PROJECT MANUAL

SITE DEVELOPMENT GRANT

I-40 ADVANTAGE PARK DRIVE

Brownsville, Tennessee

A2H # 23133

Prepared By:

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SECTION 00 0107
SEALS PAGE

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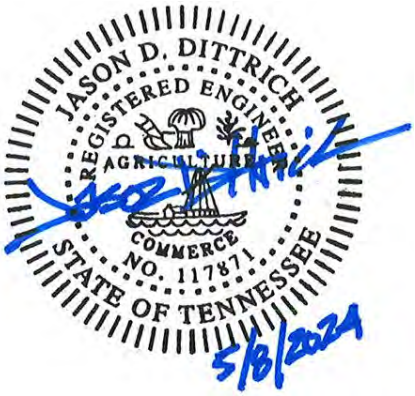

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SECTION 00 0115
LIST OF DRAWINGS SHEETS

1.01 DESCRIPTION

A. The following is the list of Project Contract Drawings entitled Site Development Grant - I-40 Advantage Frontage Road for Haywood County, TN in Brownsville, TN, dated May 8, 2024 with Revision dates, if any as noted.

SHEET NUMBER	SHEET NAME	REVISION DATE
G0.0	COVER SHEET	
C0.0	GENERAL NOTES	
C0.1	TYPICAL SECTIONS	
C1.0	DEMOLITION PLAN	
C2.0	ADVANTAGE PARK DR. LAYOUT PLAN	
C4.0	EPSC PLAN (OVERALL)	
C4.1	EPSC PLAN STAGE I	
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C6.1B	HYDRAULIC PROFILE (STA. 4+83 TO 19+00)	
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C11.0	ADVANTAGE PARK DR. CROSS SECTIONS	
C11.1	ADVANTAGE PARK DR. CROSS SECTIONS	
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END OF SECTION

ADVERTISEMENT FOR BIDS

Project No. 23133

Haywood County (Owner)

Separate sealed bids for **Site Development Grant - I-40 Advantage Park Drive** will be received by its **Mayor, The Honorable David Livingston** at the **Mayor's Office, 1 North Washington Avenue**, **Brownsville, TN 38012** until **10:00 a.m.** local time on **May 29, 2024**, and then at said office publicly opened and read aloud.

A **Non-Mandatory Pre-Bid Conference** will be held at **10:00 a.m.** local time on **May 15, 2024.** Attendees will meet at the office of Mayor David Livingston, 1 North Washington Avenue, Brownsville, TN 38012 to discuss the plans and specifications and then visit the site.

The Information for Bidders, Form of Bid, Form of Contract, Plans, Specifications, and Forms of Bid Bond, Performance and Payment Bond, and other contract documents may be examined at the following:

Haywood County, **1 North Washington Avenue**, **Brownsville, TN 38012**
A2H, Inc., 3009 Davies Plantation Road, Lakeland, TN 38002, www.a2hplanroom.com
Builder's Exchange, 642 South Cooper, Memphis, TN 38104, www.memphisbx.com
Governor's Office of Diversity Business, www.tn.gov/generalservices/procurement/
West Tennessee Plans Room, 439 Airways Blvd., Jackson, TN 38301, www.wtplanroom.com

Electronic files may be downloaded free of charge from the A2H Plan Room at www.a2hplanroom.com. Hard copy sets of plans and specifications will also be available on the plan room at the contractor's expense.

An official list of bidders will be maintained at www.a2hplanroom.com to insure eligibility requirements of the bidder are met prior to bid opening. Any bid submitted from a bidder not on the official bidders list and/or not containing the required information will not be opened.

The owner reserves the right to waive any informalities or to reject any or all bids.

Each bidder must deposit with his bid, security in the amount, form and subject to the conditions provided in the Information for Bidders.

Attention of bidders is particularly called to the requirements as to conditions of employment to be observed and minimum wage rates to be paid under the contract.

No bidder may withdraw his bid within 60 days after the actual date of the opening thereof.

The Honorable David Livingston, Mayor
Haywood County

INFORMATION FOR BIDDERS

1. Receipt and Opening of Bids:

Haywood County (herein called the "Owner"), invites bids on the form attached hereto, all blanks of which must be appropriately filled in. Bids will be received by the Owner at the **Mayor's Office** until **10:00 a.m.** on **May 29, 2024**, and then at said office publicly opened and read aloud. The envelopes containing the bids must be sealed, addressed to **The Honorable David Livingston, Mayor, 1 North Washington Avenue**, **Brownsville, TN 38012** and designated as bid for **Site Development Grant - I-40 Advantage Park Drive.**

The Owner may consider informal any bid not prepared and submitted in accordance with the provisions hereof and may waive any informalities or reject any and all bids. Any bid may be withdrawn prior to the above scheduled time for the opening of bids or authorized postponement thereof. Any bid received after the tiem and date specified shall not be considered. No bidder may withdraw a bid within 60 days after the actual date of the opening thereof.

2. Preparation of Bid: Each bid must be submitted on the prescribed form. All blank spaces for bid prices must be filled in, in ink or typewritten, in both words and figures.

Each bid must be submitted in a sealed envelope bearing on the outside the name of the bidder, his/her address, the name of the project for which the bid is submitted and all other information required by State law. If forwarded by mail, the sealed envelope containing the bid must be enclosed in another envelope addressed as specified in the bid form.

3. Subcontracts: The bidder is specifically advised that any person, for, or other party to whom it is proposed to award a subcontract under this contract must be acceptable to the owner after verification by the State of the current eligibility status.

4. Telegraphic Modification: Any bidder may modify his/her bid by telegraphic communication at any time prior to the scheduled closing time for receipt of bids provided such telegraphic communication is received by the Owner prior to the closing time, and, provided further, the Owner is satisfied that a written confirmation of the telegraphic modification over the signature of the bidder was mailed prior to the closing time. The telegraphic communication should not reveal the bid price but should provide the addition or subtraction or other modification so that the final pieces or terms will not be known by the Owner until the sealed bid is opened. If written confirmation is not received within two days from the closing time, no consideration will be given to the telegraphic modification.

5. Method of Bidding: The Owner invites Unit Price bids for the following:

6. Qualification of Bidder: The Owner may make such investigations as s/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 any 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 obligations of the contract and to complete the work contemplated therein. Conditional bids will not be accepted.

7. Bid Security: Each bid must be accompanied by cash, certified check of the bidder, or a bid bond prepared on the form of bid bond attached thereto, duly executed by the bidder as principal and having as surety thereon a surety company approved by the Owner, in the amount of 5% of the bid. Such cash, checks or bid bonds will be returned to all except the three lowest bidders within three days after the opening of bids, and the remaining cash, checks or bid bonds will be returned promptly after the Owner and the accepted bidder have executed the contract, or, if no award has been made within 60 days after the date of the opening of bids, upon demand of the bidder at any time thereafter, so long as s/he has not been notified of the acceptance of his/her bid.

8. Liquidated Damages for Failure to Enter into Contract: The successful bidder, upon his/her failure or refusal to execute and deliver the contract and bonds required within 10 days after s/he has received notice of the acceptance of his/her bid, shall forfeit to the Owner, as liquidated damages for such failure or refusal, the security deposited with his/her bid.

9. Time of Completion and Liquidated Damages: Bidder must agree to commence work on or before a date to be specified in a written “Notice to Proceed” of the Owner and to fully complete the project within **120** consecutive calendar days thereafter. Bidder must agree also to pay as liquidated damages, the sum of **$500.00** for each consecutive calendar day therafter as hereinafter provided in the Supplemental General Conditions.

10. Condition of Work: Each bidder must inform him/herself fully of the conditions relating to the construction of the project and the employment of labor thereof. Failure to do so will not relieve a successful bidder of his/her obligation to furnish all material and labor necessary to carry out the provisions of his/her contract. Insofar as possible, the contractor, in carrying out the work, must employ such methods as will not cause any interruption of or interference with the work of any other contractor.

11. Addenda and Interpretations: No interpretation of the meaning of the plans, specifications or other pre-bid documents will be made to any bidder orally. Every request for such interpretation should be in writing addressed to

Josie Fisher, Project Coordinator at **josief@a2h.com**

and to be given consideration must be received at least five days prior to the date fixed for the opening of bids. Any and all such interpretations and any supplemental instructions will be in the form of written addenda to the specifications which, if issued, will be mailed by certified mail with return receipt requested to all prospective bidders (at the respective addresses furnished for such purposes), not later than three days prior to the date fixed for the opening of bids. Failure of any bidder to receive any such addendum or interpretation shall not relieve such bidder from any obligation under his/her bid as submitted. All addenda so issued shall become part of the contract documents.

12. Security for Faithful Performance: Simultaneously with his/her delivery of the executed contract, the Contractor shall furnish a surety bond or bonds as security for faithful performance of this contract and for the payment of all persons performing labor on the project under this contract and furnishing materials in connection with this contract, as specified in the General Conditions included herein. The surety on such bond or bonds shall be a duly authorized surety company satisfactory to the Owner.

13. Power of Attorney: Attorneys-in-fact who sign bid bonds or contract bonds must file with each bond a certified and effectively dated copy of their power of attorney.

14. Notice of Special Conditions: Attention is particularly called to those parts of the contract documents and specifications which deal with the following:
    a. Inspection and testing of materials.
    b. Insurance requirements.
    c. Wage rates.
    d. States allowances.

15. Laws and Regulations: 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.

16. Method of Award – Lowest Responsible Bidder: If at the time this contract is to be awarded, the lowest base bid submitted by a responsible bidder does not exceed the amount of funds then estimated by the Owner as available to finance the contract, the contract will be awarded on the base bid only. If such bid exceeds such amount, the Owner may reject all bids or may award the contract on the base bid combined with such deductible alternates applied in numerical order in which they are listed in the Form of Bid, as produces a net amount which is within the available funds.

17. Obligation of Bidder: 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 plans and contract documents (including all addenda). The failure or omission of any bidder to examine any form, instrument or document shall in no way relieve any bidder from any obligation in respect of his/her bid.

18. Safety Standards and Accident Prevention: With respect to all work performed under this contract, the contractor shall:

a. Comply with the safety standards provisions of applicable laws, building and constrution codes and the "Manual of Accident Prevention in Construction" published by the Associated General Contractors of America, the requirements of the Occupational Safety and Health Act of 1970 (Public Law 91-596), and the requirements of Title 29 of the Code of Federal regulations, Section 1518 as published in the "Federal Register", Volume 36, No. 75, Saturday, April 17, 1971.

b. Exercise every precaution at all times for the prevention of accidents and the protection of persons (including employees) and property.

c. Maintain at his/her office or other well known place at the job site, all articles necessary for giving first aid to the injured, and shall make standing arrangements for the immediate removal to a hospital or a doctor's care of persons (including employees), who may be injured on the job site. In no case shall employees be permitted to work at a job site before the employer has made a standing arrangement for removal of injured persons to a hospital or a doctor's caree.

19. Drug-Free Workplace

Under the provisions of Tennessee Code Annotate §50-9-113 enacted by the General Assembly effective 2001, a) employers with five (5) or more employees who contract with either the state or a local government to provide construction services are required to submit an affidavit stating that they have a drug free workplace program that complies with Title 50, Chapter 9, in effect at the time of submission of a bid at least to the extent required of governmental entities. The statute imposes other requirements on the contractor, but the grantee's responsibility is specifically limited in section (b) of the state as follows:

(b) A written affidavit by the principal officer of a covered employer provided to a local government at the time such bid or contract is submitted stating that the employer is in compliance with this section shall absolve the local government of all further responsibility under this section and any liability arising from the employer's compliance or failure of compliance with the provisions of this section.

20. Pre-Bid Conference

A **Non-Mandatory Pre-Bid Conference** will be held at **10:00 a.m.** local time on **May 15, 2024.** Attendees will meet at the office of Mayor David Livingston, 1 North Washington Avenue, Brownsville, TN 38012 to discuss the plans and specifications and then visit the site.

BID BOND

KNOW ALL MEN BY THSE PRESENTS, that we, the undersigned,

_____

as Principal, and _____ as Surety, are hereby held and firmly bound unto **Haywood County** as Owner in the penal sum of _____ for the payment of which, well and truly to be made, we hereby jointly and severally bind ourselves, our heirs, executors, administrators, successors and assigns.

Signed, this _____ day of _____, 20_____.

The condition of the above obligation is such that wereas the Principal has submitted to _____ a certain Bid, attached hereto and hereby made a part hereof to enter into a contract in writing for the

Site Development Grant - I-40 Advantage Park Drive

NOW, THEREFORE,

(a) If said Bid shall be rejected, or in the alternate.

(b) If said bid shall be accepted and the Principal shall execute and deliver a contract in the Form of Contract attached hereto (properly completed in accordance with said Bid) and shall furnish a bond fo rhis faithful performance of said contract, and for the payment of all persons performing labor or furnishing materials in connection therewith, 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 force and 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 the 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 presents to be signed by their proper officers, the day and year first set forth above

(L.S.)

_____

(Principal)

_____

(Surety)

By: _____

(SEAL)

PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS, that

_____
(Name of Contractor)

_____
(Address of Contractor)

a _____, hereinafter call Contractor,
(Corporation, Partnership, Individual or Joint Venture)

and _____
(Name of Surety)

_____
(Address of Surety)

hereinafter called Surety, are held and firmly bound unto

_____
(Name of Owner)

_____
(Address of Owner)

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, this sum being in the amount of one hundred percent (100%) of the contract amount.

THE CONDITION OF THIS OBLIGATION is such that whereas, the contractor has entered into a certain contract with the OWNER, dated the _____ day of _____, 20_____, a copy of which is hereto attached and made a part hereto fore the construction of:

Site Development Grant - I-40 Advantage Park Drive

NOW, THEREFORE, if the Contrator 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 to 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 agrees that no change, extension of time, alteration or addition to the terms of the contract or to the WORK to be performed thereunder 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 tiem, alteration or addition to the terms of the 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 be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in _____ counterparts
(number)

each one of which shall be deemed an original, this the _____ day of _____, 20_____.

ATTEST:

_____ _____
(Contractor) Corporate Official Contractor

By: _____

Title: _____

_____
Address

_____

(SEAL)

_____
Witness to Contractor

_____
Address

_____

ATTEST:

_____ _____
Witness to Surety Surety

_____ By: _____
Address 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.

BOND is not valid unless accompanied by Power of Attorney.

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.

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS, that

_____
(Name of Contractor)

_____
(Address of Contractor)

a _____, hereinafter called Contractor,
(Corporation, Partnership, Individual or Joint Venture)

and _____
(Name of Surety)

_____
(Address of Surety)

hereinafter called Surety, are held and firmly bound unto

_____
(Name of Owner)

_____
(Address of Owner)

hereinafter called OWNER, in ther 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, firmed by these presents, this sum being in the amount of one hundred percent (100%) of the contract amount.

THE CONDITION OF THIS OBLIGATION is such that whereas, the contractor has entered into a certain contract with the OWNER, dated the _____ day of _____, 20____, a copy of which is hereto attached and made a part hereof for the construction of:

Site Development Grant - I-40 Advantage Park Drive

NOW, THEREFORE, if the Contractor 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 shal full indemnify and save harmless the OWNER from all costs and damages wh ich it may suffer by reason of failure to do so, and shall reimburse and repay the OWNER all 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 agrees that no change, extension of time, alternation or addition to the terms of the contract or to the WORK to be performed thereunder 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 terms of the 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 be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in _____ counterparts
(number)

each one of which shall be deemed an original, this the _____ day of _____, 20_____.

ATTEST:

_____ _____
(Contractor) Corporate Official Contractor

By: _____

Title: _____

_____
Address

_____

(SEAL)

_____
Witness to Contractor

_____
Address

_____

ATTEST:

_____ _____
Witness to Surety Surety

_____ By: _____
Address 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.

BOND is not valid unless accompanied by Power of Attorney.

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.

BID FOR UNIT PRICE CONTRACTS

Place **Site Development Grant - I-40 Advantage Park Drive -**

Date **May 29, 2024**

Project No. **23133**

Proposal of _____ (hereinafter called "Bidder"), a

_____
(corporation, partnership, or individual)

To **Haywood County** (hereinafter called "OWNER")

Dear Sir or Madam:

The Bidder, in compliance with your invitation for bids for the construction of the

Site Development Grant - I-40 Advantage Park Drive -

having examined the plans and specifications with related documents and the site of the proposed work, and being familiar with all of the conditions surrounding the construction of the proposed project including the availability of materials and labor, hereby proposes to furnish all labor, materials, and supplies, and to construct the project in accordance with the contract documents, within the time set forth therein, and at the prices stated below. These prices are to cover all expenses incurred in performing the work required under the contract documents, of which this proposal is a part.

Bidder hereby agrees to commence work under this contract on or before a date to be specified in written "Notice to Proceed" of the Owner and to fully complete the project within **120** consecutive calendar days thereafter as stipulated in the specifications. Bidder further agrees to pay as liquidated damages the sum of **$500.00** for each consecutive calendar day thereafter as hereinafter provided in Paragraph 3.c. of the Supplemental General Conditions.

Bidder acknowledges receipt of the following addendum:

_____

_____

_____

PROPOSAL:

Bidder agrees to perform all of the **Site Development Grant - I-40 Advantage Park Drive** work described in the specifications and shown on the plans for the following Unit Prices:

SITE DEVELOPMENT GRANT - I-40 ADVANTAGE PARK DRIVE ESTIMATED QUANTITIES					
No.	**Description**	**Qty**	**Unit**	**Unit Price**	**Amount**
1	ALL EROSION CONTROL MEASURES TO INCLUDE MAINTENANCE AND REMOVAL (SILT FENCE, ROCK CHECK DAMS, EARTHEN BERMS, DIVERSION DITCHES, ETC) COMPLETE IN PLACE	1	LS	$	$
2	DEMOLITION, REMOVAL, AND DISPOSAL OF EXISTING ASPHALT PAVEMENT AND AGGREGATE BASE, COMPLETE IN PLACE	1	LS	$	$
3	REMOVAL OF EXISTING WATER LINE	70	LF	$	$
4	UNCLASSIFIED EXCAVATION AND EMBANKMENT, COMPLETE IN PLACE	16,500	CY	$	$
5	TOPSOIL STRIPPING, STOCKPILE, AND SPREADING, COMPLETE IN PLACE	4,900	CY	$	$
6	TDOT 203-05 UNDERCUTTING, COMPLETE IN PLACE	1,000	CY	$	$
7	TDOT 303-01, MINERAL AGGREGATE TYPE 'A', GRADING D (LIMESTONE), 10" THICK, COMPLETE IN PLACE	9,700	TON	$	$
8	TDOT 307-01.01, GRADING 'A' (LIMESTONE) HOT MIX BITUMINOUS BASE MIX 3" THICK, COMMLETE IN PLACE	1,800	TON	$	$
9	TDOT 307-01.08, GRADING 'B-M2' (LIMESTONE) HOT MIX BITUMINOUS BASE MIX, 3" THICK, COMPLETE IN PLACE	1,950	TON	$	$

10	TDOT 403-01, BITUMINOUS TACK COAT, COMPLETE IN PLACE	10	TON	$	$
11	TDOT 411-01, GRADING 'E' (LIMESTONE) HOT MIX BITUMINOUS SURFACE, 1-1/2" THICK, COMPLETE IN PLACE	950	TON	$	$
12	TDOT 607-09.02, 48" CONCRETE PIPE CULVERT (CLASS III), COMPLETE IN PLACE	90	LF	$	$
13	TDOT 611-07.69 48" TYPE 'D' HEADWALL 3:1, COMPLETE IN PLACE	2	EA	$	$
14	TDOT 607-05.02, 24" CONCRETE PIPE CULVERS (CLASS III), COMPLETE IN PLACE	25	LF	$	$
15	TDOT 611-07.57, 24" TYPE 'D' ENDWALL, COMPLETE IN PLACE	2	LF	$	$
16	TDOT 709-05.06 MACHINED RIP-RAP (CLASS A-1), COMPLETE IN PLACE	155	TON	$	$
17	TDOT 795-07.15 12IN X 12N TAPPING SLEEVE AND VALVE	1	EA	$	$
18	TDOT 795-03.37 12 INCH SDR-18 C900 WATER LINE, COMPLETE IN PLACE	1,900	LF	$	$
19	TDOT 795-08.04 12 INCH GATE VALVE ASSEMBLY, COMPLETE IN PLACE	1	EA	$	$
20	TDOT 795-03.34 6 INCH SDR-18 C900 WATER LINE, COMPLETE IN PLACE	30	LF	$	$
21	TDOT 795-11.02 FIRE HYDRANT ASSEBMLY TO INCLUDE GATE VALVE, COMPLETE IN PLACE	3	EA	$	$
22	TDOT 716-05.20, PAINTED PAVEMENT MARKING (6" LINE), COMPLETE IN PLACE	3	LM	$	$

23	TDOT 716-05.08 PAINTED PAVEMENT MARKING (TURN LANE ARROW), COMPLETE IN PLACE	4	EA	$	$
24	TDOT 716-05.09 PAINTED PAVEMENT MARKING (STRAIGHT-TURN ARROW), COMPLETE IN PLACE	2	EA	$	$
25	TDOT 716-05.11 PAINTED PAVEMENT MARKING (STRAIGHT ARROW), COMPLETE IN PLACE	13	EA	$	$
26	TDOT 803-01 SODDING (NEW SOD), COMPLETE IN PLACE	20,000	SY	$	$
TOTAL BID				**$**	

_____

(Total Bid Amount in Words)

_____

(Amount shall be shown in both words and figures. In case of discrepancy, the amount shown in words will govern.)

The above unit prices shall include all labor, materials, bailing, shoring, removal, overhead, profit, insurance, etc., to cover the finished work of the several kinds called for. Changes shall be processed in accordance with Article 11.3.1 of the General Conditions.

Bidder understands that the Owner reserves the right to reject any or all bids and to waive any informalities in the bidding.

The bidder agrees that this bid shall be good and may not be withdrawn for a period of 60 calendar days after the scheduled closing time for receiving bids.

Upon receipt of written notice of the acceptance of this bid, Bidder will execute the formal contract attached within 10 days and deliver a Surety Bond or Bonds as required by Article 5 of the General Conditions.

The bid security attached in the sum of: _____

_____ ($_____)

is to become the property of the Owner in the event the contract and bond are not executed within the time above set forth, as liquidated damages for the delay and additional expense to the Owner caused thereby.

Respectfully submitted:

By: _____
(Signature)

_____
(Title)

_____
(Business Address & Zip Code)

(SEAL – *if bid is by a corporation*)

U.S. Department of Labor

Wage and Hour Division
Washington, D.C. 20210

MAR 22 2013

MEMORANDUM NO. 213

TO: ALL CONTRACTING AGENCIES OF THE FEDERAL GOVERNMENT AND THE DISTRICT OF COLUMBIA

FROM: MARY BETH MAXWELL
Acting Deputy Administrator

SUBJECT: Application of the Davis-Bacon and Related Acts requirement that wage rates for additional classifications, when "conformed" to an existing wage determination, bear a "reasonable relationship" to the wage rates in that wage determination

This Memorandum is notification from the Department of Labor's Wage and Hour Division (WHD) of the proper application of the Davis-Bacon and Related Acts (DBRA) requirements for wage rates for additional classifications that are "conformed" to an existing wage determination by agency contracting officers. The regulations at 29 C.F.R. § 5.5(a)(1)(ii)(A) provide that contracting officers shall approve an additional classification and its proposed wage rate in conformance with an existing wage determination only when the work to be performed by the proposed classification is not performed by a classification in the wage determination and the proposed wage rate bears a "reasonable relationship" to the wages rates in the wage determination. Although this Memorandum primarily focuses on the "reasonable relationship" requirement, it is essential at the threshold to reiterate that a conformance is not appropriate when the work of the proposed classification is already performed by a classification on the wage determination. The conformance process is narrow in scope and has the limited purpose of establishing a new classification when it is necessary to do so because work needed to perform the contract is not performed by an existing classification. *See Cambridge Plaza*, ARB Case No. 07-102 (ARB Oct. 29, 2009). Accordingly, the WHD will not add a new classification through a conformance action unless the first criterion for issuance of a conformance is satisfied, i.e., the proposed work in question is not performed by any classification in the existing wage determination. 29 C.F.R. § 5.5(a)(1)(ii)(A)(1).

In those circumstances in which the duties of the proposed classification are not performed by any classification in the existing wage determination, the WHD will consider whether the proposed wage rate bears a "reasonable relationship" to the wage rates in the wage determination. In the past, WHD has generally approved proposed wage rates for a conformed skilled craft and a power equipment operator when such rates were not less than the rate for the lowest classification in the respective category on the contract wage determination. The practice of using the lowest rate in the relevant category as a benchmark also occurred on occasion with laborers and truck drivers. In keeping with the remedial purpose of the DBRA and the governing

regulations, the wage rate of the lowest skilled craft, laborer, power equipment operator, or truck driver classification on the contract wage determination has no longer been an automatic benchmark when reviewing conformance requests. WHD's approach of not using the lowest wage rate as a benchmark has been progressively implemented over the last year.

The Conformance Process

In accordance with 29 C.F.R. § 5.5(a)(1)(ii)(A), the contracting officer shall require that any class of laborers or mechanics which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and a wage rate (including fringe benefits) for the classification only when the following criteria have been met:

(1) The work to be performed by the classification requested is not performed by a classification in the wage determination; and
(2) The classification is utilized in the area by the construction industry; and
(3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

Further, if the contractor, the laborers or mechanics (if known) to be employed in the classification or their representatives, and the contracting agency agree on the classification and wage rate proposed, a report of the action taken is sent by the contracting officer to the Administrator of WHD for approval, denial, or modification. The Administrator (or an authorized representative) shall respond within 30 days of receipt, or the contracting officer will be notified that more time is necessary. *See* 29 C.F.R. § 5.5(a)(1)(ii)(B). In the event that the contractor, the laborers or mechanics (if known) to be employed in the classification or their representatives, and the contracting agency do not agree on the classification and wage rate proposed, the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Administrator of WHD for determination. The Administrator (or an authorized representative) shall issue a determination within 30 days of receipt and so advise the contracting officer, or the contracting officer will be notified that more time is necessary. *See* 29 C.F.R. § 5.5(a)(1)(ii)(C).

"Reasonable Relationship"

WHD previously typically approved conformance requests from contracting officers for wage rates (including fringe benefits) for skilled classifications and power equipment operators by automatically using as a benchmark the lowest rate for a skilled classification or power equipment operator, respectively, in the applicable wage determination. The practice of using the lowest rate in the relevant category as a benchmark also occurred on occasion with laborers and truck drivers. WHD has concluded, however, that it better reflects the regulatory requirement that "the proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination" to consider the entirety of the rates within the relevant category on the wage determination and to not generally use as a benchmark the lowest rate within that category. The regulation at 29 C.F.R. §

5.5(a)(1)(ii)(A)(3) requires that the proposed wage rate bear a reasonable relationship to the "wage rates" on the wage determination and not to a particular rate or the lowest rate.

The category in which the requested additional classification falls is relevant to the reasonable relationship analysis. As background, classifications in wage determinations fall into four general categories: skilled crafts, laborers, power equipment operators, and truck drivers. To determine a "reasonable relationship," the requested additional classification is compared to the classifications on the applicable wage determination within the same category. A proposed skilled craft classification is compared to skilled classifications in the wage determination; a proposed laborer classification is compared to existing laborer classifications; a proposed power equipment operator classification is compared to existing power equipment operator classifications; and a proposed truck driver classification is compared to existing truck driver classifications. *See Mistick Construction*, ARB Case No. 02-004 (June 24, 2003); *Tower Construction*, WAB Case No. 94-17 (Feb. 28, 1995).[1] Thus, when considering a conformance request for a skilled classification, WHD generally considers the entirety of the rates for the skilled classifications on the applicable wage determination and looks to where the proposed wage rate falls within the rates listed on the wage determination. Occasionally, however, a wage determination may contain some wage rates for laborer classifications that are higher than some wage rates for the skilled classifications or power equipment operators (likely because the laborers' rates reflect union prevailing rates and the skilled crafts' or power equipment operators' rates reflect weighted average prevailing rates). On such occasions, the contracting officer should look to those skilled classifications whose rates are higher than the laborer classifications' rates. *See M.Z. Contractors Co.,* WAB Case No. 92-06 (Aug. 25, 1992). If, however, most of the skilled classifications' or power equipment operators' rates are lower than the laborer classifications' rates, then it may be reasonable to propose a rate that reflects the skilled classifications' rates even if they are lower than the laborer classifications' rates.

Additionally, whether the wage rates in the applicable category (skilled craft, laborer, power equipment operator, truck driver) in the wage determination are predominantly union prevailing wage rates or predominantly weighted average prevailing wage rates should be considered when proposing rates for an additional classification. For example, if a wage determination contains predominantly union prevailing wage rates for skilled classifications, it typically would be appropriate to look to the union sector skilled classifications in the wage determination and the rates for those classifications when proposing a wage rate for the additional classification. Conversely, if a wage determination contains predominantly weighted average prevailing wage rates for skilled classifications, it typically would be appropriate to look to the weighted average/ non-union sector skilled classifications in the wage determination and the rates for those classifications when proposing a wage rate for the additional classification. If the wage rates in the applicable category are roughly half union prevailing rates and half weighted average prevailing rates, it would typically be appropriate to look to the lowest union rate and the highest weighted average rate (assuming the union rates are higher than the weighted average rates) when proposing a wage rate.

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[1] Copies of Administrative Review Board (ARB) and Wage Appeals Board (WAB) decisions can be obtained from: www.oalj.dol.gov/libdba.htm.

While the majority of conformance requests are within the skilled classification category, the governing regulations and the principles outlined in this Memorandum apply to the other categories of workers – laborers, power equipment operators, and truck drivers. To meet the "reasonable relationship" test for a conformed power equipment operator or truck driver classification, the proposed wage rate should bear a reasonable relationship to the entirety of rates within the respective classification, and in particular to the union or weighted average rates in the classification (assuming union or weighted average rates prevail for the classification). When a conformance for a laborer classification is requested, WHD generally continues to use the common laborer rate already existing in the wage determination as a benchmark for the proposed rate.

Each conformance request and corresponding wage determination involves particular circumstances and therefore should be evaluated as such. The full range of wage rates on the wage determination for the appropriate category should be reviewed in the manner discussed above. When seeking conformed classifications and wage rates, the contractor and the contracting officer should not rely on a wage determination or conformance granted to another party regardless of the similarity of the work in question. *See, e.g., Inland Waters Pollution Control, Inc.*, WAB Case No. 94-12 (Sept. 30, 1994). Moreover, the contractor and the contracting officer should not prospectively rely on WHD's prior approval of rates for application to a contract performed at the same location. *See E&M Sales, Inc.*, WAB Case No. 91-17 (Oct. 4, 1991). Although atypical, use of the "lowest skilled" rate may of course be appropriate when that rate in fact bears a reasonable relationship to the wage rates contained in the wage determination for the appropriate category. *See, e.g., Tower Construction*, WAB Case No. 94-17 (Feb. 28, 1995) (conformed wage rate, which equaled lowest skilled rate on wage determination, was reasonable).

In sum, contracting agencies should take the following steps when proposing a wage rate for a classification to be conformed to an existing wage determination:

- First, the contracting agency should determine the category (skilled crafts, laborers, power equipment operators, or truck drivers) of the classification which is being conformed.

- Second, the contracting agency should determine for that category whether union or weighted average/non-union sector rates prevail in the existing wage determination.

- Third, after reviewing the entirety of the rates within the appropriate sector in the applicable category, the contracting agency should determine a rate that bears a reasonable relationship to those rates on the wage determination.

- Fourth, the contracting agency should determine whether any of the considerations identified in this Memorandum apply (or whether any other relevant considerations apply). For example, if the classification being conformed is a skilled classification and some of the wage rates for skilled classifications in the wage determination are lower than the rates for laborer classifications, then the contracting agency should use those existing skilled classification rates that are higher than the laborer rates to determine the

proposed rate. And if the classification which is being conformed is a laborer classification, the proposed wage rate should generally use the existing common laborer wage rate as a benchmark.

Conclusion

The WHD Administrator has historically maintained broad discretion under the regulations to make determinations regarding proposed wage rates for additional classifications that are conformed to existing wage determinations. This broad discretion has been confirmed by the ARB and its predecessors, as illustrated by the decisions cited in this Memorandum, among others. In exercising that discretion, WHD ensures that wage rates (including fringe benefits) for the classification to be conformed bear a reasonable relationship to the range of rates for the classifications in the wage determination in the same category (skilled classifications, power equipment operators, laborers, and truck drivers), and not automatically to the lowest rate in the applicable category. Consistent with the governing regulations, contracting agencies should ensure that they request wage rates (including fringe benefits) for additional classifications in accordance with the principles set forth in this Memorandum. By following the guidance in this AAM, contracting agencies and contractors will benefit by receiving approvals from WHD that ensure consistency in conformed wage rates and increase efficiencies in government.

In conjunction with the guidance provided in this AAM, WHD has posted on www.dol.gov/whd/govcontracts/dbra.htm a series of frequently asked questions that include examples which will provide additional guidance regarding the reasonable relationship requirement in the conformance process. WHD also is updating its Prevailing Wage Resource Book and will provide compliance assistance on DBRA conformances at future Prevailing Wage Conferences. In addition, WHD's Branch of Construction Wage Determinations is available to assist with any questions.

"General Decision Number: TN20240123 01/05/2024

Superseded General Decision Number: TN20230123

State: Tennessee

Construction Type: Heavy
Including Water and Sewer Line Construction

Counties: Decatur, Dyer, Gibson, Hardeman, Hardin, Haywood, Henderson, Henry, Lake, Lauderdale, McNairy, Obion and Weakley Counties in Tennessee.

HEAVY CONSTRUCTION PROJECTS (including sewer/water construction).

Note: Contracts subject to the Davis-Bacon Act are generally required to pay at least the applicable minimum wage rate required under Executive Order 14026 or Executive Order 13658. Please note that these Executive Orders apply to covered contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but do not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(1).

If the contract is entered into on or after January 30, 2022, or the contract is renewed or extended (e.g., an option is exercised) on or after January 30, 2022:	. Executive Order 14026 generally applies to the contract. . The contractor must pay all covered workers at least $17.20 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in 2024.
If the contract was awarded on or between January 1, 2015 and January 29, 2022, and the contract is not renewed or extended on or after January 30, 2022:	. Executive Order 13658 generally applies to the contract. . The contractor must pay all covered workers at least $12.90 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on that contract in 2024.

The applicable Executive Order minimum wage rate will be adjusted annually. If this contract is covered by one of the Executive Orders and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must still submit a

conformance request.

Additional information on contractor requirements and worker protections under the Executive Orders is available at http://www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/05/2024

ENGI0369-011 05/01/2013

	Rates	Fringes
Operating Engineers:		
Bulldozer and Crane	$ 24.47	10.85

SUTN2009-122 12/02/2009

	Rates	Fringes
ELECTRICIAN	$ 20.06	0.00
LABORER: Common or General	$ 9.05 **	1.57
LABORER: Flagger	$ 10.50 **	0.00
LABORER: Pipelayer	$ 12.59 **	0.00
OPERATOR:		
Backhoe/Excavator/Trackhoe	$ 16.76 **	0.00
TRUCK DRIVER: Dump Truck	$ 11.61 **	0.81

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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** Workers in this classification may be entitled to a higher minimum wage under Executive Order 14026 ($17.20) or 13658 ($12.90). Please see the Note at the top of the wage determination for more information. Please also note that the minimum wage requirements of Executive Order 14026 are not currently being enforced as to any contract or subcontract to which the states of Texas, Louisiana, or Mississippi, including their agencies, are a party.

Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including

preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at https://www.dol.gov/agencies/whd/government-contracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (iii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of ""identifiers"" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than ""SU"" or ""UAVG"" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the ""SU"" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average

calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on a wage determination matter
* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour National Office because National Office has responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION"

AGREEMENT (Contract)

THIS AGREEMENT, made this _____, by and between **Haywood County**, herein called "Owner", acting herein through its **Mayor**, **The Honorable David Livingston**,

and _____a(n) _____
(corporation, partnership, or individual)

Doing business as _____ of the State of

_____, County of _____, hereinafter called

"Contractor".

WITNESSETH: That for and in consideration of the payments and agreements hereinafter mentioned, to be made and performed by the OWNER, the CONTRACTOR hereby agrees with the OWNER to commence and complete the construction described as follows:

Site Development Grant - I-40 Advantage Park Drive -

hereinafter called the project, for the sum of _____

_____ Dollars ($_____)

and all extra work in connection therewith, under the terms as stated in the general and Special Conditions of the Contract; and at this (its or their) own property cost and expense to furnish all the materials, supplies, machinery, equipment, tools, superintendence, labor, insurance, and other accessories and services necessary to complete the said project in accordance with the conditions and prices stated in the Proposal, the General Conditions, Supplemental General Conditions and Special Conditions of the Contract, the plans, which include all maps, plats, blue prints, and other drawings and printed or written explanatory matter thereof, the specifications and contract documents therefore as prepared by **A2H, Inc.**, herein entitled the Architect/Engineer, and as enumerated in Paragraph 1 of the Supplemental General Conditions, all of which are made a part hereof and collectively evidence and constitute the contract.

The Contractor hereby agrees to commence work under this contract on or before a date to be specified in a written "Notice to Proceed" of the Owner and to fully complete the project within **120** consecutive calendar days thereafter.

The OWNER agrees to pay the CONTRACTOR in current funds for the performance of the contract, subject to additions and deductions, as provided in the General Conditions of the Contract, and to make payments on account thereof as provided in Paragraph 3, “Payments to Contractor”, of the Supplemental General Conditions.

IN WITNESS WHEREOF, the parties to these presents have executed this contract in six (6) counterparts, each of which shall be deemed an original, in the year and day first above mentioned.

(OWNER’S SEAL)

HAYWOOD COUNTY
Owner

_____ BY: _____
Secretary *The Honorable David Livingston*

_____ **MAYOR**
Witness *Title*

(CONTRACTOR’S SEAL)

_____
Contractor Company

_____ BY: _____
Secretary *Contractor Representative*

_____ _____
Witness *Title*

NOTE: Secretary of the Owner should attest. If Contractor is a corporation, Secretary should attest.

DRUG-FREE WORKPLACE AFFIDAVIT

STATE OF _____

COUNTY OF _____

The undersigned, principal officer of _____, an employer of five (5) or more employees contracting with **Haywood County** government to provide construction services, hereby states under oath as follows:

1. The undersigned is a principal officer of _____(hereinafter referred to as the "Company") and is duly authorized to execute this Affidavit on behalf of the Company.

2. The Company submits this Affidavit pursuant to T.C.A. § 50-9-113, which requires each employer with no less than five (5) employees receiving pay who contracts with the state or any local government to provide construction services to submit an affidavit stating that such employer has a drug-free workplace program that complies with Title 50, Chapter 9, of the Tennessee Code Annotated .

3. The Company is in compliance with T.C.A. § 50-9-113.

Further affiant saith not.

_____

Principal Officer

STATE OF _____

COUNTY OF _____

Before me personally appeared _____, with whom I am personally acquainted (or proved to me on the basis of satisfactory evidence), and who acknowledged that such person executed the foregoing affidavit for the purposes therein contained.

Witness my hand and seal at office this _____ day of _____, 20 _____ .

_____

Notary Public

My commission expires: _____

STATEMENT OF COMPLIANCE CERTIFICATE
ILLEGAL IMMIGRANTS

EACH CONTRACTOR BIDDING SHALL FILL IN AND SIGN THE FOLLOWING:

This is to certify that _____ have fully complied with all the requirements of Chapter No. 878 (House Bill No. 111 and Senate Bill No. 411) which serves to amend Tennessee Code Annotated Title 12, Chapter 4, Part I, attached herein for reference.

- All Bidders for construction services on this project shall be required to submit an affidavit (by executing this compliance document) as part of their bid, that attests that such Bidder shall comply with requirements of Chapter no. 878.

Signed: _____

State of _____

County of _____

Personally appeared before me, _____ the undersigned Notary Public, _____, the within named bargainor, with whom I am personally acquainted, and known to me to be the President / Owner / Partner (as applicable) of the _____, Corporation, Partnership, Sole Proprietorship (as applicable) and acknowledged to me that he executed the foregoing document for the purposes recited therein.

Witness my hand, at office, this _____ day of _____, 20____.

_____
Notary Public

My commission expires on _____ .

IRAN DIVESTMENT ACT

In compliance with the Iran Divestment Act (State of Tennessee 2016, Public Chapter No. 817), which became effective on July 1, 2016, certification is required of all bidders on contracts over 1,000.

By submission of this bid, each bidder and each person signing on behalf of any bidder certifies, and in the case of a joint bid each party hereto certifies as to its own organization, under penalty of perjury, that to the best of its knowledge and belief that each bidder is not on the list created pursuant to T.C.A. § 12-12-106.

I affirm, under the penalties of perjury, this statement to be true and correct.

Date	Signature of Bidder
	Company

A bid shall not be considered for award nor shall award be made where the foregoing certification has been complied with; provided, however, that if in any case the bidder cannot make the foregoing certification, the bidder shall so state and shall furnish with the bid a signed statement which sets forth in detail the reasons therefor. **Haywood County** may award a bid to a bidder who cannot make the certification, on case-by-case basis, if:

1. The investment activities in Iran were made before July 1, 2016, the investment activities in Iran have not been expanded or reviewed on or after July 1, 2016, and the person has adopted, publicized, and is implementing a formal plan to cease the investment activities in Iran and to refrain from engaging in any new investments in Iran; or

2. **Haywood County** makes a determination that the goods or services are necessary for **Haywood County** to perform its functions and that, absent such an exemption, the political subdivision will be unable to obtain the goods or services for which the contract is offered. Such determination shall be made in writing and shall be a public document.

Department of General Services | Central Procurement Office

NOTICE

Tenn. Code Ann. § 12-12-106 requires the chief procurement officer to publish, using credible information freely available to the public, a list of persons it determines engage in investment activities in Iran, as described in § 12-12-105.

For these purposes, the State intends to use the attached list of "Entities Ineligible to Contract with the State of South Carolina or any Political Subdivision of the State per the Iran Divestment Act of 2014, S.C. Code Ann. §§ 11-57-10, et. seq."

While inclusion on this list would make a person ineligible to contract with the state of Tennessee, if a person ceases its engagement in investment activities in Iran, it may be removed from the list.

If you feel as though you have been erroneously included on this list please contact the Central Procurement Office at CPO.Website@tn.gov.

Tennessee Tower, 3rd Floor • 312 Rosa L. Parks Avenue • Nashville, TN 37243
615-741-1035 • Fax: 615-741-0684 • tn.gov/generalservices

List Date: May 4, 2022

Source: https://www.ogs.ny.gov/iran-divestment-act-2012

1. Ak Makina, Ltd.
2. Amona
3. Bank Markazi Iran (Central Bank of Iran)
4. Bank Mellat
5. Bank Melli Iran
6. Bank Saderat Iran
7. Bank Sepah
8. Bank Tejarat
9. China Precision Machinery Import- Export Corporation (CPMIEC)
10. ChinaOil (China National United Oil Corporation)
11. China National Offshore Oil Corporation (CNOOC)
12. China National Petroleum Corporation (CNPC)
13. Indian Oil Corporation
14. Kingdream PLC
15. Naftiran Intertrade Co. (NICO)
16. National Iranian Tanker Co. (NITC)
17. Oil and Natural Gas Corporation (ONGC)
18. Oil India, Ltd.
19. Persia International Bank
20. Petroleos de Venezuela (PDVSA Petróleo, SA)
21. PetroChina Co., Ltd.
22. Petronet LNG, Ltd.
23. Sameh Afzar Tajak Co. (SATCO)
24. Shandong FIN CNC Machine Co., Ltd.
25. Sinohydro Co., Ltd.
26. Sinopec Corp. (China Petroleum & Chemical Corporation)
27. SKS Ventures
28. SK Energy Co., Ltd.
29. Som Petrol AS
30. Unipec (China International United Petroleum & Chemicals Co., Ltd.)
31. Zhuhai Zhenrong Co.

CERTIFICATE OF OWNER'S ATTORNEY

I, the undersigned, _____, the duly authorized and acting legal representative of _____ do hereby certify as follows:

I have examined the attached contract(s) and surety bonds and the manner of execution thereof, and I am of the opinion that each of the aforesaid agreements has been duly executed by the proper parties thereto acting through their duly authorized representatives; that said representatives have full power and authority do execute said agreements on behalf of the respective parties named thereon; and that the foregoing agreements constitute valid and legally binding obligations upon the parties executing the same in accordance with terms, conditions and provisions thereof.

Date: _____ _____

Attorney Signature

Site Development Grant

GENERAL CONDITIONS

CONTRACT AND CONTRACT DOCUMENTS

The project to be constructed and pursuant to this contract will be financed with assistance from the Site Development Grant program and is subject to all applicable Federal laws and regulations.

The Plans, Specifications and Addenda, hereinafter enumerated in Paragraph 1 of the Supplemental General Conditions shall form part of this Contract and the provisions thereof shall be as binding upon the parties hereto as if they were herein fully set forth. The table of contents, titles, headings, running headlines and marginal notes contained herein and in said documents are solely to facilitate reference to various provisions of the Contract Documents and in no way affect, limit or cast light on the interpretation of the provisions to which they refer.

INDEX TO GENERAL CONDITIONS

GENERAL CONDITIONS

ARTICLE 1--DEFINITIONS

Wherever used in these General Conditions or in the other Contract Documents the following terms have the meanings indicated which are applicable to both the singular and plural thereof:

Addenda – Written or graphic instruments issued prior to the opening of Bids which clarify, correct or change the bidding documents or the Contract Documents.

Agreement – The written agreement between OWNER and CONTRACTOR covering the Work to be performed; other Contract Documents are attached to the Agreement and made a part thereof as provided therein.

Application for Payment – The form accepted by ENGINEER which is to be used by CONTRACTOR in requesting progress or final payments and which is to include such supporting documentation as is required by the Contract Documents.

Bid – The offer or proposal of the bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

Bonds – Bid, performance and payment bonds and other instruments of security.

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 Time, issued on or after the Effective Date of the Agreement.

Contract Documents – The Agreement, Addenda (which pertain to the Contract Documents), CONTRACTOR's Bid (including documentation accompanying the Bid and any post-Bid documentation submitted prior to the Notice of Award) when attached as an exhibit to the Agreement, the Bonds, these General Conditions, the Supplementary Conditions, the Specifications and the Drawings as the same are more specifically identified in the Agreement, together with all amendments, modifications and supplements issued pursuant to paragraphs 3.4 and 3.5 on or after the Effective Date of the Agreement.

Contract Price – The moneys payable by OWNER to CONTRACTOR under the Contract Documents as stated in the Agreement (subject to the provisions of paragraph 11.9.1 in the case of Unit Price Work).

Contract Time – The number of days (computed as provided in paragraph 17.2) or the date stated in the Agreement for the completion of the Work.

CONTRACTOR – The person, firm or corporation with whom OWNER has entered into the Agreement.

Defective – An adjective which when modifying the word Work refers to Work that is unsatisfactory, faulty or deficient, or does not conform to the Contract Documents, or does not meet the requirements of any inspection, reference standard, test or approval referred to in the Contract Documents, or 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 14.8 or 14.10).

Drawings – The drawings which show the character and scope of the Work to be performed and which have been prepared or approved by ENGINEER and are referred to in the Contract Documents.

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.

ENGINEER – The person, firm or corporation named as such in the Agreement.

Field Order – A written order issued by ENGINEER which orders minor changes in the Work in accordance with paragraph 9.5 but which does not involve a change in the Contract Price or the Contract Time.

General Requirements – Sections of Division 1 of the Specifications.

Laws and Regulations; Laws or Regulations – Laws, rules, regulations, ordinances, codes and/or orders.

Notice of Award – The written notice by OWNER to the apparent successful bidder stating that upon compliance by the apparent successful bidder with the conditions precedent enumerated therein, within the time specified, OWNER will sign and deliver the Agreement.

Notice to Proceed – A written notice given by OWNER to CONTRACTOR (with a copy to ENGINEER) fixing the date on which the Contract Time will commence to run and on which CONTRACTOR shall start to perform CONTRACTOR's obligations under the Contract Documents.

OWNER – The public body or authority, corporation, association, firm or person with whom CONTRACTOR has entered into the Agreement and for whom the Work is to be provided.

Partial Utilization – Placing a portion of the Work in service for the purpose for which it is intended (or a related purpose) before reaching Substantial Completion for all the Work.

Project – The total construction of which the Work to be provided under the Contract Documents may be the whole, or a part as indicated elsewhere in the Contract Documents.

Resident Project Representative – The authorized representative of ENGINEER who is assigned to the site or any part thereof.

Shop Drawings – All drawings, diagrams, illustrations, schedules and other data which are specifically prepared by or for CONTRACTOR to illustrate some portion of the Work and all illustrations, brochures, standard schedules, performance charts, instructions, diagrams and other information prepared by a Supplier and submitted by CONTRACTOR to illustrate material or equipment for some portion of the Work.

Specifications – Those portions of the Contract Documents consisting of written technical descriptions of materials, equipment, construction systems, standards and workmanship

as applied to the Work and certain administrative details applicable thereto.

Subcontractor – An individual, firm or corporation having a direct contract with CONTRACTOR or with any other Subcontractor for the performance of a part of the Work at the site.

Substantial Completion – The Work (or a specified part thereof) has progressed to the point where, in the opinion of ENGINEER as evidenced by ENGINEER's definitive certificate of Substantial Completion, it is sufficiently complete, in accordance with the Contract Documents so that the Work (or specified part) can be utilized for the purpose for which it is intended; or if there be no such certificate issued, when final payment is due in accordance with paragraph 14.13. The terms "substantially complete" and "substantially completed" as applied to any Work refer to Substantial Completion thereof.

Supplementary Conditions – The part of the Contract Documents which amends or supplements these General Conditions.

Supplier – A manufacturer, fabricator, supplier, distributor, materialman or vendor.

Underground Facilities – All pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels or other such facilities or attachments, and any encasements containing such facilities which have been installed underground to furnish any of the following services or materials: electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, sewage and drainage removal, traffic or other control systems or water.

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

Work – The entire completed construction or the various separately identifiable parts thereof required to be furnished under the Contract Documents. Work is the result of performing services, furnishing labor and furnishing and incorporating materials and equipment into the construction, all as required by the Contract Documents.

Work Directive Change – A written directive 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 physical conditions under which the Work is to be performed as provided in paragraph 4.2 or 4.3 or to emergencies under paragraph 6.22. A Work Directive Change may not change the Contract Price or the Contract Time, but is evidence that the parties expect that the change directed or documented by a Work Directive Change 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 Time as provided in paragraph 10.2.

Written Amendment – A written amendment of the Contract Documents, signed by OWNER and CONTRACTOR on or after the Effective Date of the Agreement and normally dealing with the nonengineering or nontechnical rather than strictly Work-related aspects of the Contract Documents.

ARTICLE 2 – PRELIMINARY MATTERS

Delivery of Bonds:

2.1. When CONTRACTOR delivers the executed Agreements to OWNER, CONTRACTOR shall also deliver to OWNER such Bonds as CONTRACTOR may be required to furnish in accordance with paragraph 5.1.

***Copies of Documents*:**

2.2. OWNER shall furnish to CONTRACTOR up to ten copies (unless otherwise specified in the Supplementary Conditions) 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.

Commencement of Contract Time; Notice to Proceed:

2.3. The Contract Time will commence to run on the thirtieth day after the Effective Date of the Agreement, of, 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 thirty days after the Effective Date of the Agreement. In no event will the Contract Time commence to run later than the seventy-fifth day after the day of Bid opening or the thirtieth day after the Effective Date of the Agreement, whichever date is earlier.

Starting the Project:

2.4 CONTRACTOR shall start to perform the Work on the date when the Contract Time commences to run, but no Work shall be done at the site prior to the date on which the Contract Time commences to run.

Before Starting Construction:

2.5. Before undertaking each part of the Work, CONTRACTOR shall carefully study and compare the Contract Documents and check and verify pertinent figures shown thereon and all applicable field measurements. CONTRACTOR shall promptly report in writing to ENGINEER any conflict, error or discrepancy which CONTRACTOR may discover and shall obtain a written interpretation or clarification from ENGINEER before proceeding with any Work affected thereby; however, CONTRACTOR shall not be liable to OWNER or ENGINEER for failure to report any conflict, error or discrepancy in the Contract Documents, unless CONTRACTOR had actual knowledge thereof or should reasonably have known thereof.

2.6. Within ten days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), CONTRACTOR shall submit to ENGINEER for review:

2.6.1. an estimated progress schedule indicating the starting and completion dates of the various stages of the Work;

2.6.2. a preliminary schedule of Shop Drawing submissions; and

2.6.3. a preliminary schedule of values for all of the Work which will include quantities and prices of items aggregating the Contract Price and will subdivide the Work into component parts in sufficient detail to serve as the basis for progress payments during construction. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work which will be confirmed in writing by CONTRACTOR at the time of submission.

2.7 Before any Work at the site is started, CONTRACTOR shall deliver to OWNER, with a copy to ENGINEER, certificates (and other evidence of insurance requested by OWNER) which CONTRACTOR is required to purchase and maintain in accordance with paragraphs 5.3 and 5.4, and OWNER shall deliver to CONTRACTOR certificates (and other evidence of insurance requested by CONTRACTOR) which OWNER is required to purchase and maintain in accordance with paragraphs 5.6 and 5.7.

Preconstruction Conference:

2.8. Within twenty days after the Effective Date of the Agreement, but before CONTRACTOR starts the Work at the site, a conference attended by CONTRACTOR, ENGINEER and others as appropriate will be held to discuss the schedules referred to in paragraph 2.6, to discuss procedures for handling Shop Drawings and other submittals and for processing Applications for Payment, and to establish a working understanding among the parties as to the Work.

Finalizing Schedules:

2.9. At least ten days before submission of the first Application for Payment a conference attended by CONTRACTOR, ENGINEER and others as appropriate will be held to finalize the schedules submitted in accordance with paragraph 2.6. The finalized progress schedule will be acceptable to ENGINEER as providing an orderly progression of the Work to completion within the Contract Time, but such acceptance will neither impose on ENGINEER responsibility for the progress or scheduling of the Work nor relieve CONTRACTOR from full responsibility thereof. The finalized schedule of Shop Drawing submissions will be acceptable to ENGINEER as providing a workable arrangement for processing the submissions. The finalized schedule of values will be acceptable to ENGINEER as to form and substance.

ARTICLE 3—CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

Intent:

3.1. The Contract Documents comprise the entire agreement between OWNER and CONTRACTOR concerning the Work. The Contract Documents are complementary; what is called for by one is as binding as if called for by all. The Contract Documents will be construed in accordance with the law of the place of the Project.

3.2. 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 Work, materials or equipment that may reasonably be inferred from the Contract Documents as being required to produce the intended result will be supplied whether or not specifically called for. When words which have a well-known technical or trade meaning are used to describe Work, materials or equipment such word shall be interpreted in accordance with that meaning. Reference to standard specifications, manuals or codes of any technical society, organization or association, or to the Laws or Regulations of any governmental authority, whether such reference be specific or by implication, shall mean the latest 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. However, no provision of any referenced standard specification, manual or code (whether or not specifically incorporated by reference in the Contract Documents) shall be effective to change the duties and responsibilities of OWNER, CONTRACTOR or ENGINEER, or any of their consultants, agents or employees from those set forth in the Contract Documents, nor shall it be effective to assign to ENGINEER, or any of ENGINEER's consultants, agents or employees, any duty or authority to supervise or direct the furnishing or performance of the Work or any duty or authority to undertake responsibility contrary to the provision of paragraph 9.15 or 9.16. Clarifications and interpretations of the Contract Documents shall be issued by ENGINEER as provided in paragraph 9.4.

3.3. If, during the performance of the Work, CONTRACTOR finds a conflict, error or discrepancy in the Contract Documents, CONTRACTOR shall so report to ENGINEER in writing at once and before proceeding with the Work affected thereby shall obtain a written interpretation or clarification from ENGINEER; however, CONTRACTOR shall not be liable to OWNER or ENGINEER for failure to report any conflict, error or discrepancy in the Contract Documents unless CONTRACTOR had actual knowledge thereof or should reasonably have known thereof.

Amending and Supplementing Contract Documents:

3.4. The Contract Documents may be amended to provide for additions, deletions and revisions in the Work or to modify the terms and conditions thereof in one or more of the following ways:

3.4.1. a formal Written Amendment,

3.4.2. a Change Order (pursuant to paragraph 10.4), or

3.4.3. a Work Directive Change (pursuant to paragraph 10.1).

As indicated in paragraphs 11.2 and 12.1, Contract Price and Contract Time may only be changed by a Change Order or a Written Amendment.

3.5. In addition, the requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, in one or more of the following ways:

3.5.1. a Field Order (pursuant to paragraph 9.5),

3.5.2. ENGINEER's approval of a Shop Drawing or sample (pursuant to paragraphs 6.26 and 6.27), or

3.5.3. ENGINEER's written interpretation or clarification (pursuant to paragraph 9.4).

Reuse of Documents:

3.6. Neither CONTRACTOR nor any Subcontractor or Supplier or other person or organization performing or furnishing any of the Work under a direct or indirect contract with OWNER shall 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; and they shall not reuse any of them on extensions of the Project or any

other project without written consent of OWNER and ENGINEER and specific written verification or adaptation by ENGINEER.

ARTICLE 4—AVAILABILITY OF LANDS; PHYSICAL CONDITIONS; REFERENCE POINTS

Availability of Lands:

4.1. OWNER shall furnish, as indicated in the Contract Documents, the lands upon which the Work is to be performed, rights-of-way and easements for access thereto, and such other lands which are designated for the use of CONTRACTOR. Easements for permanent structures or permanent changes in existing facilities will be obtained and paid for by OWNER, unless otherwise provided in the Contract Documents. If CONTRACTOR believes that any delay in OWNER's furnishing these lands, rights-of–way or easements entitles CONTRACTOR to an extension of the Contract Time, CONTRACTOR may make a claim therefor as provided in Article 12. CONTRACTOR shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

Physical Conditions:

4.2.1. *Explorations and Reports*: Reference is made to the Supplementary Conditions for identification of those reports of explorations and tests of subsurface conditions at the site that have been utilized by ENGINEER in preparation of the Contract Documents. CONTRACTOR may rely upon the accuracy of the technical data contained in such reports, but not upon nontechnical data, interpretations or opinions contained therein or for the completeness thereof for CONTRACTOR's purposes. Except as indicated in the immediately preceding sentence and in paragraph 4.2.6, CONTRACTOR shall have full responsibility with respect to subsurface conditions at the site.

4.2.2. *Existing Structures*: Reference is made to the Supplementary Conditions for identification of those drawings of physical conditions in or relating to existing surface and subsurface structures (except Underground Facilities referred to in paragraph 4.3) which are at or contiguous to the site that have been utilized by ENGINEER in preparation of the Contract Documents. CONTRACTOR may rely upon the accuracy of the technical data contained in such drawings, but not for the completeness thereof for CONTRACTOR's purposes. Except as indicated in the immediately preceding sentence and in paragraph 4.2.6, CONTRACTOR shall have full responsibility with respect to physical conditions in or relating to such structures.

4.2.3. *Report of Differing Conditions*: If CONTRACTOR believes that:

4.2.3.1. any technical data on which CONTRACTOR is entitled to rely as provided in paragraphs 4.2.1 and 4.2.2 is inaccurate, or

4.2.3.2. any physical condition uncovered or revealed at the site differs materially from that indicated, reflected or referred to in the Contract Documents,

CONTRACTOR shall, promptly after becoming aware thereof and before performing any Work in connection therewith (except in an emergency as permitted by paragraph 6.22), notify OWNER and ENGINEER in writing about the inaccuracy or difference.

4.2.4. *ENGINEER's Review*: ENGINEER will promptly review the pertinent conditions, determine the necessity of obtaining additional explorations or tests with respect thereto and advise OWNER in writing (with a copy to CONTRACTOR) of ENGINEER's findings and conclusions.

4.2.5. *Possible Document Change*: If ENGINEER concludes that there is a material error in the Contract Documents or that because of newly discovered conditions a change in the Contract Documents is required, a Work Directive Change or a Change Order will be issued as provided in Article 10 to reflect and document the consequences of the inaccuracy or difference.

4.2.6. *Possible Price and Time Adjustments*: In each such case, an increase or decrease in the Contract Price or an extension or shortening of the Contract Time, or any combination thereof, will be allowable to the extent that they are attributable to any such inaccuracy or difference. If OWNER and CONTRACTOR are unable to agree as to the amount or length thereof, a claim may be made therefor as provided in Articles 11 and 12.

Physical Conditions – Underground Facilities:

4.3.1. *Shown of 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 or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:

4.3.1.1. OWNER and ENGINEER shall not be responsible for the accuracy or completeness of any such information or data; and,

4.3.1.2. CONTRACTOR shall have full responsibility for reviewing and checking all such information and data, for locating all Underground Facilities shown or indicated in the Contract Documents, for coordination of the Work with the owners of such Underground Facilities during construction, for the safety and protection thereof as provided in paragraph 6.20 and repairing any damage thereto resulting from the Work, the cost of all of which will be considered as having been included in the Contract Price.

4.3.2. *Not Shown or Indicated*. If an Underground Facility is uncovered or revealed at or contiguous to the site which was not shown or indicated in the Contract Documents and which CONTRACTOR could not reasonably have been expected to be aware of, CONTRACTOR shall, promptly after becoming aware thereof and before performing any Work affected thereby (except in an emergency as permitted by paragraph 6.22), identify the owner of such Underground Facility and give written notice thereof to that owner and to OWNER and ENGINEER. ENGINEER will promptly review the Underground Facility to determine the extent to which the Contract Documents should be modified to reflect and document the consequences of the existence of the Underground Facility, and the Contract Documents will be amended or supplemented to the extent necessary. During such time, CONTRACTOR shall be responsible for the safety and protection of such Underground Facility as provided in paragraph 6.20. CONTRACTOR shall be allowed an increase in the Contract Price or an extension of the Contract Time, or both, to the extent that they are attributable to the existence of any Underground Facility that was not shown or indicated in the Contract Documents and which CONTRACTOR

could not reasonably have been expected to be aware of. If the parties are unable to agree as to the amount or length thereof, CONTRACTOR may make a claim therefor as provided in Articles 11 and 12.

Reference Points:

4.4. 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 (unless otherwise specified in the General Requirements), shall protect and preserve the established reference points and shall make no changes or relocations without the prior written approval of OWNER. CONTRACTOR shall report to ENGINEER whenever any reference point 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 by professionally qualified personnel.

ARTICLE 5—BONDS AND INSURANCE

Performance and Other Bonds:

5.1. 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 CONTRACTOR's obligations under the Contract Documents. These Bonds shall remain in effect at least until one year after the date when final payment becomes due, except as otherwise provided by Law or Regulation or by the Contract Documents. CONTRACTOR shall also furnish such other Bonds as are required by the Supplementary Conditions. All Bonds shall be in the forms prescribed by Law or Regulation or by the Contract Documents and be executed by such sureties as are named in the current 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 Audit Staff Bureau of Accounts, U.S. Treasury Department. All Bonds signed by an agent must be accompanied by a certified copy of the authority to act.

5.2. If the surety on any Bond furnished by CONTRACTOR is declared a 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 5.1, CONTRACTOR shall within five days thereafter substitute another Bond and Surety, both of which must be acceptable to OWNER.

Contractor's Liability Insurance:

5.3. CONTRACTOR shall purchase and maintain such comprehensive general liability and other insurance as is appropriate for the Work being performed and furnished and as will provide protection from claims set forth below which may arise out of or result from CONTRACTOR's performance and furnishing of the Work and CONTRACTOR's other obligations under the Contract Documents, whether it is to be performed or furnished by CONTRACTOR, by any Subcontractor, by anyone directly or indirectly employed by any of them to perform or furnish any of the Work, or by anyone for those acts any of them may be liable:

5.3.1. Claims under workers' or workmen's compensation, disability benefits and other similar employee benefit acts;

5.3.2. Claims for damages because of bodily injury, occupational sickness or disease, or death of CONTRACTOR's employees;

5.3.3. Claims for damages because of bodily injury, sickness or disease, or death of any person other than CONTRACTOR's employees;

5.3.4. Claims for damages insured by personal injury liability coverage which are substained (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;

5.3.5. 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;

5.3.6. Claims arising out of operation of Laws or Regulations for damages because of bodily injury or death of any person or for damage to property; and

5.3.7. 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.

The insurance required by this paragraph 5.3 shall include the specific coverages and be written for not less than the limits of liability and coverages provided in the Supplementary Conditions, or required by law, whichever is greater. The comprehensive general liability insurance shall include completed operations insurance. All of the policies of insurance so required to be purchased and maintained (or the certificates or other evidence thereof) shall contain a provision or endorsement that the coverage afforded will not be cancelled, materially changed or renewal refused until at least thirty days' prior written notice has been given to OWNER and ENGINEER by certified mail. All such insurance shall remain in effect until final payment and at all times thereafter when CONTRACTOR may be correcting, removing or replacing *defective* Work in accordance with paragraph 13.12. In addition, CONTRACTOR shall maintain such completed operations insurance for at least two years after final payment and furnish OWNER with evidence of continuation of such insurance at final payment and one year thereafter.

Constructual Liability Insurance:

5.4. The comprehensive general liability insurance required by paragraph 5.3 will include contractual liability insurance applicable to CONTRACTOR's obligations under paragraphs 6.30 and 6.31.

Owner's Liability Insurance:

5.5. OWNER shall be responsible for purchasing and maintaining OWNER's own liability insurance and, at OWNER's option, may purchase and maintain such insurance as will protect OWNER against claims which may arise from operations under the Contract Documents.

Property Insurance:

5.6. Unless otherwise provided in the Supplementary Conditions, OWNER shall purchase and maintain property insurance upon the Work at the site to the full insurable value thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall include the interests of OWNER, CONTRACTOR, Subcontractors, ENGINEER and ENGINEER's consultants in the Work, all of whom shall be listed as insureds or additional insured parties, shall insure against the perils of fire and extended coverage and shall include "all risk" insurance for physical loss and damage including theft, vandalism and malicious mischief, collapse and water damage, and such other perils as may be provided in the Supplementary Conditions, and shall include damages, losses and expenses arising out of or resulting from any insured loss or incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers, architects, attorneys and other professionals). If not covered under the "all risk" insurance or otherwise provided in the Supplementary Conditions, CONTRACTOR shall purchase and maintain similar property insurance on portions of the Work stored on and off the site or in transit when such portions of the Work are to be included in an Application for Payment.

5.7. OWNER shall purchase and maintain such boiler and machinery 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, ENGINEER and ENGINEER's consultants in the Work, all of whom shall be listed as insured or additional insured parties.

5.8. All the policies of insurance (or the certificates or other evidence thereof) required to be purchased and maintained by OWNER in accordance with paragraphs 5.6 and 5.7 will contain a provision or endorsement that the coverage afforded will not be cancelled or materially changed or renewal refused until at least thirty days' prior written notice has been given to CONTRACTOR by certified mail and will contain waiver provisions in accordance with paragraph 5.11.2.

5.9. OWNER shall not be responsible for purchasing and maintaining any property insurance to protect the interests of CONTRACTOR, Subcontractors or others in the Work to the extent of any deductible amounts that are provided in the Supplementary Conditions. The risk of loss within the deductible amount, will be borne by CONTRACTOR, Subcontractor 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.

5.10. If CONTRACTOR requests in writing that other special insurance be included in the property insurance policy, OWNER shall, if possible, include such insurance, and the cost thereof will be charged to CONTRACTOR by appropriate Change Order or Written Amendment. 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.

Waiver of Rights:

5.11.1. OWNER and CONTRACTOR waive all rights against each other for all losses and damages caused by any of the perils covered by the policies of insurance provided in response to paragraphs 5.6 and 5.7 and any other property insurance applicable to the Work, and also waive all such rights against the Subcontractors, ENGINEER, ENGINEER's consultants and all other parties named as insureds in such policies for losses and damages so caused. As required in paragraph 6.11, each subcontract between CONTRACTOR and a Subcontractor will contain similar waiver provisions by the Subcontractor in favor of OWNER, CONTRACTOR, ENGINEER, ENGINEER's consultants and all other parties named as insureds. None of the above waivers shall extend to the rights that any of the insured parties may have to the proceeds of insurance held by OWNER as trustee or otherwise payable under any policy so issued.

5.11.2. OWNER and CONTRACTOR intend that any policies provided in response to paragraphs 5.6 and 5.7 shall protect all of the parties insured and provide primary coverage for all losses and damages caused by the perils covered thereby. Accordingly, all such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurer will have no rights of recovery against any of the parties named as insureds or additional insureds, and if the insurers require separate waiver forms to be signed by ENGINEER or ENGINEER's consultant OWNER will obtain the same, and if such waiver forms are required of any Subcontractor, CONTRACTOR will obtain the same.

Receipt and Application of Proceeds:

5.12. Any insured loss under the policies of insurance required by paragraphs 5.6 and 5.7 will be adjusted with OWNER and made payable to OWNER as trustee for the insureds, as their interests may appear, subject to the requirements of any applicable mortgage clause and of paragraph 5.13. 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 or Written Amendment.

5.13. OWNER as trustee shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within fifteen days after the occurrence of loss to OWNER's exercise of this power. If such objection is made, OWNER as trustee shall make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If required in writing by any party in interest, OWNER as trustee shall, upon the occurrence of an insured loss, give bond for the proper performance of such duties.

Acceptance of Insurance:

5.14. If OWNER has any objection to the coverage afforded by or other provisions of the insurance required to be purchased and maintained by CONTRACTOR in accordance with paragraphs 5.3 and 5.4 on the basis of its not complying with the Contract Documents, OWNER shall notify CONTRACTOR in writing thereof within ten days of the date of delivery of such certificates to OWNER in accordance with paragraph 2.7. If CONTRACTOR has any objection to the coverage afforded by or other provisions of the policies of insurance required to be purchased and maintained by OWNER in accordance with paragraphs 5.6 and 5.7 on the basis of their not complying with the Contract Documents, CONTRACTOR shall notify OWNER in writing thereof within ten days of the date of delivery of such certificates to CONTRACTOR in accordance with paragraph 2.7. OWNER and CONTRACTOR shall each provide to the other such additional information in respect of insurance provided by each as the other may reasonably request. Failure by OWNER or CONTRACTOR to give any such notice of objection within the time provided shall constitute acceptance of such insurance

purchased by the other as complying with the Contract Documents.

Partial Utilization – Property Insurance:

5.15. If OWNER finds it necessary to occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work, such use or occupancy may be accomplished in accordance with paragraph 14.10; provided that no such use or occupancy shall commence before the insurers providing the property insurance have acknowledged notice thereof and in writing effected the 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 cancelled or lapse on account of any such partial use or occupancy.

ARTICLE 6 – CONTRACTOR'S RESPONSIBILITIES

Supervision and Superintendence:

6.1. CONTRACTOR shall supervise 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, but CONTRACTOR shall not be responsible for the negligence of others in the design or selection of a specific means, method, technique, sequence or procedure of construction which is indicated in and required by the Contract Documents. CONTRACTOR shall be responsible to see that the finished Work complies accurately with the Contract Documents.

6.2. CONTRACTOR shall keep on the Work at all times during its progress a competent resident superintendent, who shall not be replaced without written notice to OWNER and ENGINEER except under extraordinary circumstances. The superintendent will be CONTRACTOR's representative at the site and shall have authority to act on behalf of CONTRACTOR. All communications given to the superintendent shall be as binding as if given to CONTRACTOR.

Labor, Materials and Equipment:

6.3. 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. Except in connection with the safety or protection of persons or the Work or property at the site or adjacent thereto, and except as otherwise indicated in the Contract Documents, all work at the site shall be performed during regular working hours, and CONTRACTOR will not permit overtime work or the performance of Work on Saturday, Sunday or any legal holiday without OWNER's written consent given after prior written notice to ENGINEER.

6.4. Unless otherwise specified in the General Requirements, CONTRACTOR shall furnish and assume full responsibility for all 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 furnishing, performance, testing, start-up and completion of the Work.

6.5. All materials and equipment shall be of good quality and new, except as otherwise provided in the Contract Documents. If required by ENGINEER, CONTRACTOR shall furnish satisfactory evidence (including reports of required tests) as to the kind and quality of materials and equipment. All materials and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned in accordance with the instruction of the applicable Supplier except as otherwise provided in the Contract Documents; but no provision of any such instructions will be effective as assign to ENGINEER, or any of ENGINEER's consultants, agents or employees, any duty or authority to supervise or direct the furnishing or performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of paragraph 9.15 or 9.16.

Adjusting Progress Schedule:

6.6. CONTRACTOR shall submit to ENGINEER for acceptance (to the extent indicated in paragraph 2.9) adjustments in the progress schedule to reflect the impact thereon of new developments; these will conform generally to the progress schedule then in effect and additionally will comply with any provisions of the General Requirements applicable thereto.

Substitutes or "Or-Equal" Items:

6.7.1. Whenever materials or equipment are specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier the naming of the item is intended to establish the type, function and quality required. Unless the name is followed by words indicating that no substitution is permitted, materials or equipment of other Suppliers may be accepted by ENGINEER if sufficient information is submitted by CONTRACTOR to allow ENGINEER to determine that the material or equipment proposed is equivalent or equal to that named. The procedure for review by ENGINEER will include the following as supplemented in the General Requirements. Requests for review of substitute items of material and equipment will not be accepted by ENGINEER from anyone other than CONTRACTOR. If CONTRACTOR wishes to furnish or use a substitute item of material or equipment, CONTRACTOR shall make written application to ENGINEER for acceptance thereof, certifying that the proposed substitute will perform adequately the functions and achieve the results called for by the general design, be similar and of equal substance to that specified and be suited to the same use as that specified. The application will state that the evaluation and acceptance of the proposed substitution will not prejudice CONTRACTOR's achievement of Substantial Completion on time, whether or not acceptance of the substitute for use 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 work on the Project) to adapt the design to the proposed substitute and whether or not incorporation or use of the substitute in connection with the Work is subject to payment of any license fee or royalty. All variations of the proposed substitute from that specified will be identified in the application and available maintenance, repair and replacement service will be indicated. The application will also contain an itemized estimate of all costs that will result directly or indirectly from acceptance of such substitute, including costs of redesign and claims of other contractors affected by the resulting change, all of which shall be considered by ENGINEER in evaluating the proposed substitute. ENGINEER may require CONTRACTOR to furnish at CONTRACTOR's expense additional data about the proposed substitute.

6.7.2. If a specific means, method, technique, sequence or procedure of construction is indicated in or required by the Contract Documents, CONTRACTOR may furnish or utilize a substitute means, method, sequence, technique or procedure of construction acceptable to ENGINEER, if CONTRACTOR submits sufficient information to allow ENGINEER to determine that the substitute proposed is equivalent to that indicated or required by the Contract Documents. The procedure for review by ENGINEER will be similar to that provided in paragraph 6.7.1 as applied by ENGINEER and as may be supplemented in the General Requirements.

6.7.3. ENGINEER will be allowed a reasonable time within which to evaluate each proposed substitute. ENGINEER will be the sole judge of acceptability, and no substitute will be ordered, installed or utilized without ENGINEER's prior written acceptance which will be evidenced by either a Change Order or an approved Shop Drawing. OWNER may require CONTRACTOR to furnish at CONTRACTOR's expense a special performance guarantee or other surety with respect to any substitute. ENGINEER will record time required by ENGINEER and ENGINEER's consultants in evaluating substitutions proposed by CONTRACTOR and in making changes in the Contract Documents occasioned thereby. Whether or not ENGINEER accepts a proposed substitute, CONTRACTOR shall reimburse OWNER for the charges of ENGINEER and ENGINEER's consultants for evaluating each proposed substitute.

Concerning Subcontractors, Suppliers and Others:

6.8.1. CONTRACTOR shall not employ any Subcontractor, Supplier or other person or organization (including those acceptable to OWNER and ENGINEER as indicated in paragraph 6.8.2), whether initially or as a substitute, against whom OWNER or ENGINEER may have reasonable objection. CONTRACTOR shall not be required to employ any Subcontractor, Supplier or other person or organization to furnish or perform any of the Work against whom CONTRACTOR has reasonable objection.

6.8.2. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers or other persons or organizations (including those who are to furnish the principal items of materials and equipment) to be submitted to OWNER in advance of the specified date prior to the Effective Date of the Agreement for acceptance by OWNER and ENGINEER and if CONTRACTOR has submitted a list thereof in accordance with the Supplementary Conditions, OWNER's or ENGINEER'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 person or organization so identified may be revoked on the basis of reasonable objection after due investigation, in which case CONTRACTOR shall submit an acceptable substitute, the Contract Price will be increased by the difference in the cost occasioned by such substitution and an appropriate Change Order will be issued or Written Amendment signed. No acceptance by OWNER or ENGINEER of any such Subcontractor, Supplier or other person or organization shall constitute a waiver of any right of OWNER or ENGINEER to reject *defective* Work.

6.9. CONTRACTOR shall be fully responsible to OWNER and ENGINEER for all acts and omissions of the Subcontractors, Suppliers and other persons and organizations performing or furnishing any of the Work under a direct or indirect contract with CONTRACTOR just as CONTRACTOR is responsible for CONTRACTOR's own acts and omissions. Nothing in the Contract Documents shall create any contractual relationship between OWNER or ENGINEER any such Subcontractor, Supplier or other person or organization, not shall it 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 person or organization except as may otherwise be required by Laws and Regulations.

6.10. 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.

6.11. All Work performed for CONTRACTOR by a Subcontractor will be pursuant to an appropriate agreement between CONTRACTOR and the Subcontractor which specifically binds the Subcontractor to the applicable terms and conditions of the Contract Documents for the benefit of OWNER and ENGINEER and contains waiver provisions as required by paragraph 5.11. CONTRACTOR shall pay each Subcontractor a just share of any insurance moneys received by CONTRACTOR on account of losses under policies issued pursuant to paragraphs 5.6 and 5.7.

Patent Fees and Royalties:

6.12. 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. CONTRACTOR shall indemnify and hold harmless OWNER and ENGINEER and anyone directly or indirectly employed by either of them from and against all claims, damages, losses and expenses (including attorney's fees and court and arbitration costs) arising out of 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 inventions, design, process, product or device not specified in the Contract Documents, and shall defend all such claims in connection with any alleged infringement of such rights.

Permits:

6.13. 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, CONTRACTOR shall pay all charges of utility owners for connections to the Work, and OWNER shall pay all charges of such utility owners for capital costs related thereto such as plant investment fees.

Laws and Regulations:

6.14.1. CONTRACTOR shall give all notices and comply with all Laws and Regulations applicable to furnishing and 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.

6.14.2. If CONTRACTOR observes that the Specifications or Drawings are at variance with any Laws or Regulations, CONTRACTOR shall give ENGINEER prompt written notice thereof, and any necessary changes will be authorized by one of the methods indicated in paragraph 3.4. If CONTRACTOR performs any Work knowing or having reason to know that it is contrary to such Laws or Regulations, and without such notice to ENGINEER, CONTRACTOR shall bear all costs arising therefrom; however, it shall not be CONTRACTOR's primary responsibility to make certain that the Specifications and Drawings are in accordance with such Laws and Regulations.

Taxes:

6.15. 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.

Use of Premises:

6.16. CONTRACTOR shall confine construction equipment, the storage of materials and equipment and the operations of workers to the Project site and land and areas identified in and permitted by the Contract Documents and other land and areas permitted by Laws and Regulations, rights-of-way, permits and easements, and shall not unreasonably encumber the premises 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 thereto or of any land or areas contiguous thereto, resulting from the performance of the Work. Should any claim be made against OWNER or ENGINEER by any such owner or occupant because of the performance of the Work, CONTRACTOR shall promptly attempt to settle with such other party by agreement or otherwise resolve the claim by arbitration or at law. CONTRACTOR shall, to the fullest extent permitted by Laws and Regulations, indemnify and hold OWNER and ENGINEER harmless from and against all claims, damages, losses and expenses (including, but not limited to, fees of engineers, architects, attorneys and other professionals and court and arbitration costs) arising directly, indirectly or consequentially out of any action, legal or equitable, brought by any such other party against OWNER or ENGINEER to the extent based on a claim arising out of CONTRACTOR's performance of the Work.

6.17. During the progress of the Work, CONTRACTOR shall keep the premises free from accumulations of waste materials, rubbish and other debris resulting from the Work. At the completion of the Work CONTRACTOR shall remove all waste materials, rubbish and debris from and about the premises as well as all tools, appliances, construction equipment and machinery, and surplus materials, and shall leave the site clean and ready for occupancy by OWNER. CONTRACTOR shall restore to original condition all property not designated for alteration by the Contract Documents.

6.18. 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.

Record Documents:

6.19. CONTRACTOR shall maintain in a safe place at the site one record copy of all Drawings, Specifications, Addenda, Written Amendments, Change Orders, Work Directive Changes, Field Orders and written interpretations and clarifications (issued pursuant to paragraph 9.4) in good order and annotated to show all 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.

Safety and Protection:

6.20. CONTRACTOR shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. CONTRACTOR shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:

6.20.1. all employees on the Work and other persons and organizations who may be affected thereby:

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

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

CONTRACTOR shall comply with all applicable Laws and Regulations of any public body having jurisdiction for the safety of persons or property or to protect them 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 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. All damage, injury or loss to any property referred to in paragraph 6.20.2 or 6.20.3 caused, directly or indirectly, in whole or in part, by CONTRACTOR, any Subcontractor, Supplier or any other person or organization directly or indirectly employed by any of them to perform or furnish 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 either of them or anyone for whose acts either of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of CONTRACTOR). CONTRACTOR's duties and responsibilities for the safety and 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 14.13 that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

6.21. CONTRACTOR shall designate a responsible representative at the site whose duty shall be the prevention of accidents. This person shall be CONTRACTOR's superintendent unless otherwise designated in writing by CONTRACTOR to OWNER.

Emergencies:

6.22. In emergencies affecting the safety or protection of persons or the Work or property at the site or adjacent thereto, CONTRACTOR, without special instruction or authorization from ENGINEER or OWNER, 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. If ENGINEER determines that a change in the Contract Documents is required because of the action taken in response to an emergency, a Work Directive Change or Change Order will be issued to document the consequences of the changes or variations.

Shop Drawings and Samples:

6.23. After checking and verifying all field measurements and after complying with applicable procedures specified in the General Requirements, CONTRACTOR shall submit to ENGINEER for review and approval in accordance with the accepted schedule of Shop Drawing submissions (see paragraph 2.9), or for other appropriate action if so indicated in the Supplementary Conditions, five copies (unless otherwise specified in the General Requirements) of all Shop Drawings, which will bear a stamp or specific written indication that CONTRACTOR has satisfied CONTRACTOR's responsibilities under the Contract Documents with respect to the review of the submission. All submissions will be identified as ENGINEER may require. The data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials and similar data to enable ENGINEER to review the information as required.

6.24. CONTRACTOR shall also submit to ENGINEER for review and approval with such promptness as to cause no delay in Work, all samples required by the Contract Documents. All samples will have been checked by and accompanied by a specific written indication that CONTRACTOR has satisfied CONTRACTOR's responsibilities under the Contract Documents with respect to the review of the submission and will be identified clearly as to material, Supplier, pertinent data such as catalog numbers and the use for which intended.

6.25.1. Before submission of each Shop Drawing or sample CONTRACTOR shall have determined and verified all quantities, dimensions, specified performance criteria, installation requirements, materials, catalog numbers and similar data with respect thereto and reviewed or coordinated each Shop Drawing or sample with other Shop Drawings and samples and with the requirements of the Work and the Contract Documents.

6.25.2. At the time of each submission, CONTRACTOR shall give ENGINEER specific written notice of each variation that the Shop Drawings or samples may have from the requirements of the Contract Documents, and, in addition, shall cause a specific notation to be made on each Shop Drawing submitted to ENGINEER for review and approval of each such variation.

6.26. ENGINEER will review and approve with reasonable promptness Shop Drawings and samples, but ENGINEER's review and approval will be only for conformance with the design concept of the Project and for compliance with the information given in the Contract Documents and shall not extend to means, methods, techniques, sequences or procedures of construction (except where a specific means, method, technique, sequence or procedure of construction is indicated in or required 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. 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.

6.27. ENGINEER's review and approval of Shop Drawings or samples shall not relieve CONTRACTOR from responsibility for any variation from the requirements of the Contract Documents unless CONTRACTOR has in writing called ENGINEER's attention to each such variation at the time of submission as required by paragraph 6.25.2 and ENGINEER

has given written approval of each such variation by a specific written notation thereof incorporated in or accompanying the Shop Drawing or sample approval; nor will any approval by ENGINEER relieve CONTRACTOR from responsibility for errors or omissions in the Shop Drawings or from responsibility for having complied with the provisions of paragraph 6.25.1.

6.28. Where a Shop Drawing or sample is required by the Specifications, any related Work performed prior to ENGINEER's review and approval of the pertinent submission will be the sole expense and responsibility of CONTRACTOR.

Continuing the Work:

6.29. 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 15.5 or as CONTRACTOR and OWNER may otherwise agree in writing.

Indemnification:

6.30. To the fullest extent permitted by Laws and Regulations CONTRACTOR shall indemnify and hold harmless OWNER and ENGINEER and their consultants, agents and employees from and against all claims, damages, losses and expenses, direct, indirect or consequential (including but not limited to fees and charges of engineers, architects, attorneys and other professionals and court and arbitration costs) arising out of or resulting from the performance of the Work, provided that any such claim, damage, loss or expense (a) 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 and (b) is caused in whole or in part by any negligent act or omission of CONTRACTOR, any Subcontractor, any person or organization directly or indirectly employed by any of them to perform or furnish any of the Work or anyone for whose acts any of them may be liable, regardless of whether or not it is caused in part by a party indemnified hereunder or arises by or is imposed by Law and Regulations regardless of the negligence of any such party.

6.31. In any and all claims against OWNER or ENGINEER or any of their consultants, agents or employees by any employee of CONTRACTOR, any Subcontractor, any person or organization directly or indirectly employed by any of them to perform or furnish any of the Work or anyone for whose acts any of them may be liable, the indemnification obligation under paragraph 6.30 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 or other person or organization under workers' or workmen's compensation acts, disability benefit acts or other employee benefit acts.

6.32. The obligations of CONTRACTOR under paragraph 6.30 shall not extend to the liability of ENGINEER, ENGINEER's consultants, agents or employees arising out of the preparation or approval of maps, drawings, opinions, reports, surveys, Change Orders, designs or specifications.

ARTICLE 7 – OTHER WORK

Related Work at Site:

7.1. OWNER may perform other work related to the Project at the site by OWNER's own forces, have other work performed by utility owners or let other direct contracts therefor which shall contain General Conditions similar to these. If the fact that such other work is to be performed was not noted in the Contract Documents, written notice thereof will be given to CONTRACTOR prior to starting any such other work; and, if CONTRACTOR believes that such performance will involve additional expense to CONTRACTOR or requires additional time and the parties are unable to agree as to the extent thereof, CONTRACTOR may make a claim therefor as provided in Articles 11 and 12.

7.2. CONTRACTOR shall afford each utility owner and other contractor who is a party to such a direct contract (or OWNER, if OWNER is performing the additional work with OWNER's employees) proper and safe access to the site and a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such work, and shall properly connect and coordinate the Work with theirs, CONTRACTOR shall do all cutting, fitting and patching of the Work that may be required to make its several parts come together properly and integrate with such other work. CONTRACTOR shall not endanger any work of others by cutting, excavating or otherwise altering their work and will only cut or alter their 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.

7.3. If any part of CONTRACTOR's Work depends for proper execution or results upon the work of any such other contractor or utility owner (or OWNER), CONTRACTOR shall inspect and promptly report to ENGINEER in writing any delays, defects or deficiencies in such work that render it unavailable or unsuitable for such proper execution and results. CONTRACTOR's failure so to report will constitute an acceptance of the other work as fit and proper for integration with CONTRACTOR's Work except for latent or non-apparent defects and deficiencies in the other work.

Coordination:

7.4. If OWNER contracts with others for the performance of other work on the Project at the site, the person or organization who will have authority and responsibility for coordination of the activities among the various prime contractors will be identified in the Supplementary Conditions, and the specific matters to be covered by such authority and responsibility will be itemized, and the extent of such authority and responsibilities will be provided, in the Supplementary Conditions. Unless otherwise provided in the Supplementary Conditions, neither OWNER nor ENGINEER shall have any authority or responsibility in respect of such coordination.

ARTICLE 8 – OWNER'S RESPONSIBILITIES

8.1. OWNER shall issue all communications to CONTRACTOR through ENGINEER.

8.2. In case of termination of the employment of ENGINEER, OWNER shall appoint an engineer against whom CONTRACTOR makes no reasonable objection, whose status under the Contract Documents shall be that of the former ENGINEER. Any dispute in connection with such appointment shall be subject to arbitration.

8.3. OWNER shall furnish the data required of OWNER under the Contract Documents promptly and shall make payments to CONTRACTOR promptly after they are due as provided in paragraphs 14.4 and 14.13.

8.4. OWNER's duties in respect of providing lands and easements and providing engineering surveys to establish reference points are set forth in paragraphs 4.1 and 4.4. Paragraph 4.2 refers to OWNER's identifying and making available to CONTRACTOR copies of reports of explorations and tests of subsurface conditions at the site and in existing structures which have been utilized by ENGINEER in preparing the Drawings and Specifications.

8.5. OWNER's responsibilities in respect of purchasing and maintaining liability and property insurance are set forth in paragraph 5.5 through 5.8.

8.6. OWNER is obligated to execute Change Orders as indicated in paragraph 10.4.

8.7. OWNER's responsibility in respect of certain inspections, tests and approvals is set forth in paragraph 13.4.

8.8. In connection with OWNER's right to stop Work or suspend Work, see paragraphs 13.10 and 15.1. Paragraph 15.2 deals with OWNER's right to terminate services of CONTRACTOR under certain circumstances.

ARTICLE 9 – ENGINEER'S STATUS DURING CONSTRUCTION

Owner's Representative:

9.1. 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 and shall not be extended without written consent of OWNER and ENGINEER.

Visits to Site:

9.2. ENGINEER will make visits to the site at intervals appropriate to the various stages of construction to observe the progress and quality of the executed Work and to determine, in general, if the Work is proceeding in accordance with the Contract Documents. ENGINEER will not be required to make exhaustive or continuous on-site inspections 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 to the Contract Documents. On the basis of such visits and on-site observations as an experienced and qualified design professional, ENGINEER will keep OWNER informed of the progress of the Work and will endeavor to guard OWNER against defects and deficiencies in the Work.

Project Representative:

9.3. If OWNER and ENGINEER agree, ENGINEER will furnish a Resident Project Representative to assist ENGINEER in observing the performance of the Work. The duties, responsibilities and limitations of authority of any such Resident Project Representative and assistants will be as provided in the Supplementary Conditions. If OWNER designates another agent to represent OWNER at the site who is not ENGINEER's agent or employee, the duties, responsibilities and limitations of authority of such other person will be as provided in the Supplementary Conditions.

Clarifications and Interpretations:

9.4. ENGINEER will issue with reasonable promptness such written clarifications or interpretations of the requirements of the Contract Documents (in the form of drawings or otherwise) as ENGINEER may determine necessary, which shall be consistent with or reasonably inferable from the overall intent of the Contract Documents. If CONTRACTOR believes that a written clarification or interpretation justifies an increase in the Contract Price or an extension of the Contract Time and the parties are unable to agree to the amount or extent thereof, CONTRACTOR may make a claim therefor as provided in Article 11 or Article 12.

Authorized Variations in Work:

9.5. 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 Time and are consistent with the overall intent of the Contract Documents. These may be accomplished by a Field Order and will be binding an OWNER, and also on CONTRACTOR who shall perform the Work involved promptly. If CONTRACTOR believes that a Field Order justifies an increase in the Contract Price or an extension of the Contract Time and the parties are unable to agree as to the amount or extent thereof, CONTRACTOR may make a claim therefor as provided in Article 11 or 12.

Rejecting Defective Work:

9.6. ENGINEER will have authority to disapprove or reject Work which ENGINEER believes to be *defective*, and will also have authority to require special inspection or testing of the Work as provided in paragraph 13.9, whether or not the Work is fabricated, installed or completed.

Shop Drawings, Change Orders and Payments:

9.7. In connection with ENGINEER's responsibility for Shop Drawings and samples, see paragraphs 6.23 through 6.29 inclusive.

9.8. In connection with ENGINEER's responsibilities as to Change Orders, see Articles 10, 11 and 12.

9.9. In connection with ENGINEER's responsibilities in respect of Applications for Payment, etc., see Article 14.

Determination for Unit Price:

9.10. ENGINEER will determine the actual quantities and classifications of Unit Price Work performed by CONTRACTOR. ENGINEER will review with CONTRACTOR 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 decisions thereon will be final and binding upon OWNER and CONTRACTOR, unless, within ten days after the date of any such decision, either OWNER or CONTRACTOR delivers to the other party to the Agreement and to ENGINEER written notice of intention to appeal from such a decision.

Decisions on Disputes:

9.11. ENGINEER will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. Claims, disputes and other matters relating to the acceptability of the Work or the interpretation of the requirements of the Contract Documents pertaining to the performance and furnishing of the Work and claims under Articles 11 and 12 in respect of changes in the Contract Price or Contract Time will be referred initially to ENGINEER in writing with a request for a formal decision in accordance with this paragraph, which ENGINEER will render in writing within a reasonable time. Written notice of each such claim, dispute and other matter will be delivered by the claimant to ENGINEER and the other party to the Agreement promptly (but in no event later than thirty days) after the occurrence of the event giving rise thereto, and written supporting data will be submitted to ENGINEER and the other party within sixty days after such occurrence unless ENGINEER allows an additional period of time to ascertain more accurate data in support of the claim.

9.12. When functioning as interpreter and judge under paragraphs 9.10 and 9.11, 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. The rendering of a decision by ENGINEER pursuant to paragraphs 9.10 and 9.11 with respect to any such claim, dispute or other matter (except any which have been waived by the making or acceptance of final payment as provided in paragraph 14.16) will be a condition precedent to any exercise by OWNER or CONTRACTOR of such rights or remedies as either may otherwise have under the Contract Documents or by Laws or Regulations in respect of any such claim, dispute or other matter.

Limitations on ENGINEER's Responsibilities:

9.13. Neither ENGINEER's authority to act under this Article 9 or elsewhere in the Contract Documents nor any decision made by ENGINEER in good faith either to exercise or not exercise such authority shall give rise to any duty or responsibility of ENGINEER to CONTRACTOR, any Subcontractor, any Supplier, or any other person or organization performing any of the Work, or to any surety for any of them.

9.14. Wherever in the Contract Documents the terms "as ordered", "as directed", "as required", "as allowed", "as approved", or terms of like effect or import are used, or the adjectives "reasonable", "suitable", "acceptable", "proper" or "satisfactory" or adjectives of like effect or import are used to describe a requirement, direction, review or judgment of ENGINEER as to the Work, it is intended that such requirement, direction, review or judgment will be solely to evaluate the Work for compliance with the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective shall not be effective to assign to ENGINEER any duty or authority to supervise or direct the furnishing or performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of paragraph 9.15 or 9.16.

9.15. ENGINEER will not be responsible for CONTRACTOR's means, methods, techniques, sequences or procedures of construction, or the safety precautions and programs incident thereto, and ENGINEER will not be responsible for CONTRACTOR's failure to perform or furnish the Work in accordance with the Contract Documents.

9.16. ENGINEER will not be responsible for the acts or omissions of CONTRACTOR or of any Subcontractor, any Supplier, or of any other person or organization performing or furnishing any of the Work.

ARTICLE 10 – CHANGES IN THE WORK

10.1. Without invalidating the Agreement and without notice to any surety, OWNER may, at any time or from time to time, order additions, deletions or revisions in the Work; these will be authorized by a Written Amendment, a Change Order, or a Work Directive Change. 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).

10.2. If OWNER and CONTRACTOR are unable to agree as to the extent, if any, of an increase or decrease in the Contract Price or an extension or shortening of the Contract Time that should be allowed as a result of a Work Directive Change, a claim may be made therefor as provided in Article 11 or Article 12.

10.3. CONTRACTOR shall not be entitled to an increase in the Contract Price or an extension of the Contract Time with respect to any Work performed that is not required by the Contract Documents as amended, modified and supplemented as provided in paragraphs 3.4. and 3.5, except in the case of an emergency as provided in paragraph 6.22 and except in the case of uncovering Work as provided in paragraph 13.9.

10.4. OWNER and CONTRACTOR shall execute appropriate Change Orders (or Written Amendments) covering:

10.4.1. changes in the Work which are ordered by OWNER pursuant to paragraph 10.1, are required because of acceptance of *defective* Work under paragraph 13.13 or correcting *defective* Work under paragraph 13.14, or are agreed to by the parties;

10.4.2. changes in the Contract Price or Contract Time which are agreed to by the parties; and

10.4.3. changes in the Contract Price or Contract Time which embody the substance of any written decision rendered by ENGINEER pursuant to paragraph 9.11;

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 6.29.

10.5. If notice 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 Time) is required by the provisions of any Bond to be given to a surety, the giving of any such notice will be CONTRACTOR's responsibility, and the amount of each applicable Bond will be adjusted accordingly.

ARTICLE 11 – CHANGE OF CONTRACT PRICE

11.1. The Contract Price constitutes the total compensation (subject to authorized adjustments) payable to CONTRACTOR for performing the Work. All duties, responsibilities and obligations assigned to or undertaken by CONTRACTOR shall be at his expense without change in the Contract Price.

11.2. The Contract Price may only be changed by a Change Order or by a Written Amendment. Any claim for an increase or decrease in the Contract Price shall be based on written notice delivered by the party making the claim to the other party and to ENGINEER promptly (but in no event later than thirty days) after the occurrence of the event giving rise to the claim and stating the general nature of the claim. Notice of the amount of the claim with supporting data shall be delivered within sixty days after such occurrence (unless ENGINEER allows an additional period of time to ascertain more accurate data in support of the claim) and shall be accompanied by claimant's written statement that the amount claimed covers all known amounts (direct, indirect and consequential) to which the claimant is entitled as a result of the occurrence of said event. All claims for adjustment in the Contract Price shall be determined by ENGINEER in accordance with paragraph 9.11 if OWNER and CONTRACTOR cannot otherwise agree on the amount involved. No claim for an adjustment in the Contract Price will be valid if not submitted in accordance with this paragraph 11.2.

11.3. The value of any Work covered by a Change Order or of any claim for an increase or decrease in the Contract Price shall be determined in one of the following ways:

11.3.1. Where the Work involved is covered by unit prices contained in the Contract Documents, by application of unit prices to the quantities of the items involved (subject to the provisions of paragraphs 11.9.1 through 11.9.3, inclusive).

11.3.2. By mutual acceptance of a lump sum (which may include an allowance for overhead and profit not necessarily in accordance with paragraph 11.6.2.1).

11.3.3. On the basis of the Cost of the Work (determined as provided in paragraphs 11.4 and 11.5) plus a CONTRACTOR's Fee for overhead and profit (determined as provided in paragraphs 11.6 and 11.7).

Cost of the Work:

11.4. The term Cost of the Work means the sum of all costs necessarily incurred and paid by CONTRACTOR in the proper performance of the Work. 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 include only the following items and shall not include any of the costs itemized in paragraph 11.5:

11.4.1. 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. 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' or workmen's compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. Such employees shall include superintendents and foremen at the site. The expenses of performing Work after regular working hours, on Saturday, Sunday or legal holidays, shall be included in the above to the extent authorized by OWNER.

11.4.2. 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 all returns from sale of surplus materials and equipment shall accrue to OWNER, and CONTRACTOR shall make provisions so that they may be obtained.

11.4.3. Payments made by CONTRACTOR to the Subcontractors for Work performed by Subcontractors. If required by OWNER, CONTRACTOR shall obtain competitive bids from Subcontractors acceptable to CONTRACTOR and shall deliver such bids to OWNER who will then determine, with the advice of ENGINEER, which bids will be accepted. If a 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 shall be determined in the same manner as CONTRACTOR's Cost of the Work. All subcontracts shall be subject to the other provisions of the Contract Documents insofar as applicable.

11.4.4. 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.

11.4.5. Supplemental costs including the following:

11.4.5.1. The proportion of necessary transportation, travel and subsistence expenses of CONTRACTOR's employees incurred in discharge of duties connected with the Work.

11.4.5.2. 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.

11.4.5.3. 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, installation, dismantling and removal thereof-all in accordance with 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.

11.4.5.4. Sales, consumer, use or similar taxes related to the Work, and for which CONTRACTOR is liable, imposed by Laws and Regulations.

11.4.5.5. 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.

11.4.5.6. Losses and damages (and related expenses), not compensated by insurance or otherwise, to the Work or otherwise sustained by CONTRACTOR in connection with the performance and furnishing of the Work (except losses and damages within the deductible amounts of property insurance established by OWNER in accordance with paragraph 5.9), provided they 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. If, however, any such loss or damage requires reconstruction and CONTRACTOR is placed in charge thereof, CONTRACTOR shall be paid for services a fee proportionate to that stated in paragraph 11.6.2.

11.4.5.7. The cost of utilities, fuel and sanitary facilities at the site.

11.4.5.8. Minor expenses such as telegrams, long distance telephone calls, telephone service at the site, expressage and similar petty cash items in connection with the Work.

11.4.5.9. Cost of premiums for additional Bonds and insurance required because of changes in the Work and premiums for property insurance coverage within the limits of the deductible amounts established by OWNER in accordance with paragraph 5.9.

11.5. The term Cost of the Work shall not include any of the following:

11.5.1. Payroll costs and other compensation of CONTRACTOR's officers, executives, principals (of partnership and sole proprietorships), general 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 a branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in paragraph 11.4.1 or specifically covered by paragraph 11.4.4-all of which are to be considered administrative costs covered by the CONTRACTOR's Fee.

11.5.2. Expenses of CONTRACTOR's principal and branch offices other than CONTRACTOR's office at the site.

11.5.3. Any of CONTRACTOR's capital expenses, including interest on CONTRACTOR's capital employed for the Work and charges against CONTRACTOR for delinquent payments.

11.5.4. Cost of premiums for all Bonds and for all insurance whether or not CONTRACTOR is required by the Contract Documents to purchase and maintain the same (except for the cost of premiums covered by sub-paragraph 11.4.5.9 above).

11.5.5. 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.

11.5.6. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in paragraph 11.4.

Contractor's Fee:

11.6. The CONTRACTOR's Fee allowed to CONTRACTOR for overhead and profit shall be determined as follows:

11.6.1. a mutually acceptable fixed fee; or if none can be agreed upon.

(This space was left blank intentionally).

11.7. Whenever the cost of any Work is to be determined pursuant to paragraph 11.4 or 11.5, CONTRACTOR will submit in form acceptable to ENGINEER an itemized cost breakdown together with supporting data.

Cash Allowances:

11.8. 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 done by such Subcontractors or Suppliers and for such sums within the limit of the allowances as may be acceptable to ENGINEER, CONTRACTOR agrees that:

11.8.1. The 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

11.8.2. CONTRACTOR's costs for unloading and handling on the site, labor, installation costs, overhead, profit and other expenses contemplated for the allowances have

been included in the Contract Price and not in the allowances. No demand for additional payment on account of any thereof will be valid.

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.

Unit Price Work:

11.9.1. 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 established unit prices for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement. 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 in accordance with Paragraph 9.10.

11.9.2. 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.

11.9.3. Where 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 there is no corresponding adjustment with respect to any other item of Work and if CONTRACTOR believes that CONTRACTOR has incurred additional expense as a result thereof, CONTRACTOR may make a claim for an increase in the Contract Price in accordance with Article 11 if the parties are unable to agree as to the amount of any such increase.

ARTICLE 12 – CHANGE OF CONTRACT TIME

12.1. The Contract Time may only be changed by a Change Order or a Written Amendment. Any claim for an extension or shortening of the Contract Time shall be based on written notice delivered by the party making the claim to the other party and to ENGINEER promptly (but in no event later than thirty days) after the occurrence of the event giving rise to the claim and stating the general nature of the claim. Notice of the extent of the claim with supporting data shall be delivered within sixty days after such occurrence (unless ENGINEER allows an additional period of time to ascertain more accurate data in support of the claim) and shall be accompanied by the claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant has reason to believe it is entitled as a result of the occurrence of said event. All claims for adjustment in the Contract Time shall be determined by ENGINEER in accordance with paragraph 9.11 if OWNER and CONTRACTOR cannot otherwise agree. No claim for an adjustment in the Contract Time will be valid if not submitted in accordance with the requirements of this paragraph 12.1.

12.2. The Contract Time will be extended in an amount equal to time lost due to delays beyond the control of CONTRACTOR if a claim is made therefor as provided in paragraph 12.1. Such delays shall include, but not be limited to, acts or neglect by OWNER or others performing additional work as contemplated by Article 7, or to fires, floods, labor disputes, epidemics, abnormal weather conditions or acts of God.

12.3. All time limits stated in the Contract Documents are of the essence of the Agreement. The provisions of this Article 12 shall not exclude recovery for damages (including but not limited to fees and charges of engineers, architects, attorneys and other professionals and court and arbitration costs) for delay by either party.

ARTICLE 13 – WARRANTY AND GUARANTEE; TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

Warranty and Guarantee:

13.1. CONTRACTOR warrants and guarantees to OWNER and ENGINEER that all Work will be in accordance with the Contract Documents and will not be *defective*. Prompt notice of all defects shall be given to CONTRACTOR. All *defective* Work, whether or not in place, may be rejected, corrected or accepted as provided in this Article 13.

Access to Work:

13.2. ENGINEER and ENGINEER's representatives, other representatives of OWNER, testing agencies and governmental agencies with jurisdictional interests will have access to the Work at reasonable times for their observation, inspecting and testing. CONTRACTOR shall provide proper and safe conditions for such access.

Tests and Inspections:

13.3. CONTRACTOR shall give ENGINEER timely notice of readiness of the Work for all required inspections, tests or approvals.

13.4. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) to specifically be inspected, tested or approved. CONTRACTOR shall assume full responsibility therefor, pay all costs in connection therewith and furnish ENGINEER the required certificates of inspection, testing or approval. CONTRACTOR shall also be responsible for and shall pay all costs in connection with any inspection or testing required in connection with OWNER's or ENGINEER's acceptance of a Supplier of materials or equipment proposed to be incorporated in the Work, or of materials or equipment submitted for approval prior to CONTRACTOR's purchase thereof for incorporation in the Work. The cost of all inspections, tests and approvals in addition to the above which are required by the Contract Documents shall be paid by OWNER (unless otherwise specified).

13.5. All inspections, tests or approvals other than those required by Laws or Regulations of any public body having jurisdiction shall be performed by organizations acceptable to OWNER and CONTRACTOR (or by ENGINEER if so specified).

13.6. If any Work (including the work of others) that is to be inspected, tested or approved is covered without written concurrence of ENGINEER, it must, if requested by ENGINEER, be uncovered for observation. Such uncovering 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.

13.7. Neither observations by ENGINEER nor inspections, tests or approvals by other shall relieve CONTRACTOR from CONTRACTOR's obligations to perform the Work in accordance with the Contract Documents.

Uncovering Work:

13.8. 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.

13.9. 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. If it is found that such Work is *defective*, CONTRACTOR shall bear all direct, indirect and consequential costs of such uncovering, exposure, observation, inspection and testing and of satisfactory reconstruction, (including but not limited to fees and charges of engineers, architects, attorneys and other professionals), and OWNER shall be entitled to an appropriate decrease in the Contract Price, and, if the parties are unable to agree as to the amount thereof, may make a claim therefor as provided in Article 11. If, however, such Work is not found to be *defective*, CONTRACTOR shall be allowed an increase in the Contract Price or an extension of the Contract Time, or both, directly attributable to such uncovering, exposure, observation, inspection, testing and reconstruction; and, if the parties are unable to agree as to the amount or extent thereof, CONTRACTOR may make a claim therefor as provided in Articles 11 and 12.

Owner May Stop the Work:

13.10. If the Work is *defective*, or CONTRACTOR fails to supply sufficient skilled workers or suitable materials or equipment, or fails to furnish or 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 or any other party.

Correction or Removal of Defective Work:

13.11. If required by ENGINEER, CONTRACTOR shall promptly, as directed, either correct all *defective* Work, whether or not fabricated, installed or completed, or, if the Work has been rejected by ENGINEER, remove it from the site and replace it with *nondefective* Work. CONTRACTOR shall bear all direct, indirect and consequential costs of such correction or removal (including but not limited to fees and charges of engineers, architects, attorneys and other professionals) made necessary thereby.

One Year Correction Period:

13.12. If within one year after the date of Substantial Completion or such longer period of time as may be prescribed by Laws or Regulations or 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*, CONTRACTOR shall promptly, without cost to OWNER and in accordance with OWNER's written instructions, either correct such *defective* Work, or, if it has been rejected by OWNER, remove it from the site and replace it with *nondefective* Work. If CONTRACTOR does not promptly comply with the terms of such instructions, or in an emergency where delay would cause serious risk of loss or damage, OWNER may have the *defective* Work corrected or the rejected Work removed and replaced, and all direct, indirect and consequential costs of such removal and replacement (including but not limited to fees and charges of engineer, architects, attorneys and other professionals) will be paid by CONTRACTOR. 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 or by Written Amendments.

Acceptance of Defective Work:

13.13. If, instead of requiring correction or removal and replacement of *defective* Work, OWNER (and, prior to ENGINEER's recommendation of final payment, also ENGINEER) prefers to accept it, OWNER may do so, CONTRACTOR shall bear all direct, indirect and consequential 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 to include but not be limited to fees and charges of engineers, architects, attorneys and other professionals). 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, and, if the parties are unable to agree as to the amount thereof, OWNER may make a claim therefor as provided in Article 11. If the acceptance occurs after such recommendation, an appropriate amount will be paid by CONTRACTOR to OWNER.

OWNER May Correct Defective Work:

13.14. If CONTRACTOR fails within a reasonable time after written notice of ENGINEER to proceed to correct and to correct *defective* Work or to remove and replace rejected Work as required by ENGINEER in accordance with paragraph 13.11, or if CONTRACTOR fails to perform the Work in accordance with the Contract Documents, of if CONTRACTOR fails to comply with any other provision of the Contract Documents, OWNER may, after seven days' written notice to CONTRACTOR, correct and remedy any such deficiency. In exercising the rights and remedies under this paragraph OWNER shall proceed expeditiously. To the extent necessary to complete corrective and remedial action, OWNER may include 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 for which OWNER has paid CONTRACTOR but which are stored elsewhere. CONTRACTOR shall allow OWNER, OWNER's representatives, agents and employees such access to the site as may be necessary to enable OWNER to exercise the rights and remedies under this paragraph. All direct, indirect and consequential costs of OWNER in exercising such rights and remedies will be charged against CONTRACTOR in an amount approved as to reasonableness by ENGINEER, 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, and, if the parties are unable to agree as to the amount thereof, OWNER may make a claim therefor as provided in Article 11. Such direct, indirect and consequential costs will include but not be limited to fees and charges of engineers, architects, attorneys and other professionals, all court and arbitration costs and all costs of repair and replacement of work of others destroyed or damaged by correction, removal or replacement of CONTRACTOR's *defective* Work, CONTRACTOR shall not be allowed an extension of the Contract Time because of any delay in performance of the Work attributable to the exercise by OWNER of OWNER's rights and remedies hereunder.

ARTICLE 14 – PAYMENTS TO CONTRACTOR AND COMPLETION

Schedule of Values:

14.1. The schedule of values established as provided in paragraph 2.9 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.

Application for Progress Payment:

14.2. At least twenty days before each progress payment is scheduled (but not 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, charges, security interests and encumbrances (which are hereinafter in these General Conditions referred to as "Liens") and evidence that the materials and equipment are covered by appropriate property insurance and other arrangements to protect OWNER's interest therein, all of which will be satisfactory to OWNER. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

CONTRACTOR's Warranty of Title:

14.3. 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.

Review of Applications for Progress Payment:

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14.5. ENGINEER's recommendation of any payment requested in an Application for Payment will constitute a representation by ENGINEER to OWNER, based on ENGINEER's on-site observations of the Work in progress as an experienced and qualified design professional and on ENGINEER's review of the Application for Payment and the accompanying data and schedules that the Work has progressed to the point indicated; that, to the best of ENGINEER's knowledge, information and belief, the quality of the Work is in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, to the results of any subsequent tests called for in the Contract Documents, to a final determination of quantities and classifications for Unit Price Work under paragraph 9.10, and to any other qualifications stated in the recommendation); and that CONTRACTOR is entitled to payment of the amount recommended. However, by recommending any such payment ENGINEER will not thereby

be deemed to have represented that exhaustive or continuous on-site inspections have been made to check the quality or the quantity of the Work beyond the responsibilities specifically assigned to ENGINEER in the Contract Documents or that there may not be other matters or issues between the parties that might entitle CONTRACTOR to be paid additionally by OWNER or OWNER to withhold payment to CONTRACTOR.

14.6. ENGINEER's recommendation of final payment will constitute an additional representation by ENGINEER to OWNER that the conditions precedent to CONTRACTOR's being entitled to final payment as set forth in paragraph 14.13 have been fulfilled.

14.7. ENGINEER may refuse to recommend the whole or any part of any payment if, in ENGINEER's opinion, it would be incorrect to make such representations to OWNER. ENGINEER may also refuse to recommend any such payment, or, because of subsequently discovered evidence or the results of subsequent inspections or tests, nullify any such payment previously recommended, to such extent as may be necessary in ENGINEER's opinion to protect OWNER from loss because:

14.7.1. the Work is *defective*, or completed Work has been damaged requiring correction or replacement,

14.7.2. the Contract Price has been reduced by Written Amendment or Change Order;

14.7.3. OWNER has been required to correct *defective* Work or complete Work in accordance with paragraph 13.14, or

14.7.4. of ENGINEER's actual knowledge of the occurrence of any of the events enumerated in paragraphs 15.2.1 through 15.2.9 inclusive.

OWNER may refuse to make payment of the full amount recommended by ENGINEER because claims have been made against OWNER on account of CONTRACTOR's performance or furnishing of the Work or Liens have been filed in connection with the Work or there are other items entitling OWNER to a set-off against the amount recommended, but OWNER must give CONTRACTOR immediate written notice (with a copy to ENGINEER) stating the reasons for such action.

Substantial Completion:

14.8. 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. Within a reasonable time thereafter, 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. If ENGINEER considers the Work substantially complete, ENGINEER will prepare and 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 fourteen 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 fourteen 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. 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, maintenance, heat, utilities, insurance and warranties. Unless OWNER and CONTRACTOR agree otherwise in writing and so inform ENGINEER 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.

14.9. OWNER shall have the right to exclude CONTRACTOR from the Work after the date of Substantial Completion, but OWNER shall allow CONTRACTOR reasonable access to complete or correct items on the tentative list.

Partial Utilization:

14.10. Use by OWNER of any finished 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 useable part of the Work that can be used by OWNER without significant interference with CONTRACTOR's performance of the remainder of the Work, may be accomplished prior to Substantial Completion of all the Work subject to the following:

14.10.1. OWNER at any time may request CONTRACTOR in writing to permit OWNER to use any such part of the Work which OWNER believes to be ready for its intended use and substantially complete. If CONTRACTOR agrees, CONTRACTOR will certify to OWNER and ENGINEER that said part of the Work is substantially complete and request ENGINEER to issue a certificate of Substantial Completion for that part of the Work. 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. 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 paragraphs 14.8 and 14.9 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.

14.10.2. OWNER may at any time request CONTRACTOR in writing to permit OWNER to take over operation of any such part of the Work although it is not substantially complete. A copy of such request will be sent to ENGINEER and within a reasonable time thereafter OWNER, CONTRACTOR and ENGINEER shall make an inspection of that part of the Work to determine its status of completion and will prepare a list of the items remaining to be completed or corrected thereon before final payment. If

CONTRACTOR does not object in writing to OWNER and ENGINEER that such part of the Work is not ready for separate operation by OWNER, ENGINEER will finalize the list of items to be completed or corrected and will deliver such list to OWNER and CONTRACTOR together with a written recommendation as to the division of responsibilities pending final payment between OWNER and CONTRACTOR with respect to security, operation, safety, maintenance, utilities, insurance, warranties and guarantees for that part of the Work which will become binding upon OWNER and CONTRACTOR at the time when OWNER takes over such operation (unless they shall have otherwise agreed in writing and so informed ENGINEER). During such operation and prior to Substantial Completion of such part of the Work, OWNER shall allow CONTRACTOR reasonable access to complete or correct items on said list and to complete other related Work.

14.10.3. No occupancy or separate operation of part of the Work will be accomplished prior to compliance with the requirements of paragraph 5.15 in respect of property insurance.

Final Inspection:

14.11. Upon written notice from CONTRACTOR that the entire Work or an agreed portion thereof is complete, ENGINEER will 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 sure measures as are necessary to remedy such deficiencies.

Final Application for Payment:

14.12. After CONTRACTOR has completed all such corrections to the satisfaction of ENGINEER and delivered all maintenance and operating instructions, schedules, guarantees, Bonds, certificates of inspection, marked-up record documents (as provided in paragraph 6.19) and other documents-all as required by the Contract Documents, and after ENGINEER has indicated that the Work is acceptable (subject to the provisions of paragraph 14.16), CONTRACTOR may make application for final payment following the procedure for progress payments. The final Application for Payment shall be accompanied by all documentation called for in the Contract Documents, together with complete and legally effective releases or waivers (satisfactory to OWNER) of all Liens arising out of or filed in connection with the Work. In lieu thereof and as approved by OWNER, CONTRACTOR may furnish receipts or releases in full; an affidavit of CONTRACTOR that the releases and receipts include all labor, services, material and equipment for which a Lien could be filed, and that all payrolls, material and equipment bills, and other indebtedness connected with the Work for which OWNER or OWNER's property might in any way be responsible, have been paid or otherwise satisfied; and consent of the surety, if any, to final payment.

Final Payment and Acceptance:

14.13. 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 – all 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 to OWNER for payment. Thereupon ENGINEER will give written notice to OWNER and CONTRACTOR that the Work is acceptable subject to the provisions of paragraph 14.16. Otherwise, ENGINEER will return the Application 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. Thirty days after presentation to OWNER of the Application and accompanying documentation, in appropriate form and substance, and with ENGINEER's recommendation and notice of acceptability, the amount recommended by ENGINEER will become due and will be paid by OWNER to CONTRACTOR.

14.14. 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 and recommendation of ENGINEER, and without terminating the Agreement, 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 5.1, 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.

Contractor's Continuing Obligation:

14.15. CONTRACTOR's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. Neither recommendation of any progress or final payment by ENGINEER, nor the issuance of a certificate of Substantial Completion, nor any payment by OWNER to CONTRACTOR under the Contract Documents, nor any use or occupancy of the Work or any part thereof by OWNER, nor any act of acceptance by OWNER nor any failure to do so, nor any review and approval of a Shop Drawing or sample submission, nor the issuance of a notice of acceptability by ENGINEER pursuant to paragraph 14.13, nor any correction of *defective* Work by OWNER will constitute an acceptance of Work not in accordance with the Contract Documents or a release of CONTRACTOR's obligation to perform the Work in accordance with the Contract Documents (except as provided in paragraph 14.16).

Waiver of Claims:

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

14.16.1. 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 14.11 or from failure to comply with the Contract Documents or the terms of any special guarantees specified therein; however, it will not constitute a waiver by OWNER of any rights in respect of CONTRACTOR's continuing obligations under the Contract Documents; and

14.16.2. a waiver of all claims by CONTRACTOR against OWNER other than those previously made in writing and still unsettled.

ARTICLE 15 – SUSPENSION OF WORK AND

TERMINATION

Owner May Suspend Work:

15.1. OWNER may, at any time and without cause, suspend the Work or any portion thereof for a period of not more than ninety 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 allowed an increase in the Contract Price or an extension of the Contract Time, or both, directly attributable to any suspension if CONTRACTOR makes an approved claim therefor as provided in Articles 11 and 12.

Owner May Terminate:

15.2. Upon the occurrence of any one or more of the following events:

15.2.1. if CONTRACTOR commences a voluntary case under any chapter of the Bankruptcy Code (Title 11, United States Code), as now or hereafter in effect, or if CONTRACTOR takes any equivalent or similar action by filing a petition or otherwise under any other federal or state law in effect at such time relating to the bankruptcy or insolvency;

15.2.2. if a petition is filed against CONTRACTOR under any chapter of the Bankruptcy Code as now or hereafter in effect at the time of filing, or if a petition is filed seeking any such equivalent or similar relief against CONTRACTOR under any other federal or state law in effect at the time relating to bankruptcy or insolvency;

15.2.3. if CONTRACTOR makes a general assignment for the benefit of creditors;

15.2.4. if a trustee, receiver, custodian or agent of CONTRACTOR is appointed under applicable law or under contract, whose appointment or authority to take charge of property of CONTRACTOR is for the purpose of enforcing a Lien against such property or for the purpose of general administration of such property for the benefit of CONTRACTOR's creditors;

15.2.5. if CONTRACTOR admits in writing an inability to pay its debts generally as they become due;

15.2.6. if CONTRACTOR persistently fails 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 2.9 as revised from time to time);

15.2.7. if CONTRACTOR disregards Laws or Regulations of any public body having jurisdiction;

15.2.8. if CONTRACTOR disregards the authority of ENGINEER; or

15.2.9. if CONTRACTOR otherwise violates in any substantial way any provisions of the Contract Documents;

OWNER may, after giving CONTRACTOR (and the surety, if there be one) seven days' written notice and to the extent permitted by Laws and Regulations, terminate the services of CONTRACTOR, 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), 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 finish the Work as OWNER may deem expedient. In such case CONTRACTOR shall not be entitled to receive any further payment until the Work is finished. If the unpaid balance of the Contract Price exceeds the direct, indirect and consequential costs of completing the Work (including but not limited to fees and charges of engineers, architects, attorneys and other professionals and court and arbitration costs) such excess will be paid to CONTRACTOR. If such costs exceed such unpaid balance, CONTRACTOR shall pay the difference to OWNER. Such costs incurred by OWNER will be approved as to reasonableness by ENGINEER and incorporated in a Change Order, but when exercising any rights or remedies under this paragraph OWNER shall not be required to obtain the lowest price for the Work performed.

15.3. 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.

15.4. Upon seven days' written notice to CONTRACTOR and ENGINEER, OWNER may, without cause and without prejudice to any other right or remedy, elect to abandon the Work and terminate the Agreement. In such case, CONTRACTOR shall be paid for all Work executed and any expense sustained plus reasonable termination expenses, which will include, but not be limited to, direct indirect and consequential costs (including, but not limited to, fees and charges of engineers, architects, attorneys and other professionals and court and arbitration costs).

Contractor May Stop Work or Terminate:

15.5. If, through no act or fault of CONTRACTOR, the Work is suspended for a period of more than ninety days by OWNER or under an order of court or other public authority, or ENGINEER fails to act on any Application for Payment within thirty days after it is submitted, or OWNER fails for thirty days to pay CONTRACTOR any sum finally determined to be due, then CONTRACTOR may, upon seven days' written to OWNER and ENGINEER, terminate the Agreement and recover from OWNER payment for all Work executed and any expense sustained plus reasonable termination expenses. In addition and in lieu of terminating the Agreement, if ENGINEER has failed to act on an Application for Payment or OWNER has failed to make any payment as aforesaid. CONTRACTOR may upon seven days' written notice to OWNER and ENGINEER stop the Work until payment of all amounts then due. The provisions of this paragraph shall not relieve CONTRACTOR of the obligations under paragraph 6.29 to carry on the Work in accordance with the progress schedule and without delay during disputes and disagreements with OWNER.

ARTICLE 16 – ARBITRATION

16.1. All claims, disputes and other matters in question between OWNER and CONTRACTOR arising out of, or relating to the Contract Documents or the breach thereof (except for claims which have been waived by the making or acceptance of final payment as provided by paragraph 14.16) will be decided by arbitration in accordance with the Construction Industry Arbitration Rules of the American Arbitration Association then obtaining subject to the limitations of this Article 16. This agreement so to arbitrate and any other agreement or consent to arbitrate entered into in accordance herewith as provided in this Article 16 will be specifically enforceable under the prevailing law of any court having jurisdiction.

16.2. No demand for arbitration of any claim, dispute or other matter that is required to be referred to ENGINEER initially for decision in accordance with paragraph 9.11 will be made until the earlier of (a) the date on which ENGINEER has rendered a decision or (b) the tenth day after the parties have presented their evidence to ENGINEER if a written decision has not been rendered by ENGINEER before that date. No demand for arbitration of any such claim, dispute or other matter will be made later than thirty days after the date on which ENGINEER has rendered a written decision in respect thereof in accordance with paragraph 9.11; and the failure to demand arbitration within said thirty days' period shall result in ENGINEER's decision being final and binding upon OWNER and CONTRACTOR. If ENGINEER renders a decision after arbitration proceeding have been initiated, such decision may be entered as evidence but will not supersede the arbitration proceedings, except where the decision is acceptable to the parties concerned. No demand for arbitration of any written decision of ENGINEER rendered in accordance with paragraph 9.10 will be made later than ten days after the party making such demand has delivered written notice of intention to appeal as provided in paragraph 9.10.

16.3. Notice of the demand for arbitration will be filed in writing with the other party to the Agreement and with the American Arbitration Association, and a copy will be sent to ENGINEER for information. The demand for arbitration will be made within the thirty-day or ten-day period specified in paragraph 16.2 as applicable, and in all other cases within a reasonable time after the claim, dispute or other matter in question has arisen, and in no event shall any such demand be made after the date when institution of legal or equitable proceedings based on such claim, dispute or other matter in question would be barred by the applicable statute of limitations.

16.4. No arbitration arising out of or relating to the Contract Documents shall include by consolidation, joinder or in any other manner any other person or entity (including ENGINEER, ENGINEER's agents, employees or consultants) who is not a party to this contract unless:

16.4.1. the inclusion of such other person or entity is necessary if complete relief is to be afforded among those who are already parties to the arbitration,

16.4.2. such other person or entity is substantially involved in a question of law or fact which is common to those who are already parties to the arbitration and which will arise in such proceedings, and

16.4.3. the written consent of the other person or entity sought to be included and of OWNER and CONTRACTOR has been obtained for such inclusion, which consent shall make specific reference to this paragraph; but no such consent shall constitute consent to arbitration of any dispute not specifically described in such consent or to arbitration with any party not specifically identified in such consent.

16.5. The award rendered by the arbitrators will be final, judgment may be entered upon it in any court having jurisdiction thereof, and will not be subject to modification or appeal except to the extent permitted by Sections 10 and 11 of the Federal Arbitration Act (9 U.S.C. §§ 10,11).

ARTICLE 17 – MISCELLANEOUS

Giving Notice:

17.1. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if 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 if delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

Computation of Time:

17.2.1. When any period of tiem 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.

17.2.2. A calendar day of twenty-four hours measured from midnight to the next midnight shall constitute a day.

General:

17.3. Should OWNER or CONTRACTOR suffer injury or damage to person or property because of any error, omission or act of the other party or of any of the other party's employees or agents or others for whose acts the other party is legally liable, claim will be made in writing to the other party within a reasonable time of the first observance of such injury or damage. The provisions of this paragraph 17.3 shall not be construed as a substitute for or a waiver of the provisions of any applicable statute of limitations or repose.

17.4. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto, and, in particular but without limitation, the warranties, guarantees and obligations imposed upon CONTRACTOR by paragraphs 6.30, 13.1, 13.12, 13.14, 14.3 and 15.2 and all of the rights and remedies available to OWNER and

ENGINEER thereunder, 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, and 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. All representatives, warranties and guarantees made in the Contract Documents will survive final payment and termination or completion of the Agreement.

SUPPLEMENTAL GENERAL CONDITIONS

1. Enumeration of Plans, Specifications and Addenda
2. Stated Allowances
3. Contractor Payments
4. Payments to Covered Workers
5. Certification of Eligibility
6. Employment Practices
7. Special Hazards
8. Public Liability and Property Damage Insurance
9. Photographs of Project
10. Schedule of Minimum Hourly Wage Rates
11. Builder's Risk Insurance
12. Special Equal Opportunity Provisions
13. Special Conditions Pertaining to Hazards, Safety Standards and Accident Prevention
14. Flood Disaster Protection
15. Access to Records/Maintenance of Records
16. Conflict of Interest

1. ENUMERATION OF PLANS, SPECIFICATIONS AND ADDENDA

Following are the Plans, Specifications and Addenda which for a part of this contract, as set forth in Paragraph 1 of the General Conditions, “Contract and Contract Documents”:

DRAWINGS

G0.0	COVER SHEET
C0.0	GENERAL NOTES
C0.1	TYPICAL SECTIONS
C1.0	DEMOLITION PLAN
C2.0	ADVANTAGE PARK DR. LAYOUT PLAN
C4.0	EPSC PLAN (OVERALL)
C4.1	EPSC PLAN STAGE I
C4.2	EPSC PLAN STAGE II
C4.3	EPSC PLAN STAGE III
C4.4	EPSC PLAN DETAILS
C5.0	ADVANTAGE PARK DR. PLAN AND PROFILE (OVERALL)
C5.1	ADVANTAGE PARK DR. PLAN AND PROFILE (STA.10+00 TO 20+00)
C5.2	ADVANTAGE PARK DR. PLAN AND PROFILE (STA. 20+00 TO 33+50)
C5.3	WINDROW RD PLAN AND PROFILE
C6.0	WATER LINE PLAN AND PROFILE (OVERALL)
C6.1	WATER LINE PLAN AND PROFILE (STA. 4+83 TO 19+00)
C6.1B	HYDRAULIC PROFILE (STA. 4+83 TO 19+00)
C6.2	WATER LINE PLAN AND PROFILE (STA. 19+00 TO 33+50)
C6.2B	HYDRAULIC PROFILE (STA. 19+00 TO 33+50)
C6.3	DRAINAGE PLAN AND PROFILE
C7.0	STRIPING PLAN
C10.0	DETAILS
C10.1	DETAILS
C11.0	ADVANTAGE PARK DR. CROSS SECTIONS
C11.1	ADVANTAGE PARK DR. CROSS SECTIONS
C11.2	ADVANTAGE PARK DR. CROSS SECTIONS
C11.3	ADVANTAGE PARK DR. CROSS SECTIONS
C11.4	ADVANTAGE PARK DR. CROSS SECTIONS
C11.5	ADVANTAGE PARK DR. CROSS SECTIONS
C11.6	ADVANTAGE PARK DR. CROSS SECTIONS
C11.7	ADVANTAGE PARK DR. CROSS SECTIONS
C11.8	ADVANTAGE PARK DR. CROSS SECTIONS
C11.9	ADVANTAGE PARK DR. CROSS SECTIONS
C11.10	ADVANTAGE PARK DR. CROSS SECTIONS
C11.11	ADVANTAGE PARK DR. CROSS SECTIONS
C11.12	ADVANTAGE PARK DR. CROSS SECTIONS
C11.13	ADVANTAGE PARK DR. CROSS SECTIONS

SPECIFICATIONS:

01 1000	Summary
01 2000	Price and Payment Procedures
01 2664	Weather Days

01 3000	Administrative Requirements
01 4000	Quality Requirements
01 4216	Definitions
01 5713	Temporary Erosion and Sediment Control
01 5813	Temporary Project Signage
01 7000	Execution and Closeout Requirements
01 7800	Closeout Submittals
02 3000	Subsurface Conditions
02 4100	Demolition
03 1000	Concrete Forming and Accessories
03 3000	Cast-in Place Concrete
04 0511	Masonry Mortaring and Grouting
04 2000	Unit Masonry
31 1000	Site Clearing
31 2200	Grading
31 2316	Excavation
31 2316.13	Trenching
31 2323	Fill
31 3700	Riprap
32 1216	Asphalt Paving
32 1723.13	Painted Pavement Markings
33 0110.58	Disinfection of Water Utility Piping Systems
33 0526	Utility Identification
33 0561	Drainage Manholes and Structures
33 1416	Site Water Utility Distribution Piping
33 4211	Stormwater Gravity Piping

ADDENDA:

No._____ Date_____ No._____ Date_____
No._____ Date_____ No._____ Date_____

2. STATE ALLOWANCES

Pursuant to Article 11.8 of the General Conditions, the Contractor shall include the following cash allowances in his proposal:

(a) For _____ (Page ____ of Specifications) $ _____

(b) For _____ (Page ____ of Specifications) $ _____

(c) For _____ (Page ____ of Specifications) $ _____

(d) For _____ (Page ____ of Specifications) $ _____

3. CONTRACTOR PAYMENTS

A. PAYMENTS TO CONTRACTOR

(1) To insure the proper performance of this contract, the Owner shall retain five percent (5%) of the amount of each estimate until final completion and acceptance of all work covered by this contract: Provided further that on completion and acceptance of each separate building, public work, or other division of the contract, on which the price is stated separately in the contract, payment may be made in full, including retained percentages thereon, less authorized deductions.

(2) In preparing estimates the material delivered on the site and preparatory work done may be taken into consideration.

(3) All material and work covered by partial payments made shall thereupon become the sole property of the Owner, but this provision shall not be construed as relieving the Contractor from the sole responsibility for the care and protection of materials and work upon which payments have been made or the restoration of any damaged work, or as a waiver of the right of the Owner to require the fulfillment of all of the terms of the contract.

(4) Owner's Right to Withhold Certain Amounts and Make Application Thereof: The Contractor agrees that he will indemnify and save the Owner harmless from all claims growing out of the lawful demands of subcontractors, laborers, workers, mechanics, materialmen, and furnishers of machinery and parts thereof, equipment, power tools, and all supplies, including commissary, incurred in the furtherance of the performance of this contract. The Contractor shall, at the Owner's request, furnish satisfactory evidence that all obligations of the nature hereinabove designated have been paid, discharged, or waived. If the Contractor fails so to do, then the Owner may, after having served written notice on the said Contractor, either pay unpaid bills, of which the Owner has written notice, direct, or withhold from the Contractor's unpaid compensation a sum of money deemed reasonably sufficient to pay any and all such lawful claims until satisfactory evidence is furnished that all liabilities have been fully discharged whereupon payment to the Contractor shall be resumed, in accordance with the terms of this contract, but in no event shall the provisions of this sentence be construed to impose any obligations upon the Owner to either the Contractor or his Surety. In paying any unpaid bills of the Contractor, the Owner shall be deemed the agent of the Contractor, and any payment so made by the Owner shall be considered as a payment made under the contract by the Owner to the Contractor and the Owner shall not be liable to the Contractor for any such payments made in good faith.

B. PAYMENTS BY CONTRACTOR

The Contractor shall pay (a) for all transportation and utility services not later than the 20th day of the calendar month following that in which services are

rendered, (b) for all materials, tools, and other expendable equipment to the extent of ninety percent (90%) of the cost thereof, not later than the 20th day of the calendar month following that in which such materials, tools, and equipment are delivered at the site of the project, and the balance of the cost thereof, not later than the 30th day following the completion of that part of the work in or on which such materials, tools, and equipment are incorporated or used, and (c) to each of his subcontractors, not later than the 5th day following each payment to the Contractor, the respective amounts allowed the Contractor on account of the work performed by his subcontractors to the extent of each subcontractor's interest therein.

C. TIME FOR COMPLETION AND LIQUIDATED DAMAGES

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 of the work to be done hereunder are ESSENTIAL CONDITIONS of this contract; and it is further mutually understood and agreed that the work embraced in this contract shall be commenced on a date to be specified in the "Notice to Proceed."

The Contractor agrees that said work shall be prosecuted regularly, diligently, and uninterruptedly at such rate of progress as will insure 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 the same, taking into consideration the average climatic range and usual industrial conditions prevailing in this locality.

If the said Contractor shall neglect, fail or refuse to complete the work within the time herein specified, or any proper extension thereof granted by the Owner, then the Contractor does hereby agree, as a part 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.

The said amount is fixed and agreed upon by and between the Contractor and the Owner because of the impracticability and extreme difficulty of fixing and ascertaining the actual damages the Owner would in such event sustain, and said amount is agreed to be the amount of damages which the Owner would sustain and said amount shall be retained from time to time by the Owner from current periodical estimates.

It is further agreed that time is of the essence of each and every portion of this contract and of the specifications wherein a definite and certain length of time is fixed for the performance of any act whatsoever; and where under the contract an additional time is allowed for the completion of any work, the new time limit fixed by such extension shall be of the essence of this contract. Provided that the Contractor shall not be charged with liquidated damages or any excess cost when the Owner determines that the Contractor is without fault and the Contractor's reasons for the time extension are acceptable to the Owner;

Provided further that the Contractor shall not be charged with liquidated damages or any excess cost when the delay in completion of the work is due:

(1) To any preference, priority or allocation order duly issued by the Government.

(2) To unforeseeable cause beyond the control and without the fault or negligence of the Contractor, including, but not restricted to, acts of God, or of the public enemy, acts of the Owner, acts of another Contractor in the performance of a contract with the Owner, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, and severe weather; and

(3) To any delays of Subcontractors or suppliers occasioned by any of the causes specified in subsections (1) and (2) of this article:

Provided further that the Contractor shall, within ten (10) days from the beginning of such delay, unless the Owner shall grant a further period of time prior to the date of final settlement of the contract, notify the Owner, in writing, of the delay and notify the Contractor within a reasonable time of its decision in the matter.

D. PROTECTION OF LIVES AND HEALTH

The Contractor shall exercise proper precaution at all times for the protection of persons and property and shall be responsible for all damages to persons or property, either on or off the site, which occur as a result of his prosecution of the work.

E. SUBCONTRACTS

The Contractor will insert in any subcontracts the wage provisions contained herein and such other clauses as the State of Tennessee Department of Economic and Community Development may by instructions require, and also, a clause requiring the subcontractors to include these clauses in any lower tier subcontracts which they may enter into, together with a clause requiring this insertion in any further subcontracts that may in turn be made.

F. INTEREST OF MEMBER OF OR DELEGATE TO CONGRESS

No member of or Delegate to Congress, or Resident Commissioner, shall be admitted to any share or part of this contract or to any benefit that may arise therefrom, but this provision shall not be construed to extent to this contract if made with a corporation for its general benefit.

G. OTHER PROHIBITED INTEREST

No official of the Owner who is authorized in such capacity and on behalf of the Owner to negotiate, make, accept or approve, or to take part in negotiating, making, accepting, or approving any architectural, engineering, inspection, construction or material supply contract or any subcontract in connection with the construction of the project, shall become directly or indirectly interested personally in this contract or in any part hereof. No officer, employee, architect, attorney, engineer or inspector of or for the Owner who is authorized in such capacity and on behalf of the Owner to exercise any legislative, executive, supervisory or other similar functions in connection with the construction of the project, shall become directly or indirectly interested personally in this contract or in any part thereof, any material supply contract, subcontract, insurance contract, or any other contract pertaining to the project.

H. USE AND OCCUPANCY PRIOR TO ACCEPTANCE BY OWNER

The Contractor agrees to the use and occupancy of a portion or unit of the project before formal acceptance by the Owner, provided the Owner:

(1) Secures written consent of the Contractor except in the event, in the opinion of the Architect/Engineer, the Contractor is chargeable with unwarranted delay in final clean-up of punch list items or other contract requirements.

(2) Secures endorsement from the insurance carrier and consent of the surety permitting occupancy of the building or use of the project during the remaining period of construction, or,

(3) When the project consists of more than one building, and one of the buildings is occupied, secures permanent fire and extended coverage insurance, including a permit to complete construction. Consent of the surety must also be obtained.

I. PHOTOGRAPHS OF THE PROJECT

If required by the Owner, the Contractor shall furnish photographs of the project, in the quantities and as described in the Supplemental General Conditions.

J. SUSPENSION OF WORK

Should the Owner be prevented or enjoined from proceeding with work either before or after the start of construction by reason of any litigation or other reason beyond the control of the Owner, the Contractor shall not be entitled to make or assert claim for damage by reason of said delay; but time for completion of the work will be extended to such reasonable time as the Owner may determine will compensate for time lost by such delay with such determination to be set forth in writing.

4. PAYMENTS TO COVERED WORKERS

A. DEFINITIONS

(1) *"Apprentices*" means those persons registered individually under a bona fide apprenticeship program registered with the Bureau of Apprenticeship and Training in the United States Department of Labor. The contractor or subcontractor using the apprentice must submit evidence of his/her indenture and/or apprenticeship registration when the apprentice's name first appears on a submitted payroll.

(2) *"Commission"* means the prevailing wage commission or its administrative delegation, the Tennessee Department of Labor.

(3) "*Covered Worker*" means all workers employed on State construction projects as defined by T.C.A. §12.-4-402(c).

(4) *"Subcontractor"* means one who performs part of the job called for in the prime contract. This term shall include materialmen whose employees engage in substantial operations at the project site, provided the employee of the materialman devotes as much as 20 percent of his work time on the construction premises.

B. PREVAILING WAGE RATE DETERMINATION

For those projects involving road construction, all covered workers shall receive the wages specified for their respective classifications in the prevailing wage determination and in accordance with the policies, conditions and rules of the State of Tennessee Department of Labor pursuant to the Prevailing Wage Act of 1975, as amended.

The current wage rate determination is bound herein or will be issued by addendum.

C. CLASSIFICATION OF COVERED WORKERS

For those projects involving road construction, all contractors and subcontractors must classify covered workers in the contract and payroll records, in conformity with the schedule of classifications appearing in the Department of Labor form "Wage Rate Determination."

D. POSTING OF WAGE RATES

For those projects involving road construction, each contractor or subcontractor shall post and keep posted in a conspicuous place at the site of the construction work a copy of the prevailing wage rates prescribed in this contract and make these rates available to all covered workers employed on this project at all reasonable times.

E. OVERTIME COMPENSATION

All contractors and subcontractors must pay overtime compensation as required

by any applicable Federal or State laws, rules or regulations.

F. DEDUCTIONS

The contractors and all subcontractors shall make only those deductions from wages authorized by law.

G. SUBMITTAL OF PAYROLLS

The contractors and all subcontractors shall submit weekly a copy of all payrolls to the contracting agency and shall state that the payrolls are correct and complete, and that the wage rates paid to covered workers during the reporting period equal or exceed those determined by the Commission, and that the classifications set forth for each covered worker conform with the work s/he performs.

H. INSPECTION OF RECORDS

The contractor will make his/her employment records available for inspection by representatives of the contracting agency, the Commission, and the Tennessee Department of Labor, and will permit such representatives to visit construction projects at all reasonable times. Payroll records shall not be destroyed for one (1) year following the completion of the project.

I. UNDERPAYMENTS OF WAGES

Underpayment for covered workers shall be handled in accordance with policies and conditions of the Tennessee Department of Labor.

J. BOND FOR COMPLIANCE

The bond of the contractor or subcontractor shall contain a provision obligating such contractor or subcontractor to a faithful performance of each and every requirement imposed upon such contractor or subcontractor under the terms of this contract.

K. SUBCONTRACTS

The contractor shall insert in any subcontracts the clauses set forth in Section 4 and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts which they may enter into, together with a clause requiring this insertion in any further subcontracts that may in turn be made.

5. CERTIFICATION OF ELIGIBILITY

By entering into this contract, the contractor certifies that neither if (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts.

6. EMPLOYMENT PRACTICES

The Contractor (1) shall, to the greatest extent practicable, following hiring and employment practices for work on the project which will provide new job opportunities for the unemployment and underemployed, and (2) shall insert or cause to be inserted the same provisions in each construction subcontract.

7. SPECIAL HAZARDS

The Contractor's and his Subcontractors Public Liability and Property Damage Insurance shall provide adequate protection against the following special hazards:

8. CONTRACTOR'S AND SUBCONTRACTOR'S PUBLIC LIABILITY, VEHICLE LIABILITY, AND PROPERTY DAMAGE INSURANCE

As required under Article 5 of the General Conditions, the Contractor's Public Liability Insurance and Vehicle Liability Insurance shall be in an amount not less than $\$$ 1,000,000.00 for injuries, including accidental death, to any one person, and subject to the same limit for each person, in an amount not less than $\$$ 1,000,000.00 on account of one accident, and Contractor's Property Damage Insurance in an amount not less than $\$$ 1,000,000.00.

The Contractor shall either (1) require each of his subcontractors to procure and to maintain during the life of his subcontract, Subcontractor's Public Liability and Property Damage of this type and in the same amounts as specified in the preceding paragraph, and (2) insure the activities of his subcontractors in his own policy.

9. PHOTOGRAPHS OF PROJECT

As provided in Paragraph 3.1 of the Supplemental General Conditions, the Contractor will furnish photographs in the number, type, and stage as enumerated below:

10. SCHEDULE OF OCCUPATIONAL CLASSIFICATIONS AND MINIMUM HOURLY WAGE RATES AS REQUIRED UNDER PARAGRAPH 4.B OF THE SUPPLEMENTAL GENERAL CONDITIONS

Given on Pages 43 through 47.

11. BUILDER'S RISK INSURANCE

As provided in the General Conditions, Article 5.6, the Contractor ~~will~~/will not* maintain Builder's Risk Insurance (fire and extended coverage) on a 100 percent completed value basis on the insurable portions of the project for the benefit of the Owner, the Contractor, and all Subcontractors, as their interests may appear.

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* Strike out one.

12. SPECIAL EQUAL OPPORTUNITY PROVISIONS

A. The Contractor shall take specific affirmative actions to ensure equal employment opportunity. The evaluation of the Contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The Contractor shall document these efforts fully, and shall implement affirmative action steps at least as extensive as the following:

(1) Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites, and in all facilities at which the Contractor's employees are assigned to work. The Contractor, where possible, will assign two or more women to each construction project. The Contractor shall specifically ensure that all foremen, superintendents, and other on-site supervisory personnel are aware of and carry out the Contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at such sites or in such facilities.

(2) Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the Contractor or its unions have employment opportunities available, and maintain a record of the organizations' responses.

(3) Maintain a current file of the names, addresses, and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source, or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the Contractor by the union or, if referred, not employed by the Contractor, this shall be documented in the file with the reason therefor, along with whatever additional actions the Contractor may have taken.

(4) Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs, especially those programs funded or approved by the Department of Labor. The Contractor shall provide notice of these programs to the sources compiled under b above.

(5) Disseminate the Contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the Contractor in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc; by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where

construction work is performed.

(6) Review, at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination, or other employment decisions including specific review of these items with on-site supervisory personnel such as Superintendents, General Foremen, etc., prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.

(7) Disseminate the Contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written notification to and discussing the Contractor's EEO policy with other Contractors and Subcontractors with whom the Contractor does or anticipates doing business.

(8) Direct its recruitment efforts, both oral and written, to minority, female and community organizations, to schools with minority and female students and to minority and female recruitment and training organizations serving the Contractor's recruitment area and employment needs. Not later than one month prior to the date of the acceptance of applications for apprenticeship or other training by any recruitment source, the Contractor shall send written notification to organizations such as the above, describing the openings, screening procedures, and tests to be used in the selection process.

(9) Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer, and vacation employment to minority and female youth both on the site and in other areas of a Contractor's work force.

B. Contractors are encouraged to participate in voluntary associations which assist in fulfilling one or more of their affirmative action obligations a through p. The efforts of a contractor association, joint contractor-union, contractor-community, or other similar group of which the Contractor is a member and participant, may be asserted as fulfilling any one or more of its obligations under a through p of these Specifications provided that the Contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the Contractor's minority and female workforce participation, makes a good faith effort to meet its individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the Contractor. The obligation shall not be a defense for the Contractor's non-compliance.

C. The Contractor shall designate a responsible official to monitor all employment related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the

Government and to keep records. Records shall at least include for each employee, the name, address, telephone numbers, construction trade, union affiliation if any, employee identification number where assigned, social security number, race, sex, status (e.g., mechanic, apprentice trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and location at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, contractor shall not be required to maintain separate records.

D. CERTIFICATION OF NON-SEGREGATED FACILITIES (OVER $10,000)

By the submission of this bid, the bidder, offeror, applicant or subcontractor certifies that s/he does not maintain or provide for his/her employees any segregated facility at any of his/her establishments, and that s/he does not permit employees to perform their services at any location, under his/her control, where segregated facilities are maintained. S/He certifies further that s/he will not maintain or provide for employees any segregated facilities at any of his/her establishments, and s/he will not permit employees to perform their services at any location under his/her control where segregated facilities are maintained. The bidder, offeror, applicant or subcontractor agrees that a breach of this certification is a violation of the Equal Opportunity Clause of this contract. As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms, and other storage or dressing areas, *transportation and housing facilities provided for employees which are segregated on the basis of race, color, religion, or are in fact segregated on the basis of race, color, religion, or otherwise. S/He further agrees that (except where s/he has obtained identical certifications from proposed subcontractors for specific time periods) s/he will obtain identical certification from proposed subcontractors prior to the award of subcontracts exceeding $10,000 which are not exempt from the provisions of the Equal Opportunity Clause; that s/he will retain such certifications in his/her files; and that s/he will forward the following notice to such proposed subcontractors (except where proposed subcontractors have submitted identical certifications for specific time periods).

E. CIVIL RIGHTS ACT OF 1964

Under Title VI of the Civil Rights Act of 1964, no person shall, on the grounds of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance.

F. AGE DISCRIMINATION ACT OF 1975

No person in the United States shall, on the basis of age, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under, any program or activity receiving Federal financial assistance.

* parking lots, drinking fountains, recreation or entertainment areas.

G. SECTION 504 HANDICAPPED

Non-Discrimination for Handicapped Workers

(a) No otherwise qualified handicapped individual in the U.S., as defined in Section 7, Paragraph 6 of the Rehabilitation Act of 1973 shall, solely by reason of this handicap, be excluded from the participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance.

13. SPECIAL CONDITIONS PERTAINING to HAZARDS SAFETY STANDARDS and ACCIDENT PREVENTION

A. USE OF EXPLOSIVES (MODIFY AS REQUIRED)

When the use of explosives is necessary for the prosecution of the work, the Contractor shall observe all local, state and Federal laws in purchasing and handling explosives. The Contractor shall take all necessary precautions to protect completed work, neighboring property, water lines, or other underground structures. Where there is danger to structures or property from blasting, the charges shall be reduced and the material shall be covered with suitable timber, steel or rope mats.

The Contractor shall notify all owners of public utility property of intention to use explosives at least eight hours before blasting is done, close to such property. Any supervision or direction of use of explosives by the engineer, does not in any way reduce the responsibility of the Contractor or his Surety for damages that may be caused by such use.

B. DANGER SIGNALS AND SAFETY DEVICES (MODIFY AS REQUIRED)

The Contractor shall make all necessary precautions to guard against damages to property and injury to persons. He shall put up and maintain in good condition, sufficient red or warning lights at night, suitable barricades and other devices necessary to protect the public. In case the Contractor fails or neglects to take such precautions, the Owner may have such lights and barricades installed and charge the cost of this work to the Contractor. Such action by the Owner does not relieve the Contractor of any liability incurred under these specifications or contract.

14. FLOOD DISASTER PROTECTION

This Contract is subject to the requirements of the Flood Disaster Protection Act of 1973 (P.L. 93-234). Nothing included as a part of this Contract is approved for acquisition or construction purposes as defined under Section 3(a) of said Act, for use in an area identified by the Secretary of HUD as having special flood hazards which is located in a community not then in compliance with the requirements for participation in the national flood insurance program pursuant to Section 201(d) of said Act; and the use of any assistance provided under this

Contract for such acquisition or construction in such identified areas in communities then participating in the national flood insurance program shall be subject to the mandatory purchase of flood insurance requirements of Section 102(a) of said Act.

Any contract or agreement for the sale, lease, or other transfer of land acquired, cleared or improved with assistance provided under this Contract shall contain, if such land is located in an area identified by the Secretary as having special flood hazards and in which the sale of flood insurance has been made available under the National Flood Insurance Act of 1968, as amended, 42 U.S.C. 4001 et seq., provisions obligating the transferee and its successors or assigns to obtain and maintain, during the ownership of such land, such flood insurance as required with respect to financial assistance for acquisition or construction purposes under section 102(a) of the Flood Disaster Protection Act of 1973.

15. ACCESS TO RECORDS/MAINTENANCE OF RECORDS

The Contractor shall maintain accounts and records, including personnel, property, and financial records, adequate to identify and account for all costs pertaining to the contract and such other records as may be deemed necessary by the locality to assure proper accounting for all funds. These records will be available for audit purposes to the locality or the State or any other authorized representative, and will be retained for three years after contract completion unless permission to destroy them is granted by the locality. Moreover, the locality, State, or any authorized representative shall have access to any books, documents, papers, and records of the Contractor which are directly pertinent to this contract for the purpose of making audit, examination, excerpts, and transcriptions.

16. CONFLICT OF INTEREST OF OFFICERS OR EMPLOYEES OF THE LOCAL JURISDICTION, MEMBERS OF THE LOCAL GOVERNING BODY, OR OTHER PUBLIC OFFICALS

No officer or employee of the local jurisdiction or its designees or agents, no member of the governing body, and no other public official of the locality who exercises any function or responsibility with respect to this contract, during his/her tenure or for one year thereafter, shall have any interest, direct or indirect, in any contract or subcontract, or the proceeds thereof, for work to be performed. Further, the contractor shall cause to be incorporated in all subcontracts the language set forth in this paragraph prohibiting conflict of interest.

TECHNICAL SPECIFICATIONS
TABLE OF CONTENTS

END OF SECTION

SECTION 01 1000
SUMMARY

PART 1 GENERAL

1.01 PROJECT

A. Project Name: Site Development Grant - I-40 Advantage Frontage Road

B. Owner's Name: Haywood County, TN.

C. Engineer's Name: A2H, Inc..

D. The Project consists of the construction of sitework as described in the drawings and project manual.

1.02 CONTRACT DESCRIPTION

A. The work of each separate prime contract is identified in this section and on Drawings.

1.03 DESCRIPTION OF CONSTRUCTION WORK

A. Scope of construction work is shown on drawings and specified in other sections.

B. Civil: The proposed improvement is adding a Frontage Road which includes three 12-foot lanes with 6-foot paved shoulders. Also in the project will be a 12” waterline extension along the new roadway with several fire hydrants.

C. Notice: In no event is a product to be used in this project known to contain any hazardous or toxic waste or material, radioactive materials, or other contaminants, the removal of which is required or the maintenance of which is prohibited, regulated or penalized by any local, state, or federal agency, authority or governmental unit. If any product is inadvertently specified which contains such materials, it is the Contractor’s, subcontractor’s and supplier’s obligation and duty to advise the Engineer of this fact prior to the ordering and/or installing of the product or material.

1.04 DESCRIPTION OF ALTERATIONS WORK

A. Scope of demolition and removal work is indicated on drawings and specified in Section 02 4100.

1.05 WORK SEQUENCE

A. Coordinate construction schedule and operations with Engineer.

1.06 ACCIDENT PREVENTION

A. Contractor shall comply with safety and engineering practices set forth in "Manual of Accident Prevention in Construction", published by Associated General Contractors of America and with all applicable state and local safety and sanitary laws, regulations and ordinances, as well as established safety rules and practices of Owner. Contractor shall, at his own expense, properly protect Owner's property from injury and shall make good any damage to same caused by failure to exercise required care during this work.

B. Contractor shall provide properly maintained warning signs, lights, barricades, railing and other safeguards for protection of workmen and others on or about or adjacent to the work.

C. Contractor shall provide his employees with approved eye protection, protective head gear, etc., while performing work required for this project.

1.07 FIRE-PREVENTION AND PROTECTION

A. Contractor shall take all necessary precautions to guard against and eliminate all possible fire hazards and to prevent damage to any work, equipment and building.

1.08 SPECIFICATION SECTIONS APPLICABLE TO ALL CONTRACTS

A. Unless otherwise noted, all provisions of the sections listed below apply to all contracts. Specific items of work listed under individual contract descriptions constitute exceptions.

B. Section 01 2000 - Price and Payment Procedures.

C. Section 01 3000 - Administrative Requirements.
D. Section 01 4000 - Quality Requirements.
E. Section 01 4100 - Regulatory Requirements.
F. Section 01 4216 - Definitions.
G. Section 01 7000 - Execution and Closeout Requirements.
H. Section 01 7800 - Closeout Submittals.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 2000
PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Procedures for preparation and submittal of applications for progress payments.

B. Documentation of changes in Contract Sum and Contract Time.

C. Change procedures.

D. Correlation of Contractor submittals based on changes.

E. Procedures for preparation and submittal of application for final payment.

1.02 RELATED REQUIREMENTS

1.03 SCHEDULE OF VALUES

A. Use Schedule of Values Form.

B. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit draft to Engineer for approval.

C. Forms filled out by hand will not be accepted.

D. Submit Schedule of Values in duplicate within 15 days after date of Owner-Contractor Agreement.

E. Format: Utilize the Table of Contents of this Project Manual. Identify each line item with number and title of the specification section. Identify site mobilization.

F. Include in each line item, the amount of Allowances specified in this section. For unit cost Allowances, identify quantities taken from Contract Documents multiplied by the unit cost to achieve the total for the item.

G. Include separately from each line item, a direct proportional amount of Contractor's overhead and profit.

H. Revise schedule to list approved Change Orders, with each Application For Payment.

1.04 APPLICATIONS FOR PROGRESS PAYMENTS

A. Payment Period: Submit at intervals stipulated in the Agreement.

B. Use Form supplied y Engineer.

C. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Engineer for approval.

D. Forms filled out by hand will not be accepted.

E. For each item, provide a column for listing each of the following:
   1. Item Number.
   2. Description of work.
   3. Scheduled Values.
   4. Previous Applications.
   5. Work in Place and Stored Materials under this Application.
   6. Authorized Change Orders.
   7. Total Completed and Stored to Date of Application.
   8. Percentage of Completion.
   9. Balance to Finish.
   10. Retainage.

F. Execute certification by signature of authorized officer.

G. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for stored products.

H. List each authorized Change Order as a separate line item, listing Change Order number and dollar amount as for an original item of work.

I. Submit one electronic and three hard-copies of each Application for Payment.

J. Include the following with the application:
   1. Transmittal letter as specified for submittals in Section 01 3000.
   2. Construction progress schedule, revised and current as specified in Section 01 3000.
   3. Current construction photographs specified in Section 01 3000.
   4. Partial release of liens from major subcontractors and vendors.

K. When Engineer requires substantiating information, submit data justifying dollar amounts in question. Provide one copy of data with cover letter for each copy of submittal. Show application number and date, and line item by number and description.

1.05 MODIFICATION PROCEDURES

A. Submit name of the individual authorized to receive change documents and who will be responsible for informing others in Contractor's employ or subcontractors of changes to Contract Documents.

B. For minor changes not involving an adjustment to the Contract Sum or Contract Time, Engineer will issue instructions directly to Contractor.

C. For other required changes, Engineer will issue a document signed by Owner instructing Contractor to proceed with the change, for subsequent inclusion in a Change Order.
   1. The document will describe the required changes and will designate method of determining any change in Contract Sum or Contract Time.
   2. Promptly execute the change.

D. For changes for which advance pricing is desired, Engineer will issue a document that includes a detailed description of a proposed change with supplementary or revised drawings and specifications, a change in Contract Time for executing the change with a stipulation of any overtime work required and the period of time during which the requested price will be considered valid. Contractor shall prepare and submit a fixed price quotation within 7 days.

E. Contractor may propose a change by submitting a request for change to Engineer, describing the proposed change and its full effect on the work, with a statement describing the reason for the change, and the effect on the Contract Sum and Contract Time with full documentation. Document any requested substitutions in accordance with Section 01 6000.

F. Computation of Change in Contract Amount: As specified in the Agreement and Conditions of the Contract.
   1. For change requested by Engineer for work falling under a fixed price contract, the amount will be based on Contractor's price quotation.
   2. For change requested by Contractor, the amount will be based on the Contractor's request for a Change Order as approved by Engineer.
   3. For pre-determined unit prices and quantities, the amount will based on the fixed unit prices.
   4. For change ordered by Engineer without a quotation from Contractor, the amount will be determined by Engineer based on the Contractor's substantiation of costs as specified for Time and Material work.

G. Substantiation of Costs: Provide full information required for evaluation.
   1. On request, provide the following data:
      a. Quantities of products, labor, and equipment.
      b. Taxes, insurance, and bonds.
      c. Overhead and profit.
      d. Justification for any change in Contract Time.
      e. Credit for deletions from Contract, similarly documented.
   2. Support each claim for additional costs with additional information:

a. Origin and date of claim.
b. Dates and times work was performed, and by whom.
c. Time records and wage rates paid.
d. Invoices and receipts for products, equipment, and subcontracts, similarly documented.

3. For Time and Material work, submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract.

H. Execution of Change Orders: Engineer will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.

I. After execution of Change Order, promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Sum.

J. Promptly revise progress schedules to reflect any change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.

K. Promptly enter changes in Project Record Documents.

1.06 APPLICATION FOR FINAL PAYMENT

A. Prepare Application for Final Payment as specified for progress payments, identifying total adjusted Contract Sum, previous payments, and sum remaining due.

B. Application for Final Payment will not be considered until the following have been accomplished:
1. All closeout procedures specified in Section 01 7000.
2. Completion of items specified for completion beyond time of substantial completion (regardless of whether payment application was previously made).
3. Assurance, satisfactory to the Owner, that unsettled claims will be settled and that work not actually completed and accepted will be completed without undue delay.
4. Transmittal of required project construction records to Owner.
5. Proof, satisfactory to Owner, that taxes, fees and similar obligations of Contractor have been paid.
6. Removal of temporary facilities, services, surplus materials, rubbish and similar elements.
7. Change over of door locks and other Contractor's access provisions to Owner's property.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 2664
WEATHER DAYS

PART 1 GENERAL

1.01 REQUIREMENTS

A. Wet Conditions: The required time of completion is given in calendar days in the Bid Form (which becomes part of the Contract). It is expressly understood and agreed, by and between the Contractor and Owner, that the time for completion of the work described in the bid form is a reasonable time for completion of the same, taking into consideration the average climatic range and usual lost time due to normal seasonal weather in this locality.

1. Time for completion in the Bid Form includes the average number of days that are lost due to wet conditions. The table below shows the average number of days lost in each month due to wet conditions on outdoor or exposed interior work of projects. These days are derived from historical data provided by the National Climatic Data Center regarding rainfall for Memphis, TN and Nashville, TN. They represent a number less than the actual number of days of measurable rainfall that can be expected to occur during a twenty-four (24) hour period for the months indicated.

MONTH	AVERAGE DAYS LOST TO NORMAL WET CONDITIONS
January	8
February	8
March	8
April	9
May	7
June	4
July	6
August	5
September	7
October	6
November	6
December	7

2. Based on rainfall data provided by the National Climatic Data Center for Memphis and Nashville. The total contract time includes these days that are expected to be lost each month.
    a. Definition of Rain Day: Precipitation (rain, snow, or ice) in excess of one-tenth of an inch (0.10") liquid measure in a 24 hour period.

B. Ice, Standing Snow and Frozen Ground:

1. In addition to work being delayed due to wet conditions (See 1.01 A. above), it is recognized that the work may also be delayed due to certain conditions relating to ice, snow and frozen ground; and loss of working time may also be claimed for such last mentioned conditions in accordance with the provisions of this paragraph. The average number of days lost per month in this locality due to ice, standing snow and frozen ground conditions shall be considered zero, however, lost days due to ice, standing snow and frozen ground conditions may be claimed if it is caused by one or more of the following conditions which prevent outside construction activity or access to the site within a 24-hour period:
    a. Ice which does not melt on a substantial portion of the project by 10 A.M.
    b. Temperatures which do not rise above 32 degrees F by 10 A.M.
    c. Standing snow in excess of one inch (1.00”).
    d. Precipitation (rain, snow, or ice) in excess of one-tenth of an inch (0.10") liquid measure in a 24 hour period.

C. Further Provisions Regarding Time for Completion:

1. A weather delay day may be counted, if appropriate, for dry-out days when the following conditions are met:

a. If there is a hindrance to site access; work on the envelope of the building such as masonry or roofing; site work such as excavation, backfill, or footings; and site improvements such as paving.
b. At a rate no greater than one (1) make-up day for each day or consecutive days of rain beyond the Standard Baseline that total one inch (1.00”) or more, liquid measure.

2. A weather delay day may be counted only if worse than average weather prevents work on the project for 50 percent or more of the Contractor’s scheduled work day.
3. The Contractor must submit Daily Jobsite Work Log showing which and to what extent construction activities have been affected by weather, on a monthly basis.
4. The Contractor must submit actual weather data to support a claim for the time extension obtained from nearest NOAA weather station or other independently verified source approved by the Owner at the beginning of the project.
5. The Contractor must maintain a rain gauge, thermometer and clock at the job site. Keep daily records of precipitation, temperature and the time of each occurrence throughout the project.
6. The Contractor must organize claim and documentation to facilitate evaluation on a basis of calendar month periods, and submit monthly to the Owner.
7. If an extension of the contract time is appropriate, it shall be effected in accordance with the provisions of the General Conditions of this contract.
8. No extra cost will be incurred by the Owner for any extra time increase to the contract.

1.02 EXAMPLE

A. The following example is given for further clarification of how extra time for wet conditions and/or ice, standing snow and frozen ground is to be calculated. If wet conditions were to occur for a total of sixteen (16) days during the month of January, then the extra contract time allowed would be 16 days minus 8 days (from table above), or 8 days which may be rounded up to the nearest whole day. Also, if during the same month there was standing snow on any combination of conditions as in above for three (3) days, then the Contractor would be allowed an extra 3.0 days in addition to the 8.0 days for wet conditions. The Contractor would get a total of 11.0 extra days. No extra cost will be incurred by the Owner for any extra time increase to the Contract.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 01 2664

SECTION 01 3000
ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Preconstruction meeting.

B. Progress meetings.

C. Construction progress schedule.

D. Progress photographs.

E. Submittals for review and project closeout.

F. Number of copies of submittals.

G. Requests for Interpretation (RFI) procedures.

H. Submittal procedures.

1.02 RELATED REQUIREMENTS

A. Section 01 7000 - Execution and Closeout Requirements: Additional coordination requirements.

B. Section 01 7800 - Closeout Submittals: Project record documents; operation and maintenance data; warranties and bonds.

1.03 PROJECT COORDINATOR

A. Contractor is responsible for Project Coordination.

B. Coordinate allocation of mobilization areas of site; for field offices and sheds, storage of materials, for access, traffic, and parking facilities.

C. Coordinate use of site and facilities during construction.

D. Coordinate and comply with procedures for intra-project communications; submittals, reports and records, schedules, coordination drawings, and recommendations; and resolution of ambiguities and conflicts.

E. Coordinate use of temporary utilities and construction facilities.

F. Coordinate field engineering and layout work.

G. Coordinate and make the following types of submittals to Engineer:
   1. Requests for interpretation.
   2. Requests for substitution.
   3. Shop drawings, product data, and samples.
   4. Test and inspection reports.
   5. Design data.
   6. Manufacturer's instructions and field reports.
   7. Applications for payment and change order requests.
   8. Progress schedules.
   9. Coordination drawings.
   10. Correction Punch List and Final Correction Punch List for Substantial Completion.
   11. Closeout submittals.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRECONSTRUCTION MEETING

A. Engineer will schedule a meeting after Notice of Award.

B. Attendance Required:
   1. Owner.

2. Engineer.
3. Contractor.
4. Representatives of the major subcontractors.
5. Other representatives.

C. Agenda:
1. Execution of Owner-Contractor Agreement.
2. Submission of executed bonds and insurance certificates.
3. Distribution of Contract Documents.
4. Submission of list of subcontractors, list of products, schedule of values, and progress schedule.
5. Submission of initial Submittal schedule.
6. Designation of personnel representing the parties to Contract, Owner Contractor and Engineer.
7. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
8. Major equipment deliveries and priorities, handling of materials to permit inspection, storage of material off-site.
9. Scheduling. Sequence of critical work. Review of schedules.
10. Trades whose work will require pre-start up and workmanship review meetings.
11. Use of premises, access to site, field office and storage areas, security procedures and Owner's requirements.
12. Payment procedures after substantial completion.
13. Additional items and subjects requested by the Owner, Contractor and Engineer.
14. Scheduling activities of a Geotechnical Engineer.

D. Engineer will act as chairperson of the meeting; record minutes and distribute copies within two days after meeting to participants, with one copy to Engineer, Contractor, participants, and those affected by decisions made.

3.02 PROGRESS MEETINGS

A. Schedule and administer meetings throughout progress of the work at maximum bi-monthly intervals.

B. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.

C. Attendance Required: Job superintendent, major Subcontractors and suppliers, Owner, Engineer, others as appropriate to agenda topics for each meeting.

D. Agenda:
1. Review minutes of previous meetings.
2. Review of work progress.
3. Field observations, problems, and decisions.
4. Identification of problems that impede, or will impede, planned progress.
5. Review of submittals schedule and status of submittals.
6. Review of RFIs log and status of responses.
7. Review of off-site fabrication and delivery schedules.
8. Maintenance of progress schedule.
9. Corrective measures to regain projected schedules.
10. Planned progress during succeeding work period.
11. Coordination of projected progress.
12. Maintenance of quality and work standards.
13. Effect of proposed changes on progress schedule and coordination.
14. Other business relating to Work. Other current business.

E. Record minutes and distribute copies within two days after meeting to participants, with one copy to Engineer, Owner, participants, and those affected by decisions made.

3.03 CONSTRUCTION PROGRESS SCHEDULE

A. Within 10 days after date of the Agreement, submit preliminary schedule defining planned operations for the first 60 days of work, with a general outline for remainder of work.

B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.

C. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.
   1. Include written certification that major contractors have reviewed and accepted proposed schedule.

D. Within 10 days after joint review, submit complete schedule.

E. Submit updated schedule with each Application for Payment.

3.04 REQUESTS FOR INTERPRETATION (RFI)

A. Definition: A request seeking one of the following:
   1. An interpretation, amplification, or clarification of some requirement of Contract Documents arising from inability to determine from them the exact material, process, or system to be installed; or when the elements of construction are required to occupy the same space (interference); or when an item of work is described differently at more than one place in Contract Documents.
   2. A resolution to an issue which has arisen due to field conditions and affects design intent.

B. Whenever possible, request clarifications at the next appropriate project progress meeting, with response entered into meeting minutes, rendering unnecessary the issuance of a formal RFI.

C. Preparation: Prepare an RFI immediately upon discovery of a need for interpretation of Contract Documents. Failure to submit a RFI in a timely manner is not a legitimate cause for claiming additional costs or delays in execution of the work.
   1. Prepare a separate RFI for each specific item.
      a. Review, coordinate, and comment on requests originating with subcontractors and/or materials suppliers.
      b. Do not forward requests which solely require internal coordination between subcontractors.
   2. Prepare using an electronic version of the form appended to this section.
   3. Combine RFI and its attachments into a single electronic file. PDF format is preferred.

D. Reason for the RFI: Prior to initiation of an RFI, carefully study all Contract Documents to confirm that information sufficient for their interpretation is definitely not included.
   1. Include in each request Contractor's signature attesting to good faith effort to determine from Contract Documents information requiring interpretation.
   2. Unacceptable Uses for RFIs: Do not use RFIs to request the following:
      a. Approval of submittals (use procedures specified elsewhere in this section).
      b. Approval of substitutions.
      c. Changes that entail change in Contract Time and Contract Sum (comply with provisions of the Conditions of the Contract).
      d. Different methods of performing work than those indicated in the Contract Drawings and Specifications (comply with provisions of the Conditions of the Contract).
   3. Improper RFIs: Requests not prepared in compliance with requirements of this section, and/or missing key information required to render an actionable response. They will be returned without a response, with an explanatory notation.
   4. Frivolous RFIs: Requests regarding information that is clearly indicated on, or reasonably inferable from, Contract Documents, with no additional input required to clarify the question. They will be returned without a response, with an explanatory notation.
      a. The Owner reserves the right to assess the Contractor for the costs (on time-and-materials basis) incurred by the Engineer, and any of its consultants, due to processing of such RFIs.

E. Content: Include identifiers necessary for tracking the status of each RFI, and information necessary to provide an actionable response.
   1. Official Project name and number, and any additional required identifiers established in Contract Documents.
   2. Owner's, Engineer's, and Contractor's names.
   3. Discrete and consecutive RFI number, and descriptive subject/title.
   4. Issue date, and requested reply date.
   5. Reference to particular Contract Document(s) requiring additional information/interpretation. Identify pertinent drawing and detail number and/or specification section number, title, and paragraph(s).
   6. Annotations: Field dimensions and/or description of conditions which have engendered the request.
   7. Contractor's suggested resolution: A written and/or a graphic solution, to scale, is required in cases where clarification of coordination issues is involved, for example; routing, clearances, and/or specific locations of work shown diagrammatically in Contract Documents. If applicable, state the likely impact of the suggested resolution on Contract Time or the Contract Sum.

F. Attachments: Include sketches, coordination drawings, descriptions, photos, submittals, and other information necessary to substantiate the reason for the request.

G. RFI Log: Prepare and maintain a tabular log of RFIs for the duration of the project.
   1. Indicate current status of every RFI. Update log promptly and on a regular basis.
   2. Note dates of when each request is made, and when a response is received.
   3. Highlight items requiring priority or expedited response.
   4. Highlight items for which a timely response has not been received to date.
   5. Identify and include improper or frivolous RFIs.

H. Review Time: Engineer will respond and return RFIs to Contractor within seven calendar days of receipt. For the purpose of establishing the start of the mandated response period, RFIs received after 12:00 noon will be considered as having been received on the following regular working day.
   1. Response period may be shortened or lengthened for specific items, subject to mutual agreement, and recorded in a timely manner in progress meeting minutes.

I. Responses: Content of answered RFIs will not constitute in any manner a directive or authorization to perform extra work or delay the project. If in Contractor's belief it is likely to lead to a change to Contract Sum or Contract Time, promptly issue a notice to this effect, and follow up with an appropriate Change Order request to Owner.
   1. Response may include a request for additional information, in which case the original RFI will be deemed as having been answered, and an amended one is to be issued forthwith. Identify the amended RFI with an R suffix to the original number.
   2. Do not extend applicability of a response to specific item to encompass other similar conditions, unless specifically so noted in the response.
   3. Upon receipt of a response, promptly review and distribute it to all affected parties, and update the RFI Log.
   4. Notify Engineer within seven calendar days if an additional or corrected response is required by submitting an amended version of the original RFI, identified as specified above.

3.05 SUBMITTAL SCHEDULE

A. Submit to Engineer for review a schedule for submittals in tabular format.
   1. Submit at the same time as the preliminary schedule specified for the Construction Progress Schedule.
   2. Coordinate with Contractor's construction schedule and schedule of values.
   3. Format schedule to allow tracking of status of submittals throughout duration of construction.

4. Arrange information to include scheduled date for initial submittal, specification number and title, submittal category (for review or for information), description of item of work covered, and role and name of subcontractor.
5. Account for time required for preparation, review, manufacturing, fabrication and delivery when establishing submittal delivery and review deadline dates.
    a. For assemblies, equipment, systems comprised of multiple components and/or requiring detailed coordination with other work, allow for additional time to make corrections or revisions to initial submittals, and time for their review.

3.06 SUBMITTALS FOR REVIEW

A. When the following are specified in individual sections, submit them for review:
1. Product data.
2. Design data.
3. Shop drawings.
4. Other types indicated.

B. Submit to Engineer for review for the limited purpose of checking for compliance with information given and the design concept expressed in Contract Documents.

C. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01 7800 - Closeout Submittals.

3.07 SUBMITTALS FOR PROJECT CLOSEOUT

A. Submit Correction Punch List for Substantial Completion.

B. Submit Final Correction Punch List for Substantial Completion.

C. When the following are specified in individual sections, submit them at project closeout in compliance with requirements of Section 01 7800 - Closeout Submittals:
1. Project record documents.
2. Operation and maintenance data.
3. Warranties.
4. Bonds.
5. Other types as indicated.

D. Submit for Owner's benefit during and after project completion.

3.08 NUMBER OF COPIES OF SUBMITTALS

A. Electronic Documents for Review: Submit one electronic copy in PDF format; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.

B. Documents for Review:
1. Small Size Sheets, Not Larger Than 8-1/2 by 11 inches: Submit one copy; the Contractor shall make Contractor's own copies from original returned by the Engineer after making a file copy.
2. Larger Sheets, Not Larger Than 36 x 48 inches (910 x 1220 mm): Submit two opaque reproductions; one copy will be retained by Engineer.

C. Documents for Information: Submit one copy.

D. Extra Copies at Project Closeout: See Section 01 7800.

3.09 SUBMITTAL PROCEDURES

A. General Requirements:
1. All submittals to Architect/Engineer are to be sent via email to: submittals@a2h.com.
2. Use a single transmittal for related items.
3. Submit separate packages of submittals for review and submittals for information, when included in the same specification section.
4. Transmit using approved form.

a. Use Contractor's form, subject to prior approval by Engineer.

5. Sequentially identify each item. For revised submittals use original number and a sequential numerical suffix.
6. Identify: Project; Contractor; subcontractor or supplier; pertinent drawing and detail number; and specification section number and article/paragraph, as appropriate on each copy.
7. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the work and Contract Documents.
   a. Submittals from sources other than the Contractor, or without Contractor's stamp will not be acknowledged, reviewed, or returned.
8. Deliver each submittal on date noted in submittal schedule, unless an earlier date has been agreed to by all affected parties, and is of the benefit to the project.
   a. Deliver submittals to Engineer at business address.
   b. Send submittals in electronic format via email to Engineer.
9. Schedule submittals to expedite the Project, and coordinate submission of related items.
   a. For each submittal for review, allow 15 days excluding delivery time to and from the Contractor.
   b. For sequential reviews involving Engineer's consultants, Owner, or another affected party, allow an additional 7 days.
   c. For sequential reviews involving approval from authorities having jurisdiction (AHJ), in addition to Engineer's approval, allow an additional 30 days.
10. Identify variations from Contract Documents and product or system limitations that may be detrimental to successful performance of the completed work.
11. Provide space for Contractor and Engineer review stamps.
12. When revised for resubmission, identify all changes made since previous submission.
13. Distribute reviewed submittals. Instruct parties to promptly report inability to comply with requirements.
14. Incomplete submittals will not be reviewed, unless they are partial submittals for distinct portion(s) of the work, and have received prior approval for their use.
15. Submittals not requested will not be recognized or processed.

B. Product Data Procedures:
   1. Submit only information required by individual specification sections.
   2. Collect required information into a single submittal.
   3. Submit concurrently with related shop drawing submittal.
   4. Do not submit (Material) Safety Data Sheets for materials or products.
   5. Submit sustainable design reporting submittals under separate cover.

C. Shop Drawing Procedures:
   1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting Contract Documents and coordinating related work.
   2. Do not reproduce Contract Documents to create shop drawings.
   3. Generic, non-project-specific information submitted as shop drawings do not meet the requirements for shop drawings.

3.10 SUBMITTAL REVIEW

A. Submittals for Review: Engineer will review each submittal, and approve, or take other appropriate action.

B. Submittals for Information: Engineer will acknowledge receipt and review. See below for actions to be taken.

C. Engineer's actions will be reflected by marking each returned submittal using actual stamp on hard copies of submittals.
   1. Notations may be made directly on submitted items and/or listed on appended Submittal Review cover sheet.

D. Engineer's and consultants' actions on items submitted for review:
   1. Authorizing purchasing, fabrication, delivery, and installation:
      a. No Exceptions Taken: Where the submittal is marked "No Exceptions Taken," the Work covered by the submittal may proceed provided it complies with the Contract Documents. Final acceptance will depend on that compliance. Do not resubmit.
      b. Exceptions Taken As Noted: Where the submittal is marked " Exceptions Taken As Noted," the work covered by the submittal may proceed provided it complies both with Architect's notations on the submittal and the Contract Documents. Final acceptance will depend on that compliance. Do not resubmit.
      c. Make Corrections Noted: Where submittal is marked "Make Corrections Noted," the work covered by the submittal may proceed provided it complies both with Architect's correction notations on the submittal and the Contract Documents. Final acceptance will depend on that compliance. Do not resubmit.
   2. Not Authorizing fabrication, delivery, and installation:
      a. Revise and Resubmit: Where the submittal is marked "Revise and Resubmit," do not proceed with the Work covered by the submittal, including purchasing, fabrication, delivery, or other activity for the product submitted. Revise and prepare a new submittal according to Architect's notations and corrections.
      b. Submit Specified Item: Where the submittal is marked "Submit Specified Item," do not proceed with the Work covered by the submittal, including purchasing, fabrication, delivery, or other activity for the product submitted. Revise and prepare a new submittal according to Architect's notations and corrections.
      c. Rejected: Where the submittal is marked "Rejected," do not proceed with the Work covered by the submittal. Prepare a new submittal for a product that complies with the Contract Documents.

E. Engineer's and consultants' actions on items submitted for information:
   1. Items for which no action was taken:
      a. "Received" - to notify the Contractor that the submittal has been received for record only.
   2. Items for which action was taken:
      a. "Reviewed" - no further action is required from Contractor.

END OF SECTION

SECTION 01 4000
QUALITY REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Submittals.

B. Inspection agencies and services.

C. Control of installation.

D. Tolerances.

E. Defect Assessment.

1.02 RELATED REQUIREMENTS

A. Section 01 4216 - Definitions.

1.03 REFERENCE STANDARDS

A. ASTM C1021 - Standard Practice for Laboratories Engaged in Testing of Building Sealants; 2008 (Reapproved 2023).

B. ASTM C1077 - Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation; 2017.

C. ASTM C1093 - Standard Practice for Accreditation of Testing Agencies for Masonry; 2023.

D. ASTM D3740 - Standard Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction; 2019.

E. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection; 2021.

F. ASTM E543 - Standard Specification for Agencies Performing Nondestructive Testing; 2021.

G. ASTM E699 - Standard Specification for Agencies Involved in Testing, Quality Assurance, and Evaluating of Manufactured Building Components; 2016.

H. IAS AC89 - Accreditation Criteria for Testing Laboratories; 2021.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Design Data: Submit for Engineer's knowledge as contract administrator for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents, or for Owner's information.

C. Test Reports: After each test/inspection, promptly submit two copies of report to Engineer and to Contractor.
   1. Include:
      a. Date issued.
      b. Project title and number.
      c. Name of inspector.
      d. Date and time of sampling or inspection.
      e. Identification of product and specifications section.
      f. Location in the Project.
      g. Type of test/inspection.
      h. Date of test/inspection.
      i. Results of test/inspection.
      j. Compliance with Contract Documents.
      k. When requested by Engineer, provide interpretation of results.
   2. Test report submittals are for Engineer's knowledge as contract administrator for the limited purpose of assessing compliance with information given and the design concept

expressed in the Contract Documents, or for Owner's information.

1.05 TESTING AND INSPECTION AGENCIES AND SERVICES

A. Contractor shall employ and pay for services of an independent testing agency to perform other specified testing.

B. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

C. Contractor Employed Agency:
   1. Testing agency: Comply with requirements of ASTM E329, ASTM E543, ASTM E699, ASTM C1021, ASTM C1077, ASTM C1093, and ASTM D3740.
   2. Laboratory Qualifications: Accredited by IAS according to IAS AC89.
   3. Laboratory: Authorized to operate in the State in which the Project is located.
   4. Laboratory Staff: Maintain a full time registered Engineer on staff to review services.
   5. Testing Equipment: Calibrated at reasonable intervals either by NIST or using an NIST established Measurement Assurance Program, under a laboratory measurement quality assurance program.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.

B. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

C. Have work performed by persons qualified to produce required and specified quality.

D. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

3.02 TOLERANCES

A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

3.03 TESTING AND INSPECTION

A. See individual specification sections for testing and inspection required.

B. Testing Agency Duties:
   1. Test samples of mixes submitted by Contractor.
   2. Provide qualified personnel at site. Cooperate with Engineer and Contractor in performance of services.
   3. Perform specified sampling and testing of products in accordance with specified standards.
   4. Ascertain compliance of materials and mixes with requirements of Contract Documents.
   5. Promptly notify Engineer and Contractor of observed irregularities or non-compliance of Work or products.
   6. Perform additional tests and inspections required by Engineer.
   7. Attend preconstruction meetings and progress meetings.
   8. Submit reports of all tests/inspections specified.

C. Limits on Testing/Inspection Agency Authority:
   1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
   2. Agency may not approve or accept any portion of the Work.
   3. Agency may not assume any duties of Contractor.
   4. Agency has no authority to stop the Work.

D. Contractor Responsibilities:
   1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
   2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
   3. Provide incidental labor and facilities:
      a. To provide access to Work to be tested/inspected.
      b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
      c. To facilitate tests/inspections.
      d. To provide storage and curing of test samples.
   4. Notify Engineer and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
   5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
   6. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.

E. Re-testing required because of non-compliance with specified requirements shall be performed by the same agency on instructions by Engineer.

F. Re-testing required because of non-compliance with specified requirements shall be paid for by Contractor.

3.04 DEFECT ASSESSMENT

A. Replace Work or portions of the Work not complying with specified requirements.

END OF SECTION

SECTION 01 4216
DEFINITIONS

PART 1 GENERAL

1.01 SUMMARY

A. General Explanation: A substantial amount of specification language constitutes definitions for terms found in other contract documents, including the drawings which must be recognized as diagrammatic in nature and not completely descriptive of requirements indicated thereon. Certain terms used in the contract documents are defined generally in this article. Definitions and explanations of this section are not necessarily either complete or exclusive, but are general for the work to extents not stated more explicitly in another provisions of the contract documents. This section supplements the definitions contained in the General Conditions.

B. General Requirements: The provisions or requirements of Division 01 sections. General requirements apply to either work of contract and, where so indicated, to other elements of work which are included in the project. Other definitions are included in individual specification sections.

C. Other definitions are included in individual specification sections.

1.02 DEFINITIONS

A. Indicated: The term “Indicated” is a cross-reference to details, notes or schedules on the drawings, to other paragraphs or schedules in the Project Manual, and to similar means of recording requirements in the contract documents. Where terms such as “shown”, “noted”, “scheduled”, and “specified” are used in lieu of “indicated”, it is for the purpose of helping the reader locate cross-reference, and no limitation of location is intended except as specifically noted.

B. Directed, Requested, etc.: Where not otherwise explained, terms such as “directed”, “requested”, “authorized”, “selected”, “approved”, “required”, “accepted” and “permitted” mean “directed by Engineer”, “requested by Engineer”, etc. However, no such implied meaning will be interpreted to extend Engineer’s responsibility into Contractor’s area of construction supervision.

C. Approved: Where used in conjunction with Engineer’s response to submittals, requests, applications, inquiries, reports and claims by Contractor, the meaning of term “approved” will be held to limitations of Engineer’s responsibility and duties as specified in general and Supplementary Conditions. In no case will “approval” by Engineer be interpreted as a release of Contractor from responsibilities to fulfill requirements of the contract documents.

D. Project Site: The space available to Contractor for performance of the work, either exclusively or in conjunction with others performing other work as part of the project. The extent of project site is shown on the drawings, and may or may not be identical with description of the land upon which project is to be built.

E. Furnish: To supply and deliver to project site, ready for unloading, unpacking, inspect for damage, assembly, installation, etc., as applicable in each instance.

F. Install: Operations at project site including unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protection, cleaning, start up and similar operations, make ready for use, as applicable in each instance.

G. Provide: Except as otherwise defined in greater detail, term “provide” means furnish and install, complete and ready for intended use, as applicable in each instance.

H. Installer: The entity (person or firm) engaged by the Contractor or its subcontractor or sub subcontractor for the performance of a particular unit of work at the project site, including installation, erection, application, and similar required operations. It is a general requirement that such entities (installers) be expert in operations they are engaged to perform.

I. Testing Laboratory: An independent entity engaged to perform specific inspections or tests of the work, at project site and to report and (if required) interpret results of those inspections or

tests. Refer to Section 01 4000.

J. Product: Material, machinery, components, equipment, fixtures, and systems forming the work result. Not materials or equipment used for preparation, fabrication, conveying, or erection and not incorporated into the work result. Products may be new, never before used, or re-used materials or equipment.

K. Project Manual: The book-sized volume that includes the procurement requirements (if any), the contracting requirements, and the specifications.

1.03 FORMAT AND SPECIFICATION EXPLANATIONS

A. Specification Production: None of these explanations will be interpreted to modify substance of requirements. Portions of these specifications have been produced by Architect's standard methods of editing master specifications, and may contain minor deviations from traditional writing formats. Such deviations are a normal result of this production technique, and no other meaning will be implied or permitted.

B. Format Explanation: The format of principal portions of these specifications can be described as follows; although other portions may not fully comply and no particular significance will be attached to such compliance or non-compliance:

1. Sections and Divisions: For convenience, basic unit of specification text is a "section", each unit of which is named and numbered. These are organized into related families of sections, and various families of sections are organized into "divisions", which are recognized as the present industry - consensus on uniform organization and sequencing of specifications. The section title is not intended to limit meaning or content of section, nor to be fully descriptive of requirements specified therein, nor to be an integral part of text.

a. Each section of specifications has been subdivided into 3 (or less), "parts" for uniformity and convenience (Part 1 - General, Part 2 - Products, and Part 3 - Execution). These do not limit the meaning and are not an integral part of text which specifies requirements.

C. Imperative Language: Used generally in specifications. Except as otherwise indicated, requirements expressed imperatively are to be performed by Contractor. For clarity of reading at certain locations, contrasting subjective language is used to describe responsibilities which must be fulfilled indirectly by Contractor, or when so noted, by others.

D. Section Numbering: Used to facilitate cross-references in contract documents. Sections are placed in Project Manual in numeric sequence; however, numbering sequence is not complete, and listing of sections at beginning of Project Manual must be consulted to determine numbers and names of specification sections in the contract documents.

E. Page Numbering: Numbered independently for each section; recorded in listing of section (Index or Table of Contents) in Project Manual. Section number is shown with page number at bottom of each page, to facilitate location of text in Project Manual.

F. Specification Content: Because of methods by which this project specification has been produced, certain general characteristics of content, and conventions in use of language are explained as follows:

1. Specifying Methods: The techniques or methods of specifying to record requirements varies throughout text, and may include "prescriptive", "open generic - descriptive", "compliance with standards", "performance", "proprietary" or a combination of these. The method used for specifying one unit of work has no bearing on requirements for another unit of work.

2. Overlapping and Conflicting Requirements: Where compliance with 2 or more industry standards or sets of requirements is specified, and overlapping of those different standards or requirements establishes different or conflicting minimum or levels of quality, the most stringent requirement (which is generally recognized to be most costly) is intended and will be enforced, unless specifically detailed language written into the contract documents (not by way of reference to an industry standard) clearly indicates that

a less stringent requirement is to be fulfilled. Refer apparently-equal-but-different requirements and uncertainties as to which level of quality is more stringent to Architect for decision before proceeding.

a. Contractor's Options: Except for overlapping or conflicting requirements, where more than one set of requirements are specified for a particular unit of work, option is intended to be contractor's regardless of whether specifically indicated as such.

3. Minimum Quality/Quantity: In every instance, quality level or quantity shown or specified is intended as minimum for the work to be performed or provided. Except as otherwise specifically indicated, actual work may either comply exactly with that minimum within specified tolerances, or may exceed that minimum within reasonable limits. In complying with requirements, indicated numeric values are either minimums or maximums as noted or as appropriate for context of requirements. Refer instances of uncertainty to Architect for decision before proceeding.
4. Specialist's Assignments: In certain instances, specification text requires (or at least implies) that specific work be assigned to specialists or expert entities, who must be engaged for performance of those units of work. These must be recognized as special requirements over which Contractor has no choice or option. These assignments must not be confused with (and are not intended to interfere with) normal application of regulations, union jurisdictions and similar conventions. One purpose of such assignments is to establish which party or entity involved in a specific unit of work is recognized as "expert" for indicated construction processes or operations. Nevertheless, final responsibility for fulfillment of entire set of requirements remains with Contractor.
5. Trades: Except as otherwise indicated, the use of titles (such as "carpentry") in specification text, implies neither that the work must be performed by an accredited or unionized tradesman of the corresponding generic name (such as "carpenter"), nor that specified requirements apply exclusively to work by tradesman of the corresponding generic name.
6. Abbreviations: The language of specifications and other contract documents is of the abbreviated type in certain instances, and implies words and meanings which will be appropriately interpreted. Actual work abbreviations of a self-explanatory nature have been included in the text. Specific abbreviations have been established, principally for lengthy technical terminology and primarily in conjunction with coordination of specification requirements with notations on drawings and in schedules.
    a. These are frequently defined in sections at first instance of use. Trade association names and titles of general standards are frequently abbreviated. Singular words will be interpreted as plural and plural words will be interpreted as singular where applicable and where full context of the contract documents so indicate.

1.04 DRAWING SYMBOLS

A. General: Except as otherwise indicated, graphic symbols used on drawings are those symbols recognized in the construction industry for purposes indicated. Where not otherwise noted, symbols are defined by "Architectural Graphic Standards", published by John Wiley & Sons, Inc., latest edition.

1.05 INDUSTRY STANDARDS

A. General Applicability of Standards: Applicable standards of construction industry have same force and effect (and are made a part of contract documents by reference) as if copied directly into contract documents, or as if published copies were bound herewith.
    1. Referenced standards (referenced directly in contract documents or by governing regulations) have precedence over non-referenced standards which are recognized in industry for applicability to work.
    2. Non-referenced standards recognized in the construction industry are hereby defined, except as otherwise limited in contract documents, to have direct applicability to the work, and will be so enforced for performance of the work.

B. Publication Dates: Except as otherwise indicated, where compliance with an industry standard is required, comply with standard in effect as of date in contract documents.

C. Copies of Standards: Provide where needed for proper performance of the work; obtain directly from publication sources.

D. Abbreviations and Names: Where acronyms or abbreviations are used in specifications or other contract documents they are defined to mean the industry recognized name and trade association, standards generating organization, governing authority or other “Encyclopedia of Associations”, published by Gale Research Co., available in large libraries.

1.06 GOVERNING REGULATIONS/AUTHORITIES

A. General: The procedure followed by the Architect has been to contact governing authorities where necessary to obtain information needed for the purpose of preparing the contract documents; recognizing that such information may or may not be of significance in relation to the Contractor’s responsibilities for performing the work. Contact governing authorities directly for necessary information and decisions having a bearing on the performance of the work.

1.07 SUBMITTAL

A. Permits, Licenses and Certificates: For the Owner’s records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, and similar documents, correspondence and records established in conjunction with compliance with standards and regulations bearing upon performance of the work.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 5713
TEMPORARY EROSION AND SEDIMENT CONTROL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Prevention of erosion due to construction activities.

B. Prevention of sedimentation of waterways, open drainage ways, and storm and sanitary sewers due to construction activities.

C. Restoration of areas eroded due to insufficient preventive measures.

D. Performance bond.

E. Compensation of Owner for fines levied by authorities having jurisdiction due to non-compliance by Contractor.

1.02 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Concrete for temporary and permanent erosion control structures indicated on drawings.

B. Section 31 3700 - Riprap: Temporary and permanent stabilization using riprap.

1.03 REFERENCE STANDARDS

A. ASTM D4355/D4355M - Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture, and Heat in a Xenon Arc-Type Apparatus; 2021.

B. ASTM D4533/D4533M - Standard Test Method for Trapezoid Tearing Strength of Geotextiles; 2015 (Reapproved 2023).

C. ASTM D4632/D4632M - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles; 2015a (Reapproved 2023).

D. ASTM D4751 - Standard Test Methods for Determining Apparent Opening Size of a Geotextile; 2021a.

E. ASTM D4873/D4873M - Standard Guide for Identification, Storage, and Handling of Geosynthetic Rolls and Samples; 2017 (Reapproved 2021).

F. EPA (NPDES) - National Pollutant Discharge Elimination System (NPDES), Construction General Permit; Current Edition.

G. FHWA FLP-94-005 - Best Management Practices for Erosion and Sediment Control; 1995.

H. USDA TR-55 - Urban Hydrology for Small Watersheds; USDA Natural Resources Conservation Service; 2015.

1.04 PERFORMANCE REQUIREMENTS

A. Comply with requirements of EPA (NPDES) for erosion and sedimentation control, as specified by the NPDES, for Phases I and II, and in compliance with requirements of Construction General Permit (CGP), whether the project is required by law to comply or not.

B. Also comply with all more stringent requirements of State of Tennessee Erosion and Sedimentation Control Manual.

C. Comply with all requirements of TDEC for erosion and sedimentation control , even though this project is not required by law to comply.

D. Best Management Practices Standard: FHWA FLP-94-005.

E. Runoff Calculation Standard for Urban Areas: USDA TR-55.

F. Develop and follow an Erosion and Sedimentation Prevention Plan and submit periodic inspection reports.

G. Do not begin clearing, grading, or other work involving disturbance of ground surface cover until applicable permits have been obtained; furnish all documentation required to obtain applicable

permits.
1. Owner will obtain permits and pay for securities required by authority having jurisdiction.
2. Obtain and pay for permits and provide security required by authority having jurisdiction.
3. Owner will withhold payment to Contractor equivalent to all fines resulting from non-compliance with applicable regulations.

H. Provide to Owner a Performance Bond covering erosion and sedimentation preventive measures only, in an amount equal to 100 percent of the cost of erosion and sedimentation control work.

I. Timing: Put preventive measures in place as soon as possible after disturbance of surface cover and before precipitation occurs.

J. Storm Water Runoff: Control increased storm water runoff due to disturbance of surface cover due to construction activities for this project.
1. Prevent runoff into storm and sanitary sewer systems, including open drainage channels, in excess of actual capacity or amount allowed by authorities having jurisdiction, whichever is less.
2. Anticipate runoff volume due to the most extreme short term and 24-hour rainfall events that might occur in 25 years.

K. Erosion On Site: Minimize wind, water, and vehicular erosion of soil on project site due to construction activities for this project.
1. Control movement of sediment and soil from temporary stockpiles of soil.
2. Prevent development of ruts due to equipment and vehicular traffic.
3. If erosion occurs due to non-compliance with these requirements, restore eroded areas at no cost to Owner.

L. Erosion Off Site: Prevent erosion of soil and deposition of sediment on other properties caused by water leaving the project site due to construction activities for this project.
1. Prevent windblown soil from leaving the project site.
2. Prevent tracking of mud onto public roads outside site.
3. Prevent mud and sediment from flowing onto sidewalks and pavements.
4. If erosion occurs due to non-compliance with these requirements, restore eroded areas at no cost to Owner.

M. Sedimentation of Waterways On Site: Prevent sedimentation of waterways on the project site, including rivers, streams, lakes, ponds, open drainage ways, storm sewers, and sanitary sewers.
1. If sedimentation occurs, install or correct preventive measures immediately at no cost to Owner; remove deposited sediments; comply with requirements of authorities having jurisdiction.
2. If sediment basins are used as temporary preventive measures, pump dry and remove deposited sediment after each storm.

N. Sedimentation of Waterways Off Site: Prevent sedimentation of waterways off the project site, including rivers, streams, lakes, ponds, open drainage ways, storm sewers, and sanitary sewers.
1. If sedimentation occurs, install or correct preventive measures immediately at no cost to Owner; remove deposited sediments; comply with requirements of authorities having jurisdiction.

O. Open Water: Prevent standing water that could become stagnant.

P. Maintenance: Maintain temporary preventive measures until permanent measures have been established.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Erosion and Sedimentation Control Plan:
1. Submit within 2 weeks after Notice to Proceed.

2. Submit not less than 30 days prior to anticipated start of clearing, grading, or other work involving disturbance of ground surface cover.
3. Include:
   a. Site plan identifying soils and vegetation, existing erosion problems, and areas vulnerable to erosion due to topography, soils, vegetation, or drainage.
   b. Measurements of existing turbidity of waterways.
   c. Site plan showing grading; new improvements; temporary roads, traffic accesses, and other temporary construction; and proposed preventive measures.
   d. Where extensive areas of soil will be disturbed, include storm water flow and volume calculations, soil loss predictions, and proposed preventive measures.
   e. Schedule of temporary preventive measures, in relation to ground disturbing activities.
   f. Other information required by law.
   g. Format required by law is acceptable, provided any additional information specified is also included.
4. Obtain the approval of the Plan by authorities having jurisdiction.
5. Obtain the approval of the Plan by Owner.

C. Certificate: Mill certificate for silt fence fabric attesting that fabric and factory seams comply with specified requirements, signed by legally authorized official of manufacturer; indicate actual minimum average roll values; identify fabric by roll identification numbers.

D. Inspection Reports: Submit report of each inspection; identify each preventive measure, indicate condition, and specify maintenance or repair required and accomplished.

E. Maintenance Instructions: Provide instructions covering inspection and maintenance for temporary measures that must remain after Substantial Completion.

PART 2 PRODUCTS

2.01 MATERIALS

A. Mulch: Use one of the following:
1. Straw or hay.
2. Wood waste, chips, or bark.
3. Erosion control matting or netting.
4. Cutback asphalt.
5. Polyethylene film, where specifically indicated only.

B. Grass Seed For Temporary Cover: Select a species appropriate to climate, planting season, and intended purpose. If same area will later be planted with permanent vegetation, do not use species known to be excessively competitive or prone to volunteer in subsequent seasons.

C. Bales: Air dry, rectangular straw bales.
1. Cross Section: 14 by 18 inches, minimum.
2. Bindings: Wire or string, around long dimension.

D. Bale Stakes: One of the following, minimum 3 feet long:
1. Steel U- or T-section, with minimum mass of 1.33 pound per linear foot.
2. Wood, 2 by 2 inches in cross section.

E. Silt Fence Fabric: Polypropylene geotextile resistant to common soil chemicals, mildew, and insects; non-biodegradable; in longest lengths possible; fabric including seams with the following minimum average roll lengths:
1. Average Opening Size: 30 U.S. Std. Sieve, maximum, when tested in accordance with ASTM D4751.
2. Permittivity: 0.05 sec^-1, minimum, when tested in accordance with ASTM D4491/D4491M.
3. Ultraviolet Resistance: Retaining at least 70 percent of tensile strength, when tested in accordance with ASTM D4355/D4355M after 500 hours exposure.

4. Tensile Strength: 100 pounds-force, minimum, in cross-machine direction; 124 pounds-force, minimum, in machine direction; when tested in accordance with ASTM D4632/D4632M.
5. Elongation: 15 to 30 percent, when tested in accordance with ASTM D4632/D4632M.
6. Tear Strength: 55 pounds-force, minimum, when tested in accordance with ASTM D4533/D4533M.
7. Color: Manufacturer's standard, with embedment and fastener lines preprinted.
8. Manufacturers:
   a. TenCate: www.tencate.com/#sle.
   b. North American Green: www.nagreen.com/#sle.
   c. Propex Geosynthetics: www.geotextile.com/#sle.

F. Silt Fence Posts: One of the following, minimum 5 feet long:
1. Steel U- or T-section, with minimum mass of 1.33 pound per linear foot.
2. Softwood, 4 by 4 inches in cross section.
3. Hardwood, 2 by 2 inches in cross section.

G. Riprap: See Section 31 3700.

H. Concrete: See Section 03 3000.

PART 3 EXECUTION

3.01 EXAMINATION

A. Prior to the pre-construction conference, the Contractor shall meet with the Architect/Engineer and go over in detail the expected problem areas in regard to the erosion control work. Different solutions should be discussed so that the best method might be determined. It is the responsibility of the Contractor to develop an erosion control plan acceptable to the Architect/Engineer.

B. Examine site and identify existing features that contribute to erosion resistance; maintain such existing features to greatest extent possible.

3.02 PREPARATION

A. At the pre-construction conference, the Contractor shall submit for acceptance his schedule for accomplishment of temporary and permanent erosion control work, as is applicable for clearing and grubbing, grading, bridges and other structures at watercourses, construction and paving. He shall also submit for acceptance his proposed method for erosion control on haul roads and borrow pits and his plan for disposal of waste materials. No work shall be started until the erosion control schedules and methods of operations have been accepted by the Engineer.

B. Schedule work so that soil surfaces are left exposed for the minimum amount of time.

3.03 SCOPE OF PREVENTIVE MEASURES

A. This section shall consist of temporary control measures as shown in the Plans or directed by the Engineer during the life of the Contract to control erosion and pollution through the use of berms, dikes, dams, sediment basins, fiber mats, netting, mulches, grasses, slope drains, temporary silt fences, and other control devices.

B. The temporary pollution control provisions contained herein shall be coordinated with the permanent erosion control features to assure economical, effective, and continuous erosion features and to assure economical, effective, and continuous erosion control throughout the construction and post-construction period.

C. The Engineer has the authority to limit the surface area of erodible earth material exposed by clearing and grubbing, the surface of erodible earth material exposed by excavation, borrow and fill operations and to direct the Contractor to provide immediate permanent or temporary pollution control measures to prevent contamination of adjacent streams or other watercourses, lakes, ponds, or other water impoundment. Such work may involve the construction of temporary berms, dikes, dams, sediment basins, slope drains and use of temporary mulches, mats, seeding or other control devices or methods to control erosion. Cut and fill slopes shall be

seeded and mulched as the excavation proceeds to the extent directed by the Engineer.

D. The Contractor shall be required to incorporate all permanent erosion control features into the project at the earliest practicable time as outlined in his accepted schedule. Temporary pollution control measures shall be used to correct conditions that develop during construction that were not foreseen during the design stage; that are needed prior to installation of permanent pollution control features; or that are needed temporarily to control erosion that develops during normal construction practices, but are not associated with permanent control features on the project.

E. Where erosion is likely to be a problem, clearing and grubbing operations should be so scheduled and performed that grading operations and permanent erosion control features can follow immediately thereafter if the project conditions permit; otherwise erosion control measures may be required between successive construction stages. Under no conditions shall the surface area of erodible earth material exposed at one time by clearing and grubbing exceed 750,000 square feet without approval of the Engineer.

F. The Engineer will limit the area of excavation, borrow and embankment operations in progress commensurate with the Contractor's capability and progress in keeping the finish grading, mulching, seeding, and other such permanent pollution control measures current in accordance with the accepted schedule. Should seasonal limitations make such coordination unrealistic, temporary erosion control measures shall be taken immediately to the extent feasible and justified.

G. Under no conditions shall the amount of surface area or erodible earth material exposed at one time by excavation or fill within the project area exceed 750,000 square feet without prior approval by the Engineer.

H. The Engineer may increase or decrease the amount of surface area of erodible earth material to be exposed at one time by clearing and grubbing, excavation, borrow, and fill operations as determined by his analysis of project conditions.

I. In the event of conflict between these requirements and pollution control laws, rules or regulations, or other Federal, State, or Local agencies, the more restrictive laws, rules and regulations shall apply.

J. In all cases, if permanent erosion resistant measures have been installed temporary preventive measures are not required.

K. Temporary Berms: A temporary berm is constructed of compacted soil, with or without a shallow ditch at the top of fill slopes or transverse to centerline on fills.

L. Temporary Slope Drains: A temporary slope drain is a facility consisting of stone gutters, fiber mats, plastic sheets, concrete or asphalt gutters, half-round pipe, metal pipe, plastic pipe, sod or other material acceptable to the Engineer that may be used to carry water down slopes to reduce erosion.

M. Sediment Structures: Sediment basins, ponds and traps are prepared storage areas constructed to trap and store sediment from erodible areas in order to protect properties and stream channels below the constructed areas from excessive siltation.

N. Check Dams: Check dams are barriers composed of logs and poles, large stones or other materials placed across a natural or constructed drain way. Stone check dams shall not be utilized where the drainage area exceeds fifty (50) acres. Log and pole structures shall not be used where the drainage area exceeds five (5) acres.

O. Temporary Seeding and Mulching: Temporary seeding and mulching are measures consisting of seeding, mulching, fertilizing and mating utilized to reduce erosion. All cut and fill slopes including waste sites and borrow pits shall be seeded when and where necessary to eliminate erosion.

P. Brush Barriers: Brush barriers shall consist of brush, tree trimmings, shrubs, plants, and other approved refuse from the clearing and grubbing operations. Brush barriers are placed on natural ground at the bottom of fill slopes, where the most likely erodible areas are located to

restrain sedimentation particles.

Q. Baled Hay or Straw Checks: Baled hay or straw erosion checks are temporary measures to control erosion and prevent siltation. Bales shall be either hay or straw containing five (5) cubic feet or more of material. Baled hay or straw checks shall be used where the existing ground slopes toward or away from the embankment along the toe of the slopes, in ditches or other areas where siltation erosion or water run-off is a problem.

R. Temporary Silt Fences: Silt fences are temporary measures utilizing woven wire or other approved material attached to post with filter cloth composed of burlap, plastic filter fabric, etc., attached to the upstream side of the fence to retain the suspended silt particles in the run-off water.

S. Construction Entrances: Traffic-bearing aggregate surface.
   1. Width: As required; 20 feet, minimum.
   2. Length: 50 feet, minimum.
   3. Provide at each construction entrance from public right-of-way.
   4. Where necessary to prevent tracking of mud onto right-of-way, provide wheel washing area out of direct traffic lane, with drain into sediment trap or basin.

T. Linear Sediment Barriers: Made of silt fences.
   1. Provide linear sediment barriers:
      a. Along downhill perimeter edge of disturbed areas, including soil stockpiles.
      b. Along the top of the slope or top bank of drainage channels and swales that traverse disturbed areas.
      c. Along the toe of cut slopes and fill slopes.
      d. Perpendicular to flow across the bottom of existing and new drainage channels and swales that traverse disturbed areas or carry runoff from disturbed areas; space at maximum of 200 feet apart.
      e. Across the entrances to culverts that receive runoff from disturbed areas.
   2. Space sediment barriers with the following maximum slope length upslope from barrier:
      a. Slope of Less Than 2 Percent: 100 feet.
      b. Slope Between 2 and 5 Percent: 75 feet.
      c. Slope Between 5 and 10 Percent: 50 feet.
      d. Slope Between 10 and 20 Percent: 25 feet.
      e. Slope Over 20 Percent: 15 feet.

U. Storm Drain Curb Inlet Sediment Trap: Protect each curb inlet using one of the following measures:
   1. Filter fabric wrapped around hollow concrete blocks blocking entire inlet face area; use one piece of fabric wrapped at least 1-1/2 times around concrete blocks and secured to prevent dislodging; orient cores of blocks so runoff passes into inlet.
   2. Straw bale row blocking entire inlet face area; anchor into pavement.

V. Storm Drain Drop Inlet Sediment Traps: As detailed on drawings.

W. Temporary Splash Pads: Stone aggregate over filter fabric; size to suit application; provide at downspout outlets and storm water outlets.

X. Soil Stockpiles: Protect using one of the following measures:
   1. Cover with polyethylene film, secured by placing soil on outer edges.
   2. Cover with mulch at least 4 inches thickness of pine needles, sawdust, bark, wood chips, or shredded leaves, or 6 inches of straw or hay.

Y. Mulching: Use only for areas that may be subjected to erosion for less than 6 months.
   1. Wood Waste: Use only on slopes 3:1 or flatter; no anchoring required.
   2. Asphalt: Use only where no traffic, either vehicular or pedestrian, is anticipated.

Z. Temporary Seeding: Use where temporary vegetated cover is required.

3.04 INSTALLATION

A. Traffic-Bearing Aggregate Surface:
   1. Excavate minimum of 6 inches.
   2. Place geotextile fabric full width and length, with minimum 12 inch overlap at joints.
   3. Place and compact at least 6 inches of 1 1/2 to 3 1/2 inch diameter stone.

B. Silt Fences:
   1. Store and handle fabric in accordance with ASTM D4873/D4873M.
   2. Where slope gradient is less than 3:1 or barriers will be in place less than 6 months, use nominal 16 inch high barriers with minimum 36 inch long posts spaced at 6 feet maximum, with fabric embedded at least 4 inches in ground.
   3. Where slope gradient is steeper than 3:1 or barriers will be in place over 6 months, use nominal 28 inch high barriers, minimum 48 inch long posts spaced at 6 feet maximum, with fabric embedded at least 6 inches in ground.
   4. Where slope gradient is steeper than 3:1 and vertical height of slope between barriers is more than 20 feet, use nominal 32 inch high barriers with woven wire reinforcement and steel posts spaced at 4 feet maximum, with fabric embedded at least 6 inches in ground.
   5. Install with top of fabric at nominal height and embedment as specified.
   6. Embed bottom of fabric in a trench on the upslope side of fence, with 2 inches of fabric laid flat on bottom of trench facing upslope; backfill trench and compact.
   7. Do not splice fabric width; minimize splices in fabric length; splice at post only, overlapping at least 18 inches, with extra post.
   8. Fasten fabric to wood posts using one of the following:
      a. Four nails per post with 3/4 inch diameter flat or button head, 1 inch long, and 14 gauge, 0.083 inch shank diameter.
      b. Five staples per post with at least 17 gauge, 0.0453 inch wire, 3/4 inch crown width and 1/2 inch long legs.
   9. Fasten fabric to steel posts using wire, nylon cord, or integral pockets.
   10. Wherever runoff will flow around end of barrier or over the top, provide temporary splash pad or other outlet protection; at such outlets in the run of the barrier, make barrier not more than 12 inches high with post spacing not more than 4 feet.

C. Straw Bale Rows:
   1. Install bales in continuous rows with ends butting tightly, with one bale at each end of row turned uphill.
   2. Install bales so that bindings are not in contact with the ground.
   3. Embed bales at least 4 inches in the ground.
   4. Anchor bales with at least two stakes per bale, driven at least 18 inches into the ground; drive first stake in each bale toward the previously placed bale to force bales together.
   5. Fill gaps between ends of bales with loose straw wedged tightly.
   6. Place soil excavated for trench against bales on the upslope side of the row, compacted.

D. Mulching Over Large Areas:
   1. Dry Straw and Hay: Apply 2-1/2 tons per acre; anchor using dull disc harrow or emulsified asphalt applied using same spraying machine at 100 gallons of water per ton of mulch.
   2. Wood Waste: Apply 6 to 9 tons per acre.
   3. Asphalt: Apply at 1200 gallons per acre.
   4. Erosion Control Matting: Comply with manufacturer's instructions.

E. Mulching Over Small and Medium Areas:
   1. Dry Straw and Hay: Apply 4 to 6 inches depth.
   2. Wood Waste: Apply 2 to 3inches depth.
   3. Pine Needles: Apply 2 to 3 inches depth.
   4. Asphalt: Apply 1/4 gallon per square yard.
   5. Erosion Control Matting: Comply with manufacturer's instructions.

F. Temporary Seeding:

1. When hydraulic seeder is used, seedbed preparation is not required.
2. When surface soil has been sealed by rainfall or consists of smooth undisturbed cut slopes, and conventional or manual seeding is to be used, prepare seedbed by scarifying sufficiently to allow seed to lodge and germinate.
3. If temporary mulching was used on planting area but not removed, apply nitrogen fertilizer at 1 pound per 1000 sq ft.
4. On soils of very low fertility, apply 10-10-10 fertilizer at rate of 12 to 16 pounds per 1000 sq ft.
5. Incorporate fertilizer into soil before seeding.
6. Apply seed uniformly; if using drill or cultipacker seeders place seed 1/2 to 1 inch deep.
7. Irrigate as required to thoroughly wet soil to depth that will ensure germination, without causing runoff or erosion.
8. Repeat irrigation as required until grass is established.

3.05 MAINTENANCE

A. Inspect preventive measures weekly, within 24 hours after the end of any storm that produces 0.5 inches or more rainfall at the project site, and daily during prolonged rainfall.

B. Repair deficiencies immediately.

C. Silt Fences:
   1. Promptly replace fabric that deteriorates unless need for fence has passed.
   2. Remove silt deposits that exceed one-third of the height of the fence.
   3. Repair fences that are undercut by runoff or otherwise damaged, whether by runoff or other causes.

D. Straw Bale Rows:
   1. Promptly replace bales that fall apart or otherwise deteriorate unless need has passed.
   2. Remove silt deposits that exceed one-half of the height of the bales.
   3. Repair bale rows that are undercut by runoff or otherwise damaged, whether by runoff or other causes.

E. Clean out temporary sediment control structures weekly and relocate soil on site.

F. Place sediment in appropriate locations on site; do not remove from site.

3.06 CLEAN UP

A. Remove temporary measures after permanent measures have been installed, unless permitted to remain by Engineer.

B. Clean out temporary sediment control structures that are to remain as permanent measures.

C. Where removal of temporary measures would leave exposed soil, shape surface to an acceptable grade and finish to match adjacent ground surfaces.

END OF SECTION

SECTION 01 5813
TEMPORARY PROJECT SIGNAGE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Project identification sign.

B. Project informational signs.

1.02 RELATED REQUIREMENTS

A. Section 01 1000 - Summary: Responsibility to provide signs.

1.03 REFERENCE STANDARDS

A. FHWA (SHS) - Standard Highway Signs and Markings; 2004, with Supplement (2012).

1.04 QUALITY ASSURANCE

A. Design sign and structure to withstand 50 miles/hr wind velocity.

B. Sign Painter: Experienced as a professional sign painter for minimum three years.

C. Finishes, Painting: Adequate to withstand weathering, fading, and chipping for duration of construction.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Shop Drawing: Show content, layout, lettering, color, foundation, structure, sizes and grades of members.

PART 2 PRODUCTS

2.01 SIGN MATERIALS

A. Structure and Framing: New, wood, structurally adequate.

B. Sign Surfaces: Exterior grade plywood with medium density overlay (MDO), minimum 3/4 inch thick, standard large sizes to minimize joints.

C. Rough Hardware: Galvanized.

D. Paint and Primers: Exterior quality, two coats; all sign background surfaces and supports to be white color.

E. Lettering: Exterior quality paint, contrasting colors.

F. Lettering: Pre-cut vinyl self-adhesive products, white.

G. Graphic Image: Design by Engineer.

2.02 PROJECT IDENTIFICATION SIGN

A. Contractor shall provide one painted sign surface, 4' high x 8' long [4' high x 4' long] [2' high x 4' long] x 3/4" thick exterior grade plywood with medium density overlay (MDO), with two painted 4x4x12' pressure treated wood post supports and associated fasteners for attaching sign surface to posts. Posts to be parallel to 4' [2'] high dimension of sign surface. Bottom of sign surface to be maximum 5'-0" above finished grade. Install sign at location indicated on drawings.

B. Graphic Image, 4' high x 8' long [4' high x 4' long] [2' high x 4' long], design, artwork, colors, style of lettering are designated by Engineer and will be printed on vinyl similar to 3M 180C control tac vinyl with UV inks. The Contractor will mount the UV vinyl on the sign surface MDO board and wrap the edges with vinyl. Engineer will email a print ready PDF to the Contractor for his use in purchasing the Graphic Image.

2.03 PROJECT INFORMATIONAL SIGNS

A. Painted informational signs of same colors and lettering as Project Identification sign, or standard products; size lettering to provide legibility at 100 foot distance.

B. Provide at each field office, storage shed , and directional signs to direct traffic into and within site. Relocate as Work progress requires.

C. Provide municipal traffic agency directional traffic signs to and within site.

2.04 SIGNS, SIGNALS, AND DEVICES

A. Stock Post Mounted and Wall Mounted Traffic Control and Informational Signs:
   1. Products:
      a. Brimar Industries, Inc.: www.safetysign.com/#sle.
      b. Substitutions: See Section 01 6000 - Product Requirements.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install project identification sign within 30 days after date fixed by Notice to Proceed.

B. Erect at designated location.

C. Erect supports and framing on secure foundation, rigidly braced and framed to resist wind loadings.

D. Install sign surface plumb and level, with butt joints. Anchor securely.

E. Paint exposed surfaces of sign, supports, and framing.

3.02 MAINTENANCE

A. Maintain signs and supports clean, repair deterioration and damage.

3.03 REMOVAL

A. Remove signs, framing, supports, and foundations at completion of Project and restore the area.

END OF SECTION

SECTION 01 7000
EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Examination, preparation, and general installation procedures.

B. Requirements for alterations work, including selective demolition, except removal, disposal, and/or remediation of hazardous materials and toxic substances.

C. Cleaning and protection.

D. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.

1.02 RELATED REQUIREMENTS

A. Section 01 3000 - Administrative Requirements: Submittals procedures, Electronic document submittal service.

B. Section 01 4000 - Quality Requirements: Testing and inspection procedures.

1.03 REFERENCE STANDARDS

A. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2022, with Errata (2021).

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Project Record Documents: Accurately record actual locations of capped and active utilities.

1.05 PROJECT CONDITIONS

A. Use of explosives is not permitted.

B. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.

C. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.
   1. Control fill, grading, and ditching to direct surface drainage away from excavations, pits, tunnels, and other construction areas; and to direct drainage to proper run-off.
   2. Dispose of drainage water in a manner to prevent flooding, erosion, or other damage to any portion of the site or to adjoining areas.

D. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.

E. Erosion and Sediment Control: Plan and execute work by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.
   1. Minimize amount of bare soil exposed at one time.
   2. Provide temporary measures such as berms, dikes, and drains, to prevent water flow.
   3. Construct fill and waste areas by selective placement to avoid erosive surface silts or clays.
   4. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.

F. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.
   1. At All Times: Excessively noisy tools and operations will not be tolerated inside the building at any time of day; excessively noisy includes jackhammers.
   2. Outdoors: Limit conduct of especially noisy exterior work to the hours of 8 am to 5 pm.

G. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations. Comply with federal, state, and local regulations.
   1. Provide equipment and personnel, perform emergency measures required to contain any spillages, and to remove contaminated soils or liquids.
      a. Excavate and dispose of any contaminated earth off-site, and replace with suitable compacted fill and topsoil.
   2. Take special measures to prevent harmful substances from entering public waters.
      a. Prevent disposal of wastes, effluents, chemicals, or other such substances adjacent to streams, or in sanitary or storm sewers.
   3. Provide systems for control of atmospheric pollutants.
      a. Prevent toxic concentrations of chemicals.
      b. Prevent harmful dispersal of pollutant into the atmosphere.

1.06 COORDINATION

A. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.

B. Notify affected utility companies and comply with their requirements.

C. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

D. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on drawings. Follow routing indicated for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

E. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.

F. Coordinate completion and clean-up of work of separate sections.

G. After Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.

B. Examine and verify specific conditions described in individual specification sections.

C. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.02 ALTERATIONS

A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
   1. Verify that construction and utility arrangements are as indicated.
   2. Report discrepancies to Engineer before disturbing existing installation.
   3. Beginning of alterations work constitutes acceptance of existing conditions.

3.03 PROGRESS CLEANING

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.

C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.

D. Collect and remove waste materials, debris, and trash/rubbish from site weekly and dispose off-site; do not burn or bury.

3.04 PROTECTION OF INSTALLED WORK

A. Protect installed work from damage by construction operations.

B. Provide special protection where specified in individual specification sections.

C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

3.05 FINAL CLEANING

A. Clean site; sweep paved areas, rake clean landscaped surfaces.

B. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

3.06 CLOSEOUT PROCEDURES

A. Make submittals that are required by governing or other authorities.
   1. Provide copies to Engineer.

B. Accompany Architect/Engineer on preliminary inspection to determine items to be listed for completion or correction in the Contractor's Correction Punch List for Contractor's Notice of Substantial Completion.

C. Submit written certification containing Contractor's Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Engineer's Substantial Completion inspection.

D. Conduct Substantial Completion inspection and create Final Correction Punch List containing Engineer's and Contractor's comprehensive list of items identified to be completed or corrected and submit to Engineer.

E. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Owner-occupied areas.

F. Accompany Project Coordinator on Contractor's preliminary final inspection.

G. Notify Engineer when work is considered finally complete and ready for Engineer's Substantial Completion final inspection.

H. Complete items of work determined by Engineer listed in executed Certificate of Substantial Completion.

END OF SECTION

SECTION 01 7800
CLOSEOUT SUBMITTALS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Project Record Documents.

B. Operation and Maintenance Data.

C. Warranties and bonds.

1.02 RELATED REQUIREMENTS

A. Section 01 3000 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.

1.03 SUBMITTALS

A. Project Record Documents: Submit documents to Engineer with claim for final Application for Payment.

B. Operation and Maintenance Data:
   1. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Engineer will review draft and return one copy with comments.
   2. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
   3. Submit one copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Engineer comments. Revise content of all document sets as required prior to final submission.
   4. Submit two sets of revised final documents in final form within 10 days after final inspection.

C. Warranties and Bonds:
   1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within 10 days after acceptance.
   2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
   3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of the following record documents; record actual revisions to the Work:
   1. Drawings.
   2. Specifications.
   3. Addenda.
   4. Change Orders and other modifications to the Contract.
   5. Reviewed shop drawings, product data, and samples.
   6. Manufacturer's instruction for assembly, installation, and adjusting.

B. Ensure entries are complete and accurate, enabling future reference by Owner.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress.

E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
   1. Manufacturer's name and product model and number.
   2. Product substitutions or alternates utilized.

3. Changes made by Addenda and modifications.

F. Record Drawingsand Shop Drawings: Legibly mark each item to record actual construction including:
   1. Field changes of dimension and detail.
   2. Details not on original Contract drawings.

END OF SECTION

SECTION 02 3000
SUBSURFACE CONDITIONS

PART 1 GENERAL

1.01 ADDITIONAL INVESTIGATION

A. Contractor should visit site and acquaint himself with site conditions.

B. Prior to bidding, contractor may make his own subsurface investigation, but Contractor shall make no deviations from the Contract Documents without specific and written approval.

END OF SECTION

SECTION 02 4100
DEMOLITION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Selective demolition of built site elements.

B. Abandonment and removal of existing utilities and utility structures.

1.02 RELATED REQUIREMENTS

A. Section 01 1000 - Summary: Limitations on Contractor's use of site and premises.

B. Section 01 1000 - Summary: Sequencing and staging requirements.

C. Section 01 1000 - Summary: Description of items to be salvaged or removed for re-use by Contractor.

D. Section 01 5713 - Temporary Erosion and Sediment Control.

E. Section 01 7000 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products; temporary bracing and shoring.

F. Section 31 1000 - Site Clearing: Vegetation and existing debris removal.

G. Section 31 2200 - Grading: Topsoil removal.

H. Section 31 2323 - Fill: Fill material for filling holes, pits, and excavations generated as a result of removal operations.

1.03 REFERENCE STANDARDS

A. 29 CFR 1926 - Safety and Health Regulations for Construction; Current Edition.

B. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2022, with Errata (2021).

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Site Plan: Showing:
   1. Vegetation to be protected.
   2. Areas for temporary construction and field offices.
   3. Areas for temporary and permanent placement of removed materials.

C. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.

1.05 QUALITY ASSURANCE

A. Demolition Firm Qualifications: Company specializing in the type of work required.
   1. Minimum of five years of documented experience.

PART 2 PRODUCTS

2.01 MATERIALS

A. Fill Material: As specified in Section 31 2323 - Fill.

PART 3 EXECUTION

3.01 SCOPE

A. Remove paving and curbs as required to accomplish new work.

B. Remove all other paving and curbs within construction limits indicated on drawings.

C. Fill excavations, open pits, and holes in ground areas generated as result of removals, using specified fill; compact fill as specified in Section 31 2200.

3.02 GENERAL PROCEDURES AND PROJECT CONDITIONS

A. Comply with other requirements specified in Section 01 7000.

B. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
   1. Obtain required permits.
   2. Use of explosives is not permitted.
   3. Provide, erect, and maintain temporary barriers and security devices.
   4. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
   5. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
   6. Do not close or obstruct roadways or sidewalks without permit.
   7. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.
   8. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon or limit access to their property.

C. Do not begin removal until receipt of notification to proceed from Owner.

D. Do not begin removal until built elements to be salvaged or relocated have been removed.

E. Do not begin removal until vegetation to be relocated has been removed and specified measures have been taken to protect vegetation to remain.

F. Minimize production of dust due to demolition operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.

G. If hazardous materials are discovered during removal operations, stop work and notify Engineer and Owner; hazardous materials include regulated asbestos containing materials, lead, PCB's, and mercury.

H. Hazardous Materials: Comply with 29 CFR 1926 and state and local regulations.

I. Partial Removal of Paving and Curbs: Neatly saw cut at right angle to surface.

3.03 EXISTING UTILITIES

A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.

B. Protect existing utilities to remain from damage.

C. Do not disrupt public utilities without permit from authority having jurisdiction.

D. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Owner.

E. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to Owner.

F. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.

G. Remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.

3.04 SELECTIVE DEMOLITION FOR ALTERATIONS

A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
   1. Verify that construction and utility arrangements are as indicated.
   2. Report discrepancies to Engineer before disturbing existing installation.

3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.

B. Protect existing work to remain.
   1. Prevent movement of structure; provide shoring and bracing if necessary.
   2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
   3. Repair adjacent construction and finishes damaged during removal work.
   4. Patch as specified for patching new work.

3.05 DEBRIS AND WASTE REMOVAL

A. Remove debris, junk, and trash from site.

B. Remove from site all materials not to be reused on site; do not burn or bury.

C. Leave site in clean condition, ready for subsequent work.

D. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION

SECTION 03 1000
CONCRETE FORMING AND ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Formwork for cast-in place concrete, with shoring, bracing and anchorage.

B. Openings for other work.

C. Form accessories.

D. Form stripping.

1.02 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete.

B. Section 31 2316 - Excavation: Shoring and underpinning for excavation.

1.03 REFERENCE STANDARDS

A. ACI 117 - Specification for Tolerances for Concrete Construction and Materials; 2010 (Reapproved 2015).

B. ACI 301 - Specifications for Concrete Construction; 2020.

C. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; 2011.

D. ACI 347R - Guide to Formwork for Concrete; 2014.

E. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2023.

F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023b.

G. PS 1 - Structural Plywood; 2023.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on void form materials and installation requirements.

C. Shop Drawings: Indicate pertinent dimensions, materials, bracing, and arrangement of joints and ties.

1.05 QUALITY ASSURANCE

A. Designer Qualifications: Design formwork under direct supervision of a Professional Structural Engineer experienced in design of concrete formwork and licensed in the State in which the Project is located.

B. Maintain one copy of each installation standard on site throughout the duration of concrete work.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver prefabricated forms and installation instructions in manufacturer's packaging.

B. Store prefabricated forms off ground in ventilated and protected manner to prevent deterioration from moisture.

C. Protect plastic foam products from damage and exposure to sunlight.

PART 2 PRODUCTS

2.01 FORMWORK - GENERAL

A. Provide concrete forms, accessories, shoring, and bracing as required to accomplish cast-in-place concrete work.

B. Design and construction to provide resultant concrete that conforms to design with respect to shapes, lines, dimensions and grades. Forms shall be securely tied braced in position, and

shored to support safely all construction loads, sufficiently tight to prevent appreciable leakage of mortar and be clean of all debris at time of concreting. Responsibility for adequacy and safety shall be the Contractor's responsibility but design shall be subject to approval.

C. Chamfer outside corners of beams, joists, columns, and walls with framed 3/4 inch chamfer, unless noted otherwise on the drawings.

D. Comply with applicable state and local codes with respect to design, fabrication, erection, and removal of formwork.

E. Comply with relevant portions of ACI 347R, ACI 301, and ACI 318.

2.02 WOOD FORM MATERIALS

A. Softwood Plywood: PS 1, C Grade, Group 2.

B. Softwood Plywood: PS 1, B-B High Density Concrete Form Overlay, Class I. D. All exposed corners or edges of columns, piers, walls, etc. shall be framed with a ¾-inch chamfer, unless shown or noted otherwise on the plans.

C. Plywood: Douglas Fir species; solid one side grade; sound undamaged sheets with clean, true edges.

D. Smooth surface forms shall be used for all exposed surfaces and shall consist of the following:
   1. Concrete Exterior Form Plywood, resin overlay face on fir plywood backup 5 veneer plies, 5/8" thick by 4' x 8' sheet size, factory oiled and edges sealed.
   2. Use plywood boards, except as noted, for all exterior exposed concrete. Minimize all joints between sheets, and prevent any bulging or pillowing of large sheets by back-up lumber at open spaces with a maximum distance between supports of 8".
   3. Forms for exposed concrete must be treated as finished woodwork or cabinet work. Surface material shall be laid out in as large as practicable and shall be laid out in regular and symmetrical pattern as approved. Edges of units shall be tight-butted together with clean, straight joints; any appreciable space at joints shall be filled. Maximum variation in alignment of surfaces at a joint shall be 1/16". There shall be no bulges or defects higher or lower respectively than 3/16" in four feet.
   4. Unfinished surface forms may be used for all unexposed surfaces, such as surfaces to be in contact with earth, in unfinished spaces, areas to receive finishes, and such other locations as indicated on the drawings. For these surfaces, wood No. 2 Common or Better lumber, metal or other type of forms shall be used for all surfaces that are to be plastered.
   5. Temporary openings shall be provided at the base of wall forms and at other necessary points to facilitate cleaning and inspection before concreting.
   6. The contact face of forms shall be coated with nonstaining mineral oil or other approved coating or in the case of wood forms may be thoroughly wetted (except in freezing weather). Oil coatings shall be applied and excess wiped off before placing reinforcement. Release agent shall be of a type that will not affect the rubbing, sealing or painting of the exposed concrete surface.
   7. Side forms for footings may be omitted with the approval of the Architect/Engineer where soil conditions are suitable.
   8. Forms and form lumber may be reused if in good condition after being cleaned and reconditioned, if approved.

2.03 REMOVABLE PREFABRICATED FORMS

A. Preformed Steel Forms: Minimum 16 gauge, 0.0598 inch thick, matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.

B. Preformed Plastic Forms: Thermoplastic polystyrene form liner, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.

C. Glass Fiber Fabric Reinforced Plastic Forms: Matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished concrete surfaces.

D. Pan Type: Glass fiber, of size and profile indicated.

E. Void Forms: Moisture resistant treated paper faces, biodegradable, structurally sufficient to support weight of wet concrete mix until initial set; 2 inches thick.

F. Light weight forming material
   1. Light weight forming material, Expanded Polystyrene (EPS) Board, shall conform to the requirement of ASTM Standard C-578. The EPS material shall have a minimum density of 1.25 lbs/cu ft. and a maximum density of 20 lbs/cu. ft. EPS boards shall be manufactured by PERMA “R” Products, Inc. of Grenada, MS, or approval equal.
   2. Light weight forming material shall be designed to be left in place after the pouring of concrete as a permanent fixture of the structure.

2.04 PERMANENT PREFABRICATED FOAM PANEL FORMWORK

A. Floor/Roof Deck Forms: Pre-engineered expanded polystyrene foam plastic deck and beam/joist forms with factory installed metal channel furring strips flush with face of panel and field installed form stiffener slots.
   1. Structural Performance: In accordance with applicable code.
   2. Fire Rating Impact: Provide product tested to show no detrimental effect on fire rating of concrete deck/beam/joist construction due to retention of foam plastic formwork; compare to calculated fire resistance of concrete constructed without permanent formwork as described in applicable code.
   3. Form Cross Section: As indicated on drawings; flat-bottomed solid foam blocks with voids only for stiffeners and beam/joist cross-section; interlocking long edges.
   4. Form Width: 24 inches.
   5. Beam/Joist Depth: 4 inches, exclusive of deck depth; if necessary, provide contour cut filler pieces to achieve required depth.
   6. Beam/Joist Depth: 6 inches, exclusive of deck depth; if necessary, provide contour cut filler pieces to achieve required depth.
   7. Beam/Joist Spacing: 24 inches on center.
   8. Channel Width at Face of Panel: 1-1/2 inches, minimum.
   9. Channel Spacing: 12 inches on center.
   10. Thermal Performance: Average R-value of 25, when tested in accordance with ASTM C177, based on assembled formwork.
   11. Sound Transmission: STC of 57, minimum; based on assembly consisting of 3 inch concrete cover and 14 inch concrete beam/joist depth.
   12. Sound Impact Insulation: IIC of 44, minimum; based on assembly consisting of 3 inch concrete cover and 14 inch concrete beam/joist depth with no floor finish.

B. Expanded Polystyrene (EPS) Insulation Board: ASTM C578, Type VIII.
   1. Density: 1.15 pounds per cubic foot.
   2. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
   3. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.

C. Form Stiffeners: Steel C-channels, 18 gauge, 0.0478 inch, complying with ASTM A653/A653M, galvanized to G90/Z275.

D. Form Stiffeners: 2 by 6 dimension lumber.

E. Form Stiffeners: One-half of a wood I-joist, 11-7/8 inch high.

2.05 FORMWORK ACCESSORIES

A. Form Ties: Removable type, galvanized metal, fixed length, cone type, with waterproofing washer, break back dimension nominal to cone depth. Equal to Snap-Tie by Dayton Superior.

B. Form Release Agent: Capable of releasing forms from hardened concrete without staining or discoloring concrete or forming bug holes and other surface defects, compatible with concrete and form materials, and not requiring removal for satisfactory bonding of coatings to be applied.
   1. Composition: Colorless, reactive, water-based or solvent-based compound.
   2. Do not use materials containing diesel oil or petroleum-based compounds.
   3. VOC Content: In compliance with applicable local, State, and federal regulations.

C. Filler Strips for Chamfered Corners: Rigid plastic.

D. Dovetail Anchor Slot: Galvanized steel, at least 22 gage, 0.0299 inch thick, foam filled, release tape sealed slots, anchors for securing to concrete formwork.

E. Flashing Reglets: Galvanized steel, at least 22 gage, 0.0299 inch (0.76mm) thick, longest possible lengths, with alignment splines for joints, foam filled, release tape sealed slots, anchors for securing to concrete formwork.

F. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.

G. Embedded Anchor Shapes, Plates, Angles and Bars: As specified in Section 05 1200.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with drawings.

B. Surface material shall be laid out in as large units as practicable and shall be laid out in regular and symmetrical pattern as approved. Edges of units shall be tight-butted together with straight, clean joints: any appreciable space at joints to be 1/16". There shall be no bulges or defects deeper or higher respectively than 3/16" in four feet.

C. The Owner's Representative shall be notified when the concrete is ready for inspection. The formwork and/or excavation shall have the approval of the Owner’s Representative before placing of the concrete.

3.02 ERECTION - FORMWORK

A. Erect formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI 301.

B. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to overstressing by construction loads.

C. Install permanent insulated foam panel formwork per manufacturer's recommendations.

D. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.

E. Align joints and make watertight. Keep form joints to a minimum.

F. Obtain approval before framing openings in structural members that are not indicated on drawings.

G. Install void forms in accordance with manufacturer's recommendations. Protect forms from moisture or crushing.

H. Coordinate this section with other sections of work that require attachment of components to formwork.

I. If formwork is placed after reinforcement, resulting in insufficient concrete cover over reinforcement, request instructions from Engineer before proceeding.

3.03 APPLICATION - FORM RELEASE AGENT

A. Apply form release agent on formwork in accordance with manufacturer's recommendations.

B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.

C. Do not apply form release agent where concrete surfaces will receive special finishes or applied coverings that are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.

3.04 INSERTS, EMBEDDED PARTS, AND OPENINGS

A. Provide formed openings where required for items to be embedded in passing through concrete work.

B. Locate and set in place items that will be cast directly into concrete.

C. Coordinate with work of other sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts, and components of other work.

D. Position recessed anchor slots for brick veneer masonry anchors to spacing and intervals specified in Section 04 2613.

E. Install accessories in accordance with manufacturer's instructions, so they are straight, level, and plumb. Ensure items are not disturbed during concrete placement.

F. Install waterstops in accordance with manufacturer's instructions, so they are continuous without displacing reinforcement. Heat seal joints so they are watertight.

G. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.

H. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.

I. Set and build into the work anchorage devises and other embedded items required for other work that is attached to, or supported by cast-in-place concrete. Use setting drawings, diagrams, instructions and directions provided by suppliers of the items to be attached thereto.

J. Edge Forms and Screed Strips for Slabs: Set edge forms or bulkheads and intermediate screed strips for slabs to obtain required elevations and contours in the finished slab surface. Provide and secure units to support types of screeds required.

3.05 FORM CLEANING

A. Clean forms as erection proceeds, to remove foreign matter within forms.

B. Clean and protect permanent insulated concrete foam panel formwork per manufacturer's recommendations.

C. Clean formed cavities of debris prior to placing concrete.
   1. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.
   2. During cold weather, remove ice and snow from within forms. Do not use de-icing salts. Do not use water to clean out forms, unless formwork and concrete construction proceed within heated enclosure. Use compressed air or other means to remove foreign matter.

3.06 FORMWORK TOLERANCES

A. Construct formwork to maintain tolerances required by ACI 117, unless otherwise indicated.

B. Construct permanent insulated foam panel formwork to maintain tolerances required by ACI 301.

C. Camber slabs and beams in accordance with ACI 301.

3.07 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 4000 - Quality Requirements.

B. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and to verify that supports, fastenings, wedges, ties, and items are secure.

C. Do not reuse wood formwork more than 2 times for concrete surfaces to be exposed to view. Do not patch formwork.

3.08 FORM REMOVAL

A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.

B. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.

C. Store removed forms to prevent damage to form materials or to fresh concrete. Discard damaged forms.

D. Formwork not supporting concrete, such as sides of walls, columns, and similar parts of the Work, may be removed after cumulatively curing at not less than 10 degrees C (50 degrees F) for 24 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form removal operation, and provided that curing and protection operations are maintained.

E. Reshores shall be placed as soon as practicable after stripping operations are complete but in no case later than practicable after stripping operations are complete and in no case later than the end of the day on which stripping occurs. Reshores shall be tightened to carry their required loads without overstressing the construction. Reshores shall remain in place until tests representative of the concrete being supported have reached the specified strength, and heavy loads due to construction operations have been removed.

F. Formwork supporting concrete may be removed four days after placement, only if shores and other vertical supports have been arranged to permit removal of form facing material without loosening or disturbing shores and supports.

G. Forms: Clean form material suitable for reuse before erection. Form material will not be acceptable for reuse, if in opinion of the Architect/Engineer, it will not produce finished surface required by these specifications or called for on drawings.

END OF SECTION

SECTION 03 3000
CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Miscellaneous concrete elements, including equipment pads, equipment pits, light pole bases, flagpole bases, thrust blocks, and manholes.

B. Concrete curing.

1.02 RELATED REQUIREMENTS

A. Section 03 1000 - Concrete Forming and Accessories: Forms and accessories for formwork.

1.03 REFERENCE STANDARDS

A. ACI 117 - Specification for Tolerances for Concrete Construction and Materials; 2010 (Reapproved 2015).

B. ACI 211.1 - Selecting Proportions for Normal-Density and High Density-Concrete - Guide; 2022.

C. ACI 211.2 - Standard Practice for Selecting Proportions for Structural Lightweight Concrete; 1998 (Reapproved 2004).

D. ACI 301 - Specifications for Concrete Construction; 2020.

E. ACI 302.1R - Guide to Concrete Floor and Slab Construction; 2015.

F. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; 2000 (Reapproved 2009).

G. ACI 305R - Guide to Hot Weather Concreting; 2020.

H. ACI 306R - Guide to Cold Weather Concreting; 2016.

I. ACI 308R - Guide to External Curing of Concrete; 2016.

J. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; 2011.

K. ACI 347R - Guide to Formwork for Concrete; 2014.

L. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2023.

M. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2023.

N. ASTM C42 - Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.; 1994 Edition.

O. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2024.

P. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete; 2020.

Q. ASTM C150/C150M - Standard Specification for Portland Cement; 2022.

R. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete; 2020.

S. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete; 2010a (Reapproved 2016).

T. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete; 2019.

U. ASTM C330/C330M - Standard Specification for Lightweight Aggregates for Structural Concrete; 2023.

V. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete; 2019, with Editorial Revision (2022).

W. ASTM C881/C881M - Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete; 2020a.

X. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 2020.

Y. ASTM C1116/C1116M - Standard Specification for Fiber-Reinforced Concrete; 2023.

Z. ASTM C1315 - Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete; 2019.

AA. ASTM D994/D994M - Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type); 2011.

BB. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Asphalt Types); 2023.

CC. ASTM D1752 - Standard Specification for Preformed Sponge Rubber, Cork, and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction; 2018 (Reapproved 2023).

DD. ASTM D2103 - Standard Specification for Polyethylene Film; 2023a.

EE. ASTM E1155 - Standard Test Method for Determining FF Floor Flatness and FL Floor Levelness Numbers; 2020.

FF. ASTM E1155M - Standard Test Method for Determining FF Floor Flatness and FL Floor Levelness Numbers (Metric); 2014.

GG. ASTM E1643 - Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs; 2018a.

HH. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs; 2017 (Reapproved 2023).

II. COE CRD-C 572 - Handbook for Concrete and Cement Corps of Engineers Specifications for Polyvinylchloride Waterstop; 1974.

JJ. NSF 372 - Drinking Water System Components - Lead Content; 2022.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: The Contractor is to include as a part of his expense the cost of completely dimensioned concrete shop drawings embracing plans and details, bending diagrams, steel order list, placing diagrams, which service shall be furnished by a structural engineer licensed in the State of the project. No portion of the contract documents shall be reproduced and submitted as shop drawings. The shop drawings shall include the following:
   1. Miscellaneous Items - All other reinforced concrete items shall be drawn at such scale as to give full dimensions, details and reinforcing with accessories as required.

C. All reinforcing shall be detailed, ordered, fabricated in accordance with the latest ACI Manual of Standard Practice for Detailing Concrete Structures and the CRSI Manual of Standard Practice.

D. Submit Shop Drawings to the Architect/Engineer for review, prior to release to field. Fabrication of reinforcing steel shall not be started until Drawings have been reviewed and stamped.

E. Prior to the placement of any concrete, design mixes for each type of concrete shall be submitted and approved by the testing laboratory. Mix designs shall include all required and shall include each type of aggregate and admixture to be used.

F. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements and installation instructions.
   1. For curing compounds, provide data on method of removal in the event of incompatibility with floor covering adhesives.

G. Mix Design: Submit proposed concrete mix design.
   1. Indicate proposed mix design complies with requirements of ACI 301, Section 4 - Concrete Mixtures.

2. Indicate proposed mix design complies with requirements of ACI 318, Chapter 5 - Concrete Quality, Mixing and Placing.

H. Test Reports: Submit report for each test or series of tests specified.

I. Manufacturer's Installation Instructions: For concrete accessories, indicate installation procedures and interface required with adjacent construction.

J. Project Record Documents: Accurately record actual locations of embedded utilities and components that will be concealed from view upon completion of concrete work.

K. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Perform work of this section in accordance with ACI 301 and ACI 318.
1. Maintain one copy of each document on site.

B. Follow recommendations of ACI 305R when concreting during hot weather.

C. Follow recommendations of ACI 306R when concreting during cold weather.

D. Prior to starting concrete operations the Contractor shall name his source of supply for concrete materials and shall submit representative samples and reports of quality tests for approval.

E. The Contractor will engage the services of a recognized independent testing laboratory to perform the following services, (in accordance with ASTM E 329-14a). See Division 01 General Requirements for the party responsible for choosing the laboratory and for the party, the Owner or Contractor, responsible for paying the cost of these testing services:
1. Make quality tests of materials, inspect the proportioning and mixing of all concrete for this project.
2. Slump Test, ASTM C-143, shall be taken as often as required to provide the specified consistency to concrete.
3. Cast and test a set of at least 6 cylinders for each day's pour or for each 100 cubic yards or fraction thereof. Cylinders shall be cured and tested in accordance with ASTM specifications for control tests. Cylinders shall be tested at 7 and 28 days. The Contractor shall provide insulated storage room with heat when necessary to store control cylinders, and a protected, fenced-in space for storage of field cylinders, which approximates the condition of curing of the concrete being sampled.

F. In the event that concrete tests fail to meet strength requirements of these Specifications, the Architect/Engineer may require at no additional cost to the Owner, tests in accordance with the "Standard Methods of Securing, Preparing and Testing Specimens of Hardened Concrete for Compressive and Flexural Strengths", ASTM C42, or order load tests in accordance with Chapter 20 of the ACI Building Code 318, to be made on the portions of the structure containing questionable concrete. Suitable appliances and methods of loading and measuring shall be provided by the Contractor. The portions of the structure which are found by the Architect/Engineer to contain defective concrete shall be removed and reconstructed in a manner satisfactory to the Architect/Engineer at the Contractor's expense. Concrete strength tests are to conform to Chapter 4 of the ACI Building Code 318-95.

G. The laboratory shall have free access to material stockpiles, batching and mixing plants, and job site. The Contractor shall provide adequate assistance to the laboratory in securing specified samples for tests.

H. Contractor shall give the Owner and laboratory reasonable notice before beginning any pours (at least 24 hours).

I. The laboratory shall supply a daily report of concrete and materials testing and inspection to the Architect/Engineer, Contractor and Owner.

J. Concrete batched away from the job and delivered in mixer or agitator trucks shall conform to requirements of ASTM C94.

K. Authority and Duties of Laboratory Personnel:

Inspectors shall inspect the materials and the manufacture of concrete as specified and shall report to the Contractor, Architect/Engineer the progress thereof. Also, when it appears that the material furnished and the work performed by the Contractor fail to fulfill the specification requirements and contract, the inspector shall direct the attention of the Contractor to such failure or infringement. Such inspection shall not relieve the Contractor of any obligation to furnish acceptable materials or to provide the concrete quality in the structure that is in strict accord with plans and specifications. The inspectors are not authorized to revoke, alter, relax, enlarge, or release any portion of the work, but in case of any dispute arising between the inspector and the Contractor as to materials furnished or in the manner of performing the work the inspector shall have the authority to reject materials or suspend the work until the question at issue can be referred to the Architect/Engineer. The inspector shall not act as foreman or perform other duties for the Contractor. In no case shall any advice or omission on the part of the inspector relieve the Contractor of responsibility for completing the work in accordance with the plans and specifications and the fulfillment of the contract. The work will be inspected as it progresses, but failure to reject any defective work or materials shall not in any way prevent later rejection when such defect is discovered or obligate the Architect/Engineer for final acceptance. Any expense incidental to the investigation and determination of actual quality of any questionable material shall be borne by the Contractor.

L. Sampling and Testing:
   1. All materials shall be samples, tested in accordance with appropriate ASTM Standards, and approved before inclusion in any work on this project.
   2. Samples for testing shall be furnished by the Contractor.
   3. Rejected material shall be immediately removed from the site.
   4. Reinforcing steel shall be tested by heat in shops and by random sampling in the field when required by the Architect/Engineer or Owner.

1.06 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

1.07 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Cement on the job shall be stored in watertight sheds or bins having floors off the ground.

B. Aggregate shall be handled and stored separately in a manner to prevent segregation or intrusion of foreign matter and in sufficient quantities to prevent wide fluctuation in moisture content.

C. Reinforcement when stored shall be raised off the ground on timbers.

1.08 JOB CONDITIONS

A. Concreting shall not be started during rain, sleet or snow and shall not be continued during such weather after having been started except long enough to come to a suitable cutoff point. Concrete placed during rain shall have the cement content increased in the amount of one sack of cement per cubic yard of concrete. All forms and earth forms shall be free of ice and frozen surfaces.

B. No concrete shall be poured unless temperature is 40 degrees and rising or unless special precautions are taken (approved by the Architect/Engineer). Adequate equipment shall be provided for heating the concrete materials and protecting the concrete during freezing and near freezing weather. All concrete shall have a temperature of between 50 degrees and 90 degrees F when depositing, and shall be maintained within this temperature range for at least 72 hours or for as much time as is required to insure the proper rate of curing. If the ambient temperature exceeds 90 degrees F, the mix shall be cooled by an appropriate method approved by the Architect/Engineer, such as icing the mixing water. Maintain uniform concrete temperature of succeeding batches placed. No salt or other chemicals shall be added to prevent freezing. The covering or other method used for temperature protection shall remain in place 24 hours after artificial heat is discontinued. The recommended Practice for Cold Weather Concreting" (ACI 306) and the "Recommended Practice for Hot Weather Concreting (ACI 305) shall be accepted as good practice.

PART 2 PRODUCTS

2.01 FORMWORK

A. Comply with requirements of Section 03 1000.

2.02 CONCRETE MATERIALS

A. Cement: ASTM C150/C150M, Type I - Normal Portland type.
   1. Acquire cement for entire project from same source.

B. Fine and Coarse Aggregates shall conform to the following specifications:
   1. Coarse and fine aggregate shall conform to requirements of ASTM C33/C33M.
   2. All coarse aggregates shall be crushed limestone.
   3. The maximum size of coarse aggregate shall not be larger than 1", 1/5 of the narrowest dimension between forms of the member for which the concrete is to be used, nor larger than 3/4 the minimum clear spacing between reinforcing bars. Coarse aggregate for all concrete exposed to the weather shall be crushed limestone with a #57 gradation.
   4. Absorption in coarse aggregate shall not exceed 5%.
   5. The fineness modulus for fine aggregate used shall not vary more than 0.2 from the approved sample without approval. Fineness modulus to be 2.9.
   6. Each type of aggregate shall be from the same source for the entire project.

C. Lightweight Aggregate: ASTM C330/C330M.

D. Fiber Reinforcement: Natural Cellulose Fiber complying with ASTM C1116/C1116M.

E. All concrete shall be normal weight unless specifically noted otherwise.
   1. Normal weight concrete shall be approximately 145 to 155 pounds per cubic foot.
   2. Lightweight concrete shall not exceed 110 pounds per cubic foot and shall be made of normal and normal weight fines.

F. Water shall be clean, fresh, and free from injurious amounts of oils, acids, alkali or organic material or other substances that may be deleterious to concrete or steel. ASTM C94 (potable).

G. Non-shrink grout shall be factory pre-mixed non-shrink, non-metallic grout containing mineral aggregate and shall require only the addition of water at the site. Grout shall be “EUCO NS” (non-metallic) as manufactured by the Euclid Chemical Company, “Masterflow 713” (non-metallic) as manufactured by Master Builders or approved equal. The grout shall conform to ASTM C-1107.

H. Waterstops shall be 9" Dumbbell type, Model No. 751 as manufactured by Greenstreak, at locations shown on drawings.

I. All materials shall be subject to approval. Any change of materials specified shall be submitted for approval in accordance with Section 01 6000 - Product Requirements and such change, if acceptable, shall be used only when specifically authorized in writing.

2.03 ADMIXTURES

A. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.

B. Air Entrainment Admixture: ASTM C260/C260M.

C. Water Reducing Agent: ASTM C494 Type A.

D. High Range Water Reducing Admixture: ASTM C494/C494M Type F.

E. Water Reducing Admixture: ASTM C494/C494M Type A.

2.04 ACCESSORY MATERIALS

A. Non-Shrink Cementitious Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents.
   1. Grout: Comply with ASTM C1107/C1107M.
   2. Minimum Compressive Strength at 48 Hours: 2,000 pounds per square inch.

3. Minimum Compressive Strength at 28 Days: 7,000 pounds per square inch.

2.05 BONDING AND JOINTING PRODUCTS

A. Epoxy Bonding System:
   1. Comply with ASTM C881/C881M and of Type required for specific application.

B. Waterstops: PVC, as manufactured by Greenstreak, of size and configuration and located as indicated on the drawings.
   1. Manufacturers:
      a. Substitutions: See Section 01 6000 - Product Requirements.

C. Sealant and Primer: As specified in Section 07 9200.

2.06 CURING MATERIALS, SEALING MATERIALS, AND HARDENING COMPOUND

A. Moisture-Retaining Sheet: ASTM C171.
   1. Curing paper, regular.
   2. Polyethylene film, white opaque, minimum nominal thickness of 4 mil, 0.004 inch.
   3. White-burlap-polyethylene sheet, weighing not less than 3.8 ounces per square yard.

B. Water: Potable, not detrimental to concrete.

C. Curing Compounds: Comply with ASTM C309, Type 1, Class A. If concrete contains flyash, comply with ASTM C1315.
   1. Non-yellowing formulation where subject to ultra violet light
   2. The compound shall be a dissipating resin type compound. The film must chemically break down in a two to four week period after application.

D. Curing and Sealing Compound: Comply with ASTM C309, Type 1, Class A. If concrete contains flyash, comply with ASTM C1315. Where indicated, provide curing and sealing formulation with long-lasting finish that is resistant to chemicals, oil, grease, deicing salts, and abrasion.
   1. Non-yellowing formulation where subject to ultra violet light

E. Curing and Hardening Compound: Comply with ASTM C309, Type 1, Class A. If concrete contains flyash, comply with ASTM C1315.
   1. Free of waxes, resins or oils;
   2. Penetrate concrete to change free lime to calcium silicate forming a permanently dense, hard surface.

F. The curing compound shall have test data from an independent laboratory indicating a maximum moisture loss of 0.030 grams per square cm when applied at a coverage rate of 300 square feet per gallon. Manufacturer’s certification is required.

G. Curing compounds shall not be used on any surface against which additional concrete or other cementitious materials are to be bonded.

H. All curing compound shall be delivered to the site of the work in the original container bearing the name of the manufacturer and the brand name. The compound shall be stored in a manner that prevents damage to the container and protects water-emulsion types from freezing.

I. Contractor must verify that curing compound used is appropriate for the specified floor finish and compatible with materials used in the final application.

2.07 CONCRETE MIX DESIGN

A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations and with the following requirements:

Compressive Strength, psi	Coarse Aggregate	Cement Content lbs/c.y. Min.	Slump Max.	Water-Cement Ratio Max. by Wt.
	Type Size			Non-Air Air Entrained

3,000	River Rock 1"	494	4"	.58 -
3,000	Pea Gravel 3/8"	564	3"	.58 .47
4,000	Limestone 5/8"	588	3"	.49 .44
5,000	Limestone 5/8"	635	3"	

B. Proportioning Structural Lightweight Concrete: Comply with ACI 211.2 recommendations and with the following requirements:

Compressive Strength, psi	Coarse Aggregate	Cement Content lbs/c.y. Min.	Slump Max.	Water-Cement Ratio Max. by Wt.
	Type Size			Non-Air Air Entrained
3,000	Lt. Wt. 5/8"	564	3"	
4,000	Lt. Wt. 5/8"	611	3"	

C. Concrete Strength: Establish required average strength for each type of concrete on the basis of field experience or trial mixtures, as specified in ACI 301.
   1. For trial mixtures method, employ independent testing agency acceptable to Engineer for preparing and reporting proposed mix designs.

D. Concrete proportions shall be established in accordance with Section 5.3 of ACI 318-05 or alternatively, Section 5.4 of ACI 318-05. Submit test results and calculated standard deviation basis for design per Section 5.3 to Structural Engineer of Record with mix design submittal. Proportion design mixes to produce determined required average strengths specified in Chapter 5 of ACI 318-05. All test results shall be dated within the past twelve months.

E. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended or required by manufacturer.

F. Fiber Reinforcement: Add to mix at rate of 1.5 pounds per cubic yard, or as recommended by manufacturer for specific project conditions.

G. Fly Ash: Add fly ash to concrete mixes as indicated on the design drawings. Fly ash may be used as a partial replacement for Portland Cement consistent with ACI recommendations. Limit maximum fly ash content as part of total cementitious materials as indicated on the design drawings.

H. Concrete Types: Refer to design drawings for locations requiring concrete mix design types including compressive strength and aggregate type with options for fly ash and air entrainment.

I. Strengths: Unless otherwise indicated on the drawings or in the specifications, strengths shall be 3,000 psi minimum 28 day compressive strength.

2.08 MIXING

A. It shall be the Contractor's responsibility to furnish concrete which will conform to the quality and strength specified.

B. Transit Mixers: Comply with ASTM C94/C94M.

C. Adding Water: If concrete arrives on-site with slump less than suitable for placement, do not add water that exceeds the maximum water-cement ratio or exceeds the maximum permissible slump.

D. Admixtures:
   1. Calcium Chloride shall not be used.
   2. An approved air entraining agent (ASTM C260) shall be added at the mixer with accurate dispenser to produce entrained air 4-6% by volume in all concrete subject to weathering conditions.

3. An approved water-reducing agent equal to those manufactured by Master Builder's Inc., applied at the mixer with an accurate dispenser (ASTM 494 Type A).
4. These and other admixtures shall be used only with specific approval. Tests for design mixes shall be made with the admixtures included.

E. Fiber Reinforcement: Batch and mix as recommended by manufacturer for specific project conditions.

F. The concrete shall be of such consistency and composition that it can be worked readily into the corners and angles of the forms and around reinforcement without permitting materials to segregate or free water to collect on the surfaces. Within the limiting requirements the Contractor shall adjust the consistency of the concrete as may be necessary to produce mixtures which will be placeable with reasonable methods of placing and compacting. The Contractor shall maintain on the job at all times adequate extra cement to be used at the rate of 1/2 sack cement per cubic yard concrete for each 2" slump increase for corrections due to wetness desired or obtained. No water shall be added to concrete except under the direct supervision of the Architect/Engineer or his appointed representative. Under no circumstances will the addition of more than 2 gallons of water per cubic yard of concrete be allowed at the site.

G. Measurement of Materials:
1. Cement shall be measured by the sack or half-sack unless cement is weighed for each batch.
2. Aggregates shall be proportioned separately by weight with proper compensation for weight of moisture; weighing equipment shall be accurate within 1%.
3. Water shall be measured by an approved device capable of accurate measurement to one pint.

H. Concrete shall be from a single source for each major pour.

2.09 EXPANSION MATERIALS

A. Verify compatibility of joint filler with sealant specified.

B. All expansion joints on grade shall be pre-formed non-extruding resilient type, bituminous or bonded cork (ASTM D994/D994M or ASTM D1751).

C. Other expansion joints may comply with ASTM D1752 - "Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction."

D. Manufacturer's certification and material submittal are required.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to the proper and timely completion of the Work. Do not proceed until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Formwork: Comply with requirements of ACI 301. Design and fabricate forms to support all applied loads until concrete is cured, and for easy removal without damage to concrete.

B. Verify that forms are clean and free of rust before applying release agent.

C. Coordinate placement of embedded items with erection of concrete formwork and placement of form accessories.

D. Where new concrete is to be bonded to previously placed concrete, prepare existing surface by cleaning and applying bonding agent in according to bonding agent manufacturer's instructions.
1. Use epoxy bonding system for bonding to damp surfaces, for structural load-bearing applications, and where curing under humid conditions is required.
2. Use latex bonding agent only for non-load-bearing applications.

E. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.

F. Interior Slabs on Grade: Install vapor retarder under interior slabs on grade. Comply with ASTM E1643. Lap joints minimum 6 inches. Seal joints, seams and penetrations watertight with manufacturer's recommended products and follow manufacturer's written instructions. Repair damaged vapor retarder before covering.
   1. Granular Fill Over Vapor Retarder: Cover vapor retarder with compactible granular fill as indicated on drawings. Do not use sand.
   2. Vapor Retarder Over Granular Fill: Install compactible granular fill before placing vapor retarder as indicated on drawings. Do not use sand.

G. Concrete placing shall not be started until all necessary preparations have been completed and approval has been given. Preparations shall consist of completing all form work involved, placing all reinforcing steel, pipes, conduits, sleeves, hangers, anchors, fastening devices, waterproofing and such other work to be built into the concrete in the section to be poured, and any other preparations herein required for the concreting operations. Free water and any mud or debris shall be removed from forms and excavations to be occupied by concrete. Approved equipment shall be available on the job site for heating and/or protecting the concrete whenever freezing temperatures are likely to occur within curing period. Ice or chilled water may be required to control concrete temperature in hot weather to below 90 degrees F.

H. Slabs-on-grade shall be placed on a properly leveled and thoroughly compacted subgrade, equal to 95% maximum dry density. All subsoils for slabs shall be approved before placing concrete.

I. Approved equipment shall be provided for heating concrete materials and/or protecting the concrete whenever freezing temperatures are likely to occur within curing period.

3.03 PLACING CONCRETE

A. Place concrete in accordance with ACI 304R.

B. Place concrete for floor slabs in accordance with ACI 302.1R.

C. Notify Engineer not less than 24 hours prior to commencement of placement operations.

D. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.

E. Ensure reinforcement, inserts, waterstops, embedded parts, and formed construction joint devices will not be disturbed during concrete placement.

F. Concrete shall be conveyed from the mixer or transporting vehicle to the place of final deposit as rapidly as practicable by methods which will prevent segregation or loss of materials or displacement of the reinforcing steel and which will avoid rehandling. For ready-mix concrete in an agitator truck, the elapsed time from mixer to placement shall not exceed 1-1/2 hours.

G. Concrete shall be deposited as nearly as practicable in its final position and shall have the qualities required. Concrete shall be deposited continuously in layers or section of such thickness that no concrete will be deposited on concrete which has hardened sufficiently to cause seams or planes of weakness. If sections cannot be placed continuously, proper construction joints shall be provided.

H. Concrete during and immediately after depositing shall be thoroughly compacted and worked around reinforcing and embedded fixtures and into all parts of forms by means of spades, rods and approved mechanical vibrators.

I. Place concrete continuously without construction (cold) joints wherever possible; where construction joints are necessary, before next placement prepare joint surface by removing laitance and exposing the sand and sound surface mortar, by sandblasting or high-pressure water jetting.

3.04 CONCRETE FINISHING

A. Finishing of Formed Surfaces

1. Rough Form Finish: For formed concrete surfaces not exposed-to-view in the finish work or by other construction, unless otherwise indicated. This is the concrete surface having texture imparted by form facing material used, with tie holes and defective areas repaired and patched and fins and other projections exceeding 1/4" in height rubbed down or chipped off.
2. Smooth Form Finish: For formed concrete surfaces exposed-to-view, or surfaces that are covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing, dampproofing, painting or other similar system. This is as-cast concrete surface obtained with selected form facing material, arranged orderly and symmetrically with a minimum of seams. Repair and patch defective areas with fins or other projections completely removed and smoothed.
3. Smooth Rubbed Finish: Provide smooth rubbed finish to scheduled concrete surfaces, which have received smooth form finish treatment, not later than one day after form removal. Moisten concrete surfaces and rub with carborundum brick or other abrasive until a uniform color and texture is produced. Do not apply cement grout other than that created by the rubbing process.
4. Rubbed Grout Finish: Provide rubbed grout finish to scheduled concrete surfaces as follows:
    a. Mix one (1) part Portland cement to one and one-half (1 1/2) parts of fine sand with enough water to produce a mixture with the consistency of thick paint.
    b. Wet the surface sufficiently to prevent the absorption of water from the mixture.
    c. Apply the mixture uniformly to the surface with spray or brush so that the applied thickness does not exceed 1/8 of an inch.
    d. Immediately after application of the mixture, vigorously scrub the surface with a cork float or stone in order to coat the surface and work the mixture into holes, air pockets, honey-combs and other voids.
    e. While the mixture is still plastic, remove any excess grout by working the surface with a rubber float or other suitable device.
    f. After the surface whites from drying, rub vigorously with clean burlap.
    g. Maintain the finish coat is a moist condition for at least thirty-six (36) hours after final rubbing.
5. Related Unformed Surfaces: At tops of walls, horizontal offset surfaces occurring adjacent to formed surfaces, strike-off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.05 CURING AND PROTECTION

A. Comply with requirements of ACI 308R. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

B. Curing Formed Surfaces: Cure formed concrete surfaces, by moist curing with forms in place for full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.

C. Initial Curing: Start as soon as free water has disappeared and before surface is dry. Keep continuously moist for not less than seven days by water ponding, water-saturated sand, water-fog spray, or saturated burlap.
    1. Ponding: Maintain 100 percent coverage of water over floor slab areas, continuously for 4 days.
    2. Spraying: Spray water over floor slab areas and maintain wet.
    3. Saturated Burlap: Saturate burlap-polyethylene and place burlap-side down over floor slab areas, lapping ends and sides; maintain in place.

D. Final Curing: Begin after initial curing but before surface is dry.
    1. Moisture-Retaining Sheet: Lap strips not less than 3 inches and seal with waterproof tape or adhesive; secure at edges. Maintain Moisture-Retaining Sheet for a period of 7 days.

2. Curing Compound: Apply in two coats at right angles, using application rate recommended by manufacturer as soon as final finishing operations are complete (within 2 hours).

E. Curing Methods: Perform curing of concrete by moist curing, by moisture-retaining sheet curings, by curing compound, and by combinations thereof, as herein specified.

F. Do not use membrane curing compounds on surfaces which are to be covered with coating material applied directly to concrete, liquid floor hardener, waterproofing, dampproofing, membrane roofing, flooring, painting, and other coatings and finish materials, unless otherwise acceptable to Architect/Engineer. Final cure these concrete surfaces by use of moisture-retaining sheet, unless otherwise directed.

3.06 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 4000 - Quality Requirements.

B. Provide free access to concrete operations at project site and cooperate with appointed firm.

C. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of concrete operations.

D. Tests of concrete and concrete materials may be performed at any time to ensure compliance with specified requirements.

E. Compressive Strength Tests: ASTM C39/C39M, for each test, mold and cure three concrete test cylinders. Obtain test samples for every 100 cubic yards or less of each class of concrete placed.

F. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.

G. Perform one slump test for each set of test cylinders taken, following procedures of ASTM C143/C143M.

3.07 DEFECTIVE CONCRETE

A. Test Results: The testing agency shall report test results in writing to Engineer and Contractor within 24 hours of test.

B. Defective Concrete: Concrete not complying with required lines, details, dimensions, tolerances or specified requirements.

C. Repair or replacement of defective concrete will be determined by the Engineer. The cost of additional testing shall be borne by Contractor when defective concrete is identified.

D. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Engineer for each individual area.

E. Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after removal of forms, when acceptable to Architect/Engineer. Cut out honeycomb, rock pockets, voids over 1/4" in any dimension, and holes left by tie rods and bolts, down to solid concrete but, in no case to a depth of less than 1". Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water and brush-coat the area to be patched with specified bonding agent. Place patching mortar after bonding compound has dried.

F. For exposed-to-view surfaces, blend white portland cement and standard portland cement so that, when dry, patching mortar will match color surrounding. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.

G. Repair of Formed Surfaces: Remove and replace concrete having defective surface if defects cannot be repaired to satisfaction of Engineer. Surface defects, as such, include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets; fins and other projections on surface; and stains and other discolorations that cannot be removed by cleaning. Flush out form tie holes, fill with dry pack mortar, or precast cement cone plugs secured in

place with bonding agent.

H. Repair concealed formed surfaces, where possible, that contain defects that affect the durability of concrete. If defects cannot be repaired, remove and replace concrete.

I. Repair of Unformed Surfaces: Test unformed surfaces, such as monolithic slabs, for smoothness and verify surface plant to tolerances specified for each surface and finish. Correct low and high areas as herein specified. Test unformed surfaces sloped to drain for trueness of slope, in addition to smoothness, using a template having required slope.

J. Repair finished unformed surfaces that contain defects which affect durability of concrete. Surface defects, as such, include crazing, cracks in excess of 0.01" wide or which penetrate to reinforcement of width, spalling, pop-outs, honeycomb, rock pockets, and other objectionable conditions.

K. Correct high areas in unformed surfaces by grinding, after concrete has cured at least 14 days.

L. Correct low areas in unformed surfaces during, or immediately after completion of surface finishing operations by cutting out low areas and replacing with fresh concrete. Finish repaired areas to blend into adjacent concrete. Proprietary patching compounds may be used when acceptable to Engineer.

M. Repair defective areas, except random cracks and single holes not exceeding 1" diameter, by cutting out and replacing with fresh concrete. Remove defective areas to sound concrete with clean, square cuts and expose reinforcing steel with at least 3/4" clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding compound. Mix patching concrete of same material to provide concrete of same type or class as original concrete. Place, compact and finish to blend with adjacent finish concrete. Cure in same manner as adjacent concrete.

N. Repair isolated random cracks and single holes not over 1" in diameter by dry-pack method. Groove top of cracks and cut-out holes to sound concrete and clean of dust, dirt and loose particles. Dampen cleaned concrete surfaces and apply bonding compound. Mix dry-pack, consisting of one part portland cement to 2-1/2 parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing. Place dry pack after bonding compound has dried. Compact-dry-pack mixture in place and finish to match adjacent concrete. Keep patched area continuously moist for not less than 72 hours. Use epoxy-based mortar for structural repairs, where directed by the testing laboratory.

O. Repair methods not specified above may be used, subject to acceptance of Engineer.

3.08 PROTECTION

A. Do not permit traffic over unprotected concrete floor surface until fully cured.

END OF SECTION

SECTION 04 0511
MASONRY MORTARING AND GROUTING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Mortar for masonry.

B. Grout for masonry.

1.02 RELATED REQUIREMENTS

A. Section 04 2000 - Unit Masonry: Installation of mortar and grout.

1.03 REFERENCE STANDARDS

A. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures; 2022, with Errata (2024).

B. ASTM C5 - Standard Specification for Quicklime for Structural Purposes; 2018.

C. ASTM C91/C91M - Standard Specification for Masonry Cement; 2023.

D. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar; 2018.

E. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2018.

F. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2019a, with Editorial Revision.

G. ASTM C404 - Standard Specification for Aggregates for Masonry Grout; 2024.

H. ASTM C476 - Standard Specification for Grout for Masonry; 2023.

I. ASTM C780 - Standard Test Methods for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry; 2023.

J. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete; 2016.

K. ASTM C1019 - Standard Test Method for Sampling and Testing Grout for Masonry; 2020.

L. ASTM C1072 - Standard Test Methods for Measurement of Masonry Flexural Bond Strength; 2022.

M. ASTM C1142 - Standard Specification for Extended Life Mortar for Unit Masonry; 1995 (Reapproved 2013).

N. ASTM C1314 - Standard Test Method for Compressive Strength of Masonry Prisms; 2023b.

O. ASTM E518/E518M - Standard Test Methods for Flexural Bond Strength of Masonry; 2022.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Include design mix and indicate whether the Proportion or Property specification of ASTM C270 is to be used. Also include required environmental conditions and admixture limitations.

C. Reports: Submit reports on mortar indicating compliance of mortar to property requirements of ASTM C270 and test and evaluation reports per ASTM C780.

D. Reports: Submit reports on grout indicating compliance of component grout materials to requirements of ASTM C476 and test and evaluation reports to requirements of ASTM C1019.

E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

F. Manufacturer's Installation Instructions: Submit packaged dry mortar manufacturer's installation instructions.

1.05 QUALITY ASSURANCE

A. Comply with provisions of TMS 402/602, except where exceeded by requirements of Contract Documents.
   1. Maintain one copy of each document on project site.

1.06 PRECONSTRUCTION TESTING

A. Testing will be conducted by an independent test agency, in accordance with provisions of Section 01 4000 - Quality Requirements.

B. Mortar Mixes: Test mortars prebatched by weight in accordance with ASTM C780 recommendations for preconstruction testing.
   1. Test results will be used to establish optimum mortar proportions and establish quality control values for construction testing.

C. Grout Mixes: Test grout batches in accordance with ASTM C1019 procedures.
   1. Test results will be used to establish optimum grout proportions and establish quality control values for construction testing.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Maintain packaged materials clean, dry, and protected against dampness, freezing, and foreign matter.

1.08 FIELD CONDITIONS

A. Cold and Hot Weather Requirements: Comply with requirements of TMS 402/602 or applicable building code, whichever is more stringent.

B. Maintain materials and surrounding air temperature to minimum 40 degrees F prior to, during, and 48 hours after completion of masonry work.

C. Maintain materials and surrounding air temperature to maximum 90 degrees F prior to, during, and 48 hours after completion of masonry work.

PART 2 PRODUCTS

2.01 MORTAR AND GROUT APPLICATIONS

A. Mortar Mixes:
   1. Project included Types M, S, and N mortar.
   2. Mortar mixes shall have the following minimum compressive strengths:
      a. 750 psi for Type N.
      b. 1800 psi for Type S.
      c. 2500 psi for Type M.
   3. Mortar mixes shall be used as follows:
      a. Type N for brick veneer and non-loadbearing partition walls.
      b. Type S for exterior walls and interior loadbearing walls.
      c. Type M for walls in contact with earth.

B. Mortar Mix Designs: ASTM C270, Property Specification.
   1. Concrete Masonry Units with f'm $\geq$ 2000 psi: Type M.
   2. Pointing Mortar for Prefaced or Specially Faced Unit Masonry: One part Portland cement, 1/8 part hydrated lime, and two parts graded (80 mesh) aggregate, proportioned by volume. Add aluminum tristearate, calcium stearate, or ammonium stearate equal to 2 percent of Portland cement by weight.

C. Grout Mix Designs:
   1. Bond Beams and Lintels: 3,000 psi strength at 28 days; 8-10 inches slump; provide premixed type in accordance with ASTM C 94/C 94M.
      a. Fine grout for spaces with smallest horizontal dimension of 2 inches or less.
      b. Coarse grout for spaces with smallest horizontal dimension greater than 2 inches.

2. Engineered Masonry: 3,000 psi strength at 28 days; 8-10 inches slump; provide premixed type in accordance with ASTM C 94/C 94M.
   a. Fine grout for spaces with smallest horizontal dimension of 2 inches or less.
   b. Coarse grout for spaces with smallest horizontal dimension greater than 2 inches.

2.02 MATERIALS

A. Packaged Dry Material for Mortar for Unit Masonry: Premixed Portland cement, hydrated lime, and sand; complying with ASTM C1714/C1714M and capable of producing mortar of the specified strength in accordance with ASTM C270 with the addition of water only.
   1. Type: Type N.

B. Packaged Dry Material for Mortar for Unit Masonry: Premixed masonry cement and mason's sand; complying with ASTM C1714/C1714M and capable of producing mortar of the specified strength in accordance with ASTM C270 with the addition of water only.
   1. Type: Type N.

C. Packaged Dry Material for Mortar for Repointing: Premixed Portland cement, graded sand, and chemical admixtures complying with ASTM C91/C91M with the addition of water only.
   1. Color: Natural gray.

D. Packaged Dry Material for Mortar for Repointing: Premixed Portland cement, hydrated lime, and graded sand; capable of producing Type O mortar in accordance with ASTM C270 with the addition of water only.
   1. Color: Standard gray.

E. Packaged Dry Material for Grout for Masonry: Premixed cementitious materials and dried aggregates; capable of producing grout of the specified strength in accordance with ASTM C476 with the addition of water only.
   1. Type: Fine.

F. Portland Cement: ASTM C150/C150M.
   1. Type: Type I - Normal; ASTM C150/C150M.
   2. Color: Standard gray.

G. Masonry Cement: ASTM C91/C91M.
   1. Type: Type N; ASTM C91/C91M.
   2. Colored Mortar: Premixed cement as required to match Engineer's color sample.

H. Hydrated Lime: ASTM C207, Type S.

I. Quicklime: ASTM C5, non-hydraulic type.

J. Mortar Aggregate: ASTM C144.

K. Grout Aggregate: ASTM C404.

L. Water: Clean and potable.

M. Accelerating Admixture: Nonchloride type for use in cold weather.

N. Moisture-Resistant Admixture: Water repellent compound designed to reduce capillarity.

O. Bonding Agent: Latex type.

2.03 MORTAR MIXING

A. Ready Mixed Mortar: ASTM C1142, Type equivalent to that specified according to ASTM C270.

B. Thoroughly mix mortar ingredients using mechanical batch mixer, in accordance with ASTM C270 and in quantities needed for immediate use.

C. Maintain sand uniformly damp immediately before the mixing process.

D. Do not use anti-freeze compounds to lower the freezing point of mortar.

E. If water is lost by evaporation, re-temper only within two hours of mixing.

2.04 GROUT MIXING

A. Mix grout in accordance with ASTM C94/C94M.

B. Thoroughly mix grout ingredients in quantities needed for immediate use in accordance with ASTM C476 for fine and coarse grout.

C. Add admixtures in accordance with manufacturer's instructions; mix uniformly.

D. Do not use anti-freeze compounds to lower the freezing point of grout.

PART 3 EXECUTION

3.01 PREPARATION

A. Apply bonding agent to existing concrete surfaces.

B. Plug clean-out holes for grouted masonry with brick masonry units. Brace masonry to resist wet grout pressure.

3.02 INSTALLATION

A. Install mortar and grout to requirements of section(s) in which masonry is specified.

B. Work grout into masonry cores and cavities to eliminate voids.

C. Do not install grout in lifts greater than 16 inches without consolidating grout by rodding.

D. Do not displace reinforcement while placing grout.

E. Remove excess mortar from grout spaces.

3.03 GROUTING

A. Use either high-lift or low-lift grouting techniques, at Contractor's option, subject to other limitations of Contract Documents.

B. Perform all grouting by means of low-lift technique. Do not employ high-lift grouting.

C. Low-Lift Grouting:
   1. Limit height of pours to 12 inches.
   2. Limit height of masonry to 16 inches above each pour.
   3. Pour grout only after vertical reinforcing is in place; place horizontal reinforcing as grout is poured. Prevent displacement of bars as grout is poured.
   4. Place grout for each pour continuously and consolidate immediately; do not interrupt pours for more than 1-1/2 hours.

3.04 FIELD QUALITY CONTROL

A. An independent testing agency will perform field tests, in accordance with provisions of Section 01 4000 - Quality Requirements.

B. Test and evaluate mortar in accordance with ASTM C780 procedures.
   1. Test with same frequency as specified for masonry units.

C. Test and evaluate grout in accordance with ASTM C1019 procedures.
   1. Test with same frequency as specified for masonry units.

D. Prism Tests: Test masonry and mortar panels for compressive strength in accordance with ASTM C1314, and for flexural bond strength in accordance with ASTM C1072 or ASTM E518/E518M; perform tests and evaluate results as specified in individual masonry sections.

END OF SECTION

SECTION 04 2000
UNIT MASONRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Concrete block.

1.02 RELATED REQUIREMENTS

A. Section 04 0511 - Masonry Mortaring and Grouting.

1.03 REFERENCE STANDARDS

A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.

B. ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications; 2023a.

C. ASTM A641/A641M - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire; 2009a (Reapproved 2014).

D. ASTM A951/A951M - Standard Specification for Steel Wire for Masonry Joint Reinforcement; 2022.

E. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2015.

F. ASTM C27 - Standard Classification of Fireclay and High-Alumina Refractory Brick; 1998 (Reapproved 2022).

G. ASTM C34 - Standard Specification for Structural Clay Loadbearing Wall Tile; 2023.

H. ASTM C56 - Standard Specification for Structural Clay Nonloadbearing Tile; 2022.

I. ASTM C62 - Standard Specification for Building Brick (Solid Masonry Units Made from Clay or Shale); 2023.

J. ASTM C67/C67M - Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile; 2023.

K. ASTM C73 - Standard Specification for Calcium Silicate Brick (Sand-Lime Brick); 2023.

L. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units; 2023.

M. ASTM C126 - Standard Specification for Ceramic Glazed Structural Clay Facing Tile, Facing Brick, and Solid Masonry Units; 2022.

N. ASTM C129 - Standard Specification for Nonloadbearing Concrete Masonry Units; 2023.

O. ASTM C140/C140M - Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units; 2023a.

P. ASTM C212 - Standard Specification for Structural Clay Facing Tile; 2022.

Q. ASTM C216 - Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale); 2023.

R. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2019a, with Editorial Revision.

S. ASTM C315 - Standard Specification for Clay Flue Liners and Chimney Pots; 2007 (Reapproved 2021).

T. ASTM C530 - Standard Specification for Structural Clay Nonloadbearing Screen Tile; 2023.

U. ASTM C652 - Standard Specification for Hollow Brick (Hollow Masonry Units Made from Clay or Shale); 2022.

V. ASTM C744 - Standard Specification for Prefaced Concrete and Calcium Silicate Masonry Units; 2021.

W. ASTM C780 - Standard Test Methods for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry; 2023.

X. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete; 2016.

Y. ASTM C1072 - Standard Test Methods for Measurement of Masonry Flexural Bond Strength; 2022.

Z. ASTM C1314 - Standard Test Method for Compressive Strength of Masonry Prisms; 2023b.

AA. ASTM D226/D226M - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing; 2017 (Reapproved 2023).

BB. ASTM D4637/D4637M - Standard Specification for EPDM Sheet Used in Single-Ply Roof Membrane; 2015, with Editorial Revision (2022).

CC. ASTM E514/E514M - Standard Test Method for Water Penetration and Leakage Through Masonry; 2020.

DD. BIA Technical Notes No. 7 - Water Penetration Resistance – Design and Detailing; 2005.

EE. BIA Technical Notes No. 13 - Ceramic Glazed Brick Exterior Walls; 2017.

FF. BIA Technical Notes No. 28B - Brick Veneer/Steel Stud Walls; 2005.

GG. BIA Technical Notes No. 46 - Maintenance of Brick Masonry; 2005.

HH. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures; 2022, with Errata (2024).

II. UL (FRD) - Fire Resistance Directory; current edition.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by all relevant installers.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data for masonry units, fabricated wire reinforcement, mortar, and masonry accessories.

C. Manufacturer's Certificate: Certify that masonry units meet or exceed specified requirements.

D. Manufacturer's Certificate: Certify that water repellent admixture manufacturer has certified masonry unit manufacturer as an approved user of water repellent admixture in the manufacture of concrete block.

E. Test Reports: Concrete masonry manufacturer's test reports for units with integral water repellent admixture.

1.06 QUALITY ASSURANCE

A. Comply with provisions of TMS 402/602, except where exceeded by requirements of Contract Documents.
   1. Maintain one copy of each document on project site.

B. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section with minimum three years of documented experience.

C. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.

PART 2 PRODUCTS

2.01 CONCRETE MASONRY UNITS

A. Concrete Block: Comply with referenced standards and as follows:
   1. Size: Standard units with nominal face dimensions of 16 by 8 inches and nominal depth of 8 inches.
   2. Size: Standard units with nominal face dimensions of 16 by 8 inches and nominal depths as indicated on drawings for specific locations.
   3. Special Shapes: Provide non-standard blocks configured for corners.
   4. Non-Loadbearing Units: ASTM C129.
      a. Hollow block, as indicated.
      b. Lightweight.
   5. Units with Integral Water Repellent: Concrete block units as specified in this section with polymeric liquid admixture added to concrete masonry units at the time of manufacture.
      a. Performance of Units with Integral Water Repellent:
         1) Water Permeance: When tested per ASTM E514/E514M and for a minimum of 72 hours.
            (a) No water visible on back of wall above flashing at the end of 24 hours.
            (b) No flow of water from flashing equal to or greater than 0.032 gallons per hour at the end of 24 hours.
            (c) No more than 25 percent of wall area above flashing visibly damp at end of test.
         2) Flexural Bond Strength: ASTM C1072; minimum 10 percent increase.
         3) Compressive Strength: ASTM C1314; maximum 5 percent decrease.
      b. Use only in combination with mortar that also has integral water repellent admixture.
      c. Use water repellent admixtures for masonry units and mortar by a single manufacturer.

2.02 MORTAR AND GROUT MATERIALS

A. Mortar and Grout: As specified in Section 04 0511.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive masonry.

B. Verify that related items provided under other sections are properly sized and located.

C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

3.02 PREPARATION

A. Direct and coordinate placement of metal anchors supplied for installation under other sections.

B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

3.03 COLD AND HOT WEATHER REQUIREMENTS

A. Comply with requirements of TMS 402/602 or applicable building code, whichever is more stringent.

3.04 COURSING

A. Establish lines, levels, and coursing indicated. Protect from displacement.

B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.

C. Concrete Masonry Units:
   1. Bond: Running.
   2. Coursing: One unit and one mortar joint to equal 8 inches.
   3. Mortar Joints: Concave.

3.05 PLACING AND BONDING

A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.

B. Lay hollow masonry units with face shell bedding on head and bed joints.

C. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.

D. Remove excess mortar and mortar smears as work progresses.

E. Remove excess mortar with water repellent admixture promptly. Do not use acids, sandblasting or high pressure cleaning methods.

F. Interlock intersections and external corners, except for units laid in stack bond.

G. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.

H. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.

3.06 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 4000 - Quality Requirements.

B. Concrete Masonry Unit Tests: Test each variety of concrete unit masonry in accordance with ASTM C140/C140M for compliance with requirements of this specification.

C. Mortar Tests: Test each type of mortar in accordance with ASTM C780, testing with same frequency as masonry samples.

3.07 CLEANING

A. Remove excess mortar and mortar droppings.

B. Replace defective mortar. Match adjacent work.

C. Clean soiled surfaces with cleaning solution.

D. Use non-metallic tools in cleaning operations.

3.08 PROTECTION

A. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

END OF SECTION

SECTION 31 1000
SITE CLEARING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Clearing and protection of vegetation.

B. Removal of existing debris.

1.02 RELATED REQUIREMENTS

A. Section 01 1000 - Summary: Limitations on Contractor's use of site and premises.

B. Section 01 5713 - Temporary Erosion and Sediment Control.

C. Section 01 7000 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products.

D. Section 02 4100 - Demolition: Removal of built elements and utilities.

E. Section 31 2200 - Grading: Topsoil removal.

F. Section 31 2323 - Fill: Fill material for filling holes, pits, and excavations generated as a result of removal operations.

1.03 PRICE AND PAYMENT PROCEDURES - UNIT PRICE

A. See Section 01 2200 - Unit Prices, for general requirements relating to Unit Prices for this work.

B. Payment for the project site clearing and grubbing shall be made at the contract Unit Price: Lump Sum, Item No. 201-01 or Per Acre, Item No. 201-01.03.

C. Compensation shall be for completing the clearing and grubbing as outlined in the drawings and specifications.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Site Plan: Showing:
   1. Vegetation removal limits.
   2. Areas for temporary construction and field offices.
   3. Erosion Control Plan.

1.05 GOVERNING REGULATIONS

A. Tree clearing and removal shall be coordinated with the Local Governing Authorities prior to beginning construction.

PART 2 PRODUCTS

2.01 MATERIALS

A. Fill Material: As specified in Section 31 2323 - Fill and Backfill

PART 3 EXECUTION

3.01 SITE CLEARING

A. Comply with other requirements specified in Section 01 7000.

B. Minimize production of dust due to clearing operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.

3.02 EXISTING UTILITIES AND BUILT ELEMENTS

A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.

B. Protect existing utilities to remain from damage.

C. Do not disrupt public utilities without permit from authority having jurisdiction.

D. Protect existing structures and other elements that are not to be removed.

3.03 VEGETATION

A. Scope: Remove trees, shrubs, brush, and stumps in areas to be covered by building structure, paving, playing fields, lawns, and planting beds.

B. Do not begin clearing until vegetation to be relocated has been removed.

C. Do not remove or damage vegetation beyond the limits indicated on drawings.
   1. Exception: Specific trees and vegetation indicated on drawings to be removed.
   2. Exception: Selective thinning of undergrowth specified elsewhere.

D. Install substantial, highly visible fences at least 4 feet high to prevent inadvertent damage to vegetation to remain:
   1. At vegetation removal limits.
   2. Around trees to remain within vegetation removal limits; locate no closer to tree than at the drip line.
   3. Around other vegetation to remain within vegetation removal limits.

E. In areas where vegetation must be removed but no construction will occur other than pervious paving, remove vegetation with minimum disturbance of the subsoil.

F. Vegetation Removed: Do not burn, bury, landfill, or leave on site, except as indicated.
   1. Chip, grind, crush, or shred vegetation for mulching, composting, or other purposes; preference should be given to on-site uses.

G. Dead Wood: Remove all dead trees (standing or down), limbs, and dry brush within the limits of work, treat as specified for vegetation removed.

H. Restoration: If vegetation outside removal limits or within specified protective fences is damaged or destroyed due to subsequent construction operations, replace at no cost to Owner.

3.04 DEBRIS

A. Remove debris, junk, and trash from site.

B. Leave site in clean condition, ready for subsequent work.

C. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION

SECTION 31 2200
GRADING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Removal of topsoil.

B. Rough grading of the site for work as indicated on drawings..

C. Topsoil and finish grading for planting. Replacement of topsoil and finish grading.

1.02 RELATED REQUIREMENTS

A. Section 31 1000 - Site Clearing.

B. Section 31 2316 - Excavation.

C. Section 31 2316.13 - Trenching.

D. Section 31 2323 - Fill and Backfill.

E. Section 32 9219 - Seeding.

1.03 PRICE AND PAYMENT PROCEDURES - UNIT PRICE

A. See Section 01 2200 - Unit Prices, for general requirements relating to unit prices for this work.

B. Payment for topsoil stripped and stored on site then spread and graded, shall be made at the contract Unit Price Per Cubic Yard, Item No. 203-04.

C. Compensation shall be for all work associated with the final placement of the topsoil including but not limited to excavating (stripping) existing topsoil, incorporating required amendments, scarifying and preparing substrate surface and placing.

1.04 SUBMITTALS

A. Project Record Documents: Accurately record actual locations of utilities remaining by horizontal dimensions, elevations or inverts, and slope gradients.

1.05 QUALITY ASSURANCE

A. Perform Work in accordance with State; City; Municipality; Highway Department standards.

PART 2 PRODUCTS

2.01 MATERIALS

A. Topsoil: Topsoil excavated on-site.
   1. Graded.
   2. Free of roots, rocks larger than 1/2 inch, subsoil, debris, large weeds and foreign matter.

B. Other Fill Materials: See Section 31 2323.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that survey bench mark and intended elevations for the Work are as indicated.

B. Verify the absence of standing or ponding water.

3.02 PREPARATION

A. Identify required lines, levels, contours, and datum.

B. Stake and flag locations of known utilities.

C. Locate, identify, and protect from damage above- and below-grade utilities to remain.

D. Notify utility company to remove and relocate utilities.

E. Provide temporary means and methods to remove all standing or ponding water from areas prior to grading.

F. Protect site features to remain, including but not limited to bench marks, survey control points, existing structures, fences, and paving, from damage by grading equipment and vehicular traffic.

3.03 ROUGH GRADING

A. Remove topsoil from limits of work as shown on drawings, without mixing with foreign materials.

B. Do not remove topsoil when wet.

C. Remove subsoil from areas to be further excavated, re-landscaped, or re-graded.

D. Do not remove wet subsoil , unless it is subsequently processed to obtain optimum moisture content.

E. When excavating through roots of trees designated to remain, perform work by hand and cut roots with sharp axe.

F. See Section 31 2323 for filling procedures.

G. Benching Slopes: Horizontally bench existing slopes greater than 1:4 to key fill material to slope for firm bearing.

H. Stability: Replace damaged or displaced subsoil to same requirements as for specified fill.

I. Remove and replace soils deemed unsuitable by classification and which are excessively moist due to lack surface water control.

3.04 SOIL REMOVAL

A. Stockpile topsoil to be re-used on site.

B. Stockpile subsoil to be re-used on site.

C. Stockpiles: Use areas designated on site; pile depth not to exceed 8 feet; protect from erosion.

3.05 FINISH GRADING

A. Before Finish Grading:
   1. Verify subgrade has been contoured and compacted.

B. Remove debris, roots, branches, stones, in excess of 1/2 inch in size.

C. Where topsoil is to be placed, scarify surface to depth of 3 inches.

D. In areas where vehicles or equipment have compacted soil, scarify surface to depth of 6 inches.

E. Place topsoil in areas where seeding are indicated.

F. Place topsoil to the following rolled thicknesses:
   1. Areas to be Seeded with Grass: 6 inches.

G. Place topsoil during dry weather.

H. Remove roots, weeds, rocks, and foreign material while spreading.

I. Fine grade topsoil to eliminate uneven areas and low spots. Maintain profiles and contour of subgrade.

J. Maintain stability of topsoil during inclement weather. Replace topsoil in areas where surface water has eroded thickness below specifications.

3.06 TOLERANCES

A. Top Surface of Subgrade: Plus or minus 0.10 foot from required elevation.

B. Top Surface of Finish Grade: Plus or minus 0.04 foot.

3.07 REPAIR AND RESTORATION

A. Existing Facilities, Utilities, and Site Features to Remain: If damaged due to this work, repair or replace to original condition.

B. Trees to Remain: If damaged due to this work, trim broken branches and repair bark wounds; if root damage has occurred, obtain instructions from Engineer as to remedy.

C. Other Existing Vegetation to Remain: If damaged due to this work, replace with vegetation of equivalent species and size.

3.08 FIELD QUALITY CONTROL

A. See Section 31 2323 for compaction density testing.

3.09 CLEANING

A. Remove unused stockpiled topsoil and subsoil. Grade stockpile area to prevent standing water.

END OF SECTION

SECTION 31 2316
EXCAVATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Excavating for building volume below grade, footings, pile caps, slabs-on-grade, paving, site structures, and established finished grades throughout the site.

1.02 RELATED REQUIREMENTS

A. Section 01 5713 - Temporary Erosion and Sedimentation Control.

B. Section 01 7000 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products; temporary bracing and shoring. General requirements for dewatering of excavations and water control.

C. Section 02 4100 - Demolition: Shoring and underpinning existing structures.

D. Section 31 2200 - Grading: Grading.

E. Section 31 2316.13 - Trenching.

F. Section 31 2323 - Fill: Fill materials, backfilling, and compacting.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Field Quality Control Submittals: Document visual inspection of load-bearing excavated surfaces.

1.04 PRICE AND PAYMENT PROCEDURES - UNIT PRICE

A. See Section 01 2200 - Unit Prices, for general requirements relating to Unit Prices for this work.

B. Payment for common excavation shall be made at the contract Unit Price Per Cubic Yard, Item No. 203-01.

C. Payment for undercutting shall be made at the contract Unit Price Per Cubic Yard, Item No. 203-05.

D. Measurements for excavation shall be by landsurveying of the material in place.

1. Common excavation shall include the removal of soils, moving of the material for disposal or to be placed elsewhere on site, shaping and compacting to conform to final lines and grades as indicated on the plans.
2. Undercutting wil be performed to remove unsuitable materials prior to compaction. If the material cannot be processed for reuse on site or cannot be otherwise placed on site it shall be removed from site. The unit price shall include the excavation and redepositing of the undercut material whether on or offsite. Material to replace the excavated undercut shall be paid based upon established unit price for common excavated material unless insufficient material is available in which case the unit price for common borrow shall be used.

E. See Section 31 2323 - Fill, for measurement and payment provisions related to fill.

1.05 PROJECT CONDITIONS

A. Verify that survey bench mark and intended elevations for the Work are as indicated.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PREPARATION

A. Identify required lines, levels, contours, and datum locations.

B. See Section 31 2200 for topsoil removal.

C. Locate, identify, and protect utilities that remain and protect from damage.

D. Notify utility company to remove and relocate utilities.

E. Protect bench marks, survey control points, existing structures, and paving from excavating equipment and vehicular traffic.

F. Grade top perimeter of excavation to prevent surface water from draining into excavation. Provide temporary means and methods, as required, to maintain surface water diversion until no longer needed, or as directed by Engineer.

3.02 EXCAVATING

A. Common excavation to establish cut and fill surfaces conforming to lines and grades as shown on the plans by moving and placing the materials as required. All cut surfaces shall be compacted; fill areas shall be placed in accordance with section 31 2323.

B. Notify Engineer of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.

C. When shown on the plans, or when instructed by the Engineer, undercut those areas where materials unsuitable are encountered.

D. Slope banks of excavations deeper than 4 feet to angle of repose or less until shored.

E. Remove lumped subsoil, boulders, and rock up to 1/3 cubic yard measured by volume.

F. Correct areas that are over-excavated and load-bearing surfaces that are disturbed; See Section 31 2323.

G. Provide temporary means and methods, as required, to remove all water from excavations until directed by Engineer. Remove and replace soils deemed suitable by classification and which are excessively moist due to lack of dewatering or surface water control.

H. Remove excavated material that is unsuitable for re-use from site.

I. Stockpile excavated material to be re-used in area designated on site in accordance with Section 31 2200.

3.03 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for general requirements for field inspection and testing.

3.04 PROTECTION

A. Divert surface flow from rains or water discharges from the excavation.

B. Prevent displacement of banks and keep loose soil from falling into excavation; maintain soil stability.

C. Protect open excavations from rainfall, runoff, freezing groundwater, or excessive drying so as to maintain foundation subgrade in satisfactory, undisturbed condition.

END OF SECTION

SECTION 31 2316.13
TRENCHING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Backfilling and compacting for utilities outside the building as indicated on the drawings.

1.02 RELATED REQUIREMENTS

A. Section 31 2200 - Grading: Site grading.

B. Section 31 2316 - Excavation: Building and foundation excavating.

C. Section 31 2323 - Fill: Backfilling at building and foundations.

1.03 PRICE AND PAYMENT PROCEDURES - UNIT PRICE

A. See Section 01 2200 - Unit Prices, for general requirements relating to Unit Prices for this work.

B. Trench excavation shall not be measured for payment rather it shall be incidental to other unit prices for the installation of utilities, storm drain and sanitary sewer piping, minor structure, etc.

1.04 DEFINITIONS

A. Finish Grade Elevations: Indicated on drawings.

B. Subgrade Elevations: Indicated on drawings.

1.05 REFERENCE STANDARDS

A. AASHTO T 180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and a 457 mm (18 in.) Drop; 2010.

B. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)); 2012.

C. ASTM D1556/D1556M - Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method; 2015, with Editorial Revision (2016).

D. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN m/m3)); 2012.

E. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method; 2008.

F. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System); 2017, with Editorial Revision (2020).

G. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth); 2010.

1.06 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Materials Sources: Submit name of imported materials source.

C. Fill Composition Test Reports: Results of laboratory tests on proposed and actual materials used.

D. Compaction Density Test Reports.

1.07 DELIVERY, STORAGE, AND HANDLING

A. When necessary, store materials on site in advance of need.

B. When fill materials need to be stored on site, locate stockpiles where it will not interfere with other site construction activities.
   1. Separate differing materials with dividers or stockpile separately to prevent intermixing.
   2. Prevent contamination.
   3. Protect stockpiles from erosion and deterioration of materials.

PART 2 PRODUCTS

2.01 BEDDING AND BACKFILL MATERIALS

A. Class I Material: Angular, 1/4 to 1 inch graded stone including a number of fill materials that have regional significance such as crushed stone, cinders, slag, and crushed shells.

B. Class II Material: Coarse sands and gravels with a maximum particle dimension of 1-1/2 inches, including variously graded sands and gravels containing small percentages of fines, generally granular and non-cohesive, either wet or dry.

C. Class III Material: Fine sand and clayey gravels, including fine sands, sand-clay mixtures, and gravel-clay mixtures.

D. Class IV Material: Silt, silty clays, and clays, including inorganic clays and silts of medium to high plasticity and liquid limits conforming to Standard Soils Classification (ASTM D2487) CL, CL-ML, ML.

E. Class V Material: Organic soils, as well as soil containing frozen earth, debris, rocks larger than 1-1/2 inches, and other foreign material.

2.02 PIPE BEDDING CLASSIFICATIONS

A. Type “A” bedding shall consist of a concrete cradle which shall be used only at the direction of the Engineer or if specifically called out and detailed in the construction plans.

B. Type “B” bedding shall consist of material meeting the Class II material requirement in section 2.01, B. and meeting the following gradation;

Sieve Size	1 ½”	1"	3/4"	3/8"	No. 4	No. 10	No. 100
% Passing	100	85-100	60-95	50-80	40-65	20-40	9-18

Bedding shall be a minimum of 6” of material under the pipe. The pipe shall be laid on the bedding with bell holes shaped to insure the full length of the pipe is supported. Material shall be rammed with hand tools under the haunches of the pipe. The Type II material shall be used for the initial backfill. It shall be installed in minimum 6” compacted lifts until the crown of the pipe has a minimum of 6” cover.

C. Type “C” Bedding shall consist of Class III or IV material as defined in section 2.01, C. or D. Type “C” bedding may be required when the material excavated from the trench is considered unsuitable for use as bedding and backfill material. It shall be installed in the same manner as Type “B” bedding described above.

D. Type “D” Bedding shall consist of suitable materials excavated from the trench meeting the requirements of Class I, II, III, or IV materials. Class V materials shall not be used. The pipe may be laid directly on the trench bottom with bell holes shaped as needed to insure the full length of the pipe is supported. After soil has been rammed under the haunches of the pipe the initial backfill using the excavated material shall proceed as described in 2.02,B. If the excavated material is unsuitable for use as backfill material Class “C” bedding shall be used.

2.03 ACCESSORIES

A. Geotextile Fabric: Non-biodegradable, non-woven having a maximum EOS of 100.

2.04 SOURCE QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for general requirements for testing and analysis of soil material.

B. Where fill materials are specified by reference to a specific standard, testing of samples for compliance will be provided before delivery to site.

C. If tests indicate materials do not meet specified requirements, change material and retest.

D. Provide materials of each type from same source throughout the Work.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that survey bench marks and intended elevations for the work are as indicated.

3.02 PREPARATION

A. Identify required lines, levels, contours, and datum locations.

B. Locate, identify, and protect utilities that remain and protect from damage.

C. Notify utility company to remove and/or relocate utilities when so noted in the construction documents.

D. Protect bench marks, survey control points, existing structures, fences, and paving from excavating equipment and vehicular traffic.

E. Grade top perimeter of trenching area to prevent surface water from draining into trench. Provide temporary means and methods, as required, to maintain surface water diversion until no longer needed, or as directed by the Engineer.

F. Install barriers and other devices to protect areas adjacent to construction.

3.03 TRENCHING

A. Notify Engineer of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.

B. Slope banks of excavations from 1' foot above the crown (top) of pipe to angle of repose or less until shored.

1. When necessary furnish, put in place, and maintain such sheeting, bracing, etc., as may be required to support the sides of the excavation and to prevent movement. The trenching and excavation requirements of 29CFR 1926.651 and 1926.652 or comparable OSHA approved State requirements shall be used by the Contractor.
2. Take care to prevent voids outside the sheeting.
3. If voids are formed, immediately fill and ram to the satisfaction of the Engineer.
4. Devise plans for performing this work subject to the approval of the Engineer.
5. Unless it is to remain in place, advance the removal of all sheeting, shoring, and bracing as the bedding and initial backfill is placed around the pipe to insure intimate contact between the bedding and the trench walls.
6. Cut off shoring to remain in place a minimum of 2’ below finished grade.

C. Trench width: minimum is pipe diameter plus 1 foot; the maximum is outside diameter of the pipe plus 4 feet.

D. Cut pavement along neat, straight lines with either a pavement breaker or pavement saw.

E. Trench depth: for waterlines--sufficient to provide minimum cover of 36 inches over the top of the pipe; for sewer lines--as shown on the Plans or as specified.

F. Align trench as shown on the Plans unless a change is necessary to miss an unforeseen obstruction. Do not make field adjustment in the alignment or grade of gravity lines without written approval of the Engineer.

G. Hand trim excavations. Remove loose matter.

H. Remove large stones and other hard matter that could damage piping or impede consistent backfilling or compaction.

I. Remove lumped subsoil, boulders, and rock up to 1/3 cubic yard measured by volume. See Section 31 2316.26 for removal of larger material.

J. Remove excavated material that is unsuitable for re-use from site.

K. Stockpile excavated material to be re-used in area designated in Section 31 2200.

L. Provide temporary means and methods, as required, to remove all water from trenching until directed by the Engineer. Remove and replace soils deemed unsuitable by classification and

which are excessively moist due to lack of dewatering or surface water control.

M. Determine the prevailing groundwater level prior to trenching. If the proposed trench extends less than 1 foot into the prevailing groundwater, control groundwater intrusion with perimeter drains routed to sump pumps, or as directed by the Engineer.

N. When unstable soil is encountered at the trench bottom, remove it to a depth required to assure support of the pipeline and backfill to the proper grade with coarse aggregate AASHTO M-43, Size No. 2. Before placing any bedding material over stone a non-woven filter fabric with a maximum 100 EOS shall be placed over the stone for full width and length of the trench where the stone foundation is used.

O. Remove rock encountered in trench excavation to a depth of 6 inches below the bottom of the pipe barrel, backfill with an approved material, and compact to uniformly support the pipe. In no case shall solid rock exist within six (6) inches of the finished pipeline.

P. When rock borings or soundings are provided, they are for information only and do not guarantee existing conditions. Make such investigations as deemed necessary to determine existing conditions.

3.04 PREPARATION FOR UTILITY PLACEMENT

A. Cut out soft areas of subgrade not capable of compaction in place. Backfill with general fill.

B. Compact subgrade to density equal to or greater than requirements for subsequent fill material.

C. Until ready to backfill, maintain excavations and prevent loose soil from falling into excavation.

3.05 BACKFILLING

A. Backfill to contours and elevations indicated using unfrozen materials.

B. Fill up to subgrade or finish elevations unless otherwise indicated.

C. Employ a placement method that does not disturb or damage other work.

D. Do not fill over porous, wet, frozen or spongy subgrade surfaces.

E. Maintain +/- 2% of optimum moisture content of fill materials to attain required compaction density.

F. Granular Fill: Place and compact materials in equal continuous layers not exceeding 8 inches compacted depth.

G. Soil Fill: Place and compact material in equal continuous layers not exceeding 6 inches compacted depth.

H. Slope grade away from building minimum 2%, unless noted otherwise. Make gradual grade changes. Blend slope into level areas.

I. Correct areas that are over-excavated.
   1. Thrust bearing surfaces: Fill with concrete.
   2. Other areas: Use general fill, flush to required elevation, compacted to minimum 95 percent of maximum dry density.

J. Compaction Density Unless Otherwise Specified or Indicated:
   1. Under paving, slabs-on-grade, and similar construction: 98 percent of maximum dry density.
   2. At other locations: 95 percent of maximum dry density.

K. Reshape and re-compact fills subjected to vehicular traffic.

3.06 BEDDING AND FILL AT SPECIFIC LOCATIONS

A. Use general fill unless otherwise specified or indicated.

B. Storm Sewer Pipe
   1. All storm sewer pipe classified as flexible (PVC, HDPE, CMP, etc.) shall be installed using Type “B” bedding.

2. Storm sewer pipe classified as rigid (RCP, D.I., etc) may be installed using Type “D” bedding, unless otherwise noted on the construction drawings.

C. Water and Gas Lines - shall be installed using Type “D” bedding, unless otherwise noted on the construction drawings.

3.07 FINAL BACKFILLING

A. After the initial backfill has been placed, perform final backfilling.

B. Backfilling in unimproved areas.
1. Dispose of and replace all soft or yielding material which is unsuitable for trench backfilling with suitable material.
2. Suitable material excavated from the trench may be used as backfill material. It shall be installed in maximum of 8” loose lifts and compacted to a minimum of 95% standard Proctor.

C. Backfilling beneath driveways and streets where non-rigid and rigid type surfacing is to be replaced.
1. Use granular backfill of crushed stone or gravel meeting the requirements for Type A, Grading D as set forth in subsection 903.05 in the TDOT Standard Specifications for Road and Bridge Construction.
2. Carefully deposit in uniform layers, not to exceed 6" thick.
3. Compact each layer thoroughly by rolling, ramming, and tamping with tools suitable for that purpose in such a manner so as to not disturb the pipe.

D. Backfilling of shoulders along streets and highways.
1. Backfilling methods and materials for shoulders along streets and highways shall be in accordance with the requirements of governing local, county, or state departments maintaining the particular roadway or highway.
2. Replace with similar materials, all shoulders which may be damaged or destroyed as a result of pipe trenching.
3. Backfilling of shoulders shall not be directly measured for payment unless traffic whips out the shoulder material rather than settling it, then any additional crushed stone placed shall be paid for as crushed stone for shoulder replacement.
4. Where shoulders along state highways have seal coat surfaces, replace with double bituminous seal.
5. Where the State Highway Department or local authority requires trenches to be backfilled entirely with granular material in the shoulder of roads, granular material so placed shall not be a pay item, but included in the prices per linear foot of pipe.

E. Crushed stone for pavement maintenance and shoulder replacement.
1. Where possible, salvage and reuse all base material that is removed during construction.
2. Wet and thoroughly compact crushed stone and blade to tie into the existing surface prior to final acceptance.
3. Base material placed as a portion of pavement replacing items will not be directly measured for payment unless traffic whips out the base material rather than settling it, then any additional base material placed shall be paid for as crushed stone for pavement maintenance.

3.08 TOLERANCES

A. Top Surface of General Backfilling: Plus or minus 0.1' from required elevations.

B. Top Surface of Backfilling Under Paved Areas: Plus or minus 0.04' from required elevations.

3.09 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for general requirements for field inspection and testing.

B. Before installing the initial backfill the Contractor shall examine the pipe to insure proper line and grade has been established and all joints are fully belled up and properly installed. Should

tests or observation made at a later date reveal problems with the pipe integrity and/or alignment it shall be the responsibility of the Contractor to correct the problem(s) at his own expense.

C. Perform compaction density testing on compacted fill in accordance with ASTM D1556, ASTM D2167, or ASTM D6938.

D. Evaluate results in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D1557 ("modified Proctor"), AASHTO T 180, or ASTM D698 ("standard Proctor").

E. If tests indicate work does not meet specified requirements, remove work, replace and retest.

F. Frequency of Tests: Minimum every 200 lineal feet of trench for each lift of backfill.

3.10 CLEANING

A. Leave unused materials in a neat, compact stockpile.

B. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

C. Leave borrow areas in a clean and neat condition. Grade to prevent standing surface water.

END OF SECTION

SECTION 31 2323
FILL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Filling, backfilling, and compacting for building volume below grade, footings, pile caps, slabs-on-grade, paving, site structures, utilities within the building, and to establish finished grades throughout the site..

B. Filling holes, pits, and excavations generated as a result of removal (demolition) operations.

1.02 RELATED REQUIREMENTS

A. Section 01 5713 - Temporary Erosion and Sediment Control: Slope protection and erosion control.

B. Section 03 3000 - Cast-in-Place Concrete.

C. Section 31 2200 - Grading: Removal and handling of soil to be re-used.

D. Section 31 2316 - Excavation: Removal and handling of soil to be re-used.

E. Section 31 2316.13 - Trenching: Excavating for utility trenches to utility main connections.

F. Section 31 3700 - Riprap.

1.03 PRICE AND PAYMENT PROCEDURES - UNIT PRICE

A. See Section 01 2200 Unit Prices for general requirements relating to unit prices for this work.

B. No separate measurement for common fill will be made: The volume of common fill will be addressed during the measurements for payment for common excavation - Section 31 2316.

C. No separate measurement for borow fill will be made. The volume of borrow fill will be addressed during the measurements for payment for borrow excavation - Section 31 2316.

1.04 DEFINITIONS

A. Finish Grade Elevations: Indicated on drawings.

B. Subgrade Elevations: Indicated on drawings.

1.05 REFERENCE STANDARDS

A. ASTM C136/C136M - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates; 2019.

B. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth); 2005.

C. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)); 2012.

D. ASTM D1556/D1556M - Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method; 2015, with Editorial Revision (2016).

E. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN m/m3)); 2012.

F. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System); 2017, with Editorial Revision (2020).

G. ASTM D4318 - Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils; 2017, with Editorial Revision (2018).

H. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth); 2010.

1.06 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Materials Sources: Submit name of imported materials source.

C. Fill Composition Test Reports: Results of laboratory tests on proposed and actual materials used.

D. Compaction Density Test Reports.

1.07 DELIVERY, STORAGE, AND HANDLING

A. When necessary, store materials on site in advance of need.

B. When fill materials need to be stored on site, locate stockpiles where it will not interfere with other site construction activities.
   1. Separate differing materials with dividers or stockpile separately to prevent intermixing.
   2. Prevent contamination.
   3. Protect stockpiles from erosion and deterioration of materials.

PART 2 PRODUCTS

2.01 FILL MATERIALS

A. General Fill - Common Fill : Conforming to State of Tennessee Highway Department standard.

B. Granular Fill - Gravel : Angular crushed stone; free of shale, clay, friable material and debris.
   1. Graded in accordance with ASTM C136/C136M, within the limits listed in ASSHTO M 43, Size # 68.

C. Crushed stone fill, graded in accordance with ASTM C136 within the limits listed in ASSHTO M43 of the size specified: # 57, # 2, # 68 or # CR6-10.

D. Topsoil: See Section 31 2200.

2.02 ACCESSORIES

A. Geotextile Fabric: Non-biodegradable, non-woven with a maximum EOS 100.

B. Vapor Retarder: 10 mil thick, polyethylene.

2.03 SOURCE QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for general requirements for testing and analysis of soil material.

B. Where fill materials are specified by reference to a specific standard, test and analyze samples for compliance before delivery to site.

C. If tests indicate materials do not meet specified requirements, change material and retest.

D. Provide materials of each type from same source throughout the Work.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that survey bench marks and intended elevations for the Work are as indicated.

B. Identify required lines, levels, contours, and datum locations.

C. See Section 31 2200 for additional requirements.

D. Verify areas to be filled are not compromised with surface or ground water.

3.02 PREPARATION

A. Proofroll to identify soft spots, then scarifyand proof roll subgrade surface to a depth of 6 inches.

B. Cut out soft areas of subgrade not capable of compaction in place. Backfill with general fill.

C. Compact subgrade to density equal to or greater than requirements for subsequent fill material.

D. Until ready to fill, maintain excavations and prevent loose soil from falling into excavation.

3.03 FILLING

A. Fill to contours and elevations indicated using unfrozen materials.

B. Fill up to subgrade elevations unless otherwise indicated.

C. Employ a placement method that does not disturb or damage other work.

D. Do not fill over wet, frozen or spongy subgrade surfaces.

E. Maintain +/- 2% optimum moisture content of fill materials to attain required compaction density.

F. Granular Fill: Place and compact materials in equal continuous layers not exceeding 6 inches compacted depth.

G. Soil Fill: Place and compact material in equal continuous layers not exceeding 6 inches compacted depth.

H. Compaction Density Unless Otherwise Specified or Indicated:
   1. Under paving and similar construction: 98 percent of maximum dry density.
   2. At other locations: 95 percent of maximum dry density.

I. Reshape and re-compact fills subjected to vehicular traffic.

J. Maintain temporary means and methods, as required, to remove all water while fill is being placed as required, or until directed by the Engineer. Remove and replace soils deemed unsuitable by classification and which are excessively moist due to lack of dewatering or surface water control.

3.04 TOLERANCES

A. Top Surface of General Filling: Plus or minus 0.10 foot from required elevations.

B. Top Surface of Filling Under Paved Areas and under slabs on grade: Plus or minus 0.04 foot from required elevations.

3.05 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for general requirements for field inspection and testing.

B. Perform compaction density testing on compacted fill in accordance with ASTM D1556 or ASTM D3017 or ASTM D6938.

C. Results will be evaluated in relation to compaction curve determined by testing uncompacted material in accordance with AASHTO T 180, ASTM D1557 ("modified Proctor"), ASTM D698 ("standard Proctor"), AASHTO T 180, ASTM D1557 ("modified Proctor"), ASTM D698 ("standard Proctor"), AASHTO T 180, ASTM D1557 ("modified Proctor"), or ASTM D698 ("standard Proctor").

D. If tests indicate work does not meet specified requirements, remove work, replace and retest.

E. Frequency of Tests: minimum 5 tests per 10 000 square yards for each lift placed.

F. Proof roll compacted fill at surfaces that will be under pavement.

3.06 CLEANING

A. Leave unused materials in a neat, compact stockpile.

B. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

C. Leave borrow areas in a clean and neat condition. Grade to prevent standing surface water.

END OF SECTION

SECTION 31 3700
RIPRAP

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Riprap .
   1. Machined Riprap.

1.02 RELATED REQUIREMENTS

A. Section 31 1000 - Site Clearing.

B. Section 31 2200 - Grading.

C. Section 03 1000 - Concrete Forming and Accessories

1.03 PRICE AND PAYMENT PROCEDURES - UNIT PRICE

A. See Section 01 2200 Unit Price for general requirements relating to Unit Prices for this work.

B. Payment for Machined Riprap shall be made by the contract Unit Price Per Ton for the type noted in the plans and/or standard drawings. Pay Item No. for the class(es) are:
   1. Class A-3; 709-05.05
   2. Class A-1; 709-05.06
   3. Class A-2; 709-05.07
   4. Class B; 709-05.08
   5. Class C; 709-05.09

C. No measurement will be made for excavation or for preparing the foundation for riprap, or filter material (blanket or geotextile) when specified. These items shall be considered as included in the Unit Cost of riprap.

1.04 QUALITY ASSURANCE

A. Perform Work in accordance with State of Tennesse Highways standard, as appropriate.

PART 2 PRODUCTS

2.01 MATERIALS

A. Riprap: Provide in accordance with State of Tennessee Highway standards, as appropriate.

B. Riprap: Limestone; machined riprap type; solid and nonfriable; when subjected to five alterations of the sodium sulfate soundness test (AASHTO T 104) shall have a weight loss percentage of 12 or less. All riprap materials shall have a length to width ratio of 1:3 or less and shall be approximately rectangular or trapezoidal in shape.
   1. Machined Riprap (Class A-1) shall vary in size from 2 inches to 1.25 feet with no more than 20% by weight being less than 4 inches. The thickness of the stone layer shall be 1.5 feet with a tolerance of 3 inches.
   2. Machined Riprap (Class A-2) shall be identical to Class A-1 except that the Contractor may substitute hand placed rubble stone riprap placed 1 foot thick for 1.5 feet machined riprap.
   3. Machined Riprap (Class A-3) shall vary in size from 2 to 6 inches with no more than 20% by weight being less than 4 inches. The thickness shall be as shown on the plans.
   4. Machined Riprap (Class B) shall vary in size from 3 inches to 2.25 feet with no more than 20% by weight being less than 6 inches. The thickness of the layer shall be 2.5 feet with a tolerance of 4 inches.
   5. Machined Riprap (Class C) shall vary in size from 5 inches to 3 feet with no more than 20% by weight being less than 9 inches. The thickness of the layer shall be 3.5 feet with a tolerance of 6 inches.

C. Filter Materials:
   1. Filter Blanket shall consist of graded crushed stone or gravel conforming to the following gradation limits:

Size	% Passing
6"	100
3"	75-95
1"	35-75
#4	10-40
#10	5-25
#40	0-10
#200	0-5

2. A filter blanket shall be installed under all rubble stone grouted riprap and all stacked sand-cement riprap. The blanket shall be 6 inches thick. Filter fabric may be installed elsewhere when specifically noted on the plans.
3. Geotextile shall be non-biodegradable, needle punched, non-woven and meet or exceed the following physical properties:

Property	Test Method	Underlying Soils % Passing No. 200 Sieve	
		< 50%	> 50%
Tensile Strength (Grab), lbs	ASTM D-4632	315	200
Minimum Sewn Strength, lbs	ASTM D-4884	270	182
Minimum Puncture, lbs	ASTM D-4833	112	80
Minimum Trapezoidal Tear, lbs	ASTM D-4533	112	80
UV Resistance % Retained at 500 hrs	ASTM D-4355	50	50
Permittivity Sec -1	ASTM D-4491	0.2	0.1
* Apparent Opening Size (AOS), US Standard Sieve	ASTM D-4751	60 or less	70 or greater

* subject to specific soils value.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not place riprap over frozen or spongy subgrade surfaces.

3.02 PREPARATION

A. Immediately prior to the construction riprap, trim the slopes or ground surfaces within reasonably close conformity to the lines and grades indicated on the drawings or as directed by the Engineer, and thoroughly compact by the use of hand or mechanical tamps.

B. On slopes, place the bottom of the riprap at least 2 feet below the natural ground surface, unless otherwise directed.

3.03 MACHINED RIPRAP

A. Care shall be taken when preparing the subgrade to ensure that the design waterway is not reduced. When called for on the plans a filter blanket or geotextile shall be installed on the prepared subgrade.

B. Dump and place the material using appropriate power equipment to produce a uniform surface. Approximately 50% of the finished surface area shall consist of stones no smaller than half the size specified. Hand work may be required to correct irregularities.

END OF SECTION

SECTION 32 1216
ASPHALT PAVING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Mineral aggregate surface.

B. Prime coat.

C. Tack coat.

D. Double bituminous surface treatment.

E. Bituminous plant mix pavements - general.

F. Bituminous plant mix surface course (cold mix).

G. Asphaltic concrete surface course (hot mix).

H. Surface treatments.

1.02 RELATED REQUIREMENTS

A. Section 31 2200 - Grading: Preparation of site for paving.

B. Section 31 2323 - Fill: Compacted subgrade for paving.

C. Section 32 1723.13 - Painted Pavement Markings.

D. Section 33 0561 - Drainage Manholes and Structures: Manholes, including frames; gutter drainage grilles, covers, and frames for placement by this section.

1.03 PRICE AND PAYMENT PROCEDURES

A. See Section 01 2200 - Unit Prices for requirements applicable to this section. Measurement and payment will be as follows:

B. Prime and tack coats applied to the prepared surfaces shall be paid for on a per ton basis.

C. The various bituminous plant mixes and asphaltic concrete plant mixes shall be paid for by the ton, complete in place.

D. The cost per ton shall include all necessary material equipment and labor to process, transport, and install the required product.

E. Quality control testing shall be the responsibility of the Contractor. All testing shall be documented and copies of reports shall be delivered to the Engineer as the project progresses.

1.04 REFERENCE STANDARDS

A. Part 4 and/or Division 400 of the **Tennessee Department of Transportation Standard Specifications for Road and Bridge Construction, January 1, 2021** shall be made a part of these specifications as if provided herein in their entirety.

B. AI MS-2 - Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types; 1997.

1.05 QUALITY ASSURANCE

A. Perform Work in accordance with Tennessee Department of Transportation Standard Specifications for Road and Bridge Construction, January 1, 2021.

B. Quality control testing for the materials and acceptance of work shall be implemented as set forth in the Tennessee Department of Transportation Standard Specifications for Road and Bridge Construction, January 1, 2021 procedures for the sampling and testing, and acceptance of materials and products.

C. The temperature of the bituminous materials at the time of installation shall be within the temperature range for the specific material as established in the **Tennessee Department of Transportation Standard Specifications for Road and Bridge Construction, January 1, 2021.**

D. Obtain materials from same source throughout.

1.06 FIELD CONDITIONS

A. Do not place asphalt when ambient air or base surface temperature is less than 40 degrees F, or surface is wet or frozen. The air temperature shall be 40° F and rising.

PART 2 PRODUCTS

2.01 MATERIALS

A. Shall meet the requirements as set forth in the Tennessee Department of Transportation Standard Specifications for Road and Bridge Construction, January 1, 2021.

2.02 ASPHALT PAVING MIXES AND MIX DESIGN

A. Use dry material to avoid foaming. Mix uniformly.

B. The mix design shall meet all requirements of the Tennessee Department of Transportation Standard Specifications for Road and Bridge Construction, January 1, 2021.

C. Base Course: 3.0 to 6 percent of asphalt cement by weight in mixture in accordance with AI MS-2.

D. Wearing Course: 5 to 7 percent of asphalt cement by weight in mixture in accordance with AI MS-2.

E. Submit proposed mix design of each class of mix for review prior to beginning of work.

2.03 SOURCE QUALITY CONTROL

A. Test mix design and samples in accordance with Asphalt Institute MS-2, and as may be modified by Tennessee Department of Transportation Standard Specifications for Road and Bridge Construction, January 1, 2021.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that compacted subgrade, granular base, and stabilized soil is dry and ready to support paving and imposed loads by performing proof-roll testing.

B. Verify gradients and elevations of base are correct.

3.02 INSTALLATION

A. The preparation installation of various bituminous mixes and products shall be in conformance with the Tennessee Department of Transportation Standard Specifications for Road and Bridge Construction, January 1, 2021.

END OF SECTION

SECTION 32 1723.13
PAINTED PAVEMENT MARKINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Roadway lane, legend and symbol markings and crosswalk markings.

1.02 RELATED REQUIREMENTS

A. Section 32 1216 - Asphalt Paving.

1.03 PRICE AND PAYMENT PROCEDURES

A. See Section 01 2200 - Unit Prices, for additional unit price requirements.

1.04 REFERENCE STANDARDS

A. FS TT-B-1325 - Beads (Glass Spheres) Retro-Reflective; 2007d (Validated 2017).

B. MPI (APL) - Master Painters Institute Approved Products List; Master Painters and Decorators Association; Current Edition.

C. FHWA MUTCD - Manual on Uniform Traffic Control Devices; 2023.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.

C. Certificates: Submit for each batch of paint and glass beads stating compliance with specified requirements.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver paint in containers of at least 5 gallons accompanied by batch certificate.

B. Deliver glass beads in containers suitable for handling and strong enough to prevent loss during shipment accompanied by batch certificate.

C. Store products in manufacturer's unopened packaging until ready for installation.

1.07 FIELD CONDITIONS

A. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 PRODUCTS

2.01 MATERIALS

A. Line and Zone Marking Paint: MPI (APL) No. 97 Latex Traffic Marking Paint; color(s) as indicated.
   1. Roadway Markings: As required by authorities having jurisdiction.

B. Reflective Glass Beads: FS TT-B-1325, Type I (low index of refraction), Gradation A (coarse, drop-on).

C. Temporary Marking Tape: Preformed, reflective, pressure sensitive adhesive tape in color(s) required; Contractor is responsible for selection of material of sufficient durability as to perform satisfactorily during period for which its use is required.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Engineer of unsatisfactory preparation before proceeding.

3.02 PREPARATION

A. Allow new pavement surfaces to cure for a period of not less than 14 days before application of marking materials.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Clean surfaces thoroughly prior to installation.
   1. Remove dust, dirt, and other granular surface deposits by sweeping, blowing with compressed air, rinsing with water, or a combination of these methods.
   2. Completely remove rubber deposits, existing paint markings, and other coatings adhering to the pavement, by scraping, wire brushing, mechanical abrasion, or approved chemicals.

D. Where oil or grease are present, scrub affected areas with several applications of trisodium phosphate solution or other approved detergent or degreaser, and rinse thoroughly after each application.

E. Establish survey control points to determine locations and dimensions of markings; provide templates to control paint application by type and color at necessary intervals.

F. Temporary Pavement Markings: When required or directed by Engineer, apply temporary markings of the color(s), width(s) and length(s) as indicated or directed.
   1. After temporary marking has served its purpose, remove temporary marking by carefully controlled sandblasting, approved grinding equipment, or other approved method so that surface to which the marking was applied will not be damaged.
   2. At Contractor's option, temporary marking tape may be used in lieu of temporary painted marking.

3.03 INSTALLATION

A. Begin pavement marking as soon as practicable after surface has been cleaned and dried.

B. Do not apply paint if temperature of surface to be painted or the atmosphere is less than 45 degrees F.

C. Apply in accordance with manufacturer's instructions using an experienced technician that is thoroughly familiar with equipment, materials, and marking layouts.

D. Comply with FHWA MUTCD manual (http://mutcd.fhwa.dot.gov) for details not shown.

E. Apply markings in locations determined by measurement from survey control points; preserve control points until after markings have been accepted.

F. Apply uniformly painted markings of color(s), lengths, and widths as indicated on drawings true, sharp edges and ends.
   1. Apply paint in one coat only.
   2. Wet Film Thickness: 0.015 inch, minimum.
   3. Length Tolerance: Plus or minus 3 inches.
   4. Width Tolerance: Plus or minus 1/8 inch.

G. Roadway Traffic Lanes: Use suitable mobile mechanical equipment that provides constant agitation of paint and travels at controlled speeds.
   1. Conduct operations in such a manner that necessary traffic can move without hindrance.
   2. Place warning signs at the beginning of the wet line, and at points well in advance of the marking equipment for alerting approaching traffic from both directions. Place small flags or other similarly effective small objects near freshly applied markings at frequent intervals to reduce crossing by traffic.
   3. If paint does not dry within expected time, discontinue paint operations until cause of slow drying is determined and corrected.
   4. Skip Markings: Synchronize one or more paint "guns" to automatically begin and cut off paint flow; make length of intervals as indicated.
   5. Use hand application by pneumatic spray for application of paint in areas where a mobile paint applicator cannot be used.

6. Distribute glass beads uniformly on the paint lines within ten seconds without any waste, applied at rate of 7 pounds per gallon of paint; if the marking equipment does not have a glass bead dispenser, use a separate piece of equipment adjusted and synchronized with the paint applicator; remove and replace markings having faulty distribution of beads.

3.04 DRYING, PROTECTION, AND REPLACEMENT

A. Protect newly painted markings so that paint is not picked up by tires, smeared, or tracked.

B. Provide barricades, warning signs, and flags as necessary to prevent traffic crossing newly painted markings.

C. Allow paint to dry at least the minimum time specified by the applicable paint standard and not less than that recommended by the manufacturer.

D. Remove and replace markings that are applied at less than minimum material rates; deviate from true alignment; exceed length and width tolerances; or show light spots, smears, or other deficiencies or irregularities.

E. Remove markings in manner to avoid damage to the surface to which the marking was applied, using carefully controlled sand blasting, approved grinding equipment, or other approved method.

F. Replace removed markings at no additional cost to Owner.

END OF SECTION

SECTION 33 0110.58
DISINFECTION OF WATER UTILITY PIPING SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Disinfection of site domestic water lines and site fire water lines specified in Section 33 1416.

B. Testing and reporting results.

1.02 RELATED REQUIREMENTS

A. Section 33 1416 - Site Water Utility Distribution Piping.

1.03 PRICE AND PAYMENT PROCEDURES

A. See Section 01 2200 - Unit Prices, for additional unit price requirements.

B. Disinfection: By the linear foot. Includes preparing, disinfecting, testing, and reporting.

1.04 REFERENCE STANDARDS

A. AWWA B300 - Hypochlorites; 2011.

B. AWWA B301 - Liquid Chlorine; 2010.

C. AWWA B302 - Ammonium Sulfate; 2010.

D. AWWA B303 - Sodium Chlorite; 2010.

E. AWWA C651 - Disinfecting Water Mains; 2014, with Addendum (2020).

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Test Reports: Indicate results comparative to specified requirements.

C. Certificate: From authority having jurisdiction indicating approval of water system.

D. Certificate: Certify that cleanliness of water distribution system meets or exceeds specified requirements.

E. Disinfection report:
   1. Type and form of disinfectant used.
   2. Date and time of disinfectant injection start and time of completion.
   3. Test locations.
   4. Initial and 24 hour disinfectant residuals (quantity in treated water) in ppm for each outlet tested.
   5. Date and time of flushing start and completion.
   6. Disinfectant residual after flushing in ppm for each outlet tested.

F. Bacteriological report:
   1. Date issued, project name, and testing laboratory name, address, and telephone number.
   2. Time and date of water sample collection.
   3. Name of person collecting samples.
   4. Test locations.
   5. Initial and 24 hour disinfectant residuals in ppm for each outlet tested.
   6. Coliform bacteria test results for each outlet tested.
   7. Certification that water complies, or fails to comply, with bacterial standards of the State of Tennessee.

1.06 QUALITY ASSURANCE

A. Water Treatment Firm: Company specializing in disinfecting potable water systems specified in this Section with minimum three years documented experience.

B. Testing Firm: Company specializing in testing potable water systems, certified by governing authorities of the State in which the Project is located.

C. Submit bacteriologist's signature and authority associated with testing.

PART 2 PRODUCTS

2.01 DISINFECTION CHEMICALS

A. Chemicals: AWWA B300 Hypochlorite, AWWA B301 Liquid Chlorine, AWWA B302 Ammonium Sulfate, AWWA B303 Sodium Chlorite, AWWA B300 Hypochlorite, AWWA B301 Liquid Chlorine, AWWA B302 Ammonium Sulfate, AWWA B303 Sodium Chlorite, AWWA B300 Hypochlorite, AWWA B301 Liquid Chlorine, AWWA B302 Ammonium Sulfate, AWWA B303 Sodium Chlorite, AWWA B300 Hypochlorite, AWWA B301 Liquid Chlorine, AWWA B302 Ammonium Sulfate, and AWWA B303 Sodium Chlorite.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that piping system has been cleaned, inspected , and pressure tested.

B. Schedule disinfecting activity to coordinate with start-up, testing, adjusting and balancing, demonstration procedures, including related systems.

3.02 DISINFECTION

A. Use method prescribed by the applicable state or local codes, or health authority or water purveyor having jurisdiction, or in the absence of any of these follow AWWA C651.

B. Provide and attach equipment required to perform the work.

C. Inject treatment disinfectant into piping system.

D. Maintain disinfectant in system for 24 hours.

E. Flush, circulate, and clean until required cleanliness is achieved; use municipal domestic water.

F. Replace permanent system devices removed for disinfection.

G. Pressure test system to the standards of the Brownsville Utility Department. Repair leaks and re-test.

3.03 FIELD QUALITY CONTROL

A. Perform field inspection and testing in accordance with Section 01 4000.

B. Test samples in accordance with AWWA C651.

END OF SECTION

SECTION 33 0526
UTILITY IDENTIFICATION

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. The marking of underground utilities to aid in the accurate location of the utilities to help prevent damage during unrelated construction activities; and, in finding the lines and appurtenances when tying into and/or extending the utilities.

1.02 RELATED REQUIREMENTS

A. Section 33 1416 - Site Water Utility Distribution Piping

B. Section 33 4211 - Stormwater Gravity Piping

1.03 PRICE AND PAYMENT PROCEDURES

A. The marking and identification of underground utilities will not be measured and paid for directly. Rather all labels and materials used in the marking, labeling and identification of underground utilities shall be considered incidental to the cost of the installation of the utility lines and included in the unit cost for installing the utility line.

1.04 REFERENCE STANDARDS

A. Federal Specification TT-P-1952; Paint, Traffic and Air Field Markings, Waterborne.

B. ASTM B170-99 (2015) - Standard Specification for Oxygen-Free Electrolytic Copper-Refinery Shapes.

C. ASTM B869-07 (2013) - Standard Specification for Copper-Clad Steel Electrical Conductor for CATV Drop Line.

D. ASTM D562 – Test Method for Consistency of Paints Measuring Krebs Units (KU) Viscosity Using a Stormer-Type Viscometer.

E. ASTM D671-93 – Standard Test Method for Flexural Fatigue of Plastics.

F. ASTM D711 – Standard Test Method for No-Pick-Up Time of Traffic Paint.

G. ASTM D868 – Standard Practice for Determination of Degree of Bleeding of Traffic Paint.

H. ASTM D882-12 – Standard Test Method for Tensile Properties of Thin Plastic Sheeting.

I. ASTM D1248-12 – Standard Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable.

J. ASTM D2103 – Standard Specification for Polyethylene Film and Sheeting.

K. ASTM D2578-09 – Standard Test Method for Wetting Tension of Polyethylene and Polypropylene Films.

L. ASTM D2582-09 – Standard Test Method for Puncture-Propagation Tear Resistance of Plastic Film and Thin Sheeting.

M. ASTM D2805 – Standard Test Method for Hiding Power of Paints by Reflectometry.

N. ASTM D3960-87 – Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings.

O. ASTM D4213-08 (2012) Standard Test Method for Scrub Resistance of Paints by Abrasion Weight Loss.

P. ASTM E97-82 (1987) Test Methods for Directional Reflectance Factor, 45-Deg 0-Deg, of Opaque Specimens by Broad-Band Filter Reflectometry.

1.05 SUBMITTALS

A. Product Data: Provide data on paints, tapes, file, wiring and accessories for the marking of utilities and the installation of underground locating and tracing systems.

PART 2 – PRODUCTS

2.01 ABOVE GROUND MARKING OF PAVEMENT CROSSINGS

A. Paint-Traffic Paint
   1. Chemical & Physical Analysis – Comply with Federal Specification TT-P-1952E and meet the following minimum requirements:

Property	White Paint	Black Paint
Weight Per Gallon	12.35 lbs/gal	11.90 lbs/gal
Volatile Organic Content (VOC)	<150 g/l	<150 g/l
Viscosity (KU)	70-110	70-110
Dry to No-Pick-Up Time	<30 min.	<30 min.
Scrub Resistance	1,000 cycles min.	1,000 cycles min.
Degree of Bleeding	0.98 min.	0.98 min.
Directional Reflectance	>86%	N/A
Dry Opacity	>0.965	N/A
Water Reseistance Cycles	8 min.	8 min.
PH of Paint	9.6 min.	9.6 min.
Solids (by weight) %	64-66	57-59

2.02 WARNING TAPE

A. Tape shall meet the following standard for color and legend:

Utility	Color	Legend
Electric	Red	Caution High Voltage Buried Below
Gas	Yellow	Caution Gas Line Below
Communication	Orange	Caution Communication Cable Buried Below
Potable Water	Blue	Caution Buried Water Line Below
Raw Water	Olive Green	Caution Untreated Water Line Below
Reclaimed Water	Purple	Caution Reclaimed Water Line Below-Do Not Drink
Sanitary Sewer	Green	Caution Sewer Line Below

B. Non-Detectable Warning Tape
   1. Low-density mono-layer polyethylene plastic fusion.
   2. Color fast lead-free pigments containing no heavy metals.
   3. Thickness overall – 4.0 mil minimum.
   4. Weight – 10lbs/1000 l.f. minimum.
   5. Tensile Strength – 2777 psi minimum.
   6. Elongation – 600% minimum.
   7. Printability - >40 dynes.
   8. Width = 6 inches.

C. Detectable Warning Tape
   1. Construction consists of a minimum 5.0 mil overall thickness; 0.8 mil clear polypropylene film, reverse printed and laminated to a 0.35 mil solid aluminum foil core and then laminated to a 3.75 mil clear polyethylene film.
   2. Density 1.09 g/cm3.
   3. Elongation: (MD) 139%; (TD) 80%.
   4. Printability: 45 dynes.
   5. Tensile Strength – 15,000 psi.

6. Maximum bury – 24”.

2.03 TRACER WIRE

A. #12 AWG copper clad steel.

B. 30 mil HDPE insulation thickness.

C. Color of insulation to conform to the color code in table 2.01, B, 1.

D. Break load: open trench installation minimum - 450 lbs.; directional drilling installation minimum – 1,150 lbs.

E. Connections and devices
   1. Connectors shall be lockable, specifically manufactured for use with underground tracer wire; dielectric silicon filled and provides a complete connection with no exposed bare wire.
   2. Prohibited connections; non-locking friction fit, twist on or taped connectors.
   3. Ground rods shall be 5/8 inch diameter x 60-inches long copper clad steel.
      a. Grounding clamp shall be solid brass.
   4. Trace wire termination points: grade level or above ground access box, specifically manufactured for use with pipe tracing systems as manufactured by:
      a. Farwest Corrosion Control Company; Big Fink test station.
      b. Bigham & Taylor; 2 1/2” shaft test box, Model P200.
      c. Pollard Water; Rhine TriView Tracer Ped with internal terminals.
      d. Or approved equal.
      e. Color of exposed marker and/or lid – in conformance with Table 2.01, B, 1.

PART 3 – EXECUTION

3.01 COORDINATION AND RECORD KEEPING

A. All activities associated with the marking of utilities and the installation of measures to aid in the location of the underground facilities after construction has been completed.

B. As the work progresses the Contractor shall keep as-built records of the location of utility.
   1. The points where the utility lines including lateral service lines cross under roadways shall be noted and referenced so that they can be permanently marked.
   2. When 2 lines run parallel to the edge of pavement, the distance from the edge of pavement or face of curb shall be noted.
   3. The location of all valves shall be referenced to permanent improvements that can be easily identified at a later date.
   4. The Contractor may use a clean copy of the construction plans as:
      a. Base to prepare the as-built plans
         1) The as-built elevation of all structures on gravity sewer and storm drainage systems shall be noted on the as-build plan.
         2) The depth of bury for all pressure lines shall be noted at each valve and changes in the vertical alignment. The location of changes in the horizontal alignment shall be noted and referenced.
         3) The completed as-built plans shall be scanned and submitted to the Owner and the Engineer for review and approval.

3.02 NON-DETECTABLE WARNING TAPE INSTALLATION

A. Unless otherwise noted a 6” wide polyethylene warning tape shall be installed during the backfill of the utility as it is being installed by the open trench method.

B. The color and legend of the tape shall conform to the type of utility being installed. See Table 2.01, B, 1.

C. The warning tape shall be installed at a uniform depth centered over the top of the utility line or pipe.

D. The warning tape shall be installed a minimum of 18” above the top of the utility.

E. The tape shall be continuous over the entire length of the line of pipe including lateral service lines. See exceptions noted in Section 3.03 Detectable Warning Tape.

3.03 DETECTABLE WARNING TAPE INSTALLATION

A. Service laterals in a gravity piping system such as sanitary sewer collection system or a roof drainage collection system shall have a 6” wide laminated detectable warning tape installed directly over the line as it is being backfilled.

B. The detectable warning tape shall be continuous between the point where it connects to the main and the upstream termination point of the line.

C. The detectable warning tape shall be installed at a depth of 18-24 inches below the finished grade.

3.04 TRACER WIRE SYSTEM INSTALLATION

A. All non-metallic pressure piping systems must have a tracer wire system installed concurrently with the installation of the pressure piping.

B. The tracer wire shall be #12 AWG copper clad steel wire conforming to the requirements of Section 2.03 Tracer Wire.

C. The color of the wire insulation shall conform to the color code requirements of the utility being installed. See Table 2.01, B, 1.

D. The tracer wire shall be installed as the pipe is laid. After the pipe bedding has been installed to the spring line of the pipe the tracer wire shall be positioned on the pipe at the 2 o’clock position (when looking north or east along the pipe alignment). The wire shall be held in place with a non-metallic tape approximately every 5 feet along the pipe. At branches in the system, including but not limited to fire hydrant leads and service lines, the continuity of the system must be maintained through the use of proper water proof connectors. No bare wire shall be visible at any connection. No non-locking friction fit, twist on or tape connects will be allowed.

E. The ends of the tracer wire system shall be grounded.

F. Tracer wires at service laterals, fire hydrants, or stubs must be terminated at an approved grade level or in ground trace wire access box. The access box shall not be located within the traveled way of the roadway.

G. Tracer wire shall not be coiled or looped in the trench nor wound around the piping.

H. Long runs, in excess of 500 lineal feet without any intermediate laterals must be provided with an approved access box located outside the traveled way.

I. The tracer wire installation shall be performed in such manner that allows proper access for connection of line tracing equipment, proper location of wire without loss or deterioration of low frequency (512 Hz) signal for 1,000 feet without distortion of signal.

J. After installation of the tracer wire system is completed it shall be located using low frequency (512 Hz) line tracing equipment, witnessed by the Contractor, Architect/Engineer and Utility Owner/Operator prior to acceptance of the utility installation. Continuity testing in lieu of line tracing will not be accepted.

3.05 SURFACE MARKING OF UNDERGROUND UTILITIES

A. The points where utility lines cross under the edge of pavement or curb shall be marked using traffic paint.
   1. A white background measuring 5”x6” shall be painted on the face of curb or a minimum of 8” from the edge of pavement when no curb is present directly over the crossing point of the utility.
   2. A black 3-inch tall letter shall be stenciled on the white background denoting the utility underneath.
      a. G – Lateral Gas Line.
      b. S – Sanitary Sewer.
      c. W – Potable Water.

B. The location of valves shall be referenced by similar pavement markings. The marking shall be located on the face of curb or edge of pavement perpendicular to the alignment of the utility. It shall be stenciled with the appropriate utility designation and the distance from the label to the center of the valve.

END OF SECTION

SECTION 33 0561
DRAINAGE MANHOLES AND STRUCTURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Monolithic concrete manholes with masonry transition to lid frame, covers, anchorage, and accessories.

B. Modular precast concrete manhole sections with tongue-and-groove joints with masonry transition to lid frame, covers, anchorage, and accessories.

C. Masonry manhole sections with masonry transition to lid frame, covers, anchorage, and accessories.

1.02 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete.

B. Section 04 0511 - Masonry Mortaring and Grouting.

C. Section 04 2000 - Concrete: Masonry units .

1.03 PRICE AND PAYMENT PROCEDURES

A. See Section 01 2200 - Unit Prices, for additional unit price requirements.

B. Manhole: By the unit. Includes excavating, concrete base pad, concrete manhole sections, brick masonry manhole construction, brick masonry transition to cover frame, cover frame and cover, to indicated depth, forming and sealing pipe inlets and outlets.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate manhole locations, elevations, piping sizes and elevations of penetrations.

C. Manufacturer's Qualification Statement.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years' experience.

1.06 FIELD CONDITIONS

A. Cold and Hot Weather Requirements: Comply with requirements of ACI 530/530.1/ERTA or applicable building code, whichever is more stringent.

B. Maintain materials and surrounding air temperature to minimum 50 degrees F prior to, during, and 48 hours after completion of masonry work.

PART 2 PRODUCTS

2.01 MATERIALS

A. Manhole Sections: Reinforced precast concrete in accordance with ASTM C478 (ASTM C478M), with resilient connectors complying with ASTM C923 (ASTM C923M).

B. Concrete: As specified in Section 03 3000.

C. Concrete Brick Units: ASTM C1634 or ASTM C 55 Grade N, cored, normal weight; nominal modular size of 2-1/4 x 3-5/8 x 7-5/8 inches.

D. Concrete Brick Units: As specified in Section 04 2000.

E. Mortar and Grout: As specified in Section 04 2000, Type S.

F. Mortar and Grout: As specified in Section 04 0511, Type S.

G. Concrete Reinforcement: As specified in Section 03 3000.

2.02 COMPONENTS

A. Lid and Frame: ASTM A48/A48M, Class 30B Cast iron construction, machined flat bearing surface, removable lockable lid, closed lid design; AASHTO HL93; sealing gasket; lid molded with identifying name.

B. Manhole Steps: Formed copolymer polypropylene plastic reinforced with 1/2 inch diameter, grade 60 steel, 10-3/4 inch tread width, 4-3/8 inch embedment depth; minimum 5-3/8 inch distance from wall of structure to the edge of tread. Color orange.

2.03 CONFIGURATION

A. Shaft Construction: Concentric with eccentric cone top section; lipped male/female dry joints; sleeved to receive pipe sections.

B. Shape: Cylindrical or as noted in project drawings.

C. The minimum Clear Inside Dimensions: 48 inch diameter.

D. Clear Inside Dimensions: As indicated for each structure.

E. Design Depth: As indicated for each structure.

F. The minimum Clear Lid Opening: 26 inches diameter.

G. Clear Lid or Grate Opening: As indicated for each structure.

H. Pipe Entry: Provide openings as indicated.

I. Steps: 10-1/2 inches wide, 16 inches on center vertically, set into manhole wall.

J. Steps: When indicated.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify items provided by other sections of Work are properly sized and located.

B. Verify that built-in items are in proper location, and ready for roughing into Work.

C. Verify excavation for manholes is correct.

3.02 PREPARATION

A. Coordinate placement of inlet and outlet pipe or duct sleeves required by other sections.

3.03 MANHOLES

A. Precast concrete base sections with an integrated bottom shall be placed on a No. 67 crushed stone base having a minimum thickness of 12 inches. The stone base shall be fully encapsulated in a geotextile fabric. The fabric must have an AOS greater than 100.

B. Precast concrete base sections with an open bottom shall have a poured in place bottom as detailed in the project drawings.

C. Place precast manhole sections to the correct lines and grades.

D. Poured in place manholes shall be installed to the correct lines and grades. All form work shall be designed to be fully removed without damage to the structure.

E. Pipe and conduit opening in pre-cast structures shall be formed or cut smooth. The diameter of the opening shall be 4 inches larger than the outside diameter of the pipe or conduit.

F. Unless noted otherwise on the plans the annular space between the structure and the pipe or conduit shall be filled with non-shrink grout.

G. All structures shall have a fully developed invert. The invert shall be built up with concrete and/or grout to provide a smooth flow channel through the structure.

H. If needed use concrete grade rings to adjust the top to finished grade.

I. The rim iron shall be set using butyl sealant and be bolted to the concrete structure using (4) 3/4 inch x 5-1/2 inch stud type expansion anchors.

1. In non-paved areas the rim iron shall be set level.
2. In paved areas the rim iron shall be set to match the line and grade of the surrounding finished pavement.

3.04 MASONRY WORK

A. Brick structures shall only be used when authorized by the Engineer.

B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.

C. Lay masonry units in running bond. Course one unit and one mortar joint to equal 8 inches.

D. Form flush mortar joints.

E. Lay masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.

F. Every fifth course of brick shall be a header bond.

END OF SECTION

SECTION 33 1416
SITE WATER UTILITY DISTRIBUTION PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pipe and fittings for site water lines including domestic water lines and fire water lines.

B. Valves, Fire hydrants, and Domestic water hydrants.

1.02 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Concrete for thrust restraints.

B. Section 31 2316.13 - Trenching: Excavating, bedding, and backfilling.

C. Section 33 0561 - Drainage Manholes and Structures.

1.03 PRICE AND PAYMENT PROCEDURES

A. See Section 01 2200 - Unit Prices, for additional unit price requirements.

B. Pipe and Fittings: By the linear foot. Includes hand trimming excavation, pipe and fittings, bedding, concrete thrust restraints, and to provide utility water source.

C. Valves: By the unit. Includes valve, fittings and accessories.

D. Hydrant: By the unit. Includes hand trimming excavation, gravel sump, hydrant, valve, connection, and accessories.

1.04 REFERENCE STANDARDS

A. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2021.

B. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2014.

C. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts; 2007a (Reapproved 2014).

D. ASTM D2466 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40; 2023.

E. ASTM D2467 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80; 2020.

F. ASTM D2855 - Standard Practice for the Two-Step (Primer and Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets; 2020.

G. ASTM D3139 - Standard Specification for Joints for Plastic Pressure Pipes using Flexible Elastomeric Seals; 2019.

H. ASTM F2657 - Standard Method for Outdoor Weathering of Crosslinked Polyethylene.

I. ASTM F2023 - Standard Test Method for Evaluating the Oxidative Resistance of Crosslinked Polyethylene (PEX) Pipe, Tubing and Systems to Hot Chlorinated Water; 2015.

J. ASTM F876 - Standard Specification for Crosslinked Polyethylene (PEX) Tubing; 2013a.

K. ASTM F877 - Standard Specification for Crosslinked Polyethylene (PEX) Plastic Hot- and Cold-Water Distribution Systems; 2011.

L. AWWA C105/A21.5 - Polyethylene Encasement for Ductile-Iron Pipe Systems; 2010.

M. AWWA C111/A21.11 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings; 2023.

N. AWWA C115/A21.15 - Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges; 2020.

O. AWWA C200 - Steel Water Pipe, 6 In. (150 mm) and Larger; 2017.

P. AWWA C502 - Dry-Barrel Fire Hydrants; 2018.

Q. AWWA C509 - Resilient-Seated Gate Valves for Water Supply Service; 2023.

R. AWWA C600 - Installation of Ductile-Iron Mains and Their Appurtenances; 2023.

S. AWWA C602 - Cement-Mortar Lining of Water Pipelines in Place - 4 In. (100 mm) and Larger; 2023.

T. AWWA C605 - Underground Installation of Polyvinyl Chloride (PVC) and Molecularly Oriented Polyvinyl Chloride (PVCO) Pressure Pipe and Fittings; 2013.

U. AWWA C606 - Grooved and Shouldered Joints; 2022.

V. AWWA C651-14 - Disinfecting Water Mains.

W. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. through 60 In. (100 mm through 1500 mm); 2022.

X. AWWA C905-10 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 14 In. Through 48 In. for Water Transmission and Distribution.

Y. AWWA C901 - Polyethylene (PE) Pressure Pipe and Tubing, 3/4 In. (19 mm) Through 3 In. (76 mm), for Water Service; 2020.

Z. UL 246 - Hydrants for Fire-Protection Service; Current Edition, Including All Revisions.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Conduct a preinstallation meeting at least one week prior to the start of the work of this section; require attendance by all affected installers.

B. Sequencing: Ensure that utility connections are achieved in an orderly and expeditious manner.

1.06 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Submit manufacturer's technical product data and installation instructions for potable water system materials and products.

C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

D. Project Record Documents: Record actual locations of piping mains, valves, connections, thrust restraints, and invert elevations. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.07 QUALITY ASSURANCE

A. Perform Work in accordance with utility company requirements.

B. Manufacturer's Qualifications: Firms regularly engaged in manufacture of potable water systems materials and products, of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

C. Installer's Qualifications: Firm with at least 3 years of successful installation experience on projects with potable water piping work similar to that required for project.

D. Codes and Standards
   1. Plumbing Code Compliance: Comply with applicable portions of Local Plumbing Code pertaining to selection and installation of potable water system materials and products.
   2. Water Purveyor Compliance: Comply with requirements of Purveyor supplying water to project, obtain required permits and inspections.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store valves in shipping containers with labeling in place.

1.09 DESCRIPTION OF WORK

A. Extent of potable water systems work is indicated on drawings and schedules, and by requirements of this section.

PART 2 PRODUCTS

2.01 WATER PIPE

A. Ductile Iron Pipe: AWWA C151/A21.51:
   1. Cement lined, AWWA C104.
   2. Bituminous Coated.
   3. Unless otherwise noted all pipe joints shall be push-on, bell and socket; rubber gasket; AWWA C111.
   4. Pressure Class 350, unless otherwise noted on drawings.
   5. Fittings: AWWA C10-12; ductile iron; mechanical joint; cement lined; bituminous coated.

B. PVC Pipe: ASTM D2241 SDR 21 for 200 psi pressure rating: (6"-24" diameter):
   1. Joints, Push-on, integral rubber gasket.
   2. Fittings: AWWA C111, ductile iron, mechanical joint.

C. PVC Pipe: AWWA C900 Class 200 (6"-12" diameter):
   1. Fittings: AWWA C111, ductile iron, mechanical joint.
   2. Joints: Push-on, integral gasket.

D. High Density Polyethylene (HDPE, PE) Pipe; (2"-12" nominal diameter); (for directional bore):
   1. PE 3608 or PE 4710 meeting Cell classification 345464C per ASTM D 3350; and meeting Type III, Class B or Class C, Category 5, Grade P34 per ASTM D1248.
   2. Pipe shall conform to AWWA C906, DR-11; marked with blue co-extended color strips.
   3. Joints: Butt fusion.
   4. Fittings:
      a. PE to PE; heat fusion.
      b. Dissimilar pipe (PE to PVC; PE to D.I.): mechanical joint with appropriate adaptors, and stiffener inserts..

E. Trace Wire: Magnetic detectable conductor, clear plastic covering, imprinted with "Water Service" in large letters.

2.02 VALVES

A. Valves: Manufacturer's name and pressure rating marked on valve body.

B. Gate Valves: These shall be iron body, resilient-seated gate, non-rising stem type for a design working pressure of 200 psi for valves with diameters of 2”-12” and 150 psi for valves with diameter 14” or greater unless otherwise specified or shown on the plans, conforming to AWWA Specification C509. Each valve shall have “O” ring type stem seal, standard two inch AWWA operating nut, and shall be opened by COUNTER-CLOCKWISE stem rotation unless otherwise specified. Except where otherwise specified, indicated, or required for the application involved, all gate valve ends shall be AWWA Specification C111 mechanical joint type, with plain rubber gaskets. The valve body shall be coated inside and out with an epoxy coating conforming to AWWA Specification C550.
   1. Manufacturers:
      a. Clow Valve Company.
      b. Kennedy Valve Co.
      c. American Flow Control.
      d. Watts.
      e. Substitutions: See Section 01 6000 - Product Requirements.

C. Valve Box Riser Assembly:
   1. Description: Valve boxes shall be screw type and shall consist of a base, middle section, top section with cover and intermediate extension sections when required. The top section shall be designed to thread onto the middle section so that the unit can be adjusted to a variable length. The top section shall be designed to receive a circular drop cover. Valve boxes may have extension sections designed to fit between the middle and top section to achieve the required length. A valve box is installed to provide access to the operator of a direct buried valve.

2. Material: The valve box and component parts shall be cast iron in accordance with ASTM-A48 class 20, 30, and 35.

2.03 HYDRANTS

A. Hydrants: Type as required by utility company.

B. Fire Hydrants shall equal or exceed all provisions of the most current edition of AWWA C502 and shall fully comply with the following provisions:
   1. Hydrants shall be of the compression type with the main valve closing with the water pressure, 5-1/4 inch size.
   2. Hydrants shall be furnished with two 2-1/2 inch hose nozzles and one pumper nozzle. The Contractor shall verify with the local fire department the size of pumper nozzle required. All nozzles shall be threaded in accordance with National Standard Hose Coupling Thread Specification.
   3. Hydrants shall be sized for a depth of 3 feet and shall be provided with a 6 inch shoe (inlet) connection. Shoe connections shall be furnished with all necessary joint material to properly conform to the O.D. of the type of water main pipe indicated.
   4. Hydrants shall open by turning counterclockwise and shall have 1-1/2 inch pentagon operating stem nuts and nozzle cap nuts. Nozzle caps shall be securely chained to the upper barrel. Note: Contractor shall verify with local authorities CW or CCW opening.
   5. Hydrants shall be of the "break-away" type, so designed that neither barrel nor stem damaged on vehicular impact with no loss of water, and so designed that repairs may be effected by easily replaceable components without excavation.
   6. Hydrant flow losses shall not exceed 4.75 psi through the 5-1/4 inch pumper nozzle at 1000 gpm, 1.90 psi through two 2-1/2 inch hose nozzles at 500 gpm, and .95 psi through one 2-1/2 inch hose nozzle at 250 gpm.
   7. The hydrant main valve assembly shall include an integral drain valve system which operates automatically each time the hydrant is operated, with no toggles, springs, or adjustable mechanisms. The upper valve plate, seat ring, and drain outlets shall be constructed of bronze.
   8. Hydrants shall be capable of withstanding an application of 200 ft.-lb. of torque at the operating stem nut in either the fully closed or fully open position with no injury.
   9. Hydrant bonnet assemblies shall be so designed as to make tampering difficult and shall be provided with a convenient means of lubricating.
   10. Hydrant barrel flanges below ground shall be integrally cast with the barrel.

2.04 BEDDING AND COVER MATERIALS

A. Bedding: As specified in Section 31 2316.13.

B. Cover: As specified in Section 31 2316.13.

2.05 ACCESSORIES

A. Anchorages: Proved anchorages for tees, wyes, crosses, plugs, caps, bends, valves, and hydrants. After installation, apply full coat of asphalt or other acceptable corrosion-retarding material to surfaces of ferrous anchorages.

B. Clamps, straps, rods, bolts and washers meeting the requirements of ASTM A307, ASTM D3953-10, and ASTM F4844.

2.06 IDENTIFICATION

A. Underground pipe marking and identification shall be in accordance with Section 33 0526 - Utility Identification.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that building service connection and municipal utility water main size, location, and invert are as indicated.

B. General: Examine areas and conditions under which potable water system's materials and products are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.02 PREPARATION

A. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, remove burrs.

B. Remove scale and dirt on inside and outside before assembly.

C. Prepare pipe connections to equipment with flanges or unions.

3.03 TRENCHING

A. See the section on trenching for additional requirements.

B. Hand trim excavation for accurate placement of pipe to elevations indicated.

C. Form and place concrete for pipe thrust restraints at each change of pipe direction. Place concrete to permit full access to pipe and pipe accessories. Provide adequate bearing area on undisturbed soil as detailed in the construction plans. Wrap the fitting in 6 mil polyethylene sheeting prior to pouring concrete.

D. Backfill around sides and to top of pipe with cover fill, tamp in place and compact, then complete backfilling.

3.04 INSTALLATION - PIPE

A. Maintain separation of water main from sewer 10 ft horizontal; min 18" clear vertical at crossing points.

B. Group piping with other site piping work whenever practical.

C. Establish elevations of buried piping to ensure not less than 3 ft of cover.

D. Install ductile iron piping and fittings to AWWA C600.

E. Install grooved and shouldered pipe joints to AWWA C606.

F. Generally, route pipe in straight line; piping may be laid in a curved alignment using joint deflection. Do not over deflect per manufacturers specifications.

G. Install pipe to allow for expansion and contraction without stressing pipe or joints.

H. Install access fittings to permit disinfection of water system.

3.05 INSTALLATION - VALVES AND HYDRANTS

A. Set valves on solid bearing.

B. Install valves as indicated in the drawings. Insure that valve and operating stem are orientated vertically.
   1. Set valve box over the valve, centered and plumb over the operating nut. Ensure that the valve box base is properly supported.
   2. Adjust the valve box to final grade.
   3. House keeping Pad: Pour an 8"x24"x24" concrete pad around the valve box.
      a. In non-traffic areas-flush with surrounding grade.
      b. In paved areas:
         1) Rigid pavement - flush with finished grade.
         2) Flexible pavement - top of pad 2" below final grade.
      c. Access lid legend: "WATER"

C. Set hydrants plumb; locate pumper nozzle perpendicular to and facing roadway in accordance with Section 21 1100.

D. Set hydrants to grade, with nozzles at least 20 inches above ground in accordance with Section 21 1100.

E. Locate control valve 4 inches away from hydrant. The hydrant control valve shall be a fixed to a MJ x HJ x swivel tee installed in main line.

F. Provide a drainage pit 36 inches square by 24 inches deep filled with 2 inches washed gravel. Encase elbow of hydrant in gravel to 6 inches above drain opening. Do not connect drain opening to sewer.

G. Paint hydrants in accordance with Section 09 9113.

3.06 SERVICE CONNECTIONS

A. The water service line material shall be as specified and/or required by the operator/owner of the water system and of size and type as noted in the drawings.

B. The connection at the main:
   1. Service lines 2" diameter or less use cast brass corporation stops in accordance with AWWA C800.
      a. Ductile iron mains may be tapped directly.
      b. Double band brass saddles with stainless steel bands shall be used when tapping PVC, cast iron or asbestos cement water mains.

C. Extend the service line to the meter location. A cast bronze curb stop with ball valve and stops. The inlet connection shall be compatible with the type of service line being used. The outlet end shall have female NPT.

D. Set the meter box when called for in the drawings.

E. Unless otherwise noted, the utility owner will set the meter.

F. Provide product submittals for all components of the service line assembly. Do not order materials until the submittals have been approved by the Owner and Architect/Engineer.

3.07 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Water Main Disinfection shall be performed in accordance with AWWA C651-05 using one of three methods.
   1. Tablets (granules) of hypochlorite placed in the main during construction.
   2. Continuous Method: fill the main with a premixed solution of chlorinated water or injection of chlorinated water into the main as it is being filled.
   3. Slug Method: Flow a slug of highly chlorinated water (100 mg/L) at a rate to insure that all parts of the system are exposed to the highly chlorinated water for a period of 3 hours.
   4. The table below presents the contact times and residual chlorine amount for each method:

Chlorination Methods for Disinfecting Water Mains			
Chlorination Method Used	Initial Chlorine Dose (mg/L)	Minimum Contact Time	Minimum Chlorine Resid. (mg/L)
Non-emergency Procedures			
Tablet	25	24	10
Continuous	25	24	10
Slug	100	3	50

   5. If the tablet (granules) method is used, care must be taken during construction of the main to ensure that the system does not become contaminated with dirt or other materials during construction.
   6. Initial flushing should be performed before the continuous or slug method is undertaken.

C. Final flushing of the main shall be performed after the minimum retention time but not before acceptable residual chlorine levels have been reached. Care should be taken to ensure that discharged water with residual chlorine levels does not reach a stream, river or lake.

D. Bacteriological Testing
   1. If the new main is connected directly to the active water distribution system a bacteriological testing must be performed prior to pressure and leak testing of the system.

2. After final flushing two consecutive sets of water samples, taken at least 24 hours apart shall be taken from the water mains.
    a. Sample points shall be located a minimum of every 1,200 ft of water main, at each end of the pipe line, and at each branch of the system.
    b. The samples must be delivered to the lab in a timely manner. Check with the laboratory to confirm handling requirements.
    c. The sample bottles shall be sealed and labeled and a chain of custody form shall be maintained.
    d. Upon satisfactory receipt of satisfactory report results from the laboratory copies shall be delivered to the Owner and Architect/Engineer.
    e. Should the test results be unsatisfactory the system shall be redisinfected and retested as necessary to obtain satisfactory results, no additional cost to the utility.

E. Hydrostatic Testing: Prior to placing the main in service the system shall be leak tested.
1. Hydrostatic Tests for ductile iron and PVC main: Test at not less than 1-1/2 times working pressure for 2-hours, but no less than 175 psi.
    a. The test shall be performed in accordance with AWWA C-600-82. The allowable leakage is the quantity of water that must be supplied into the section of pipe being tested to maintain a test pressure within 5 psi of the test pressure after the air in the pipeline has been expelled and the pipe has been filled with water. The pipe will not be accepted if the leakage exceeds the amount determined by the following formula: $L=SD\sqrt{P} / 133,200$.
    b. in which L is the allowable leakage, in gallons per hour, S is the length of pipe tested, in feet, D is nominal diameter of the pipe, in inches, and P is the average test pressure during the leakage test, in pounds per square inch gauge.
    c. When testing against closed metal-seated valves, an additional leakage per closed valve of 0.078 gallons per hour per inch of nominal valve size shall be allowed.
    d. When hydrants are in the test section, test against the closed hydrant lead valve.
    e. If the actual volume of water pumped into the system during the 2 hour test period exceeds the calculated total gallons allowable, the line will have failed. The contractor shall pump the line up to test pressure and visually inspect for leaks at all joints and fittings. Correct all leaks found and re-test.
2. Hydrostatic Tests for HDPE: Test at not less than 1-1/2 times working pressure, but no less than 175 psi.
    a. The test consists of maintaining the test pressure over a period of 4 hours and then dropping the pressure by 10 psi. If the pressure then remains within 5% of the target value for 1 hour, this indicates there is no leakage in the system.
    b. Under no circumstances shall the total time under test exceed 8 hours at 1.5 times the system pressure rating. If the test is not complete within this time limit (due to leakage, equipment failure, etc.) the test section shall be permitted to "relax" for 8 hours prior to the next test sequence.

3.08 INSTALLATION OF IDENTIFICATION

A. General: During back-filling/top-soiling of underground plastic potable water piping, install continuous underground-type plastic line markers, located directly over buried lines at 6" to 8" below finished grade.

3.09 ADJUSTING AND CLEANING

A. Disinfection of Water Mains: Flush and disinfect in accordance with AWWA C651-05 "Standard for Disinfecting Water Mains."

END OF SECTION

SECTION 33 4211
STORMWATER GRAVITY PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Storm drainage piping, fittings, accessories and structures.

B. Extension of the drainage system to point of discharge for the site.

C. All structures and connections as listed in the storm drainage tables on the drawings.

1.02 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete.

B. Section 31 2316 - Excavation: Excavating of trenches.

C. Section 31 2316.13 - Trenching: Excavating, bedding, and backfilling.

D. Section 31 2323 - Fill: Bedding and backfilling.

E. Section 33 0561 - Drainage Manholes and Structures.

1.03 PRICE AND PAYMENT PROCEDURES

A. See Section 01 2200 - Unit Prices, for additional unit price requirements.

B. Pipe and Fittings:
   1. Basis of Measurement: By the linear foot.
   2. Basis of Payment: Includes hand trimming excavation, bedding and backfilling, pipe and fittings, connection to building service piping and to point of discharge for the site.

1.04 DEFINITIONS

A. Bedding: Fill placed under, beside and directly over pipe, prior to subsequent backfill operations.

1.05 REFERENCE STANDARDS

A. ASTM C76 - Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe; 2022a.

B. ASTM C443 - Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets; 2021.

1.06 ADMINISTRATIVE REQUIREMENTS

A. Sequencing: Ensure that utility connections are achieved in an orderly and expeditious manner.

1.07 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data indicating pipe, pipe accessories, pre-cast structures and castings.

C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

D. Manufacturer's Installation Instructions: Indicate special procedures required to install Products specified.

E. Field Quality Control Submittals: Document results of field quality control testing.

F. Project Record Documents:
   1. Record location of pipe runs, connections, catch basins and sturctures, and invert elevations.
   2. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

A. Comply with applicable County Standard Construction regulations.

2.02 STORM SEWER PIPE MATERIALS

A. Provide products that comply with applicable code(s).

B. Concrete Pipe: Reinforced, ASTM C76. Provide in the pipe sizes as noted in the Drainage Table(s) contained in the drawings. Unless otherwise noted in the drawings, all reinforced concrete pipe shall be Class III, with wall Type B. Joints may be bell and spigot or tongue and groove.

C. Reinforced Concrete Pipe Joint Device: ASTM C443 (ASTM C443M) rubber compression gasket joint. Gaskets shall be profile type. No "O" ring gaskets are permitted.

D. PE or PP Profile Wall Pipe: ASTMs F2648; F2736, F2881; size(s) as noted in the Drainage Table(s) contained in the drawings. Joints shall be bell and spigot water tight joints.

2.03 PIPE ACCESSORIES

A. Pipe connections to structures; made using non-shrinking grout, mechanical clamp ring type, stainless steel, expanding and contracting sleeve, neoprene, or ribbed gasket for positive seal.

B. Fittings: Same material as pipe molded or formed to suit pipe size and end design, in required tee, bends, elbows, cleanouts, reducers, traps and other configurations required.

C. Filter Fabric: Non-biodegradable, non-woven with an EOS 100.

2.04 BEDDING AND COVER MATERIALS

A. Bedding: As specified in Section 31 2316.13.

B. Cover: As specified in Section 31 2316.13.

PART 3 EXECUTION

3.01 TRENCHING

A. See Section 31 2316.13 - Trenching for additional requirements.

B. See Section 31 2316 - Excavation and Section 31 2323 - Fill for additional requirements.

C. Hand trim excavation for accurate placement of pipe to elevations indicated.

D. Backfill around sides and to top of pipe with cover fill, tamp in place and compact, then complete backfilling.

3.02 INSTALLATION - PIPE

A. Prepare the trench ready to receive work and excavations, dimensions, and elevations are as indicated on drawings.

B. Install pipe, fittings, and accessories in accordance with manufacturer's instructions. Seal watertight.
   1. Install bedding and initial backfill in accordance with section 31 2316.13.
   2. Install the final backfill in accordance with Section 31 2316.13.

C. Lay pipe to slope gradients noted on drawings.

D. Connect to building storm drainage system, foundation drainage system, and utility/municipal sewer system.

E. Make connections through walls through sleeved openings, where provided.

3.03 FIELD QUALITY CONTROL

A. Testing: Perform testing of completed piping in accordance with local authorities having jurisdiction.

B. The piping shall be visually inspected as the work proceeds:

1. Insure that a full circle is observed. If not, then take corrective action.
    a. For rigid pipe (concrete, D.I. ect.) relay pipe to establish a straight line and grade.
    b. For flexible pipe (PVC, PE, PP) determine what section(s) of the pipe is(are) overly deflected; remove the backfill and bedding; reinstall the bedding taking care to provide full support of the pipe walls; then reinstall the backfill.
2. If damaged pipe is observed, the damaged sections(s) shall be immediately removed and replaced. Progress on laying additional storm sewer shall cease until the problem is corrected.
3. If hanging gaskets are observed, the entire run of pipe shall be removed and relaid.

C. Completion Inspection
1. Each run of pipe shall be visually inspected by shining the line (using sunlight and mirrors).
    a. Debris observed shall be removed by flushing and balling if necessary. The material shall be trapped to insure that it is not washed downstream of the project.
    b. Damaged pipe sections shall be removed and replaced.
2. Flexible Pipe shall be deflection tested for 5% maximum deflection.
    a. A go-no-go mandrel shall be used on all pipe 18 inches and smaller.
    b. The vertical diameter of pipes with a diameter greater than 18 inches shall be measured, recorded, and compared to the factory specified inside diameter of the pipe. Measurements shall be taken 4 feet either side of each joint and at the midpoint of each section of pipe.
    c. Any section of pipe determined to be over-deflected (greater than 5%) shall be corrected.

D. The cost of testing and all corrective actions necessary to provide an acceptable system shall not be paid for directly. The Contractor shall include the costs in the value established for the installation of the system.

3.04 PROTECTION

A. Protect pipe and bedding cover from damage or displacement until backfilling operation has been completed.

B. Protect the piping and drainage structures from silt and debris being washed into the system. Clear the pipe immediately upon observing such contamination. Do not allow silt or debris to exit the site.

END OF SECTION

STANDARD WATER SPECIFICATIONS

FOR

BROWNSVILLE ENERGY AUTHORITY
BROWNSVILLE, TENNESSEE

DW20221166

APPROVED WATER SPECIFICATIONS

THE DOCUMENT BEARING THIS STAMP HAS BEEN RECEIVED AND REVIEWED BY THE

TENNESSEE DEPT. OF ENVIRONMENT & CONSERVATION

DIVISION OF WATER RESOURCES

AND IS HEREBY APPROVED FOR USE IN CONSTRUCTION BY THE COMMISSIONER

Cindy Wheeler

10/07/2022

THIS APPROVAL SHALL NOT BE CONSTRUED AS CREATING A PRESUMPTION OF CORRECT OPERATION OR AS WARRANTING BY THE COMMISSIONER THAT THE APPROVED FACILITIES WILL REACH THE DESIGNED GOALS.

APPROVAL EXPIRES FIVE YEARS FROM ABOVE DATE

W. SCOTT DANIEL
REGISTERED ENGINEER
XVI
AGRICULTURE
COMMERCE
No. 104425
STATE OF TENNESSEE

SEPTEMBER 2022

BROWNSVILLE ENERGY AUTHORITY
SPECIFICATIONS FOR NEW WATER LINES

1. Definitions

Wherever used in these Specifications, the following terms shall have the meanings indicated and shall be applicable to both the singular and plural thereof.

The term "CONTRACTOR" shall mean the person, firm or corporation which is responsible for performing the work described herein.

The term "OWNER" shall mean the Brownsville Energy Authority.

The term "ENGINEER" shall mean the Brownsville Energy Authority or duly authorized representative.

2. Scope of the Specifications

The purpose of these specifications is to standardize construction methods and materials for new 6-inch through 12-inch size water lines and appurtenances which are added to the water system of the Brownsville Energy Authority.

Before any construction is started on any water line which is to be turned over to and served by the Brownsville Energy Authority, plans and specifications for said water lines and appurtenances shall be submitted to and approved by the Brownsville Energy Authority. Plans and Specifications submitted to the Brownsville Energy Authority for approval shall be in compliance with the requirements of these Standard Specifications and the requirements of the Tennessee Department of Environment and Conservation.

Contractor shall initiate pre-construction conference with BEA prior to beginning any water work. One week notice is required.

Contractor shall provide to Brownsville Energy Authority as-built measurements of all water facilities upon completion of the installation and prior to the scheduling of the required testing.

3. Pipeline Materials for Water Lines

a. General

The minimum size of any new water line to be connected to the Brownsville Energy Authority water system shall be 6 inches, except

where otherwise authorized by written permission of the Brownsville Energy Authority.

Generally, the water lines shall be DR 18 C900 polyvinyl chloride (PVC) plastic pipe meeting the requirements of the latest AWWA/ANSI Standards.

All water lines above 12-inchs shall be Ductile Iron Thickness Class 51 or Pressure Class 350.

Water lines extending under proposed roadways or at locations stipulated by the Owner shall be AWWA Pressure Class 350 ductile iron pipe.

b. Polyvinyl Chloride (PVC) Pipe

Polyvinyl chloride (PVC) pipe for water lines shall be made from Class 12454-B polyvinyl chloride plastic (PVC 1120) as defined in the latest revision of ASTM Specification D1784.

Additives and fillers, including but not limited to stabilizers, antioxidants, lubricants, colorants, etc. shall not exceed ten (10) parts by weight per 100 parts of PVC resin in the compound.

The pipe shall meet all the requirements of the latest revision of AWWA C900 Specification for standard thermoplastic pipe dimension ratio DR 18 rated for 235 psi water pressure at 73°F. The pipe shall have push-on elastomeric gasket bell end joints designed so that the pipe and fittings may be connected on the job without the use of solvent cement or any special equipment. Push-on joints and lubricants shall conform to the latest revision of AWWA C900 Specification.

The pipe shall be furnished in nominal lengths of 20 feet. The pipe shall be supported at least every 10 feet of its length during storage. If the pipe is to be stored for more than 30 days, it shall be shielded from direct sun- light.

All PVC pipe for water lines shall bear identification markings that will remain legible during normal handling, storage, and installation. Marking on pipe shall include the following and shall be applied at intervals of not more than five feet:

(a) Nominal size (for example, 6 in.).
(b) Type of plastic pipe material in accordance with the designation code (for example, C900).

(c) Dimension ratio (for example, DR 18).
(d) ASTM designation D 2241.
(e) Manufacturer's name or trademark and production-record code.
(f) Seal (mark) of the testing agency verifying the suitability of the pipe material for potable-water service.

c. Ductile Iron Pipe

(1) Pipe and Push-on Type Joints

Ductile iron pipe (DIP) shall be centrifugally cast meeting the requirements of the latest revision of ANSI/AWWA Standard C151/A21.51 as modified in this Paragraph. Except where specifically designated otherwise by the Owner, the pipe shall be push-on type joint, AWWA Pressure Class 350 as described in Table 5 of the latest revision of ANSI/AWWA Standard C150/A21.50, with 20 feet laying length. Where special joints are required by the Owner, they shall comply with the specifications for special joints provided hereinafter.

The inside of all pipe shall be cement-mortar lined in accordance with the latest revision of ANSI/AWWA Standard C104-A21.4. In addition, the cement-mortar lining shall be coated with asphaltic material at least one mil thick that conforms to all appropriate requirements of the latest revision of ANSI/AWWA Standard C104/A21.4.

The weight, class, or nominal thickness, and casting period for each length of ductile iron pipe shall be shown on each length of DIP. The manufacturer's mark, country where cast, year in which the pipe was produced, and the letters "DI" or "DUCTILE" shall be cast or metal stamped on the pipe. All required markings shall be clear and legible, and all cast or metal-stamped marks shall be on or near the bell.

(2) Restrained Type Joints

Where stipulated by the Owner, ductile iron pipe shall have restrained-type joints and shall meet all requirements of Paragraph 3.c.(1) except for joint type. The restrained joints shall be suitable for a maximum working pressure of 100 psi plus a 100 psi surge allowance. The restrained joints shall be Flex-Ring Joint® Pipe or Fastite Joint Pipe with Fast-Grip® gaskets manufactured by American Cast Iron Pipe Company; TR Flex® Restrained Joint Pipe or Ductile Iron Tyton Joint Pipe with Field

Lok™ gaskets manufactured by United States Pipe and Foundry Company; or an approved equal.

d. Fittings (Ductile Iron Pipe and PVC Pipe)

Fittings for ductile iron pipe and PVC pipe shall be ductile iron meeting the requirements of the latest revision of ANSI/AWWA Standard C110/A21.10 or ANSI/AWWA C153/A21.53 as modified in this Paragraph. Except where specifically designated otherwise by the Owner, fittings shall be push-on joint, suitable for a working pressure of 100 psi plus a surge allowance of 100 psi. The push-on joints shall conform to the dimensions and weights set out in the latest revision of ANSI/AWWA Standard C110/A21.10 or ANSI/AWWA C153/A21.53 and shall also conform to the latest revision of ANSI/AWWA C111/A21.11 or ANSI/AWWA C153/A21.53.

All water line fittings shall be restrained by megalug retainers or concrete thrusting blocking.

The inside of all fittings shall be cement mortar lined in accordance with the latest revision of ANSI/AWWA Standard C104/A21.4. In addition, the cement mortar lining shall be coated with asphaltic material at least one mil thick that conforms to all appropriate requirements of the latest revision of ANSI/AWWA Standard C104/A21.4.

Ductile iron fittings shall have distinctly cast on them the pressure rating, nominal diameters of openings, manufacturer's identification, the country where cast, and the number of degrees or fraction of the circle on all bends. Ductile-iron fittings shall have the letters “DI” or “DUCTILE” cast on them. Cast letters and figures shall be on the outside body of the fitting and shall have dimensions no smaller than the following:

Size in.	Height of Letters in.	Relief in.
Less than 8	As large as practical	As large as practical
8 – 10	¾	3/32
12	1 1/4	3/32

4. Lines and Grades

The Contractor shall be responsible for all lines and grades required for the water lines and appurtenances. Water lines shall be laid to such lines and grades as required to insure that any air release valves have sufficient depth and that air is not trapped in high points in the water line.

5. Excavation for Water Line Trenches

a. General

The excavation for pipeline trenches for water lines shall be to the depths and widths indicated on the accompanying Standard Details for the pipe material being installed. The Contractor, at his own expense, shall provide adequate facilities for promptly removing water from all excavations.

All depths of fittings are measured to the top of the pipe and shall be as specified unless otherwise stipulated by the Owner.

Unless specifically directed otherwise by the Engineer or where required to uncover or determine the presence of underground obstructions, not more than three hundred feet of trench shall be opened ahead of the pipe laying, and not more than two hundred feet of open ditch shall be left behind the pipe laying. Before laying the pipe, the Contractor shall open the trench far enough ahead to reveal obstructions that may necessitate changing the line or grade of the pipeline.

All barricades, lanterns, watchmen, and other such signs and signals as may be necessary to warn the public of the dangers in connection with open trenches, excavations and other obstructions shall be provided by and at the expense of the Contractor.

The trench shall be straight and uniform so as to permit laying pipe to the proper lines and grades.

When so required by the Owner, one-half of the crossings of existing streets and roads shall be excavated, then temporary bridges consisting of steel plate having a thickness of 1/2-inch shall be placed over the side excavated for the convenience of the traveling public, then the remainder of the excavation shall be carried out. All backfilled ditches shall be maintained in such a manner that they offer minimal hazard to the passage of traffic. The convenience of the traveling public and the property owners abutting the improvements shall be taken into consideration. All public or private drives shall be promptly backfilled or bridged.

All excavated material not needed for backfilling purposes shall be disposed of in a manner satisfactory to the Owner.

If wet, mucky and/or unstable or unsuitable material is

encountered in a trench bottom, the Engineer may require additional excavation to insure a firm foundation for the pipe. In such cases, the trench bottom shall be brought back up to proper grade with crushed stone bedding material meeting the quality requirements of ASTM D692 and the gradation requirements for Size No. 57, TDOT Specifications.

All excavation shall be accomplished in accordance with applicable safety laws and regulations; the Owner or Engineer does not assume responsibility of any degree or sort for acts of the Contractor.

In all areas along existing roadways where the pipeline is being laid under the pavement or in the right-of-way of the road, excavation during each day shall be limited to the length of pipe that can be laid and the trench be backfilled so that no ditch is left open overnight in such areas.

b. Trench Width and Depth

1) Ductile Iron Pipe

The width of the trench at the top of the pipe shall be the nominal diameter of the ductile iron pipe plus 24 inches.

Unless otherwise stipulated by the Owner, trenches for ductile iron pipe shall be excavated to the depth necessary to allow a minimum of 42 inches of cover over the top of the installed ductile iron pipe in paved areas or the maintained shoulder of any roadway, and to allow a minimum of 30 inches of cover over the top of the ductile iron pipe in non-paved areas.

2) PVC Pipe

The minimum width of the trench at the centerline of the PVC pipe shall be at least 18 inches or the nominal diameter of the PVC pipe plus 12 inches, whichever is greater. The maximum width of the trench at the top of the PVC pipe shall not exceed the nominal diameter of the PVC pipe plus 24 inches.

Unless otherwise shown on the Plans, trenches for PVC pipe shall be excavated to the depth necessary to allow a minimum of 42 inches of cover over the installed pipe in paved areas or the maintained shoulder of any roadway, and to

allow a minimum of 30 inches of cover over the installed pipe in non-paved areas.

c. Excavation Near Sanitary Sewer Lines

The Contractor shall protect the water line that crosses sewer lines by providing an 18-inch minimum separation between the top of the sewer line and the bottom of the water line. When this vertical separation cannot be achieved, the water line shall be centered over the sewer line so that both joints will be as far from the sewer line as possible.

When water lines are laid parallel to sewer lines, there should be a minimum of 10 feet horizontal separation or a minimum of 18 inches vertical separation as specified above and laid in separate trenches.

When the above conditions cannot be obtained, both the water and sewer lines shall be constructed of Pressure Class 350 ductile iron pipe and be pressure tested to assure water tightness.

d. Excavation on Easements

Excavation of pipeline trenches on easements shall be performed in such a manner that the private property owner's facilities and grounds shall be restored to as near their original condition as possible considering the work performed. The vegetative cover of the ditches or excavations shall be the same type as the original undisturbed cover.

Before any excavation is begun or before drilling and blasting, a minimum of nine (9) inches of the top soil or original cover shall be removed and stockpiled in a manner so as not to contaminate the topsoil with other fill or excavated material. Should depth of excavation require a trench wider than specified in Paragraph 5.b. of this Section, a minimum of nine (9) inches of topsoil or original cover shall be removed from the additional area and stockpiled as described hereinbefore.

Excavated materials suitable for backfill shall be placed at a distance far enough from the ditch to allow excavated rock to be placed next to the open trench; however, stockpiling outside the easement shall be done only with the written permission of the affected property owner and the Engineer shall be provided a copy.

e. Removal of Water

The Contractor shall at all times during construction provide and maintain means and devices with which to promptly dispose of all water entering the excavations or other parts of the work and shall keep said

excavations dry until the construction therein is completed. No concrete shall be placed in water nor shall water be allowed to rise over structures if there is danger of flotation or of setting up unequal pressures in the concrete until the concrete has set at least 24 hours and any danger of flotation has been removed.

The Contractor shall dispose of water from the work in a suitable manner without damage to adjacent property. No water shall be drained into work built or under construction.

During the laying of the water pipeline and until the water pipeline has been bedded in place with at least two (2) feet of backfill over the pipe, the Contractor shall keep the groundwater table below the bottom of the trench.

Laying of water pipeline will not be permitted except in a dry trench. Running water shall be completely blocked off by dewatering and/or sheathing. The trench must be dry and clean to assure that the hub and spigot of the pipe are dry before a joint is made.

All removal and handling of water required to maintain dry trenches or other excavations for the construction of water lines or other structures in the dry trench shall be at the expense of the Contractor.

6. Water Line Laying, Bedding and Initial Backfilling

a. General

The trench shall be excavated to the depth and width shown on the Standard Details and the bedding prepared as specified and shown on the Standard Details, in advance of pipe laying.

Before each piece of pipe is lowered into the trench, it shall be thoroughly swabbed out to insure its being clean. Each piece of pipe shall be lowered separately unless special permission is given otherwise by the Owner.

Care shall be taken to prevent injury to the pipe both inside and out. No piece of pipe or fitting which is known to be defective shall be laid or placed in the lines. If any defective pipe or fitting shall be discovered after the pipeline is laid, they shall be removed and replaced with a satisfactory pipe or fitting without additional charge.

All bend-type and "tee" fittings in the pipelines, either vertical or horizontal, shall be satisfactorily braced or anchored against the tendency of

movement with joint harness, concrete or equal anchors to the satisfaction of the Owner.

Open ends of unfinished pipelines shall be securely plugged or closed at the end of each day's work or when the line is left temporarily at any other time.

CRUSHED STONE BEDDING AND INITIAL BACKFILL MEETING THE QUALITY REQUIREMENTS OF ASTM D692 AND THE GRADATION REQUIREMENTS FOR SIZE NO. 57, TDOT SPECIFICATION SHALL BE USED FOR ALL PIPE INSTALLED IN TRENCHES UNDER EXISTING OR PROPOSED PAVED AREAS.

b. Ductile Iron Pipe

Ductile iron pipe shall be installed in accordance with the requirements of the latest revision of ANSI/AWWA Standard C600 as modified in this Paragraph.

In case a length of DIP is cut in the field, it shall be so cut as to leave a smooth end at right angle to the longitudinal axis of the pipe in accordance with Section 3.4.4 of the latest revision of ANSI/AWWA Standard C600.

The maximum horizontal or vertical deflection allowed at a push-on type joint for DIP shall not exceed the deflection shown on the Standard Details.

Ductile iron pipe shall be laid on a loose soil foundation by placing "select material" on the excavated trench bottom to a depth of not less than four-inches. "Select material" shall be native soil excavated from the trench, free of rocks, foreign materials and frozen earth. The loose soil foundation shall be prepared to insure that the pipe is uniformly supported over its entire length. Any unyielding material such as rock within the pipe foundation shall be removed and the foundation shall be brought up to grade as specified in Subparagraph a. of this Paragraph. Initial backfill materials up to a plane even with the top of the pipe shall be compacted to 80 percent of their Standard Proctor Density (ASTM D698-Method A). The initial backfill materials shall be manually worked under the sides of the pipe with a shovel to provide satisfactory haunch support.

c. PVC Pipe

PVC pipe shall be installed in accordance with the requirements of the latest revision of ANSI/AWWA Standard C605 as modified in this paragraph.

In case a length of PVC pipe is cut in the field, it shall be so cut as to leave a smooth end at right angle to the longitudinal axis of the pipe in accordance with Section 5.5.1 of the latest revision of ANSI/AWWA Standard C605.

The maximum horizontal or vertical bending allowed in a length of PVC pipe shall not exceed the bending shown on the Standard Details.

PVC pipe shall be laid on a loose soil foundation by placing select material on the excavated trench bottom to a depth of not less than four inches. "Select material" shall be native soil excavated from the trench, free of rocks, foreign materials and frozen earth. The loose soil foundation shall be prepared to insure that the pipe is uniformly supported over its entire length. Any unyielding material such as rock within the pipe foundation shall be removed and the foundation shall be brought up to grade as specified in Subparagraph a. of this Paragraph. Initial backfill materials up to a plane even with the top of the pipe shall be compacted to 80 percent of their Standard Proctor Density (ASTM D698-Method A). The initial backfill materials shall be manually worked under the sides of the pipe with a shovel to provide satisfactory haunch support.

NO. 10 THHN GREEN COATED TRACER WIRE SHALL BE LAID IN THE TRENCH ABOVE THE PIPE APPROXIMATELY ALONG THE LONGITUDINAL AXIS OF THE PIPE. **THE WIRE SHALL BE LAID CONTINUOUSLY. THE TRACER WIRE SHALL BE ACCESED AT ALL VALVES OR INTERMEDIATE ACCESS POINTS SO THAT ACCESS POINTS ARE NO MORE THAN 1,000 FEET APART.**

7. Class "C" Concrete for Thrust Blocks, Anchors and Encasement

Thrust blocks shall be placed on the water line at all bends, "wyes," "tees," "dead- ends," or as otherwise required by the Engineer. All thrust blocks, anchors and pipe encasements shall be Class "C" concrete. Class "C" concrete shall possess the following characteristics and/or proportions of materials:

Minimum Cement Content: 5.0 bags (470 pounds) per cubic yard.

Minimum 28-day compressive strength: 2500 psi – average of any three cylinders.

Slump: Five (5) to eight (8) inches.

Admixtures: None required.

All thrust blocks shall be designed to resist surges and transient pressures normally encountered in lines operating at a working pressure of 100 psi unless otherwise directed by the Engineer.

8. Final Backfilling Water Lines

a. Final Backfilling in Unpaved Areas

In the backfilling of the trench above the plane even with the top of the pipe, material reasonably free from rock and acceptable to the Engineer shall be used. Walking or working on the completed pipeline, except as may be necessary in tamping or backfilling, shall not be permitted until the trench bas been backfilled to a height of at least 12 inches above the top of the pipe. The filling of the trench shall be carried on in such a manner that the completed pipeline will not be disturbed and injurious side pressures do not occur.

In filling the remainder of the trench in non-paved areas, the backfill material may be shoveled into the trench without compacting, and heaped over whenever, in the opinion of the Engineer, this method of backfilling may be used without inconvenience to the public.

When backfill material has been piled up and before final acceptance, the Contractor will be required to level off all trenches to the level of the surrounding street, roadway, or terrain. The Contractor will be required to remove from the streets, roadways and private property all excess earth or other materials.

b. Final Backfilling in Paved Areas

CRUSHED STONE BACKFILL MEETING THE QUALITY REQUIREMENTS OF ASTM D692 AND THE GRADATION REQUIREMENTS FOR SIZE NO. 67, TDOT SPECIFICATION SHALL BE USED FOR FINAL BACKFILLING IN TRENCHES UNDER EXISTING OR PROPOSED PAVED AREAS.

c. Backfilling Operations Conducted on Easements

Backfilling of trenches or excavations on easements shall be performed in such a manner that the private property owner's facilities and grounds shall be restored to as near as possible their original condition immediately after pipe laying.
The residue of the excavated material for the pipe trench shall be cleaned up and placed into the trench, leaving no residue scattered over the areas. The top portion of the trench or excavation shall be filled using the stockpiled topsoil. The ditch shall be left high to allow for settling unless

in the opinion of the Owner this method of backfilling will cause inconvenience to the private property owner. Seeding or sodding shall proceed immediately following backfill.

If the backfilling operation is performed during extremely dry weather, the Contractor should leave some stockpiled topsoil to use later as additional fill after settlement has occurred.

The Contractor will be held responsible for the condition of grass cover and the condition of the ground surface at the time of final inspection unless the private owner has plowed or excavated the ground.

d. Location Tape

WHEN THE FINAL BACKFILL HAS REACHED A PLANE 12-INCHES BELOW FINISHED GRADE A 6-INCH WIDE LOCATION TAPE SHALL BE LAID IN THE DITCH APPROXIMATELY ALONG THE LONGITUDINAL AXIS OF ALL PIPE, REGARDLESS OF PIPELINE MATERIAL. THE LOCATION TAPE SHALL BE BLUE IN COLOR, AND HAVE "CAUTION WATER LINE BURIED BELOW" WRITTEN IN BOLD BLACK LETTERS. The location tape shall be Terra Tape or approved equal.

9. Unauthorized Excavation and Over-Breakage

Whenever the excavation is carried beyond or below the lines and grades given by the Engineer, the Contractor, at his own expense, shall refill such excavated space with such material and in such a manner as will in the opinion of the Engineer, ensure stability of the structure or line involved, including the use of crushed stone or Class "C" concrete meeting the requirements of Paragraph 7.

Over-breakage is that portion of any material displaced or loosened beyond the finished work as planned or authorized by the Engineer, including slides. All over-breakage shall be removed by the Contractor and disposed of as directed.

10. Shoring, Sheeting and Bracing of Excavations

Where unstable materials are encountered or as required by law or regulations, such as OSHA, the sides of the trench or excavation shall be supported by substantial sheeting, bracing and shoring, or the sides sloped as required by OSHA regulations. The design and installation of all sheeting, sheet piling, bracing, shoring and slopes shall be the Contractor's responsibility and shall be based on computations of pressure exerted by the materials to be retained under prevailing conditions. **Adequate and proper**

shoring of all excavations shall be the entire responsibility of the Contractor.

Existing foundations, adjacent to where the excavation is to be made below the depth of the foundation, shall be supported by shoring, bracing, or underpinning of a temporary or a permanent nature as may be required to assure the integrity of the structure. The Contractor will be held strictly responsible for any damage to existing foundations or structures.

Even though computations shall be used to determine the size of the various components, no timber sheeting less than two inches in thickness and timber bracing, cross bracing or struts less than six inches in thickness will be acceptable.

Solid sheeting will be required for wet or unstable material. It shall consist of continuous vertical sheet piling of timber two inches thick or of steel with suitable shores and braces.

Care shall be taken to avoid excessive backfill loads on the completed pipelines and the requirements that the width of the ditch at the level of the crown on the pipe not exceed that specified in Paragraph 5.b. of this Section.

Trench sheeting shall not be removed until sufficient backfill has been placed to protect the pipe.

All sheeting, planking, timbering, bracing and bridging shall be placed, renewed and maintained as long as is necessary.

11. Inspection of Water Lines During Construction

The Contractor shall notify the Owner when pipe and fitting materials will be received on the job so that proper arrangements may be made for inspecting the pipe.

BEFORE THE CONTRACTOR BACKFILLS ANY OF THE PIPELINES, THEY SHALL BE FIRST INSPECTED BY THE OWNER. If any joints, pipes, or other workmanship or materials are found to be defective, they shall be removed and replaced by the Contractor.

12. Hydrostatic Testing of Water Lines

Water lines shall be subjected to hydrostatic testing in accordance with the requirements of the latest revision of ANSI/AWWA Standard C600 for ductile iron pipe and ANSI/AWWA Standard C605 for PVC pipe, as modified in this paragraph, as a condition of acceptance. For the purposes of this paragraph, normal working pressure in the water line is 75 psi. Transient or "surge"

pressures of up to 75 psi are expected. Therefore, water lines shall be tested under a pressure of 150 psi measured at the highest point of each pipeline and shall not show leakage exceeding the following values:

Allowable Leakage/1,000 Feet of Pipeline

Pipe Size (PVC)	150 psi Test Pressure (at Highest Point along Test Section)
6-inch	0.55 Gal/Hour/50 Joints
8-inch	0.74 Gal/Hour/50 Joints
10-inch	0.92 Gal/Hour/50 Joints
12-inch	1.10 Gal/Hour/50 Joints

The Contractor shall furnish all gauges, meters, pumps, and other equipment required and shall maintain said equipment in condition for accurate testing as determined by the Engineer.

Each section of pipe shall be slowly filled with water to the specified test pressure, based on the elevation of the highest point on the section under test.

Pressure shall be applied by means of a pump connected to the pipe in a manner satisfactory to the Owner.

Before applying the specified test pressure, air shall be expelled completely 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 the air has been expelled, the corporation cocks shall be closed and the test pressure applied. At the conclusion of the pressure test, the corporation cocks shall be removed and plugged or left in place at the discretion of the Owner.

Any exposed pipe, fittings and joints shall be examined carefully during the test. Any damaged or defective pipe, fittings or joints that are discovered following the pressure test shall be repaired or replaced with sound material, and the test shall be repeated until it is satisfactory to the Owner. Where leaks are visible at exposed joints and/or evident on the surface when joints are covered, the pipe shall be rejoined and leakage minimized regardless of total leakage as shown by test.

LEAKAGE SHALL BE DEFINED AS THE QUANTITY OF WATER THAT MUST BE SUPPLIED INTO THE NEWLY LAID PIPE OR ANY VALVED SECTION THEREOF TO MAINTAIN PRESSURE WITHIN 5 PSI OF THE SPECIFIED TEST PRESSURE AFTER THE PIPE HAS BEEN FILLED WITH WATER AND THE AIR HAS BEEN EXPELLED. LEAKAGE SHALL NOT BE

MEASURED BY A DROP IN PRESSURE IN A TEST SECTION OVER A PERIOD OF TIME.

Duration of the pressure test shall be not less than 2 hours where joints are exposed and not less than 8 hours where joints are covered.

Lines which fail to meet the leakage requirements shall be repaired and retested until test requirements are met. All pipe, fittings and other materials found to be defective under test shall be removed and replaced at the Contractor's expense.

Leaks due to faulty joining of pipe sections shall be repaired using mechanical joint cast or ductile iron sleeves. Steel repair clamps will not be allowed.

13. Disinfection of Water Lines

After all water main installation and service and hydrant connections are completed, and simultaneously with the hydrostatic test, but prior to opening any corporation stops or line valves connecting to the existing water distribution system; the water main shall be disinfected in accordance with the latest revision of ANSI/AWWA Standard C651 using the Tablet Method.

During installation of the water main, the Contractor shall place calcium hypochlorite granules or 5 gram tablets meeting the requirements of the latest revision of ANSI/AWWA Standard B300 in the water main at the intervals listed in the following tables.

GRANULES

Pipe Size	Ounces of Granules Placed at 500 Ft. Intervals
4-inch	0.5
6-inch	1.0
8-inch	2.0
10-inch	3.0
12-inch	4.0

TABLETS

Pipe Size	No. of Tablets Placed at Each 20 Feet Length of Pipe
4-inch	1
6-inch	1
8-inch	2
10-inch	3
12-inch	4

When tablets are used, one tablet shall also be placed at each hydrant. Tablets shall be attached to the top inside of the pipe using Permatex Form-A-Gasket No. 2 of Permatex Clear RTV Silicone Adhesive Sealant.

Disinfection will occur concurrently with the hydrostatic test. Following the hydrostatic testing, the chlorinated water shall remain in the water main for a total 24-hour period, including the time required for the hydrostatic testing.

After the chlorinated water has remained in the line for 24 hours, the line will be flushed and refilled and bacteriological samples will be taken with coordination of the Owner per AWWA C651. With negative samples obtained, the line may be placed in service. If a positive sample is obtained, the disinfection procedure must be repeated until negative samples are obtained. The cost of the bacteriological test will be borne by the Contractor. The Owner will pay for the water required for the initial filling of the lines and for the first refill after flushing, but the Contractor shall pay for any other water required.

14. Resilient Seated Gate Valves

Resilient seated gate valves shall meet all requirements of the latest revision of ANSI/AWWA Standard C509 as modified herein. Submittal documents for valves shall be provided to the Owner and shall include catalog data and weight information. An affidavit of compliance is required. Bolting materials shall be cadmium plated. Valves shall be furnished with mechanical joint ends. Stem sealing shall be by an O-ring. Resilient seats shall be applied to both sides of the gate.

All valves shall be non-rising stem and shall have a counterclockwise opening direction. All valves shall be furnished with 2-inch square wrench nuts. Extension stems shall be provided where necessary to ensure that the wrench nut is not more than 30-inches below the top of the valve box.

Resilient seated gate valves shall be Mueller or M&H.

15. Valve Boxes and Pads

All manually actuated buried valves shall be fitted with valve boxes. The valve boxes shall be manufactured by Opelika, Tyler, or Mueller. Valve boxes shall be set vertically and properly adjusted so that the cover shall be in the same plane as the finished surface of the ground or street. For ease of location and identification, a 2'-0" square by 6-inch thick concrete pad shall be furnished as shown on the Standard Details for valves located outside paved areas.

Valve boxes for resilient seated gate valves shall be cast iron, 5 1/4-inch shaft, three piece, screw type with a number six round base and four-inch drop cover marked "Water".

16. Fire Hydrants

Fire hydrants shall be the Style 129 manufactured by Mueller or M & H Valve Company. Installation of hydrants shall be in accordance with Section 3.7 of the latest revision of ANSI/AWWA Standard C600. Seals shall be "O"-ring type. The hydrant inlet shall be suitable for mechanical joint connection. The hydrant main valve shall be 5 1/4-inch compression type.

After installation, each fire hydrant shall be tested for flow and residual pressure. All fire hydrants shall be color coded according to the standard color scheme of the National Fire Prevention Association.

The top bonnet and nozzle caps of each hydrant shall be painted with the appropriate standard color designation to indicate the flow capability of each hydrant. The color schemes of the hydrant top bonnet and nozzle caps, along with the corresponding flow rates and hydrant classes, shall be as follows:

Hydrant Class	Flow Rate @ 20 psi	Color
Class AA	1,500 GPM and Above	Light Blue
Class A	1,000 GPM – 1,499 GPM	Green
Class B	500 GPM – 999 GPM	Orange
Class C	0 GPM – 499 GPM	Red

17. Manual Air Release Valve Assembly

Manual air release valve assemblies shall be constructed and located as shown on the Standard Details. All manual air release valve assemblies shall be housed in a meter box. Meter boxes shall be constructed of concrete and shall have a concrete top with a cast iron reader lid or a cast iron top with a cast iron reader lid. The thickness of the concrete walls and lid of the box shall not be less than 1 ½-inches and the minimum inside dimension of the box shall be 10 inches wide by 17 inches long. All meter boxes shall be Series

36H as manufactured by the Goddard Concrete Company of Memphis, Tennessee, or approved equal.

18. Service Connection Piping

Service connection piping shall be 1-inch Type K soft drawn copper tubing rated for at least 160 psi and meeting the requirements of ASTM B-88. Special care shall be taken to protect the service connection piping with earthen material, from sharp and hard objects. Cover shall be at least 24-inches at all points. The Contractor shall be responsible for connecting to the proposed water main and the existing water service connection piping with the necessary fittings and shall provide the corporation stop at the water line (which shall be left in the open position). Service connection piping fittings shall be copper meeting the chemical requirements of ASTM B62. Service connection piping fittings shall be manufactured by Ford Meter Box Company.

19. Corporation Stops

Corporation stops shall be installed at each service tap into the new water line. Corporation stops shall be brass ball valves with AWWA taper thread (cc) inlet and compression joint for 1-inch Type K copper outlet. Corporation stops shall be 3/4-inch as manufactured by the Ford Meter Box Company.

20. Service Saddles (Only for PVC Pipe)

Where corporation stops are installed in PVC pipe, a service saddle shall be used in conjunction with the installation. Service saddles shall be double strapped with stainless steel straps. **Saddles for PVC pipe meeting the requirements of ANSI/AWWA C900 shall be preformed at the factory.** Service saddles shall be Style FS202 as manufactured by the Ford Meter Box Company.

21. Meter Yokes and Coppersetters

Meter coppersetters shall be installed in each meter box and shall be used to raise the meter to the proper depth as shown on the meter setting detail. No meter shall be shallower than 6 inches nor deeper than 10 inches measured from the top of the meter to the top of the reader lid. The Contractor shall be responsible for determining the height of the coppersetter to be used to bring the water meter to its proper grade. Coppersetters shall be coupled to a short length of 3/4-inch copper tubing between the curb stop and the coppersetter. Coppersetters shall be Series 270 with removable pack joints manufactured by the Ford Meter Box Company, Inc. The inlet coppersetter riser stem shall be fitted with an angle inverted key meter valve with lock wings, Catalog No. KV-2W manufactured by the Ford Meter Box Company, Inc.

22. Curb Stops

A curb stop shall be installed immediately upstream from the inlet of each coppersetter. Curb stops shall be brass ball valves with pack joint inlet for 3/4-inch tubing and IP thread or pack joint for 3/4-inch tubing outlet end as required by installation conditions. All curb stops shall be fitted with padlock wings. Curb stops shall be manufactured by the Ford Meter Box Company.

23. Meter Boxes

Meter boxes shall be installed over each coppersetter and curb stop for each service line. Meter boxes shall be constructed of high-density polyethylene (HDPE) and shall have a HDPE top with a reader lid. The minimum inside dimension of the box shall be 10-inches wide by 15-inches long. All meter boxes shall be model RMB101512-NSW as manufactured by Sigma-Raven or approved equal. All meter boxes must be approved by the Owner.

24. Manual Air Release Valve Assembly Concrete Meter Boxes

Manual air release valve assemblies shall be constructed as shown on the Plans and installed only at locations selected by the Owner. All manual air release valve assemblies shall be housed in a meter box.

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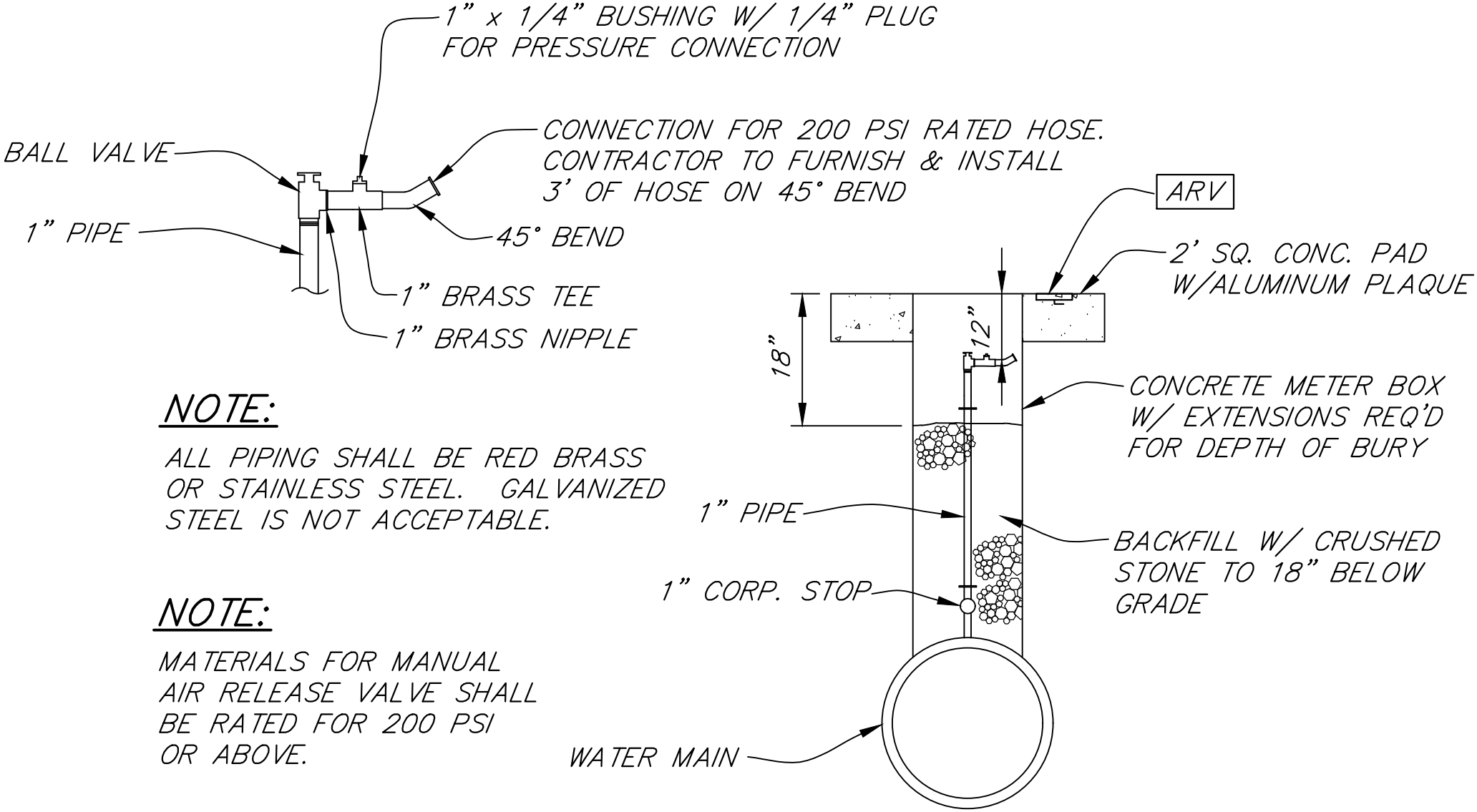


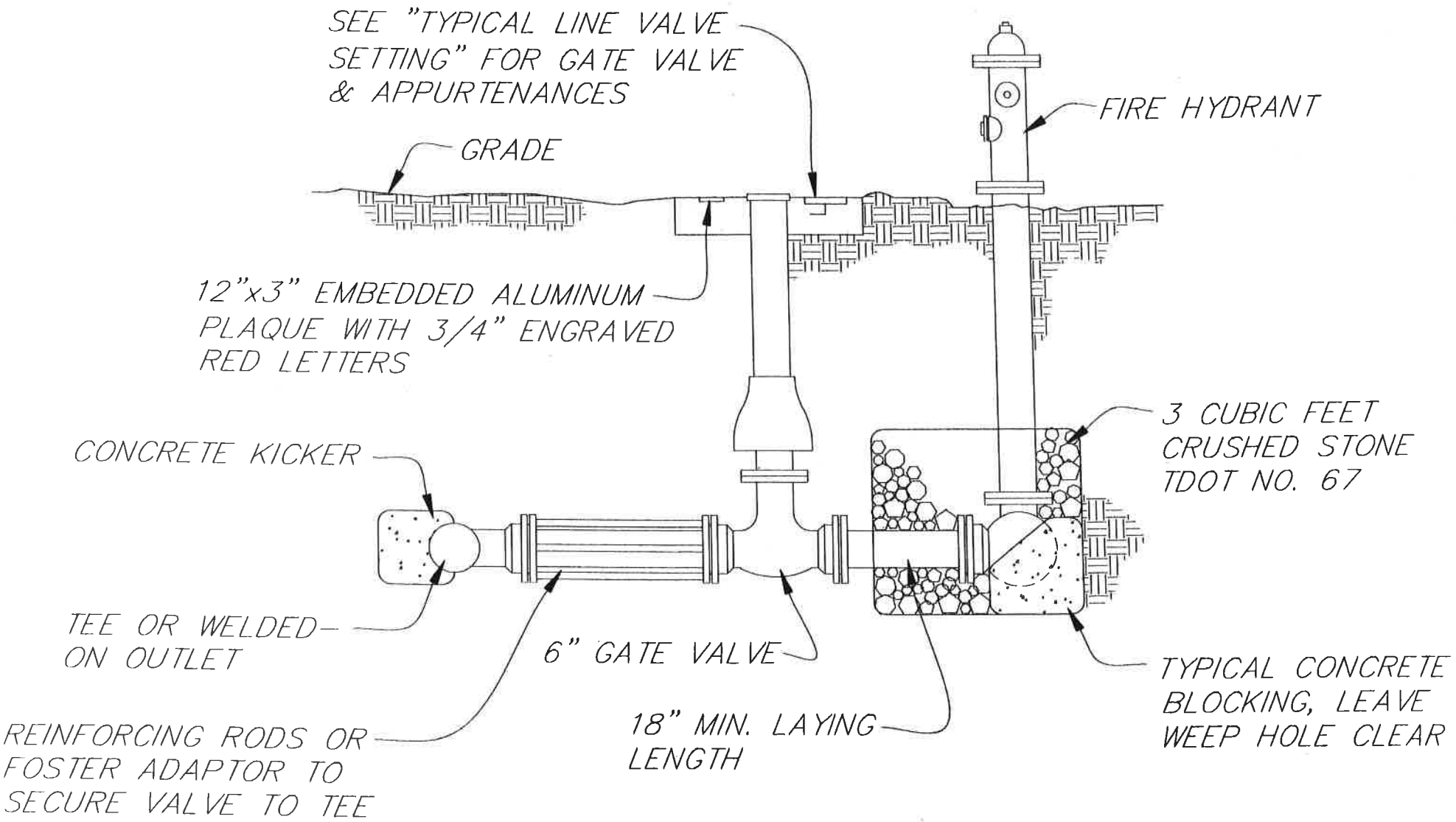
NOTE:

ALL PIPING SHALL BE RED BRASS OR STAINLESS STEEL. GALVANIZED STEEL IS NOT ACCEPTABLE.

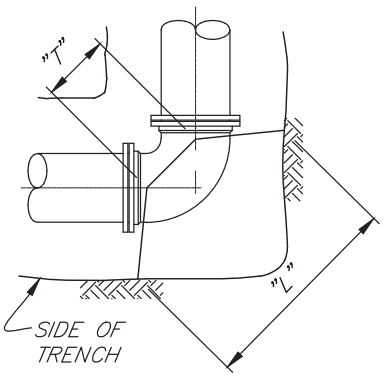
NOTE:

MATERIALS FOR MANUAL AIR RELEASE VALVE SHALL BE RATED FOR 200 PSI OR ABOVE.

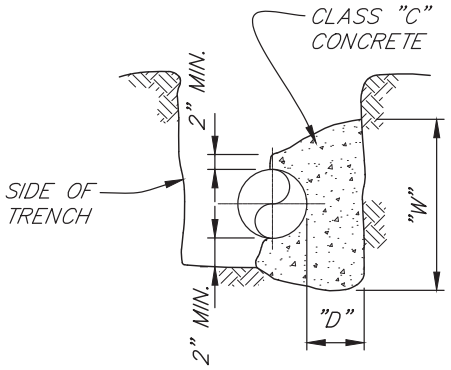
1" MANUAL AIR RELEASE VALVE ASSEMBLY



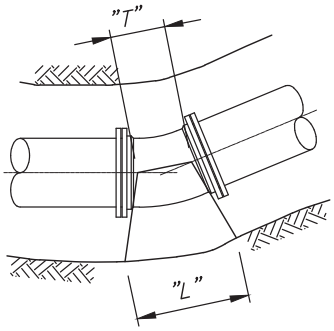
TYPICAL FIRE HYDRANT SETTING



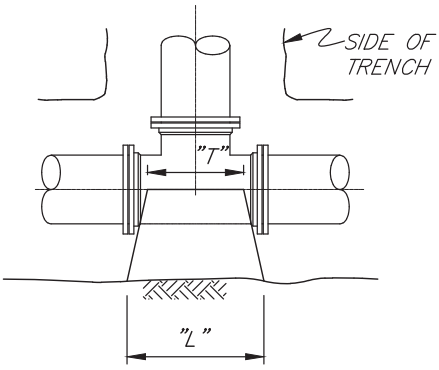
90° BEND



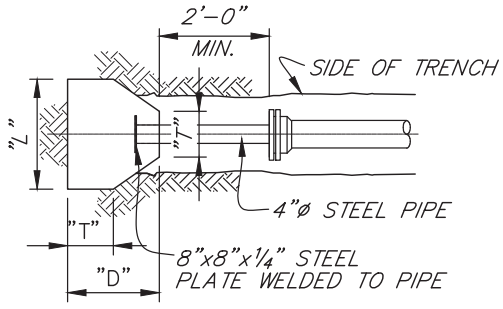
TYPICAL SECTION



45°, 22 1/2° & 11 1/4° BENDS



TEE



PLUG

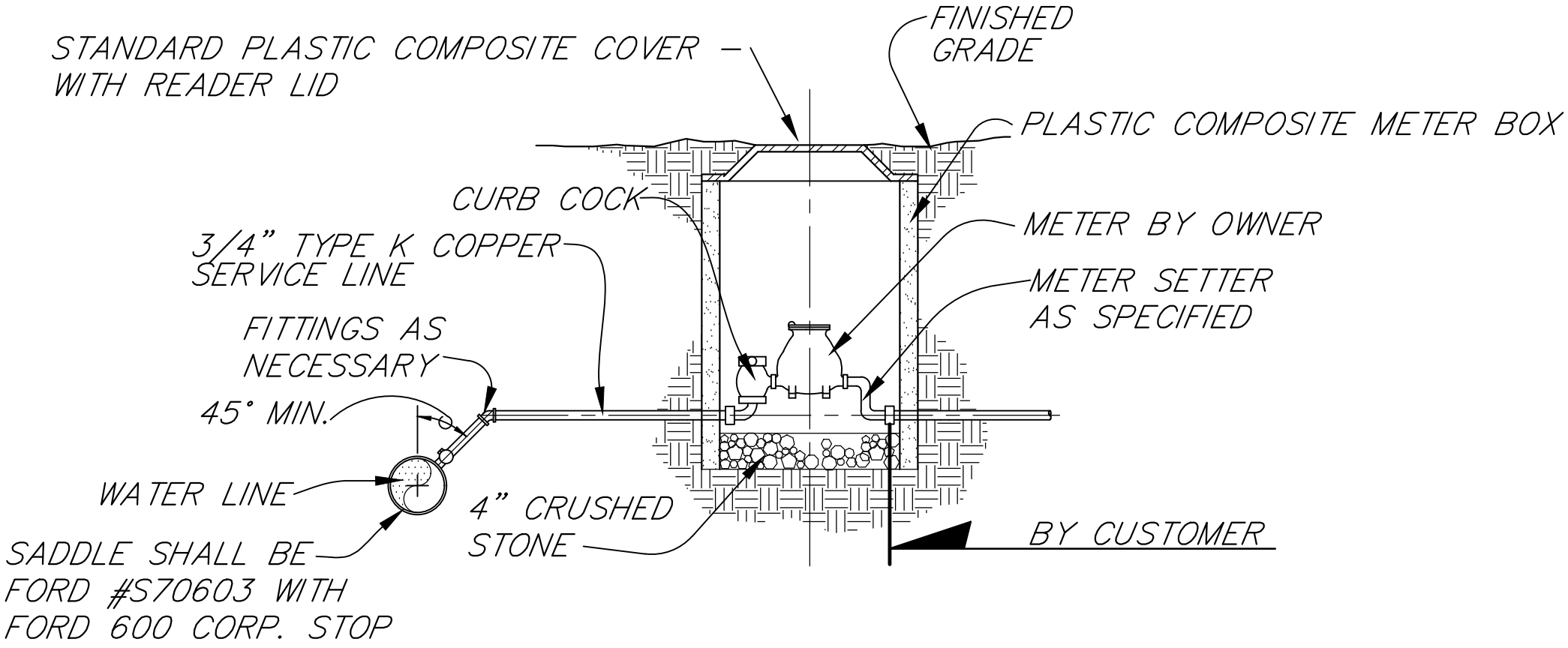
BEARING PRESSURE = 3000 PSF						
PSI = 125						
90° BEND						
SIZE	8"	10"	12"			
D	11	18	18			
L	25	36	42			
W	25	30	30			
T	11	12	12			
45° BEND						
SIZE	8"	10"	12"			
D	8	16	18			
L	19	28	30			
W	19	24	24			
T	8	8	8			
22 ½° & 11 ¼° BENDS						
SIZE	8"	10"	12"			
D	9	12	15			
L	13	20	24			
W	13	18	20			
T	9	8	8			
TEE						
SIZE	8"	10"	12"			
D	16	16	18			
L	22	42	48			
W	22	30	34			
T	16	18	20			
PLUG						
SIZE	8"	10"	12"			
D	16	24	30			
L	22	42	48			
W	22	30	36			
T	16	20	22			

DIMENSIONS ARE IN INCHES

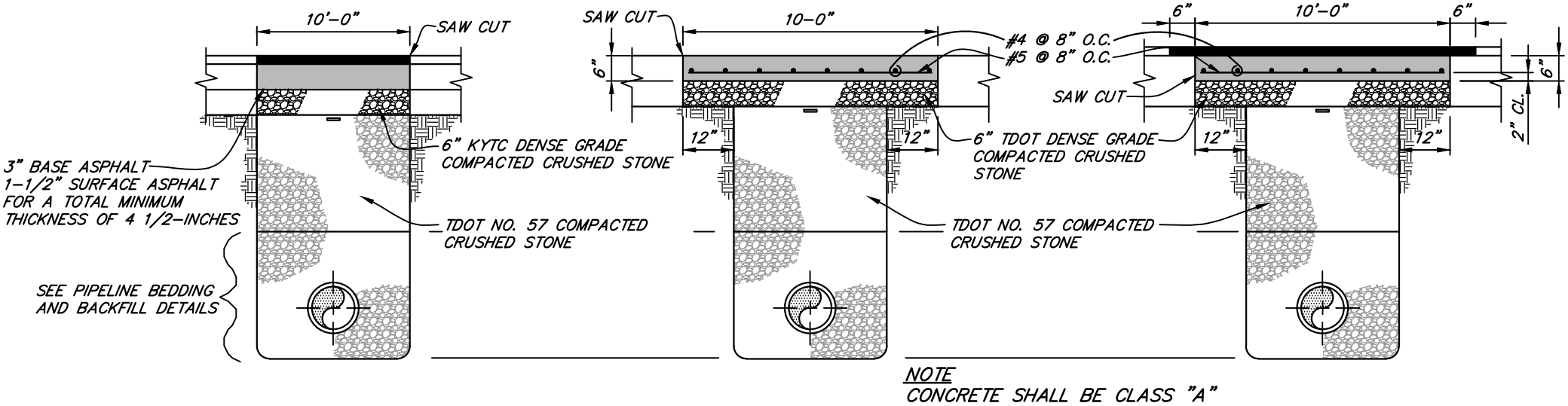
NOTES

1. FOR TEE WITH BRANCH UNEQUAL TO RUN, USE TEE TYPE KICKER WITH D, L & W DIMENSIONS THE SAME AS THOSE FOR PLUG WITH SAME DIMENSIONS AS BRANCH OF TEE, SELECT T DIMENSION FROM TEE TABLE UNDER COLUMN HEADED BY THE SIZE OF THE BRANCH.
2. IF EXACT SIZE OF PIPE BLOCKING IS NOT SHOWN, USE NEXT LARGER SIZE.
3. DIMENSION D MAY BE GREATER THAN SPECIFIED TO ALLOW WORKING SPACE. CONCRETE BLOCKING MUST BE POURED AGAINST UNDISTURBED EARTH.
4. ALL FITTINGS SHALL HAVE EBBA IRON MEGALUGS OR APPROVED EQUAL AND CONCRETE KICKERS.

CONCRETE BLOCKING FOR PIPE (KICKERS)



METER SETTING FOR 3/4" SERVICES

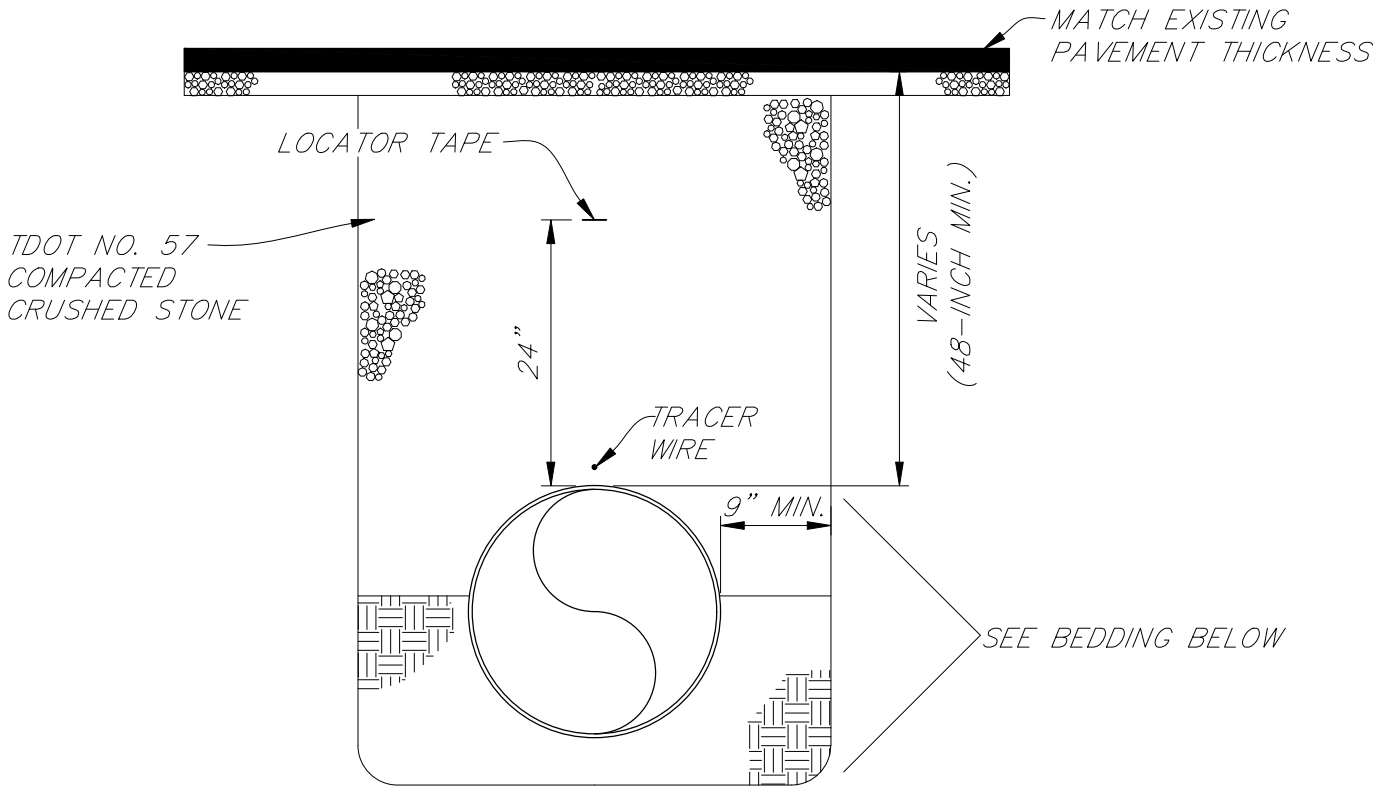


NOTE
CONCRETE SHALL BE CLASS "A"

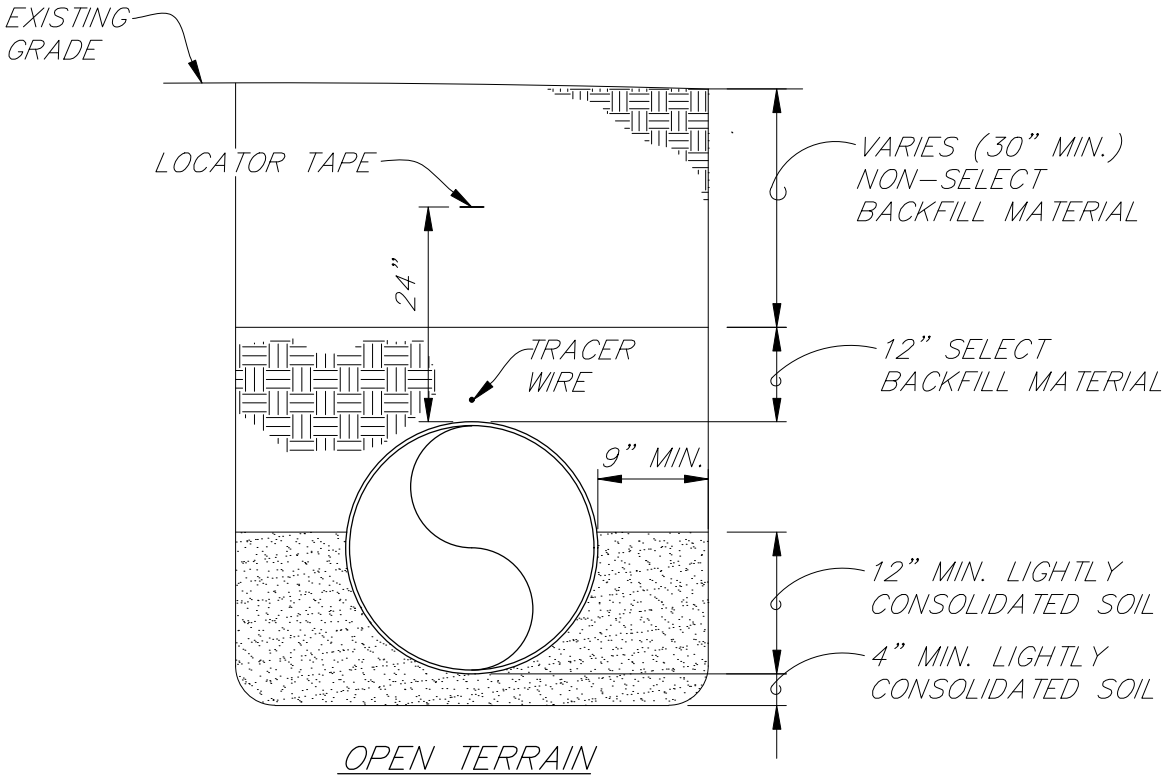
ASPHALT OR BITUMINOUS SURFACE

CONCRETE PAVEMENT

BITUMINOUS SURFACE CONCRETE BASE

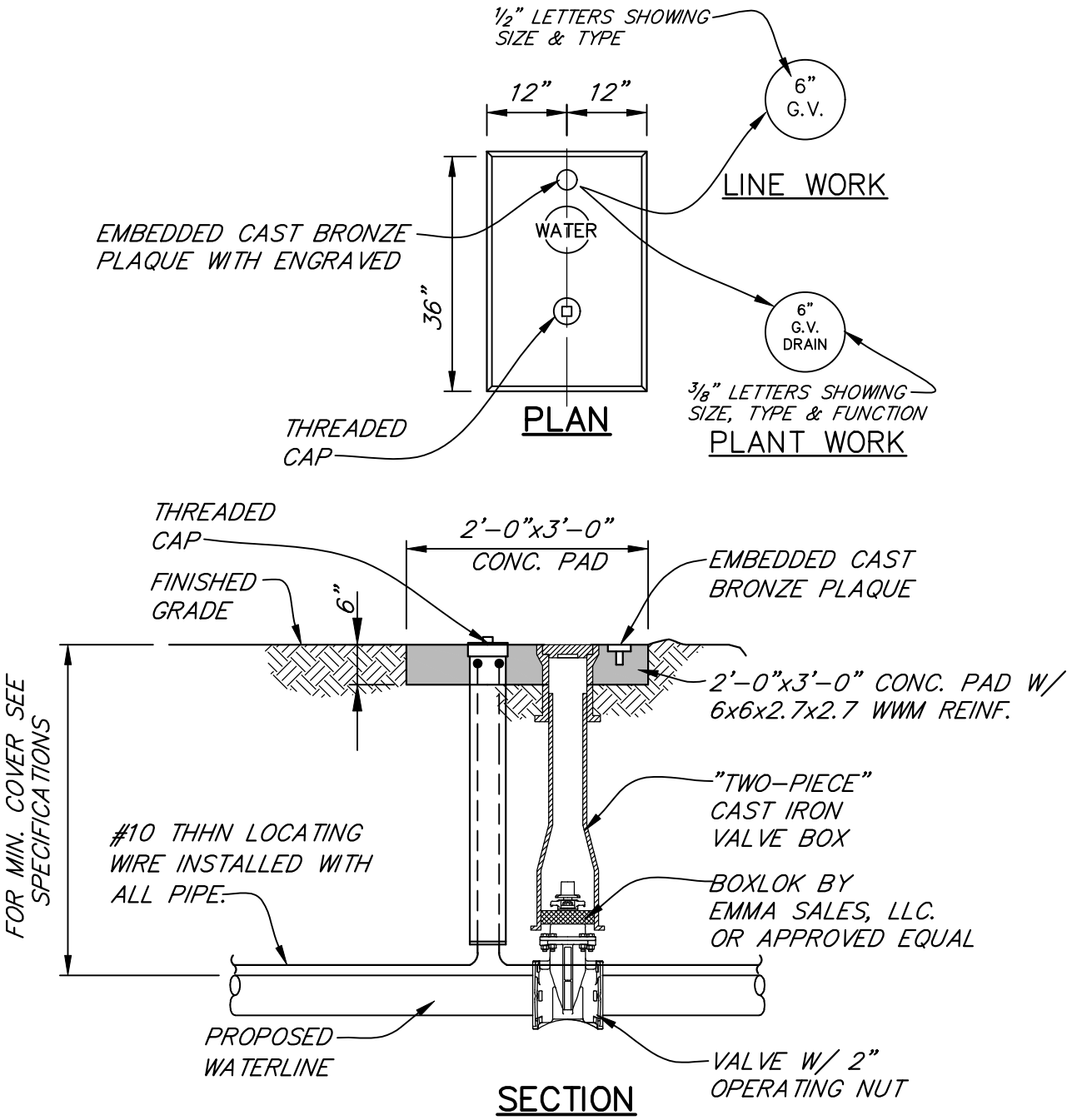


UNDER STREET OR PAVED SURFACE



OPEN TERRAIN

WATER LINE
BEDDING AND BACKFILL DETAIL



TYPICAL LINE VALVE SETTING