittings shall be encased with an 8-mil thick loose polyethylene encasement in accordance with the latest edition of AWWA C-105 (ANSI A21.5).
- J. If flexible joint or river crossing pipe is required and/or indicated in the project plans or specifications the joint shall be designed for a maximum deflection of 15 degrees, and a maximum working pressure rating of 250 psi. The type shall be the USIFLEX joint as manufactured by U.S. Pipe or an approved equal.

## **2.04 POLYVINYL CHLORIDE (PVC) PIPE**

### **GRAVITY PVC PIPING**

- A. All gravity PVC sewer pipe and fittings smaller than 18" shall be unplasticized polyvinyl chloride meeting the minimum of SDR 26 of the requirements of ASTM Specification D 3034 and with a minimum "pipe stiffness" ( $F/Y = 115$  psi at 5% deflection - maximum allowable for installed pipe for SDR 26) when tested in accordance with ASTM D 2412. All pipe and fittings shall be joined by means of an integral wall bell and spigot joint and sealed with a rubber ring conforming to ASTM D 3212. The pipe and fittings shall be shipped to the job with a solid cross section rubber sealing ring securely locked in place in the bell.



All gravity PVC sewer pipe and fittings 18" and larger shall be unplasticized polyvinyl chloride meeting the minimum of SDR 26 of the requirements of ASTM Specification F679 and with a minimum "pipe stiffness" ( $F/Y = 115$  psi at 5% deflection - maximum allowable for installed pipe for SDR 26) when tested in accordance with ASTM D 2412. All pipe and fittings shall be joined by means of an integral wall bell and spigot joint and sealed with a rubber ring conforming to ASTM D 3212. The pipe and fittings shall be shipped to the job with a solid cross section rubber sealing ring securely locked in place in the bell.

- B. The pipe shall be made from white PVC compound having physical properties and chemical resistance of cell classification 12454-B and fittings shall be made from white PVC compound having physical properties and chemical resistance of cell classifications 12454-B, 12454-C or 13343-C as defined in ASTM D 1784.
- C. All jointing shall be made in accordance with the manufacturer's recommendations.
- D. All pipes shall bear the National Sanitation Foundation (NSF) seal of approval.

#### **FORCE MAIN PVC PIPING**

- A. All force main PVC sewer pipe and fittings four inches and larger in diameter shall conform to the latest edition of AWWA C-900 and shall be made from Class 12454-A or B materials per the latest edition of ASTM D-1784. Pipe shall be a minimum of SDR 18 unless otherwise specified for a working pressure of 150psi. All pipe shall conform with the outside diameter dimensions of ductile iron pipe to facilitate use of ductile iron fittings, standard cast iron valves and specials. All joints shall be elastomeric seals conforming to the latest edition of ASTM F-477.
- B. All force main PVC sewer pipe and fittings three inches and smaller in diameter shall conform to the latest edition of ASTM D-1784. Pipe shall be a minimum of SDR 21, PC 200. The thermoplastic material shall be virgin, rigid PVC plastic conforming to ASTM D-1784 for a minimum cell class of 12454. Pipe joints shall be integral bell and spigot and shall conform to the latest edition of ASTM D 3139. Flexible seals shall be elastomeric conforming to the latest edition of ASTM F-477. Gaskets shall be factory applied and fittings shall conform to ASTM D2241 and D 1784 and be pressure class 200.
- C. All jointing shall be made in accordance with the manufacturer's recommendations.
- D. All pipes shall bear the National Sanitation Foundation (NSF) seal of approval.

#### **2.05 POLYETHYLENE PIPE AND FITTINGS (HDPE)**

- A. Pipe shall be high molecular weight, high-density polyethylene pipe. The material shall be listed by the Plastic Pipe Institute (PPI) with a designation of PE 3408/3608 and have a minimum cell classification of 345434C, D, or E as described in ASTM D3350. The pipe material shall meet the requirements for Type III, Class B or C, Category 5, Grade P34 material as described in ASTM D1248. The pipe shall contain no recycled compound except that generated in the manufacturer's own plant from resin of the same specification from the same raw material pipe. Pipe (excluding black colored pipe) stored outside shall not be recycled. Pipe and fittings shall be made in conformance with ASTM F714 and ASTM D3261 as modified for the specified material. The pipe shall be homogeneous throughout and free of visible cracks, holes, foreign inclusions or other injurious defects. It shall be uniform in density and other physical properties. All HDPE piping shall be designed with an adequate wall thickness to withstand loading, and under no conditions shall the SDR measurements of the pipe be greater than 11. Fittings shall also be SDR 11 maximum unless otherwise specified. Pipe ends shall be connected using butt fusion per ASTM D2657, or using stainless steel couplings of a design approved by the Engineer. The pipe shall be provided with a lightly pigmented interior coating to aid in

pipeline inspection. Any pipe not meeting these criteria shall be rejected.

B. Pipe Color:

Pipe shall conform to the following:

1. Pipe shall be black or gray only.
- 2.. Color shall homogeneous throughout.

C. Heat fusion fittings shall be made from PE 3408/3608 or PE 4710 High Density Polyethylene. Socket fittings shall comply with ASTM D2683. Butt fusion fittings shall comply with ASTM D3261. Electrofusion fittings shall comply with ASTM F1055.

D. The material shall be manufactured and tested in accordance with AWWA 901 for ½" – 3" pipe and AWWA C906 for 4" – 63" pipe.

## **2.06 ON-PIPE & UNDERGROUND PIPE MARKING**

A. Pipe materials are specified under 2.03 & 2.04 of this section.

B. On-Pipe markings shall be legibly marked by the pipe manufacturer. The following shall be printed on each pipe:

1. Name and trademark of manufacturer.
2. Nominal pipe size.
3. Dimension ratio.
4. The letters PE followed by the polyethylene grade per ASTM D1248, followed by the Hydrostatic Design Basis in hundreds of psi.
5. Manufacturing Standard Reference.
6. A production code from which the date and place of manufacture can be determined.
7. Each piece of pipe or fitting shall be clearly marked with a designation which shall conform to designations shown on the shop drawings.
8. Class designation shall be cast or painted on each piece of pipe or fitting four inches in diameter or larger.
9. Piping smaller than 4 inches in diameter shall be clearly marked by the manufacturer as to material, type and rating.

C. Underground Marking. Tracer Wire Required on Force Mains Only

- a. See Section 02825 for specifications on tracer wire
- b. Contractor shall place magnetic warning tape approximately 12 to 18 inches below grade in all pressure pipe force main trenches. It shall be 3 inches wide, green background with black lettering and read "Caution-Buried Sewer Line"

D. See Contract Drawings for required pipe material.

## **2.07 PRECAST CONCRETE MANHOLES**

- A. Precast manholes shall conform to the details shown. Manhole bases may be precast.
- B. Except where otherwise specified, manhole sections shall conform to ASTM C 478.
- C. Precast manhole bases shall be of approved design and of sufficient strength to withstand the loads to be imposed upon them. An approved joint shall be provided to receive the riser sections forming the barrel.
- D. Mark date of manufacture and name or trademark of manufacturer on inside of barrel.
- E. Unless a larger size is required by the Drawings, the barrel of precast manholes shall be constructed of 48-inch diameter standard reinforced concrete manhole sections. The barrel shall be constructed of various lengths in combination to provide the correct height with the fewest joints. Wall sections shall not be less than five inches thick. For 72-inch and larger manholes, a transition slab, as shown on the Contract Drawings, is required for manholes greater than 12 feet deep.
- F. Joints shall be tongue and groove with preformed mastic joint compound. Preformed joint compound shall be Preformed Asphalt and Butyl Gasket Material, a product of the Blue Ridge Rubber Company, or "Ram-Nek" as manufactured by K.T. Snyder Company, Inc. of Houston, Texas, or "Kent-Seal" as manufactured by Hamilton-Kent Manufacturing Company or equal.
- G. A precast slab or precast eccentric cone, as shown or approved, shall be provided at the top of the manhole barrel to receive the cast iron frame and cover. The slab or cone shall be of acceptable design and of sufficient strength to safely support an H-20 loading. Concrete slabs shall be not less than 8 inches thick.
- H. Manhole sections shall contain manhole steps, uniformly spaced, 12 inches minimum, 16 inches maximum on centers, accurately positioned and embedded in the concrete. Manhole steps shall be M.A. Industries, Model PS1-PF or equal.
- I. Rubber gaskets shall be the "O" ring type conforming to the requirements of the latest edition of ASTM Standard Specification A-443. The gaskets shall be as manufactured by the Blue Ridge Company of Flecher, North Carolina, or the Tylox "O" Ring Gasket produced by Hamilton-Kent Manufacturing Company of Kent, Ohio, or approved equal. Lubricants used with the selected gaskets shall be as furnished or recommended by the gasket manufacturer.
- J. All manholes shall be produced with crystalline concrete waterproofing admixture in the concrete.

## **2.08 INTERIOR MANHOLE COATINGS**

- A. Coal Tar Epoxy
  - 1. The interior of all precast manhole sections, slabs and adjusting rings shall be coated with a coal tar epoxy coating unless otherwise specified.
  - 2. Surface Preparation:
    - a. Surface to be coated must be clean, dry, properly cured and free from all surface contaminants.
    - b. "Brush off Blast" (SSPC-SP7) is to provide an etched surface and to

remove contaminants and laitance.

c. Remove dust before coating.

3. Coating shall be applied in strict accordance with the manufacturer's requirements.

4. Coating shall be applied at the concrete casting facility.

5. Field touch-up and repair shall be performed in strict accordance with the manufacturer's requirements.

6. Thickness as recommended by the manufacturer

7. Number of coats as recommended by the manufacturer.

8. Product and Manufacturer:

a. CB-42 by International Oil Company

b. 40-AX-7 Coal Tar Solution by BLP Mobile Paints

c. Or equal

B. 100% Solids Epoxy

1. The interior of all manholes noted to be coated shall be visually inspected prior to beginning work and areas of hazardous structural damage reported to the engineer.

2. Pressure clean the manhole (minimum 3,500 psi) to remove all dirt, grease, sand and surface contaminants on the wall and floor leaving a clean, wet or dry surface. If a detergent or de-greaser solution is used, the surface shall be thoroughly rinsed and neutralized prior to the installation of the liner system.

3. Coating shall be applied in strict accordance with the manufacturer's requirements.

4. Field touch up and repair shall be performed in strict accordance with the manufacturer's requirements.

5. Thickness shall be a minimum of 250mils.

6. Number of coats as recommended by the manufacturer.

7. Product and Manufacturer

a. Warren Environmental System 100% Solids Epoxy

c. Approved equal.

C. Crystalline Concrete Waterproofing

1. The concrete waterproofing admixture shall be of the cementitious crystalline type that chemically controls and permanently fixes a non-soluble crystalline structure throughout the capillary voids of the concrete.

2. The design shall include the use of the crystalline waterproofing repair materials

that generate a non-soluble crystalline formation in the concrete.

3. The manufacturers shall be the following:
  - a. Xypex Chemical Corporation, Richmond, B.C., Canada.
  - b. Equivalent materials as approved by the engineer 10 days prior to acceptance of bids.
4. The material shall be the following:
  - a. Xypex Admix C-1000-T containing red dye to ensure detection in the concrete.
  - b. Xypex Concrete

## **2.09 MANHOLE FRAMES AND COVERS**

Provide standard manhole frames with covers where noted as manufactured by one of the following:

- A. "Paved Areas" Manholes:
  1. East Jordan Iron Works, V-1115
  2. Or equal.
- B. "Non-Paved Areas" Manholes:
  1. East Jordan Iron Works, V-1115
  2. Or equal.

Provide watertight manhole frames with covers where noted as manufactured by one of the following:

- A. East Jordan Iron Works V-2358
- B. Or Equal

## **2.10 DROP INLET CONNECTIONS**

Drop inlet connections for manholes shall be constructed where shown and shall conform to the design and details shown. Pipes and fittings shall be the same as the inlet pipe except where noted on the details or described herein. Concrete shall be bonded to manhole in a manner shown or otherwise approved by Engineer.

## **2.11 RUBBER MANHOLE BOOTS**

- A. Rubber manhole boots complying with ASTM C923 shall be employed in the connection of each sewer pipe with outside diameter less than 59 inches to precast manholes.
- B. Connector will consist of rubber EPDM and elastomers designed to resist ozone, acids, alkalis, oils and petroleum products.
- C. Banding mechanism shall be totally non-magnetic 304 stainless steel and torqued for 60-70 inch/lbs.

- D. Manufacturer:
  - 1. Kor-N-Seal.
  - 2. Or equal.

## **2.12 LATERAL CONNECTIONS**

- A. Lateral connectors can be employed in the connection of sewer pipe 15" in diameter or less in lieu of rubber manhole boots.
- B. Lateral connectors shall consist of a PVC hub, rubber sleeve, and stainless-steel band.
- C. PVC hub shall meet ASTM D3034 and be SDR 26 and gasket in hub shall meet ASTM F477. Rubber sleeve shall meet ASTM C443. Band and housing shall be type 301 stainless steel and screw shall be type 305 stainless steel.
- D. Model and Manufacturer:
  - 1. Inserta Tee by Inserta Fittings Company.
  - 2. Or equal.

## **2.14 SWING CHECK VALVES**

- A. Check valves shall be iron body, bronze mounted, swing type conforming to the requirements of AWWA Standard Specification C508. Unless otherwise specified, all check valves shall have Class 125 flange joint ends in accordance with AWWA C110. Each joint shall be fitted with a full-face rubber gasket.
- B. Check valves in sizes four inches (4") through twelve inches (12") shall be designed for a working pressure of 175 psi and hydrostatically tested to 350 psi. Check valves fourteen inches (14") and larger shall be designed for a working pressure of 150 psi and hydrostatically tested to 300 psi. All connecting hardware shall be T304 stainless steel, hinge pin and key shall be stainless steel, and the seat shall be bronze or T304 stainless steel. The chamber and plunger shall be bronze.
- C. Generally, check valves shall be the outside lever with adjustable weight type unless gravity type is specified on the Drawings or in the proposal for direct bury.
- D. Check valves shall be Model A-2600-6-01 as manufactured by Mueller or approved equal and certified by the manufacturer and supplier that above specifications are met.

## **2.15 SEWERAGE AIR AND VACUUM VALVES (COMBINATION)**

- A. Shall allow unrestricted venting or re-entry of air thru it, during filling or draining of the force main to prevent vacuum.
- B. All valves shall be installed per the manufacturer's recommendations.
- C. Valves shall be installed on a section of pipe no closer than 18" to a bell, coupling, joint or fitting.
- D. Valves shall be suitable for use with strained raw sewage.
- E. Valves shall be capable of providing air release and vacuum break.
- F. Valves shall be designed to ensure that no leaking, deformation or damage of any kind will occur when subjected to 1.5 times the working pressure rating.

- G. Connection shall be NPT male or ANSI B16.5 Class 150 flanged, depending on the valves size. Flanged ends shall be supplied with the requisite number of stainless-steel screwed studs inserted for alignment with ANSI B16.5 Class 150 bolt pattern.
- H. Valve shall be 3" inlet and outlet nominal in size. Shall be one of the following:
  - 1. ARI Model D-026
  - 2. Vent O Mat Model RGX
  - 3. Pre-approved equal.
- I. The valve shall be supplied with the following:
  - 1. Cutoff/Isolation valve of the same nominal size installed between the connection with the force main and the valve to permit future maintenance.
  - 2. All piping, nipples, plugs, additional valves, etc shall be stainless steel rated for same pressure as valve and for sanitary sewer use.
  - 3. Use short body valves where height restricts the use of long body valves.
  - 4. Tapping saddle shall be double strap stainless steel and rated for same pressure as valve and for sanitary use.
- J. The valve shall be equipped with a "Flushing Attachment" consisting of: stainless steel shut off valves, quick-disconnect couplings and rubber hose, for back washing with clear water.
- K. Valve body and cover shall be made of nylon
- L. Valve shall be rated for minimum working pressure of 200 PSI
- M. Valve manhole:
  - 1. Use 60" diameter precast manhole wall sections coated 100% solids epoxy meeting specifications.
  - 2. Manhole frame and cover shall be of the vented type, and shall be Model CAP-24-BD as made by Composite Access Products or pre-approved equal.

## **2.16 GATE VALVES AND VALVE BOXES**

- A. Gate valves shall be non-rising stem, iron body, bronze mounted type, 200 psi working pressure, tested to 400psi and shall conform to AWWA standard C-500. Valves shall open by turning counter clockwise, be equipped with "O" Ring Seals at the top of the stem, shall be suitable for underground service and provided with 2" square operating nuts.
- B. Generally, gate valves shall be mechanical joint type unless otherwise specified.
- C. Gate valves shall be Mueller 2360 Series or approved equal.
- D. Valve boxes shall be installed on valves 2" and larger. Valve boxes shall be cast iron, two-piece screw type with a 5-1/4" screw type shaft, flared base and drop in lid which reads "SEWER". Base shall be sized to fit the specified size valve. Valve boxes shall be as manufactured by East Jordan Iron Works or approved equal. Valve boxes shall be adjusted to grade as shown on the drawings. No additional compensation shall be made to Contractor for adjustment of the length of valve boxes.

## **2.17 PLUG VALVES AND VALVE BOXES**

- A. Plug valves shall be non-lubricated type, drip tight shut off with pressure in each direction and eccentric in design. Plug valves larger than 14" shall be rated for 150 psi working pressure and less than 12" shall be rated for 175 psi working pressure. The port area shall be 100% of the connecting pipe area.
- B. Cast body, flanged (ANSI B16.1, Class 125 or 150) or threaded ends (NPT requirements of ANSI B1.20.2) for rigid joints and mechanical joints for buried valves. Design similar to MSS SP-108. Body shall be cast iron, ASTM A126, Class B, or Carbon steel, ASTM A216 Grade 65-45-12 with bolted bonnet of same material.
- C. Plug with upper and lower shaft in a one-piece casting, with round or rectangular port. Plug shall be made of same material as body with resilient facing of NBR.
- D. Body and Bonnet Bearing: Type 316L or Type 316 stainless steel
- E. Packing: NBR or PTFE V-Type
- F. Bonnet screws and Nuts shall be stainless steel.
- G. Manufacturer:
  - 1. DeZurik
  - 2. Pratt/Milliken
  - 3. Val-Matic

## 2.18 COATINGS

- A. All valve bodies and non stainless ferrous metals associated with valves including but not limited to stem, actuator, and related components shall be coated in accordance with AWWA C550 "Protective Epoxy Interior Coatings for Valves and Hydrants", unless otherwise specified.
- B. Epoxy coating shall be NSF approved for use in potable water.
- C. Minimum 12-mil dry film thickness except where limited by valve operating tolerances. Epoxy coating shall be spark tested at the valve manufacture's factory in accordance with AWWA C550 to verify uniform thickness. A certified test report on valve manufacturer's letterhead shall be supplied for each valve furnished.
- D. Epoxy coating shall meet the following:
  - 1. Surface Preparation: SSPC-SP 10.
  - 2. Amine-cured epoxy.
  - 3. Manufacturers:
    - i. PPG Protective and Marine Coatings.
    - ii. Sherwin Williams Co.
    - iii. Tnemec
  - 4. Type: High build.
  - 5. Minimum Solids Content: 80 percent by volume.
  - 6. Number of Coats: Two.
  - 7. Dry Film Thickness per Coat: 5 mils.
- E. Any materials which shall receive coatings shall inspected prior to installation. Coatings shall meet the following field quality control requirements:
  - 1. Surface shall be prepared in accordance with SSPC-SP10
  - 2. All Submerged surfaces and surfaces within vapor area shall be holiday tested.
  - 3. Dry film thickness shall be measured and documented prior to installation according to SSPC-PA2
  - 4. All areas containing holidays or not meeting minimum thickness requirements shall be repaired or recoated according to manufacturer instructions; areas shall then be retested prior to acceptance/installation



## 2.19 SPECIALS

Specials shall be of the same material as the pipe material being used or as approved by the Engineer. The term specials shall include plugs, caps, and other items as needed. Specials shall conform to the applicable AWWA/ASTM/ANSI Standards.

## 2.20 OTHER MATERIAL

- A. Concrete: Concrete shall be in accordance with Section 03000, Concrete, and shall develop a compressive strength of 3,000 pounds per square inch at twenty-eight (28) days.
- B. Steel Casing: The steel casing pipe shall conform to requirements of Section 2300.
- C. Pipe Embedment: Pipe Embedment (Select Bedding pay item if not absorbed) shall consist of the following per ASTM D 2321:
  - 1. Foundation Material: Foundation material is required where unsuitable material is encountered at the bottom of the trench or over-excavation has occurred.
  - 2. Bedding Material
  - 3. Haunching Material
  - 4. Initial Backfill
- D. Select material for Pipe Embedment which includes foundation, bedding, haunching and initial backfill zones shall be referred to as "Select Bedding Material" and shall:
  - 1. Meet the requirements to be classified as a Class I, or II per ASTM Standard Specification D 2321 (Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications) Table 1 according to particle size, shape and gradation; or
  - 2. Be a mixture of coarse concrete aggregate and coarse river run sand. The mixture shall consist of two (2) parts coarse aggregate conforming with ASTM C-33 to one (1) part coarse sand. The embedment material shall be thoroughly blended by the Contractor to produce a well-graded uniform mixture prior to placement in the trench. Prior to blending, the coarse concrete aggregate shall conform to the gradation sizing number 467 specified in Table 2 of ASTM C-33 as follows:

<u>SIEVE SIZE</u>	<u>PERCENT PASSING BY WEIGHT</u>
2 inch	100
1-1/2 inch	95 - 100
3/4 inch	35 - 70
3/8 inch	10 - 30
No. 4	0 - 5

The grading limits for fine aggregate shall be as follows:

<u>SIEVE SIZE</u>	<u>PERCENT PASSING BY WEIGHT</u>
3/8 inch	100
No. 4	95 - 100

No. 8	80 - 100
No. 16	50 - 90
No. 30	30 - 70
No. 50	3 - 30
No. 100	0 - 5

E. Initial Backfill Material: See above.

F. Final Backfill Material (Select Backfill pay item if not absorbed):

1. Native material will be considered as an acceptable final backfill material in unpaved areas. Contractor shall provide the Engineer with geotechnical evaluation of material for consideration.
2. In paved areas, select material for backfilling trenches and other designated excavations shall meet the requirements of select material per the geotechnical report (if report is available) or be composed of a natural or artificial mixture of sand silt and clay or soil binder or shall be a select well-graded sand-gravel material as specified and approved by the Engineer. The following limits (percentage, by weight, passing square mesh sieves) shall apply to the sand-clay material:

- a. 30-100% passing the No. 10 sieve

The material passing the No. 10 sieve shall meet the following:

- a. 100% passing the No. 10
- b. 20-85% passing the No.40
- c. 15-70% passing the No. 60
- d. 8-40% passing the No. 200

The material passing the number 40 sieve shall meet the following:

Liquid Limit (LL)-----Not more than 25  
Plasticity Index (PI)-----Not more than 6

The fraction passing the number 200 sieve shall not be greater than two-thirds (2/3) the fraction passing the number 40 sieve.

- G. All testing shall be done by licensed professionals in related field. Costs required by the Engineer associated with verifying that off-site material or material from trench excavations or on-site excavations meet the requirements of select material are the responsibility of the Contractor.

## **PART 3 – EXECUTION**

### **3.01 GENERAL**

- A. The Contractor shall duly notify and coordinate any work with interested parties such as the Mississippi Department of Transportation, the Mississippi Department of Environmental Quality and the appropriate City or County Officials. No work which affects these interested parties will commence until satisfactory coordination has been achieved.
- B. The work required shall consist of excavation and trenching for open cut construction, installation of pipe, manholes and appurtenances, backfilling, testing, repair and

restoration of property, and final cleanup.

### **3.02 EXCAVATION FOR PIPING**

- A. No more than 200 feet of trench may be opened in advance of pipe laying.
- B. Trench width shall be minimized to greatest extent practical but shall conform to the following:
  - 1. Sufficient to provide room for installing, jointing and inspecting piping, but in no case wider at top of pipe than pipe barrel O.D. plus 3 feet.
  - 2. Enlargements at pipe joints may be made if required and approved by Engineer.
  - 3. Sufficient for sheeting, bracing, sloping, and dewatering.
  - 4. Sufficient to allow thorough compacting of backfill adjacent to bottom half of pipe.
  - 5. Do not use excavating equipment which requires the trench to be excavated to excessive width.
- C. Depth of trench shall be as shown. If required and approved by Engineer depths may be revised.
- D. The Contractor shall perform all excavation of every description and of whatever substances encountered to the depth specified in the Contract Drawings or as directed by the Engineer. All trenches shall be excavated along the lines and to the grades established in the Contract Drawings.
- E. The bottom of all trenches shall be carefully shaped, graded and aligned. Care shall be taken not to excavate below the depth specified; however, in the event this should occur, the bottom of the trench shall be filled back to grade with approved material and thoroughly compacted in a manner satisfactory to the Engineer.
- F. The bed for each piece of pipe is to be shaped either by trimming the bottom of the trench or by placing excavated earth therein and tamping so that each piece of pipe will have uniform bearing and be in continuous contact with the supporting ground for its entire length. The trench shall be further excavated around each bell or hub, if necessary, so that it will entirely be clear of the ground and leave ample room for making up joints.
- G. When rock is encountered, the Contractor shall excavate to a depth at least 4 inches below the required grade and a minimum clearance of 12 inches on each side of pipe and backfilled to grade with 4 inches of sand cushion.
- H. Water will not be permitted in the trenches while the pipe is being laid. The Contractor shall not open up more trench than the available pumping facilities are able to dewater to the satisfaction of the Engineer.
- I. Should conflicts in grade occur with other utilities, the sewer line grade shall be changed to avoid the conflict as directed by the Engineer.
- J. All material suitable for backfilling shall be piled in an orderly manner a sufficient distance from the banks of the trench to avoid overloading and to prevent slides or cave-ins. Contractor to pile material so that free access is provided at all times to all fire hydrants and water valves in the vicinity of the Work and to cause as little inconvenience as possible to public travel and the abutting property. All excavated materials not required or not suitable for backfill shall be removed and wasted as indicated or as directed by the Engineer. Such grading shall be done as may be necessary to prevent surface water from flowing into trenches or other excavations and any water accumulating therein shall be

removed by pumping or by other approved methods.

- K. The disposal of all surplus and unsuitable excavation shall be the responsibility of the contractor at his own expense. The surplus and unsuitable material not to be used in the construction of the project shall not be left on the right-of-way or easement of the project or adjacent thereto.
- L. Contractor shall excavate only the length of trench as needed for same day pipe installation. No open trenches shall be left at the end of each work day.

### **3.03 EXCAVATION FOR MANHOLES, PUMPING STATION AND OTHER STRUCTURES**

- A. Excavation for structures shall be sufficient to permit the carrying out of the construction as required by these specifications and Contract Drawings.
- B. Care shall be taken not to excavate for the structures below the depths specified on the plans in correspondence with the detail sheet. If extra depth of excavation is necessitated by the nature of the soil and is ordered by the engineer, the contractor will be paid for the selected fill material as provided elsewhere in these Contract Documents for "Extra Work", unless the contract contains unit prices for the materials used.

### **3.04 SHEETING, SHORING AND BRACING**

- A. The Contractor shall furnish and place such sheeting and bracing as may be required to support the sides of the trench and to protect the workmen and pipe or adjacent structures from injury by the sloughing off or caving in of the trenches.
- B. When using movable trench support, care shall be exercised not to disturb the pipe location, jointing or embedment.
- C. Any voids left in the embedment material by support removal shall be carefully filled with granular material and adequately compacted.
- D. The sheeting and bracing may be removed as the trench is backfilled, or may be left in place where necessary to prevent damage. In the event the sheeting or bracing is left in place, it shall not extend nearer than three feet (3') to the surface of the ground.
- E. In no case will extra compensation be allowed for furnishing, placing, removing or leaving in place any sheeting and bracing, but the cost of this work shall be included in the unit price bid for installing the pipe.
- F. The sides of the trench shall be maintained in strict compliance with OSHA regulations.

### **3.05 DEWATERING, DRAINAGE AND FLOTATION**

- A. 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.
- B. 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.
- C. 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 sub-grade

foundation condition, 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.

- D. Dewatering shall at all times be conducted in such a manner as to preserve the natural undisturbed bearing capacity of the sub-grade soils at proposed bottom of excavation.
- E. Well-points may be required for pre-drainage of the soils prior to final excavation for some of the deeper below ground structures of 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. Well-points shall be surrounded by suitable filter sand and no fines shall be removed by pumping. Pumping from well-points shall be continuous and standby pumps shall be provided.
- F. 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 observations wells shall be at structures and along pipelines as approved by the Engineer prior to their installation.
- G. 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 or natural bearing of soils or damage to structures caused by an inadequate dewatering system or by interruption of the continuous operation of the system as specified.
- H. As part of the submittal of his dewatering system, the Contractor may be required to demonstrate the adequacy of the proposed system and well-point filter sand by means of a test installation. Discharge water shall be clear, with no visible soil particles in a one-quart sample.
- I. During backfilling and construction, water levels shall be measured in observation wells located as directed by the Engineer.
- J. Continuous pumping will be required as long as water levels are required to be below natural levels.
- K. 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.

### **3.06 PROTECTION OF PERSONS AND PROPERTY:**

- A. Barricade open excavations occurring as part of this work and post with warning light in accordance with local requirements. Operate warning lights as recommended by authorities having jurisdiction.
- B. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.

### **3.07 PIPE EMBEDMENT**

- A. Select embedment material used around and under pipes is as specified in 2.18 of this section.

- B. Select Embedment Installation:
1. Foundation: If required, as recommended for material class in Table 2 of ASTM D 2321 compacted to 96% Standard Proctor Dry Density ASTM D 698
  2. Bedding: As recommended for material class in Table 2 of ASTM D 2321 compacted to 96% Standard Proctor Dry Density ASTM D 698
  3. Haunching: As recommended for material class in Table 2 of ASTM D 2321 compacted to 96% Standard Proctor Dry Density ASTM D 698
  4. Initial Backfill: As recommended for material class in Table 2 of ASTM D 2321 compacted to 96% Standard Proctor Dry Density ASTM D 698
- C. No pipe shall be brought into position until the preceding length has been embedded and secured in its final position.
- D. Place embedment materials so that the pipe after installation will be true to line and to grade.

### **3.08 PIPE LAYING**

- A. Pipes, specials and fittings shall be carefully laid to the line and grade established on the Contract Drawings or as directed by the Engineer. All pipes shall be laid in compliance with the manufacturer's instructions, technical specifications and details on contract drawings and at such depths that a minimum cover is maintained as specified previously. Extra depth will not be measured unless noted on the Bid Form.
- B. Install all pipes accurately to the line and grade shown unless otherwise approved by the Engineer. Remove and relay pipes that are not laid correctly.
- C. Pipe laying will not be permitted when trench contains water.
- D. Slope piping uniformly between elevations given.
- E. Start laying pipes at lowest point and proceed towards higher elevations, unless otherwise approved by Engineer.
- F. Place bell and spigot so that bells face the direction of laying, unless otherwise approved by the Engineer.
- G. Excavate around the joints in bedding and lay pipes so that only the barrel receives bearing pressure from the trench bottom.
- H. Blocking is not allowed to bring pipe to grade.
- I. Permissible deflections at joints shall not exceed the amount allowed by the manufacturer.
- J. Take every precaution to ensure that no foreign material enters the piping prior to and during installation.
- K. All pipes and fittings shall be carefully examined for cracks, damage or other defects while suspended above the trench before installation. Defective materials shall be immediately removed from site.
- L. Interior of all pipes and fittings shall be inspected and all dirt, gravel, sand, debris or other foreign materials shall be completely removed from pipe interior before it is moved into the trench.

- M. Bell and spigot mating surfaces shall be thoroughly wire brushed and wiped clean and dry immediately before pipe is laid.
- O. Every time that pipe laying is not actively in progress the open ends of pipe shall be closed by a watertight plug.
- P. Field cutting pipe, where required, shall be made with a machine specially designed for cutting piping. Cuts shall be carefully done, without damage to pipe or lining, so as to leave a smooth end at right angles to the axis of pipe. Cut ends shall be tapered and sharp edges filed off smooth. Flame cutting will not be allowed.
- Q. Touch up protective coatings in a satisfactory manner prior to backfilling.
- R. All piping shall be inspected by the Engineer prior to any backfilling operations. Contractor shall notify Engineer in advance of any backfilling operations.

### **3.09 HORIZONTAL AND VERTICLE ALIGNMENT OF PIPES**

- A. The Contractor shall utilize a commercial grade laser beam specifically manufactured to aid in maintaining grade and alignment of pipelines during installation. The primary unit shall be mounted on a heavy-duty base and firmly anchored in the downstream manhole of the reach under construction. The maximum distance shall not exceed 400 feet per setup.
- B. Each joint of pipe will be installed using an approved target to align the pipe with the projected laser beam. The methods and procedures shall be in strict accordance with the manufacturer's recommendations and instructions.
- C. Proper ventilation shall be maintained at all times and care shall be exercised to avoid bumping or misalignment of the projected beam.
- D. Sewer pipe shall be laid so that the installation variation of invert elevations when compared with the construction plans does not exceed 0.10 feet. If the variation exceeds 0.10 feet the line shall be rejected.

### **3.10 MAKING JOINTS**

#### **A. PVC PIPE**

- 1. Joints shall be constructed in accordance with the recommendations of the manufacturer.
- 2. Clean completely all jointing surfaces and adjacent areas immediately before matting joint.
- 3. Lubricate and adjust gaskets as recommended by manufacturer.
- 4. After gaskets are compressed and before pipe is brought fully home, each gasket shall be checked for proper position around full circumference of the joint.

#### **B. HDPE PIPE**

- 1. All jointing shall be done by butt fusion welding and shall be performed in accordance with manufacturer's recommendations by a certified operator for the method allowed.
- 2. Fusion equipment shall be operated only by technicians who have been certified by the pipe manufacturer or supplier and who have a minimum of 2 years' experience of fusion welding 8 inches or larger diameter pipelines. The

technician's experience and verifiable references shall be documented in the HDPE pipe submittal.

4. See Section 02815 for additional information on jointing and complete installation.

#### C. DUCTILE IRON PIPE JOINT CONSTRUCTION

1. The installation and joint of ductile iron pipe shall generally conform to the applicable provisions of AWWA Standard Specification C-600 for pipe laying.
2. Where mechanical joint pipe is used, the surfaces which come in contact with the gasket shall be thoroughly brushed with a wire brush just prior to assembly. The gasket should be brushed with soapy water prior to installation to remove loosed dirt and to lubricate gasket as it is forced into its retaining space.
3. When tightening bolts, it is essential that the gland be brought up toward the pipe flange evenly. The bolts should be partially tightened; the bottom bolt first, then the top; next the bolts on either side; and last, the remaining bolts. Overstressing of bolts to compensate for poor installation will not be permitted. Bolt torque shall be in accordance with manufacturer's recommendations.
4. When push-on joint pipe is used, the pipe must be cleaned with a wire brush and the spigot end of the pipe lubricated with a thin film of lubricant. The gasket shall be inserted into bell socket recess and the spigot end pushed home. The joint shall be installed in accordance with the manufacturer's specifications.
5. All joints of whatever type shall be completely watertight after being subjected to the required tests.

### 3.11 TRANSITION FROM ONE TYPE OF PIPE TO ANOTHER

Provide all necessary adapters, specials and connection pieces required when connecting different types and sizes of pipe or when connecting pipe made by different manufacturers.

### 3.12 SERVICE ASSEMBLES AND SERVICE LINE INSTALLATION

- A. Assemblies shall consist of appurtenances needed to complete the assembly in accordance with the Contract Drawings. They shall be installed in a good and workmanlike manner in the places designated on the Plans or as directed by the Engineer.
- B. Service line shall be as specified herein and will be measured and paid for separately as detailed herein.
- C. Service lines to be marked as shown in the Contract Drawings.

### 3.13 CONNECTION TO EXISTING MANHOLES

- A. Where indicated on the Contract Drawings, the Contractor will be required to make a water tight connection to an existing wastewater collection system. The Contractor shall furnish all labor and materials and service required for the excavating, removal and relocation of sections of old pipe, de-watering the trench, connecting of the sewer line with the existing lift station or manhole and the setting of necessary fittings, specials and required replacement of manhole coatings as shown on the Contract Drawings.
- B. The size of the opening cut (must be core drilled) in the existing manhole wall shall be



restricted to a normal diameter sufficient only to insert the sewer pipe. After insertion of the pipe, the void between the outside of the pipe and the manhole shall be dry packed with a Portland cement-sand mix. The moisture content of the cement-sand mixture shall be minimized in order to avoid undue shrinkage after drying.

### **3.14 MANHOLE BASES**

Precast bases shall be set on a concrete foundation or compacted granular material as shown in the Contract Drawings. Precast bases shall be set at the proper grade and carefully leveled and aligned.

### **3.15 PRECAST MANHOLE SECTIONS**

- A. Set sections vertical with sections true to alignment.
- B. Install sections in accordance with manufacturer's recommendations.
- C. Lifting holes shall be sealed water tight with non-shrink grout inside and out.

### **3.16 MANHOLE CHANNELS**

- A. For straight through flow, inverts shall be formed of concrete and shall be given a hard trowel finish. The invert shall be a minimum of  $\frac{1}{2}$  the diameter of the pipe in height.
- B. Where side channels occur, the channels within the manholes shall be formed of concrete and shall be given a hard trowel finish.

### **3.17 GRADING RINGS**

- A. Grading rings shall be used on all concrete manholes where required. Stacks shall be a maximum of 12 inches in height. The height of the stack shall be such as is necessary to bring the manhole frame to the proper grade.
- B. The outside of the grading rings shall be neatly plastered with 1/2 inch of cement mortar as the work progresses.
- C. Each grading ring shall be laid in a full bed of mortar and shall be thoroughly bonded.

### **3.18 MANHOLES WATER TIGHTNESS**

- A. All manholes shall be free of visible leaks.
- B. All leaks shall be repaired in a manner subject to the Engineer's approval.
- C. All lift holes to be sealed water tight inside and out with non-shrink grout.

### **3.19 FLEXIBLE PIPE CONNECTOR AND WATERSTOP AT MANHOLE BASES**

An approved flexible connector shall be provided between each pipe entering and exiting manhole. The joint into the manhole base shall be completely watertight.

### **3.20 DROP MANHOLES**

- A. In manholes where the free fall inside the manhole exceeds 2 feet measured from the invert of the pipe to the top of the manhole floor, drop manholes shall be constructed in the same manner as specified for standard manholes except that the bottom shall be extended to support the drop line.

- B. One joint of ductile iron pipe shall be extended upstream from the drop manhole and secured on the undisturbed bedding of the adjacent pipe trench.

### **3.21 BACKFILLING TRENCHES**

- A. Backfilling shall be carefully performed and the original surface restored, to the full satisfaction of the Engineer. The trenches shall be backfilled with fine, loose earth, free from large clods, stones or rocks, frozen material or debris.
- B. The trenches shall be backfilled carefully and rammed until enough has been placed to provide a cover of not less than one foot (1') above the pipe prior to placing Final Backfill.
- C. Proper compaction procedures should be exercised to provide the required soil densities.
- D. The Final Backfill procedures shall be as follows and dependent on location of trench:
  - 1. Open areas or cross-country: Backfill material suitable for this method shall be machine-placed in successive layers and compacted until a density of at least the adjacent undisturbed ground is obtained (90% min.). This operation will continue until all settlement has occurred and to the full satisfaction of the Engineer.
  - 2. Under or within 5' of paved (concrete or asphalt) surfaces or concrete structures the backfill material shall be placed in successive layers, not to exceed six inches (6"). Each lift shall be thoroughly compacted with mechanical tampers so that at least 98% of the density determined by the Proctor Method, ASTM D-698, shall be obtained before the next lift is placed.
  - 3. Backfill in unpaved areas shall be made as above specified, except the backfill lifts above the pipes may be deposited in layers not to exceed 6 inches and thoroughly tamped until a density of at least that of the adjacent soil is obtained (90% Min.).
- C. Each lift of the backfill material shall have the proper moisture content to permit compaction to the required density.
- D. Whenever the trenches have not been properly filled, or if settlement occurs, they shall be refilled, smoothed off, and finally made to conform to the surface of the ground at no additional cost to the Owner. Surplus material shall be disposed of as directed by the Engineer at no cost to the Owner.

### **3.22 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 materials 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.

### **3.23 WORK AFFECTING EXISTING PIPING**

#### **A. Location of Existing Piping:**

1. Locations of existing piping shown should be considered approximate.
2. Contractor is responsible for determining exact location of existing piping to which connections are to be made, or which may become disturbed during earth moving operations, or which may be affected by the work in anyway.

#### **B. Work on Existing Pipelines:**

1. Cut pipes as shown or required with machines specifically designed for this work.
2. Install temporary plugs to keep out all mud, dirt, water and debris.
3. Provide all necessary adapters, fittings, pipes and appurtenances required.

### **3.24 TESTING OF GRAVITY SEWER LINES**

#### **A. General:**

1. Contractor shall conduct a low-pressure air test and a deflection test for all gravity sewer piping. For gravity sewer pipe 30" and larger, an infiltration/exfiltration test shall be performed.
2. Notify Engineer 48 hours in advance of testing.
3. Provide all testing apparatus.
4. Pipelines which fail to hold specified test pressure or which exceed the allowable leakage rate shall be repaired and retested.
5. Test pressures required are at the lowest elevation of the pipeline section being tested unless otherwise specified.
6. Unless otherwise approved, conduct all tests in the presence of the Engineer.

#### **B. Installed Low Pressure Air Test: UNI-Bell's UNI-B-6.**

##### **1. Procedure:**

The sewer line to be tested shall be tested between manholes. The line shall be sealed at both ends. The seal at one end shall have an orifice through which to pass air into the pipe. An air supply shall be connected to the orifice at one end of the line. the air supply line will contain an on-off gas valve and a pressure gauge having a range of 0 to 15 psi. The gauge shall have minimum divisions of .10 psi and shall have an accuracy of +/- .04 psi. Pressuring equipment should include a regulator or relief valve to avoid overpressuring and damaging an otherwise acceptable line.

The pipe line under test shall be pressurized to 4 PSIG for a period of no less than 5 minutes. If necessary, air should be added to the line to maintain the pressure above 3.5 PSIG. After stabilization period, the gas valve shall be closed. When the line pressure drops to 3.5 PSIG, commence timing with a stop watch. The stop watch should be allowed to run until such time as line pressure drops to 2.5 PSIG. Then the watch should be stopped and the time lapse compared with the allowable time

lapse in Table I in this Section and for pipe size and leakage allowance specified by the Engineer. If the time lapse is greater than that specified, the section undergoing testing shall have passed, and the test may be discontinued at that time. If the time is less than that specified, the line has not passed the test and the Contractor will be required to find the leak(s), repair them and retest until the section passes at his own expense.

2. Table I: Line Pressure Air Test Using Low-Pressure Air Specification Time Required for a 1.0PSIG Pressure Drop for Size and Length of Pipe Indicate

Pipe Diameter (in)	Minimum Time (min)	Length for Min. Time (ft)	Time for Longer Length (sec)	Specification Time for Length (L) Shown, Min.'s							
				100'	150'	200'	250'	300'	350'	400'	450'
4	3:46	597	.380L	3:46	3:46	3:46	3:46	3:46	3:46	3:46	3:46
6	5:40	398	.854L	5:40	5:40	5:40	5:40	5:40	5:40	5:42	6:24
8	7:34	298	1.520L	7:34	7:34	7:34	7:34	7:36	8:52	10:08	11:24
10	9:26	239	2.374L	9:26	9:26	9:26	9:53	11:52	13:51	15:49	17:48
12	11:20	199	3.418L	11:20	11:20	11:24	14:15	17:05	19:56	22:47	25:38
15	14:10	159	5.342L	14:10	14:10	17:48	22:15	26:42	31:09	35:36	40:04
18	17:00	133	7.692L	17:00	19:13	25:38	32:03	38:27	44:52	51:16	57:41
21	19:50	114	10.471L	19:50	22:10	34:54	43:37	52:21	61:00	69:48	78:31
24	22:40	99	13.674L	22:47	34:11	45:34	56:58	68:22	79:46	91:10	102:33

C. Deflection Test:

1. Deflection tests shall be performed on all PVC and ductile iron gravity sewer pipe. The test shall be conducted after the final backfill has been in place at least 30 days.
2. No pipe shall exceed a deflection of 5%.
3. If the deflection test is to be run using a rigid ball or mandrel, it shall have a diameter equal to 95% of the inside diameter of the pipe. The test shall be performed without mechanical pulling devices.
4. The mandrel shall be drawn through the pipe by hand. Irregularities or obstructions encountered in the line shall be corrected by the Contractor.
5. If a section of pipe with excessive deflection is found, the Contractor shall uncover the pipe for inspection. Damaged pipe will be replaced. If the pipe is undamaged, the Contractor may reinstall the bedding and backfill and retest the pipe. Retesting shall include mandrel and low-pressure air testing.

D. Infiltration/Exfiltration Test:

1. Infiltration/Exfiltration Test shall be performed in those sections of sewer pipe that lie under the groundwater table.
2. Contractor shall supply needed equipment and personnel to perform the infiltration/exfiltration test.
3. Allowable infiltration/exfiltration shall not exceed 50 gallons per inch of nominal diameter per mile of sewer per day.
4. An exfiltration test shall be performed where the crown of the entire reach of sewer being tested lies less than five feet under the existing water table. Minimum upstream testing head shall be five feet above existing water table.

5. An infiltration test shall be performed where the crown of the entire reach of sewer being tested lies five feet or more under the existing water table.
6. Sections of installed piping shall be tested from manhole to manhole.
7. The Contractor shall install a calibrated weir at lower end of section being tested and shall measure leakage for a minimum of four hours if infiltration test is performed. Provide bulkhead at upper end of pipe section being tested.
8. The Contractor shall measure required water to maintain minimum upstream testing head if exfiltration test is performed.

### **3.25 TESTING OF FORCE MAIN SEWER LINES**

#### **Hydrostatic Test for Force Main Sewer Lines:**

1. After the pipe has been laid and partially backfilled, all newly laid pipe, or any valved section thereof, shall be subjected to a hydrostatic pressure of 150 psi. The duration of each pressure test shall be at least two (2) hours. Pressure shall not vary by more than  $\pm 5$  psi for the duration of the test.
2. Each valved section of pipe shall be slowly filled with water and the specified test pressure, based on the elevation of the lowest point on 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 Contractor shall furnish all necessary assistance for conducting the test.
3. Before applying the specified test pressure, all air shall be expelled from the pipe. If permanent air vents are not located at all high points, the Contractor shall install corporation cocks at such points so that the air can be expelled as the line is filled with water. After all air has been expelled, the corporation cocks shall be closed and the test pressure applied.

#### **Leakage Test for Force Main Sewer Lines:**

1. A leakage test shall be conducted by the Contractor at his expense and in the presence of the Engineer or his representative for installed force main line. The duration of each leakage test shall be 12 hours. During the test, the main shall be subjected to a pressure of not less than 150 psi measured at the average elevation of the pipe to be tested. The leakage test shall be conducted by the Contractor after the pressure test has been satisfactorily completed
2. Leakage shall be defined as the quantity of water that must be supplied in the newly laid pipe, or any valved section thereof, to maintain the specified leakage test pressure, within 5 psi, after the air in the pipe has been expelled and pipe has been filled with water.
3. No pipe installation will be accepted if the leakage is greater than that determined by the formula  $L = (SD\sqrt{P})/133,200$  where L is the allowable leakage in gallons per hour, S is the length of pipe tested in feet, D is the nominal diameter of the pipe in inches, and P is the average test pressure during the leakage test in psi gauge.
4. If any test of pipe laid discloses leakage greater than that specified, the Contractor shall at his own expense locate and repair the defective joints until the leakage is within the specified allowance. All visible leaks shall be repaired regardless of the amount of leakage.

### **3.26 FLUSHING**

- A. All piping shall be thoroughly cleaned and flushed in a manner approved by the Engineer prior to placing in service. Piping 48 inches in diameter and larger shall be inspected from the inside and all debris, dirt and foreign matter removed.
- B. Water for flushing and testing shall be furnished and paid for by the Contractor. Contractor shall provide all temporary piping, hose, valves, appurtenances and services required.
- C. The completed gravity flow system shall be clean of all muck, siltation and other foreign matter deposited or collected during construction. Flushing shall continue downstream manhole to manhole.
- D. Flushing shall be accomplished prior to testing should the collected matter be sufficient in quantity to obstruct or effect the testing. Flushing will not be required in those sections of the installed pipes and manholes where the exfiltration test has adequately cleaned the mains.

### **3.27 CLEAN-UP**

- A. In areas where the wastewater collection system has been backfilled, the Contractor shall clear the right-of-way and surrounding ground, and shall dispose of all waste materials and debris resulting from his operations. He shall fill and smooth holes and ruts and shall repair all miscellaneous and unclassified ground damage done by him and shall restore the ground to such a stable and suitable condition as may be reasonably required, consistent with the condition of the ground prior to construction.
- B. Clean-up, including grading, disposal, dress work and other incidentals shall be completed by the Contractor at no additional cost to the Owner to the extent directed by the Engineer.

## **PART 4 - COMPENSATION**

### **4.01 GENERAL**

No separate payment shall be made for any item necessary for the completion of the work indicated on the Contract Drawings and in the Specifications but not shown as a pay item on the proposal form; therefore, full compensation for these items shall be considered absorbed in the Contract Lump Sum or related pay items.

### **4.02 MEASUREMENT AND PAYMENT**

- A. Gravity Mains
  - 1. General: Gravity mains will be measured and paid for in linear feet along the centerline of the pipe from the center to center of manholes and from center of manhole to center of junction with existing main or plugged end. The total length of pipe thus measured will be separated into the various kinds and sizes for each increment of depth to establish the quantities of each Pay Item. Depth zones will be measured from existing ground line or the finished ground to the invert of pipe, whichever is less.
  - 2. No deduction in length of main will be made for diameter of manholes 60" and smaller, or for space occupied by other specials installed.
  - 3. Gravity mains installed in cased or tunneled openings will be measured along the centerline of the pipe from end to end of the casing.
  - 4. Gravity mains designated to be jacked or bored through open cut barriers or restrictions shall be

measured for payment along the centerline of the pipe from trench end to trench end. Trench end shall be defined as the vertical face of the trench that is perpendicular to the centerline of the jacked or bored pipe and is adjacent to the open cut barrier or restrictive area.

B. Force Mains

1. General: Force mains will be measured and paid for in linear feet along the centerline of the pipe from the center of the valve pit to center of junction with existing main or plugged end.
2. Force mains installed in cased or tunneled openings will be measured along the centerline of the pipe from end to end of the casing.
3. Gravity mains designated to be jacked or bored through open cut barriers or restrictions shall be measured for payment along the centerline of the pipe from trench end to trench end. Trench end shall be defined as the vertical face of the trench that is perpendicular to the centerline of the jacked or bored pipe and is adjacent to the open cut barrier or restrictive area.

C. Manholes: Manholes will be measured and paid for as the type, size and number of completed and accepted units in place and of incremental depths indicated in the Proposal. Incremental depths shall be determined from the finished elevation of the top of the completed unit to the invert of the outlet pipe. Manholes constructed over existing sewer mains will include a separate, measurement item per each for installation of the manhole and connection to the existing sewer main. Manholes flotation straps installed at the locations shown on the plans shall be cost absorbed in the manhole. Manhole coatings shall be cost absorbed in the price of manholes.

D. Pipe Connections: Pipe connections to existing manholes or structures will be measured and paid for in units of each, with no allowance of incremental depths of bury.

E. Removal and Restoration of Permanent Surfaces

1. General: No separate measurement for payment purposes will be made for removal of permanent surfaces. This shall be considered an absorbed cost item unless otherwise specified on the Proposal.
2. No separate measurement for payment for restoration of concrete pavements, sidewalks, driveways, curb and gutter or for clay gravel will be made. These shall be considered as absorbed cost items unless otherwise specified on the Proposal.
3. No separate measurement for payment for restoration of asphalt pavements will be made. This shall be considered an absorbed cost item unless otherwise specified on the Proposal.

F. Removal and Restoration of Landscaping: Items designated to be removed and restored shall not be measured for payment, unless otherwise indicated on the Proposal.

G. Timber Sheeting or Sheet Piling Left in Place: Timber sheeting or sheet piling left in place will not be measured for payment but shall be considered an absorbed cost item.

H. Supplementary Items: If provided for in the Proposal, work performed in support of the gravity main construction shall be measured for payment in the manner prescribed in the respective Sections of the SPECIFICATIONS covering new construction of these items. Otherwise, these items will be absorbed costs.

I. Select Bedding Material hauled in from off-site areas shall not be measured for separate payment but shall be considered an absorbed cost item unless itemized as a pay item on the Proposal. If shown as a pay item it shall be referred to as "Select Bedding Material" and paid for per cubic yard, compacted and in-

place. Should on-site excavated trench material meet the requirements to be classified as select bedding material, the Contractor shall use this material for such purpose and, in turn, the use of and placement of this material shall be considered an absorbed cost per foot of pipe.

- J. Final Backfill shall not be measured for separate payment but shall be considered an absorbed cost item unless itemized as a pay item on the Proposal. If shown as a pay item it shall be referred to as "Select Backfill Material" and paid for per cubic yard, compacted and in-place.
- K. Pipe on Piers: Sewer pipe installed on piers across creeks, sloughs and low areas shall be measured along the centerline of the pipe from the point at which the top of the pipe leaves the natural ground to the point where the top of the pipe re-enters the natural ground. Measurement will not be made of excavation, grading or other items incidental to completion of the work. Measurement of piers and related appurtenances shall be per each installed.
- L. Sanitary sewer service lines shall be measured along the centerline of the pipe per linear foot of each type installed with no allowance for cut depth differentials. No separate measurement for payment shall be made of specials, fittings, plugs, marker posts or other incidentals. Service assemblies including wye, bend, cap, post and other incidentals shown on the drawings and shall be measured per each installed.
- M. Sewer Main Bores and Service Line Bores shall be measured in the units specified in the Proposal.

**--END OF SECTION 02900--**



**SECTION 03300**  
**CAST IN PLACE REINFORCED CONCRETE FOR PAVEMENTS AND SIDEWALKS**

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**PART 1 - GENERAL**

**1.01 DESCRIPTION OF WORK**

- A. Scope: Contractor shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish and install cast-in-place concrete, reinforcement and related materials for concrete required for the site work.
- B. Coordination: Review installation procedures under other Sections and coordinate the installation of items that must be installed in the concrete.

**1.02 QUALITY ASSURANCE**

- A. Source Quality Control:
  - 1. Concrete Testing Service:
    - a. Contractor shall employ acceptable testing laboratory to perform materials evaluation, testing and design of concrete mixes.
    - b. Contractor's laboratory shall also evaluate concrete delivered to and placed at the site.
  - 2. Certificates, signed by concrete producer and Contractor, may be submitted in lieu of material testing when acceptable to Engineer.
  - 3. Quality Control: Perform sampling and testing during concrete placement, as follows:
    - a. Sampling: ASTM C 172.
    - b. Slump: ASTM C 143, one test for each load at point of discharge.
    - c. Air Content: ASTM C 31, one for each set of compressive strength specimens.
    - d. Compressive Strength: ASTM C 39, one set for each 50 cubic yards or fraction thereof for each class of concrete; 1 specimen tested at 7 days, 2 specimens tested at 28 days.
  - 4. Report test results in writing to Engineer on same day tests are made.
- B. Reference Standards: Comply with the applicable provisions and recommendations of the following, except as otherwise shown or specified.
  - 1. ACI 301, Specifications for Structural Concrete for Building (includes ASTM Standards referred to herein except ASTM A 36).
  - 2. ACI 347, Recommended Practice for Concrete Form work.
  - 3. ACI 304, Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete.

4. ACI 315, Manual of Standard Practice for Detailing Reinforced Concrete Structures.
5. ACI 305, Recommended Practice for Hot Weather Concreting.
6. ACI 306, Recommended Practice for Cold Weather Concreting.
7. ASTM A 36, Structural Steel.
8. Concrete Reinforcing Steel Institute, Manual of Standard Practice, include ASTM Standards referred herein.

### **1.03 SUBMITTALS**

- A. Samples: Submit samples of materials as specified and may be requested by the Engineer including names, sources and descriptions.
- B. Shop Drawings: Submit the following for approval with additional requirements as specified.
  1. Copies of manufacturer's specifications with application and installation instructions for proprietary materials and items, including admixtures and bonding agents.
  2. Drawings for fabrication, bending, and placement of concrete reinforcement. Comply with ACI 315, Chapters 1 thru 8. For walls, show elevations to a minimum scale of  $\frac{1}{4}$  inch to 1 foot. Show bar schedules, stirrup spacing, diagrams of bent bars, arrangements and assemblies, as required for the fabrication and placement of concrete reinforcement.
  3. List of concrete materials and concrete mix designs proposed for use. Include the results of all tests performed to qualify the materials and to establish the mix designs in accordance with ACI 301, 3.9. Submit written report to Engineer for each proposed concrete mix at least 15 days prior to start of Work. Do not begin concrete production until mixes have been reviewed and are acceptable to Engineer. Mix designs may be adjusted when material characteristics, job conditions, weather, test results or other circumstances warrant. Do not use revised concrete mixes until submitted to and accepted by Engineer.
- C. Laboratory Test Reports: Submit copies of laboratory test reports for concrete cylinders, materials and mix design tests. Production of concrete to comply with specified requirements is the responsibility of the Contractor.

### **1.04 PRODUCT DELIVERY, STORAGE AND HANDLING**

- A. Deliver concrete reinforcement materials to the site bundled, tagged and marked. Use metal tags indicating bar size, lengths, and other information corresponding to markings shown on placement diagrams.
- B. All materials used for concrete must be kept clean and free from all foreign matter during transportation and handling and kept separate until measured and placed in the mixer. Bins or platforms having hard clean surfaces shall be provided for storage. Suitable means shall be taken during hauling, piling and handling to ensure that segregation of the coarse and fine aggregate particles does not occur and the grading is not affected.

## 1.05 DEFINITIONS

- A. Contraction Joint - A *contraction joint* is formed, sawed, or tooled groove in a concrete structure to create a weakened plane to regulate the location of cracking resulting from the dimensional change of different parts of the structure.
- B. Isolation Joint - An *isolation joint* is a separation between adjacent sections of a new concrete structure adjacent to existing structures such as a building foundation, drainage structure, manholes, light pole bases, etc. to allow relative movement in two or more directions and through which all of the bonded reinforcement is interrupted.
- C. Expansion Joint - An *expansion joint* in a concrete structure is a separation provided between adjacent sections to allow independent movement due to dimensional increases and reductions of the adjacent sections to minimize cracking and through which some or all of the bonded reinforcement is interrupted.
- D. Construction Joint - A *construction joint* is the interface between concrete placements intentionally created to facilitate construction.
- E. Cold Joint - A *cold joint* is a joint or discontinuity resulting from a delay in placement of sufficient duration to preclude intermingling and bonding of the material, or where mortar or plaster rejoin or meet. Cold Joints should be avoided during construction.

## PART 2 - PRODUCTS

### 2.01 CONCRETE MATERIALS

- A. Portland Cement: ASTM C 150, Type II.
- B. Aggregates: ASTM C 33.
  - 1. Fine Aggregate: Clean, sharp, natural sand free from loam, clay, lumps or other deleterious substances. Dune sand, bank run sand and manufactured sand are not acceptable.
  - 2. Coarse Aggregate: Clean, uncoated, processed aggregate containing no clay, mud, loam, or foreign matter, as follows:
    - a. Crushed stone, processed from natural rock or stone.
    - b. Washed gravel, either natural or crushed. Use of slag and pit or bank run gravel is not permitted.
- C. Coarse Aggregate Size: Size to be ASTM C 33, Nos. 57 or 67, unless permitted otherwise by Engineer.
- D. Water: Clean, potable.
- E. Air-Entraining Admixture: ASTM C 260.
- F. Water-Reducing Admixture: ASTM C 494. Only use admixtures which have been tested and accepted in mix designs.
- G. Slump Limits: Proportion and design mixes to result in concrete slump at the point of placement of not less than one inch and not more than four inches.

## **2.02 FORM MATERIALS**

- A. Provide form materials with sufficient stability to withstand pressure of placed concrete without bow or deflection.
- B. Exposed Concrete Surfaces: Acceptable panel-type to provide continuous, straight, smooth, as-cast surfaces. Use largest practical sizes to minimize form joints.
- C. Unexposed Concrete Surfaces: Suitable material to suit project conditions.
- D. Provide 3/4 inch chamfer at all exposed corners.
- E. All formwork shall conform to the requirements of ACI 301-05. Forms shall not be removed until 48 hours after placement of concrete.

## **2.03 REINFORCING MATERIALS**

- A. Reinforcing Bars: ASTM A 615, Grade 60.
- B. Welded Wire Fabric: ASTM A 185 & ASTM A 82.
- C. Steel Wire: ASTM A 82, flat sheets not rolls
- D. Supports for Reinforcement: Bolsters, chairs, spacers and other devices for spacing, supporting and fastening reinforcement in place.
  - 1. Use wire bar type supports complying with CRSI recommendations, except as specified below. Do not use wood, brick, or other unacceptable materials.
  - 2. For slabs on grade, use supports with sand plates or horizontal runners where base materials will not support chair legs.
  - 3. For all concrete surfaces, where legs of supports are in contact with forms, provide supports complying with CRSI, Manual of Standard Practice as follows:
    - a. Either hot-dip galvanized, plastic protected or stainless steel legs.

## **2.04 GROUT**

- A. Non-metallic, 100 percent solids, high strength epoxy grout.
  - 1. Use clean well graded sand with epoxy resins suitable for use on dry or damp surfaces.
  - 2. Product and Manufacturer: Provide one of the following:
    - a. Euco High Strength Grout by the Euclid Chemical Company.
    - b. Sikadur 42 Grout by Sika Chemical Company.
    - c. Five Star Epoxy Grout by U.S. Grout Corporation.
    - d. Or equal.
- B. Nonshrink, Nonmetallic Grout:
  - 1. Premixed nonstaining cementitious grout requiring only the addition of water at the job site.

2. Product and Manufacturer: Provide one of the following:
  - a. Euco N-S by the Euclid Chemical Company.
  - b. Masterflow 713 by Master Builders Company.
  - c. Five Star by U.S. Grout Corporation.
  - d. Or equal.
- C. Ordinary Cement-Sand Grout: Except where otherwise specified use 1 part cement to 3 parts sand complying with the following:
  1. Cement: ASTM C 150, Type II.
  2. Sand: ASTM C 33.

## **2.05 EXPANSION JOINTS**

- A. Expansion joint filler shall be preformed expansion joint filler complying with ASTM D1751 or D1752 or as required on the drawings.
- B. Expansion joint sealer shall comply with:
  1. ASTM C920-18 for elastomeric type and be self leveling; or
  2. ASTM D5893 for single-component silicone sealants; or
  3. ASTM D6690 for hot-applied sealants

## **2.06 ISOLATION JOINTS**

- A. Isolation joint filler shall be pre-formed expansion joint filler complying with ASTM D1751 or D1752 or as required on the drawings.
- B. Isolation joint sealer shall comply with:
  1. ASTM C920-18 for elastomeric type and be self leveling; or
  2. ASTM D5893 for single-component silicone sealants; or
  3. ASTM D6690 for hot-applied sealants

## **2.07 WATERSTOPS**

- A. Reference Standard CRD-C 572.
  1. Construction Joints: A dumbbell shape polyvinyl chloride waterstop with the following minimum requirements:
    - a. Thickness: 3/8 inch.
    - b. Length: Six inches.
    - c. Bulb diameter: 3/4 inch.
  2. Expansion Joints: A dumbbell shape polyvinyl chloride waterstop with the following minimum requirements:
    - a. Thickness: 3/8 inch.

- b. Length: Nine inches.
  - c. Bulb diameter: 3/4 inch.
- B. Product and Manufacturer: Provide waterstops as manufactured by one of the following:
  - 1. Vuncan Products, Inc.
  - 2. W. R. Meadows, Inc.
  - 3. Or equal.

## **PART 3 - EXECUTION**

### **3.01 INSPECTION**

Contractor and his installer shall examine the substrate and the conditions under which Work is to be performed and notify Engineer of unsatisfactory conditions. Do not proceed with the Work until unsatisfactory conditions have been corrected in a manner acceptable to Engineer.

### **3.02 FORM WORK**

- A. Form work: Construct so that concrete members and structures are correct size, shape, alignment, elevation and position, complying with ACI 347.
- B. Provide openings in Form work to accommodate Work of other trades. Accurately place and securely support items built into forms.
- C. Clean and adjust forms prior to concrete placement. Apply form release agents or wet forms, as required. Retighten forms during and after concrete placement if required to eliminate mortar leaks.

### **3.03 REINFORCEMENT, JOINTS, AND EMBEDDED ITEMS**

- A. Comply with the applicable recommendations of specified codes and standards, and ACI, Manual No. SP-66, latest edition, for details and methods of reinforcement placement and supports.
- B. Clean reinforcement to remove loose rust and mill scale, earth, ice, and other materials which reduce or destroy bond with concrete.
- C. Position, support, and secure reinforcement against displacement during Form work construction or concrete placement. Locate and support reinforcing by metal chairs, runners, bolsters, spacers and hangers, as required.
  - 1. Place reinforcement to obtain the minimum concrete converges as shown and as specified in ACI 318. Arrange, space, and securely tie bars and bar supports together with 16 gage wire to hold reinforcement accurately in position during concrete placement operations. Set with ties so that twisted ends are directed away from exposed concrete surfaces.
  - 2. Reinforcing steel shall not be secured to forms with wire, nails or other ferrous metal. Metal supports subject to corrosion shall not touch formed or exposed concrete surfaces.

- D. Provide sufficient numbers of supports of strength required to carry reinforcement. Do not place reinforcing bars more than 2 inches beyond the last leg of any continuous bar support. Do not use supports as bases for runways for concrete conveying equipment and similar construction loads.
- E. Splices: Provide standard reinforcement splices by lapping ends, placing bars in contact, and tying tightly with wire. Comply with requirements shown for minimum lap of spliced bars.
- F. Install welded wire fabric in as long lengths as practical, lapping at least one mesh.
- G. Concrete shall not be placed until the reinforcing steel is inspected and permission for placing concrete is granted by Engineer. All concrete placed in violation of this provision will be rejected.
- H. Joints: Provide construction, isolation, expansion and contraction joints as indicated or required. Locate construction joints so as to not impair the strength and appearance of the structure. Place isolation and control joints in slabs on ground to stabilize differential settlement and random cracking. Control Joint spacing shall not exceed 15' and shall not exceed an aspect ratio (slab length to width) of 1.25. Contraction joints shall be cut or tooled to a minimum of 25% of the pavement thickness in roadway, parking lot sections. Contraction joints must be tooled in sidewalks unless prior permission to sawcut is asked for and received from Engineer. Typical allowable maximum joint spacing for large paved surfaces such as parking lots, driveways and patios is 10' for slab thickness < 5"; 12.5' for slab thickness < 6"; and 15' for slab thickness of 6" or greater.
- I. Installation of Embedded Items: Set and build into the Work anchorage devices and embedded items required for other Work that is attached to or supported by cast-in-place concrete. Use setting diagrams, templates and instructions provided under other Sections and other contracts for locating and setting. Refer also to Paragraph 1.01.B., Coordination, above.
- J. Waterstops:
  - 1. General:
    - a. Comply with ACI 301, Chapter 6, and as specified below. All joints shall be made in accordance with manufacturer's instructions.
    - b. Obtain Engineer's approval for waterstop locations not shown.
    - c. Provide waterstops in all foundations, tanks and other substructures up to an elevation at least 12 inches above grade or to an elevation at least 12 inches above liquid level in tanks, whichever is higher, except where otherwise shown or noted.
  - 2. Polyvinyl Chloride Waterstop:
    - a. Tie waterstop to reinforcement so that it is securely and rigidly supported in the proper position during concrete placement continuously inspect waterstops during concrete placement to insure their proper positioning.
    - b. Waterstops shall be fused using equipment as supplied by or recommended by the manufacturer.
    - c. Where required, weld polyvinyl chloride waterstop to steel waterstop by gently heating while applying pressure to the two materials. Use a steel

plate and two "C" clamps to apply the pressure and a propane torch to apply the heat. The polyvinyl chloride waterstop shall be clamped between the steel waterstop and the steel plate which is held in place by the two "C" clamps. As heat is applied to the steel waterstop tighten the "C" clamps. Heat for approximately 15 minutes at a temperature just enough to make the polyvinyl chloride "runny" and the weld complete. After cooling remove the "C" clamps and plate. Engineer must approve polyvinyl chloride before embedding in concrete.

### **3.04 CONCRETE AND PLACEMENT**

- A. Proportioning and Design of Mix:
  - 1. Minimum compressive strength at 28 days: 4,000 psi unless otherwise specified
  - 2. Maximum water cement ratio by weight: 0.45.
  - 3. Minimum cement content: 564 pounds per cubic yard.
  - 4. Normal weight: 145 pounds per cubic foot.
  - 5. Use air-entraining admixture in all concrete: Provide not less than 4 percent nor more than 7 percent entrained air for concrete exposed to freezing and thawing, and from 2 percent to 4 percent for other concrete.
  - 6. Calcium Chloride: Do not use calcium chloride in concrete, unless otherwise authorized in writing by ENGINEER. Do not use admixtures containing calcium chloride.
  - 7. If fly ash is used, not more than 15% of the cement may be replaced by fly ash. Fly ash may not be used in concrete slabs to receive a float, trowel, or non-slip finish.
- B. Job-Site Mixing: Use drum type batch machine mixer, mixing not less than 1½ minutes for one cubic yard or smaller capacity. Increase mixing time at least 15 seconds for each additional cubic yard or fraction thereof.
- C. Ready-Mixed Concrete: ASTM C 94.
- D. Concrete Placement: Comply with ACI 304, placing concrete in a continuous operation within planned joints or sections. Do not begin placement until work of other trades affecting concrete is completed.
- E. Consolidate placed concrete using mechanical vibrating equipment with hand rodding and tamping, so that concrete is worked around reinforcement and other embedded items and into all parts of forms.
- F. Protect concrete from physical damage or reduced strength due to weather extremes during mixing, placement, and curing.
  - 1. In cold weather comply with ACI 306.
  - 2. In hot weather comply with ACI 305.

### **3.05 QUALITY OF CONCRETE WORK**

- A. Make all concrete solid, compact and smooth, and free of laitance, cracks and cold joints.



- B. Cut out and properly replace to the extent ordered by the Engineer, or repair to the satisfaction of the Engineer, surfaces which contain cracks or voids, are unduly rough, or are in any way defective. Patches or plastering will not be acceptable.
- C. Repair, removal, and replacement of defective concrete as ordered by the Engineer shall be at no additional cost to the Owner.

### **3.06 CURING**

- A. Begin initial curing after placing and finishing concrete as soon as free water has disappeared from exposed surfaces. Where possible, keep continuously moist for not less than 72 hours. Continue curing use of moisture-retaining cover or membrane-forming curing compound. Cure formed surfaces by moist curing until forms are removed. Provide protection as required to prevent damage to exposed concrete surfaces.
- B. Forms on structural walls shall be left in place for a minimum of 72 hours unless a cylinder breaks indicating the strength of the concrete has reached 75 percent of design strength.
- C. Forms on structural floors and ceiling shall be left in place until a cylinder break indicates the strength of the concrete has reached 85 percent of design strength.

### **3.07 FINISHES**

- A. Finish:
  - 1. After placing concrete slabs, do not work the surface further until ready for floating. Begin floating when the surface water has disappeared or when the concrete has stiffened sufficiently. Use a wood float only. Check and level the surface plane to a tolerance not exceeding 1/4 inch in 10 feet when tested with a 10 foot straightedge placed on the surface at not less than 2 different angles. Cut down high spots and fill all low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat the surface to a uniform, smooth, granular texture.
  - 2. After floating, begin the first trowel finish operation using a trowel. Begin final troweling when the surface produces a ringing sound as the trowel is moved over the surface.
  - 3. Consolidate the concrete surface by the final hand troweling operation. Finish shall be free of trowel marks, uniform in texture and appearance, and with a surface plane tolerance not exceeding 1/8 inch in 10 feet when tested with a 10 foot straight edge. Grind smooth surface defects.
  - 4. Use trowel finish for the following: Interior exposed slabs unless otherwise shown or specified.
  - 5. Apply non-slip broom finish to exterior concrete slab and elsewhere as shown on the Drawings.

### **3.08 GROUT PLACEMENT**

- A. General:

1. Place grout as shown and in accordance with manufacturer's instructing. If manufacturer's instructions conflict with the Specifications do not proceed until Engineer provides clarification.
2. Drypacking will not be permitted.
3. Manufacturer's of proprietary products shall make available upon 72 hours notification the services of a qualified, full-time employee to aid in assuring proper use of the product under job conditions.
4. Placing grout shall conform to the temperature and weather limitations described in Article 3.04 above.

**--END OF SECTION 03300--**

## **SECTION 03345**

### **CONCRETE FINISHING FOR PAVEMENTS AND SIDEWALKS**

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#### **PART 1 - GENERAL**

##### **1.01 DESCRIPTION**

- A. 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.
- B. Except as may be modified herein or otherwise directed by the Engineer, comply with ACI.

##### **1.03 SUBMITTALS**

- A. Comply with pertinent provisions of Sections 01300 & 01340.
  - 1. Materials list of items proposed to be provided under this Section.
  - 2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements;
  - 3. Manufacturer's recommended installation procedures which, when approved by the Engineer, will become the basis for accepting or rejecting actual installation procedures used on the Work.

##### **1.04 PRODUCT HANDLING**

Comply with pertinent provisions of Section 01600.

#### **PART 2 - PRODUCTS**

##### **2.01 MATERIALS**

- A. General
  - 1. Carefully study the Drawings and these Specifications, and determine the location, extent, and type of required concrete finishes.
  - 2. As required for the Work, provide the following materials, or equals approved in advance by the Engineer.
- B. Concrete materials: Comply with pertinent provision of Section 03300, except as may be modified herein.
- C. Liquid bonding agent: "Weld-Crete" manufactured by the Larsen Products Corporation.
- D. Curing and protection paper:
  - 1. Approved products:
    - a. "Sisalkraft, Orange Label";

- b. Equal products complying with ASTM C171.
  - 2. Where concrete will be exposed and will be subjected to abrasion, such as floor slabs, use non-staining paper such as □Sisalkraft□, □Seekure 896□, or equal paper faced with polyethylene film.
- E. Liquid curing agents:
- 1. Where application of specified finish materials will be inhibited by use of curing agents, cure the surface by water only; do not use chemical cure.
  - 2. For curing other areas, use "Hunt TLF" manufactured by Hunt Process Company, Inc.

## **2.02 OTHER MATERIALS**

Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Engineer.

## **PART 3 - EXECUTION**

### **3.01 SURFACE CONDITIONS**

- A. General:
- 1. After removal of forms, give the concrete surfaces one or more of the finishes specified below where so indicated on the Drawings.
  - 2. Revise the finishes as needed to secure the approval of the Engineer.
- B. As-cast finish:
- 1. Rough form finish:
    - a. Leave surfaces with the texture imparted by forms, except patch tie holes and defects.
    - b. Remove fins exceeding 1/4" in height.
  - 2. Smooth form finish:
    - a. Coordinate as necessary to secure form construction using smooth, hard, uniform surfaces, with number of seams kept to a practical minimum and in a uniform and orderly pattern.
    - b. Patch tie holes and defects.
    - c. Remove fins completely.
- C. Rubbed finishes:
- 1. Provide these finishes only where specifically called for, and then only on a "smooth form finish" base as described above.
  - 2. Smooth rubbed finish:

- a. Produce on newly hardened concrete no later than the day following form removal.
  - b. Wet the surfaces and rub with carborundum brick or other abrasive until uniform color and texture are produced.
  - c. Do not use a cement grout other than the cement paste drawn from the concrete itself by the rubbing process.
3. Grout cleaned finish:
- a. Do not start cleaning operations until all contiguous surfaces to be cleaned are completed and accessible.
  - b. Do not permit cleaning as the work progresses.
  - c. Mix one part portland cement and 1-1/2 parts fine sand with sufficient water to produce a grout having the consistency of thick paint.
  - d. Substitute white Portland cement for part of the gray Portland cement as required to produce a color matching the color of surrounding concrete, as determined by a trial patch.
  - e. Wet the surface of the concrete sufficiently to prevent absorption of water from the grout and apply the grout uniformly with brushes or spray gun.
  - f. Immediately after applying the grout, scrub the surface vigorously with a cork float or stone to coat the surface and fill all air bubbles and holes.
  - g. While the grout is still plastic, remove all excess grout by working the surface with a rubber float, sack, or other means.
  - h. After the surface whites from drying (about 30 minutes at normal temperatures), rub vigorously with clean burlap.
  - i. Keep the surface damp for at least 36 hours after final rubbing.
- D. Unspecified finish: If the finish of formed surfaces is not specifically called out elsewhere in the Contract Documents, provide the following finishes as applicable.
- 1. Rough form finish:
    - a. For all concrete surfaces not exposed to public view.
  - 2. Smooth form finish:
    - a. For all concrete surfaces exposed to public view.

### **3.03 CURING AND PROTECTION**

- A. Beginning immediately after placement, protect concrete from premature drying, excessively hot and cold temperatures, and mechanical injury.
- B. Preservation of moisture:

1. Unless otherwise directed by the Engineer, apply one of the following procedures to concrete not in contact with forms immediately after completion of placement and finishing.
    - a. Ponding or continuous sprinkling;
    - b. Application of absorptive mats or fabric kept continuously wet;
    - c. Application of sand kept continuously wet;
    - d. Continuous application of steam (not exceeding 150°F) or mist spray;
    - e. Application of waterproof sheet materials specified in Part 2 of this Section;
    - f. Application of other moisture-retaining covering as approved by the Engineer;
    - g. Application of the curing agent specified in Part 2 of this Section or elsewhere in the Contract Documents.
  2. Where forms are exposed to the sun, minimize moisture loss by keeping the forms wet until they can be removed safely.
  3. Cure concrete by preserving moisture as specified above for at least seven (7) days.
- C. Temperature, wind, and humidity:
1. Cold weather:
    - a. When the mean daily temperature outdoors is less than 40°F, maintain the temperature of the concrete between 50°F and 70°F for the required curing period.
    - b. When necessary, provide proper and adequate heating system capable of maintaining the required heat without injury due to concentration of heat.
    - c. Do not use combustion heaters during the first 24 hours unless precautions are taken to prevent exposure of the concrete to exhaust gases which contain carbon dioxide.
  2. Hot weather: When necessary, provide wind breaks, fog spraying, shading, sprinkling, ponding, or wet covering with a light colored material, applying as quickly as concrete hardening and finishing operations will allow.
  3. Rate of temperature change: Keep the temperature of the air immediately adjacent to the concrete during and immediately following the curing period as uniform as possible and not exceeding a change of 5°F in any one hour period, or 50°F in any 24 hour period.
- D. Protection from mechanical injury:
1. During the curing period, protect the concrete from damaging mechanical disturbances such as heavy shock, load stresses, and excessive vibration.

2. Protect finished concrete surfaces from damage from construction equipment, materials, and methods, by application of curing procedures, and by rain and running water.
3. Do not load self-supporting structures in such a way as to overstress the concrete.

**-- END OF SECTION 03345--**

## **SECTION 04100 WOOD FENCES**

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### **PART 1 – GENERAL**

- 1.01 DESCRIPTION OF WORK:** The work required under this Section will consist of furnishing and installing wood fences and gates as shown on the Plans and in conformance with these Specifications.

### **PART 2 – PRODUCTS**

#### **2.1 GENERAL**

- A. All wood materials shall be treated wood, or wood of a natural resistance to decay. Materials shall be free from loose knots, cracks, and other imperfections.
- B. Cast-in-place Concrete: Section 03300, minimum compressive strength 4000 psi.

#### **2.2 WOOD BOARDS OR SLATS**

- A. Wood boards or slats shall be of cedar, cypress or northern red pine acceptable to the Engineer.
- B. Wood boards or slats shall be between 3/8 inches and 5/8 inches thick and be no greater than 6 inches wide.

#### **2.3 POSTS**

- A. Fence and Man Gate posts shall be 4-inch by 4-inch.
- B. Truck Gate posts shall be at minimum dual 6-inch by 6-inch or as recommended by manufacturer.
- C. Posts shall be pressure treated cedar, cypress, northern red pine or similar wood acceptable to the Engineer.
- D. Buried post ends should be treated with an approved wood preservative product.

#### **2.4 GATES**

- A. Provide additional horizontal, vertical, and diagonal members to ensure proper gate operation and for attachment of wood, hardware and accessories. Consult manufacturer as necessary.
- B. Accessibility: Gate stops, latches and locks shall be accessible from either side of gate.
- C. Types: Man Gates and Truck Gates
  - 1. Man Gates
    - a. Openings shall be a minimum of 3 feet wide.



## 2. Truck Gates

- a. Openings shall be a minimum of 12 feet wide or as shown on the plans.

D. Gate designs shall be approved by Engineer prior to installation.

### 2.5 GATE HARDWARE

- A. Gate hardware including, but not limited to, latches, hinges, stops and bolts shall be stainless steel, powder coated black, or galvanized.
- B. Hinges and Pins shall be heavy duty and sized as per manufacturer's recommendations.
- C. For truck gates (double-leaf), a drop rod or stop shall be installed on one leaf, include at least one guide and shall extend into concrete base or similarly solid base.
- D. Dual access (accessible and lockable from either side) latch and lock systems are required on all gates.
  1. The following dual access latch and lock systems are allowed and must be approved in writing by the Engineer prior to installation:
    - a. Lock Thru™ Latch (website: <http://www.hooverfence.com/woodfence/lockthru.htm>);
    - b. Sure Latch (website: <http://surelatch.com/gate-latches/7-lockable-two-way-latch-and-pin.html>);
    - c. or Equal.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Follow all applicable local building codes and ordinances procedures.
- B. Unless otherwise directed, Engineer's representative shall be on-site during entire fence installation.

### 3.2 LAYOUT OF WORK

- A. Under no circumstance shall a fence or gate post be located without Engineer's approval.
- B. Gate location shall be approved by Engineer prior to installation.

### 3.3 INSTALLATION OF POSTS

- A. Posts shall be set true to line and grade.
- B. Set posts in 12-inch diameter concrete footings extending at least 24- inches into undisturbed natural ground or properly compacted fill.

### **3.4 INSTALLATION OF FENCE**

- A. Typical fence installation can be found at the end of this specification section.

### **3.5 INSTALLATION OF GATES**

- A. Install gates plumb, level, and secure for full opening without interference. Install ground-set items in concrete for anchorage as recommended by the fence manufacturer. Adjust hardware for smooth operation.
- B. Man Gates:
1. Shall be installed as shown on the contract drawings.
  2. Shall be configured to allow persons to enter or exit the enclosed area.
  3. Once gate is installed coordinate with Engineer on lock installation.
  4. Typical gate installation can be found at the end of this specification section.
- C. Truck Gates:
1. Shall be installed as shown on the contract drawings.
  2. Shall open/close in direction as directed by Engineer.
  3. Shall be configured to allow vehicles to enter and exit the enclosed as required.
  4. Once gate is installed coordinate with Engineer on lock installation.
  5. Typical gate installation can be found at the end of this specification section.

## **PART 4 – METHOD OF MEASUREMENT AND PAYMENT**

### **4.01 METHOD OF MEASUREMENT**

Fencing will be measured in linear feet per plan dimensions when installed in accordance with the plans. When the plan dimensions are changed by the Engineer, as-built dimensions will be used as the basis for determining the actual linear feet.

### **4.02 BASIS OF PAYMENT**

Fencing will be paid for at the contract unit price per linear foot, which price shall be full compensation for all materials, equipment, tools, labor and incidentals necessary to complete the work. Gates will be paid for at the contract unit price per each, which price shall be full compensation for all materials, equipment, tools, labor and incidentals necessary to complete the work for gate installation.

**--END OF SECTION 04100--**