

PROJECT MANUAL

2023 SITE DEVELOPMENT GRANT BEECH BLUFF UTILITY EXTENSION SITE IMPROVEMENTS

Halls, Tennessee

A2H # 23134

Prepared By:

A2H

ENGINEERS • ARCHITECTS • PLANNERS

3009 Davies Plantation Road
Lakeland, TN 38002

901.372.0404
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A2H, Inc.

SEALS PAGE

CIVIL ENGINEER:

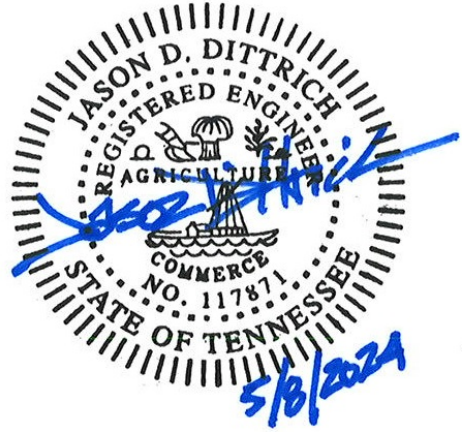
JASON DITTRICH, PE

A2H, INC.

3009 DAVIES PLANTATION ROAD

LAKELAND, TN 38002

PHONE: (901) 372-0404



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LIST OF DRAWINGS

DESCRIPTION

The following is the list of Project Contract Drawings entitled **2023 Site Development Grant Beech Bluff Utility Extension Site Improvements** for the Town of Halls in Halls, Tennessee, dated May 8, 2024 with Revision dates, if any as noted.

SHEET NO	SHEET NAME	REVISION DATE
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END OF SECTION

ADVERTISEMENT FOR BIDS

Project No. 23134

Town of Halls (Owner)

Separate sealed bids for **2023 Site Development Grant Beech Bluff Utility Extension Site Improvements** will be received by its **Mayor, The Honorable Eugene Pugh** at **City Hall, 208 N. Church Street, Halls, TN 38040** until **2:00 p.m.** local time on **May 28, 2024**, and then at said office publicly opened and read aloud.

A **Non-Mandatory Pre-Bid Conference** will be held at **2:00 p.m.** local time on **May 14, 2024**. Attendees will meet at City Hall, 208 N. Church Street, Halls, TN 38040 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:

Town of Halls, 208 N. Church Street, Halls, TN 38040

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 Eugene Pugh, Mayor
Town of Halls

INFORMATION FOR BIDDERS

1. Receipt and Opening of Bids:

Town of Halls (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 **City Hall** until **2:00 p.m.** on **May 28, 2024**, and then at said office publicly opened and read aloud. The envelopes containing the bids must be sealed, addressed to **The Honorable Eugene Pugh, Mayor, 208 N. Church Street, Halls, TN 38040** and designated as bid for **2023 Site Development Grant Beech Bluff Utility Extension**.

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 time 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:

2023 Site Development Grant Beech Bluff Utility Extension - Site Improvements.

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 **90** consecutive calendar days thereafter. Bidder must agree also to pay as liquidated damages, the sum of **\$500.00** for each consecutive calendar day thereafter 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

Laurie Smith, Project Coordinator at lauries@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 construction 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 care.

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 **2:00 p.m.** local time on **May 14, 2024**. Attendees will meet at City Hall, 208 N. Church Street, Halls, TN 38040 to discuss the plans and specifications and then visit the site.

BID BOND

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

_____ as Principal, and _____ as

Surety, are hereby held and firmly bound unto **Town of Halls** 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 whereas 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

2023 Site Development Grant Beech Bluff Utility Extension - Site Improvements

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 for the 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 heretofore the construction of:

2023 Site Development Grant Beech Bluff Utility Extension

NOW, THEREFORE, if the Contractor 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 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

Address

By: _____

Attorney-in-Fact

Address

NOTE: Date of BOND must not be prior to date of Contract. If CONTRACTOR is Partnership, all partners should execute BOND.

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 their 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, firm 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:

2023 Site Development Grant Beech Bluff Utility Extension

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

Address

By: _____
Attorney-in-Fact

Address

NOTE: Date of BOND must not be prior to date of Contract. If CONTRACTOR is Partnership, all partners should execute BOND.

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 **2023 Site Development Grant Beech Bluff Utility Extension - Site Improvements**

Date **May 28, 2024**

Project No. **23134**

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

(corporation, partnership, or individual)

To **Town of Halls** (hereinafter called "OWNER")

Dear Sir or Madam:

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

2023 Site Development Grant Beech Bluff Utility Extension - Site Improvements

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 **90** 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 **2023 Site Development Grant Beech Bluff Utility Extension Site Improvements** work described in the specifications and shown on the plans for the following Unit Prices:

2023 SITE DEVELOPMENT GRANT BEECH BLUFF UTILITY EXTENSION ESTIMATED QUANTITIES					
No.	Description	Qty	Unit	Unit Price	Amount
707-01	MOBILIZATION	1	LS	\$	\$
795-03.06	8" PVC WATER LINE (SDR 21)	2,400	LF	\$	\$
795-07.06	8 INCH X 8" TAPPING SLEEVE AND VALVE	1	EA	\$	\$
795-08.05	8" GATE VALVE ASSEMBLY	1	EA	\$	\$
795-11.02	FIRE HYDRANT ASSEMBLY	1	EA	\$	\$
797-03.08	6" PVC SEWER FORCE MAIN (SDR 21)	2,860	LF	\$	\$
797-06.44	JACK/BORE 16" STEEL CASING	30	LF	\$	\$
797-07.06	48" MANHOLE, 12-14 FT DEEP (FLAT TOP, FUTURE WET WELL)	1	EA	\$	\$
797-07.02	48" MANHOLE, 4-6 FT DEEP (VAULT FOR FUTURE AIR/VACUUM VALVE)	1	EA	\$	\$
795-09.26	2" AIR/VACUUM VALVE ASSEMBLY (PARTIAL)	1	EA	\$	\$
791-03.04	4" HDPE HOT TAP GAS CONNECTION	1	EA	\$	\$
791-03.04	4" HDPE GAS MAIN	1,550	LF	\$	\$

791-07.02	4" HDPE GAS VALVE ASSEMBLY	2	EA	\$	\$
920-10.04	ROADWAY TRACER WIRE BOX	7	EA	\$	\$
303-01	MINERAL AGGREGATE, TYPE A, GRADING D (LIMESTONE)	155	TN	\$	\$
307-01.08	ASPHALTIC CONCRETE MIX (PG64-22) (BPMB-HM) GRADING BM2	10	TN	\$	\$
411-01.10	ASPHALTIC CONCRETE MIX (PG64-22) (BPMB-HM) GRADING D	8	TN	\$	\$
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 set forth above, 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)

"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.

=====

** 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.

=====


END OF GENERAL DECISION"



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.

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.

AGREEMENT (Contract)

THIS AGREEMENT, made this _____, by and between **Town of Halls**, herein called "Owner", acting herein through its **Mayor, The Honorable Eugene Pugh**, 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:

2023 Site Development Grant Beech Bluff Utility Extension - Site Improvements

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 **90** 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)

	TOWN OF HALLS

	<i>Owner</i>
	BY: _____
_____	<i>The Honorable Eugene Pugh</i>
<i>Secretary</i>	
	MAYOR

	<i>Title</i>

<i>Witness</i>	

(CONTRACTOR'S SEAL)

	<i>Contractor Company</i>
	BY: _____
_____	<i>Contractor Representative</i>
<i>Secretary</i>	

	<i>Title</i>

<i>Witness</i>	

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 **Town of Halls** 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 the requirements of Chapter no. 878.

Signed: _____

State of _____

County of _____

Personally appeared before me, _____ the undersigned Notary Public, _____, the within named bargainer, 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. **Town of Halls** 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. **Town of Halls** makes a determination that the goods or services are necessary for **Town of Halls** 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.



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.

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 Mellī 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. Unipecc (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.

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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 or Indicated:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the site is based on information and data furnished to OWNER or ENGINEER by the owners of such Underground Facilities 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 subordinated (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.

Contractual 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 on 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.

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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, or 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.

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

17.2.2. 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":

SPECIFICATIONS

- 01 2500 Substitution Procedures
- 01 2500.01 Substitution Request Form
- 01 2664 Weather Days
- 01 6000 Product Requirements
- 01 7800 Closeout Submittals
- 03 1000 Concrete Forming and Accessories
- 03 2000 Concrete Reinforcing
- 03 3000 Cast-in-Place Concrete
- 31 1000 Site Clearing
- 31 2200 Grading
- 31 2316 Excavation
- 31 2316.13 Trenching
- 31 2323 Fill
- 32 9219 Seeding
- 33 0110.58 Disinfection of Water Utility Piping Systems
- 33 0516 Railroad and Highway Crossings - Utility Casing Pipe
- 33 1416 Site Water Utility Distribution Piping
- 33 3123 Sanitary Sewerage Force Main Piping
- 33 3213 Packaged Wastewater Pumping Stations
- 33 5216 Gas Hydrocarbon Piping

DRAWINGS:

- G0.0 Cover Sheet
- G0.1 Sheet Index and General Notes
- C6.0 Overall Utility Layout Plan
- C6.1 Detailed Utility Layout Plan
- C6.2 Water Line Plan and Profile
- C6.3 Sanitary Sewer Plan and Profile
- C6.4 Sanitary Sewer Plan and Profile
- C6.5 Sanitary Sewer Hydraulic Grade Profile
- C10.0 Construction Details
- C10.1 Construction Details
- C10.2 Construction Details

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 unemployed 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 _____ through _____.

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.

* 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 OFFICIALS

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.

**SECTION 00 0110
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END OF SECTION

**SECTION 01 2500
SUBSTITUTION PROCEDURES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Procedural requirements for proposed substitutions.

1.02 RELATED REQUIREMENTS

- A. Section 01 6000 - Product Requirements: Fundamental product requirements, product options, delivery, storage, and handling.

1.03 DEFINITIONS

- A. Substitutions: Changes from Contract Documents requirements proposed by Contractor to materials, products, assemblies, and equipment.
 - 1. Substitutions for Cause: Proposed due to changed Project circumstances beyond Contractor's control.
 - a. Unavailability.
 - b. Regulatory changes.
 - 2. Substitutions for Convenience: Proposed due to possibility of offering substantial advantage to the Project.
 - a. Substitution requests offering advantages solely to the Contractor will not be considered.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

- A. A Substitution Request for products, assemblies, materials, and equipment constitutes a representation that the submitter:
 - 1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product, equipment, assembly, or system.
 - 2. Agrees to provide the same warranty for the substitution as for the specified product.
 - 3. Agrees to provide same or equivalent maintenance service and source of replacement parts, as applicable.
 - 4. Agrees to coordinate installation and make changes to other work that may be required for the work to be complete, with no additional cost to Owner.
 - 5. Waives claims for additional costs or time extension that may subsequently become apparent.
 - 6. Agrees to reimburse Owner and Engineer for review or redesign services associated with re-approval by authorities.
- B. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents. Burden of proof is on proposer.
 - 1. Note explicitly any non-compliant characteristics.
- C. Content: Include information necessary for tracking the status of each Substitution Request, and information necessary to provide an actionable response.
 - 1. Forms indicated in the Project Manual are adequate for this purpose, and must be used.
- D. Limit each request to a single proposed substitution item.
 - 1. Submit an electronic document, combining the request form with supporting data into single document.

3.02 SUBSTITUTION PROCEDURES DURING PROCUREMENT

- A. Submittal Form (before award of contract):

1. Submit substitution requests by completing the form attached to this section. See this form for additional information and instructions. Use only this form; other forms of submission are unacceptable.
- B. Owner will consider requests for substitutions only if submitted at least 10 days prior to the date for receipt of bids.

3.03 SUBSTITUTION PROCEDURES DURING CONSTRUCTION

- A. Submittal Form (after award of contract):
 1. Submit substitution requests by completing 01 2500.01 - Substitution Request Form. See this form for additional information and instructions. Use only this form; other forms of submission are unacceptable.
- B. Engineer will consider requests for substitutions only within 15 days after date of Agreement.
- C. Submit request for Substitution for Cause within 14 days of discovery of need for substitution, but not later than 14 days prior to time required for review and approval by Engineer, in order to stay on approved project schedule.
- D. Submit request for Substitution for Convenience immediately upon discovery of its potential advantage to the project, but not later than 14 days prior to time required for review and approval by Engineer, in order to stay on approved project schedule.
 1. In addition to meeting general documentation requirements, document how the requested substitution benefits the Owner through cost savings, time savings, greater energy conservation, or in other specific ways.
 2. Document means of coordinating of substitution item with other portions of the work, including work by affected subcontractors.
 3. Bear the costs engendered by proposed substitution of:
 - a. Owner's compensation to the Engineer for any required redesign, time spent processing and evaluating the request.
 - b. Other construction by Owner.
 - c. Other unanticipated project considerations.
- E. Substitutions will not be considered under one or more of the following circumstances:
 1. When they are indicated or implied on shop drawing or product data submittals, without having received prior approval.
 2. Without a separate written request.
 3. When acceptance will require revisions to Contract Documents.

3.04 RESOLUTION

- A. Engineer may request additional information and documentation prior to rendering a decision. Provide this data in an expeditious manner.
- B. Engineer will notify Contractor in writing of decision to accept or reject request.
 1. Engineer's decision following review of proposed substitution will be noted on the submitted form.

3.05 ACCEPTANCE

- A. Accepted substitutions change the work of the Project. They will be documented and incorporated into work of the project by Change Order, Construction Change Directive, Architectural Supplementary Instructions, or similar instruments provided for in the Conditions of the Contract.

3.06 CLOSEOUT ACTIVITIES

- A. See Section 01 7800 - Closeout Submittals, for closeout submittals.

- B. Include completed Substitution Request Forms as part of the Project record. Include both approved and rejected Requests.

END OF SECTION

**SECTION 01 2500.01
SUBSTITUTION REQUEST FORM**

Project: _____	Substitution Request Number: _____
	From: _____
To: _____	Date: _____
	A/E Project Number: _____
Re: _____	Contract For: _____

Specification Title: _____	Description: _____
Section: _____	Page: _____ Article/Paragraph: _____

Proposed Substitution: _____

Manufacturer: _____	Address: _____	Phone: _____
Trade Number: _____	Model No.: _____	

Attached data includes product description, specifications, drawings, photographs, and performance and test data adequate for evaluation of the request; applicable portions of the data are clearly identified.

Attached data also includes a description of changes to the Contract Documents that the proposed substitution will require for its proper installation.

	Yes	No
The substitution will create an additional cost to the owner?	<input type="checkbox"/>	<input type="checkbox"/>
The substitution will create a savings to the owner?	<input type="checkbox"/>	<input type="checkbox"/>
The substitution is being used for cost saving purposes?	<input type="checkbox"/>	<input type="checkbox"/>
The substitution is being used for the purpose of making installation less difficult?	<input type="checkbox"/>	<input type="checkbox"/>
Please list additional reasons and/or a reason not shown above why this substitution is being requested.	_____	

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing and construction costs caused by the substitution.

Submitted by: _____

Signed by: _____

Address: _____

Telephone: _____

A/E's REVIEW AND ACTION

- Substitution Approved - Make submittals in accordance with Specification Section 01 3000.
- Substitution Approved as Noted - Make submittals in accordance with Specification Section 01 3000.
- Substitution Rejected - Use specified materials.
- Substitution Request Received Too Late - Use specified Materials.

Signed by: _____ Date: _____

Supporting Data Drawings Product Data Samples Tests Reports _____

Attached:

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.
 - a.

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

**SECTION 01 6000
PRODUCT REQUIREMENTS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General product requirements.
- B. Transportation, handling, storage and protection.
- C. Product option requirements.
- D. Substitution limitations.
- E. Maintenance materials, including extra materials, spare parts, tools, and software.

1.02 RELATED REQUIREMENTS

- A. Section 01 2500 - Substitution Procedures: Substitutions made during procurement and/or construction phases.

1.03 REFERENCE STANDARDS

- A. 16 CFR 260.13 - Guides for the Use of Environmental Marketing Claims; Federal Trade Commission; Recycled Content; Current Edition.
- B. ASTM D6866 - Standard Test Methods for Determining the Biobased Content of Solid, Liquid, and Gaseous Samples Using Radiocarbon Analysis; 2022.
- C. CAN/CSA Z809 - Sustainable Forest Management; 2016 (Reaffirmed 2021).

1.04 SUBMITTALS

- A. Proposed Products List: Submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
 - 1. Submit within 15 days after date of Agreement.
 - 2. For products specified only by reference standards, list applicable reference standards.
- B. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- C. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

1.05 QUALITY ASSURANCE

- A. Material and equipment incorporated into the Work:
 - 1. Conform to applicable specifications and standards.
 - 2. Comply with size, make, type, and quality specified, or as specifically approved in writing by the Engineer.
 - 3. Manufactured and Fabricated Products:
 - a. Design, fabricate, and assemble in accord with the best engineering and shop practices.
 - b. Manufacture like parts of duplicate units to standard sizes and gages, to be interchangeable.
 - c. Two or more items of the same kind shall be identical, by the same manufacturer.
 - d. Products shall be suitable for service conditions.
 - e. Equipment capacities, sizes, and dimensions shown or specified shall be adhered to unless variations are specifically approved in writing.
 - 4. Do not use material or equipment for any purpose other than that for which it is designated or is specified.

- B. Manufacturer's Instructions:
1. When Contract Documents require that installation of work shall comply with manufacturer's printed instructions, obtain and distribute copies of such instructions to parties involved in installation, including copies to Engineer and Contractor. Maintain one (1) set of complete instructions at the job site during installation and until completion.
 2. Handle, install, connect, clean, condition and adjust products in strict accordance with such instructions and in conformance with specified requirements.
 3. Should job conditions or specified requirements conflict with manufacturer's instructions, consult with Architect for further instructions. Do not proceed with work without clear instructions.
 4. Do not omit any preparatory step or installation procedure unless specifically modified or exempted by Contract Documents, or Architect's written instructions.

PART 2 PRODUCTS

2.01 NEW PRODUCTS

- A. Provide new products unless specifically required or permitted by Contract Documents.
- B. Use of products having any of the following characteristics is not permitted:
1. Made outside the United States, its territories, Canada, or Mexico.
 2. Made using or containing CFC's or HCFC's.
 3. Containing lead, cadmium, or asbestos.
- C. Provide interchangeable components of the same manufacture for components being replaced.

2.02 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.
- B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.
- C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

2.03 MAINTENANCE MATERIALS

- A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.
- B. Deliver and place in location as directed; obtain receipt prior to final payment.

PART 3 EXECUTION

3.01 SUBSTITUTION LIMITATIONS

- A. See Section 01 2500 - Substitution Procedures.

3.02 TRANSPORTATION AND HANDLING

- A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.
- B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.
- C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.
- D. Transport and handle products in accordance with manufacturer's instructions.
- E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.

- F. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
- G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.
- H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.03 STORAGE AND PROTECTION

- A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication. See Section 01 7419.
- B. Store and protect products in accordance with manufacturers' instructions.
- C. Store with seals and labels intact and legible.
- D. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.
- E. For exterior storage of fabricated products, place on sloped supports above ground.
- F. Provide off-site storage and protection when site does not permit on-site storage or protection.
- G. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.
- H. Comply with manufacturer's warranty conditions, if any.
- I. Do not store products directly on the ground.
- J. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- K. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
- L. Prevent contact with material that may cause corrosion, discoloration, or staining.
- M. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- N. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

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 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 Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
 - 1. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - 2. Field changes of dimension and detail.
 - 3. Details not on original Contract drawings.

3.02 OPERATION AND MAINTENANCE DATA

- A. Source Data: For each product or system, list names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.
- B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.
- C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.
- D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

3.03 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

- A. For Each Product, Applied Material, and Finish:
 - 1. Product data, with catalog number, size, composition, and color and texture designations.
 - 2. Information for re-ordering custom manufactured products.
- B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.
- C. Moisture protection and weather-exposed products: Include product data listing applicable reference standards, chemical composition, and details of installation. Provide recommendations for inspections, maintenance, and repair.
- D. Additional information as specified in individual product specification sections.
- E. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

3.04 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

- A. For Each Item of Equipment and Each System:
 - 1. Description of unit or system, and component parts.
 - 2. Identify function, normal operating characteristics, and limiting conditions.
 - 3. Include performance curves, with engineering data and tests.
 - 4. Complete nomenclature and model number of replaceable parts.
- B. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.
- C. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- D. Include manufacturer's printed operation and maintenance instructions.
- E. Include sequence of operation by controls manufacturer.
- F. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

- G. Provide control diagrams by controls manufacturer as installed.
- H. Provide Contractor's coordination drawings, with color coded piping diagrams as installed.
- I. Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- J. Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- K. Include test and balancing reports.
- L. Additional Requirements: As specified in individual product specification sections.

3.05 ASSEMBLY OF OPERATION AND MAINTENANCE MANUALS

- A. Assemble operation and maintenance data into durable manuals for Owner's personnel use, with data arranged in the same sequence as, and identified by, the specification sections.
- B. Where systems involve more than one specification section, provide separate tabbed divider for each system.
- C. Binders: Commercial quality, 8-1/2 by 11 inch three D side ring binders with durable plastic covers; 2 inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.
- D. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.
- E. Project Directory: Title and address of Project; names, addresses, and telephone numbers of Engineer, Consultants, Contractor and subcontractors, with names of responsible parties.
- F. Tables of Contents: List every item separated by a divider, using the same identification as on the divider tab; where multiple volumes are required, include all volumes Tables of Contents in each volume, with the current volume clearly identified.
- G. Dividers: Provide tabbed dividers for each separate product and system; identify the contents on the divider tab; immediately following the divider tab include a description of product and major component parts of equipment.
- H. Text: Manufacturer's printed data, or typewritten data on 20 pound paper.
- I. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
- J. Arrangement of Contents: Organize each volume in parts as follows:
 - 1. Project Directory.
 - 2. Table of Contents, of all volumes, and of this volume.
 - 3. Operation and Maintenance Data: Arranged by system, then by product category.
 - a. Source data.
 - b. Product data, shop drawings, and other submittals.
 - c. Operation and maintenance data.
 - d. Field quality control data.
 - e. Photocopies of warranties and bonds.
 - 4. Design Data: To allow for addition of design data furnished by Engineer or others, provide a tab labeled "Design Data" and provide a binder large enough to allow for insertion of at least 20 pages of typed text.

3.06 WARRANTIES AND BONDS

- A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial completion is determined.

- B. Verify that documents are in proper form, contain full information, and are notarized.
- C. Co-execute submittals when required.
- D. Retain warranties and bonds until time specified for submittal.
- E. Include originals of each in operation and maintenance manuals, indexed separately on Table of Contents.
- F. Manual: Bind in commercial quality 8-1/2 by 11 inch three D side ring binders with durable plastic covers.
- G. Cover: Identify each binder with typed or printed title WARRANTIES AND BONDS, with title of Project; name, address and telephone number of Contractor and equipment supplier; and name of responsible company principal.
- H. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification section in which specified, and the name of product or work item.
- I. Separate each warranty or bond with index tab sheets keyed to the Table of Contents listing. Provide full information, using separate typed sheets as necessary. List Subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

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.

1.03 REFERENCE STANDARDS

- A. ACI 117 - Specification for Tolerances for Concrete Construction and Materials; 2010 (Reapproved 2015).
- B. ACI 301 - Specifications for Structural Concrete; 2010 (Errata 2012).
- 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.
- D. Permanent Insulated Foam Panel Formwork Shop Drawings: Include calculations or selections from manufacturer's prescriptive design tables that indicate compliance with applicable building code and manufacturer's requirements.
 - 1. Include test reports for performance criteria specified.
 - 2. Include the design engineer's stamp or seal on each sheet of shop drawings.

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.
- F. Use the following form types:
 - 1. Basement Walls: Site fabricated plywood.
 - 2. Elevated Floor Slabs: Prefabricated glass fiber pan forms, treated for exposed to view finish.
 - 3. Elevated Floor/Roof Slabs: Permanent prefabricated foam panel formwork; formwork to remain.

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 3/4-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 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 bugholes 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. 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.
- D. Flashing Reglets: Galvanized steel, at least 22 gage, 0.0299 inch thick, longest possible lengths, with alignment splines for joints, foam filled, release tape sealed slots, anchors for securing to concrete formwork.
- E. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.
- F. 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 devices 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 Engineer, it will not produce finished surface required by these specifications or called for on drawings.

END OF SECTION

**SECTION 03 2000
CONCRETE REINFORCING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Reinforcing steel for cast-in-place concrete.
- B. Supports and accessories for steel reinforcement.

1.02 RELATED REQUIREMENTS

- A. Section 03 1000 - Concrete Forming and Accessories.
- B. Section 03 3000 - Cast-in-Place Concrete.

1.03 REFERENCE STANDARDS

- A. ACI 301 - Specifications for Structural Concrete; 2010 (Errata 2012).
- B. ACI 315 - Manual of Standard Practice for Detailing Reinforcing Concrete Structures, including welded wire reinforcement; latest edition.
- C. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; 2011.
- D. ACI SP-66 - ACI Detailing Manual; 2004.
- E. ASTM A706/A706M - Standard Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement; 2022a.
- F. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement; 2019.
- G. ASTM A775/A775M - Standard Specification for Epoxy-Coated Steel Reinforcing Bars; 2022.
- H. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2015.
- I. ASTM D3963/D3963M - Standard Specification for Fabrication and Jobsite Handling of Epoxy-Coated Steel Reinforcing Bars; 2021.
- J. AWS D1.4/D1.4M - Structural Welding Code - Steel Reinforcing Bars; 2018, with Amendment (2020).
- K. CRSI (DA4) - Manual of Standard Practice; 2018, with Errata (2019).
- L. CRSI (P1) - Placing Reinforcing Bars; 2011.
- M. ICC - International Code Council (ICC); latest edition adopted,
 - 1. AC 133 "Proposed Revisions to the Acceptance Criteria for Mechanical Connector Systems for Steel Reinforcing Bars."

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Comply with requirements of ACI SP-66. Include bar schedules, shapes of bent bars, spacing of bars, and location of splices.
 - 1. Prepare shop drawings under seal of a Professional Structural Engineer experienced in design of work of this type and licensed in the State in which the Project is located.
 - 2. Make shop drawings in accordance with Section 03 3000, paragraph 1.05, Shop drawings. No reproduction of Contract Drawings for use as shop drawings will be permitted.
- C. Reports: Submit certified copies of mill test report of reinforcement materials analysis.

1.05 QUALITY ASSURANCE

- A. Perform work of this section in accordance with ACI 301.

1. Maintain one copy of each document on project site.
- B. Provide Engineer with access to fabrication plant to facilitate inspection of reinforcement. Provide notification of commencement and duration of shop fabrication in sufficient time to allow inspection.
- C. Welders' Certificates: Submit certifications for welders employed on the project, verifying AWS qualification within the previous 12 months.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver reinforcement to the job site bundled, tagged and marked. Use metal tags indicating bar size, lengths and other information corresponding to markings shown on placement diagrams.
- B. Storage: Store reinforcement at the job site in a manner to prevent damage and accumulation of dirt and excessive rust.

PART 2 PRODUCTS

2.01 REINFORCEMENT

- A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi).
 1. Plain billet-steel bars.
 2. Unfinished.
 3. Galvanized in accordance with ASTM A767/A767M, Class I.
 4. Epoxy coated in accordance with ASTM A775/A775M.
- B. Weldable Reinforcing Steel: ASTM A706/A706M, deformed low-alloy steel bars.
 1. Unfinished.
 2. Galvanized in accordance with ASTM A767/A767M, Class I.
 3. Epoxy coated in accordance with ASTM A775/A775M.
- C. Stirrup Steel: ASTM A1064/A1064M steel wire, unfinished.
- D. Steel Welded Wire Reinforcement (WWR): Galvanized, deformed type; ASTM A1064/A1064M.
 1. Form: Flat Sheets.
 2. WWR Style: 6 x 12-W12 x W5.
- E. Reinforcement Accessories: Bolsters, chairs, spacers and other devices for spacing, supporting and fastening reinforcement in place:
 1. Use wire type bar supports or plastic chairs or supports complying with CRSI recommendations unless otherwise indicated. Do not use wood, brick or other unacceptable materials.
 2. For slabs on grade, use supports with sand plates or horizontal runners where base material will not support chair legs.
 3. For footings or other concrete that will be in direct contact with earth, provide supports with either hot-dipped galvanized, stainless steel, plastic protected steel legs, precast concrete bar supports, or supports made entirely of plastic or other acceptable, inert polymer. Do not use wood, brick or other unacceptable materials.
 4. Tie Wire: Annealed, minimum 16 gauge, 0.0508 inch.
 5. Provide stainless steel components for placement within 1-1/2 inches of exposed to view weathering surfaces.

2.02 RE-BAR SPLICING:

- A. Coupler Systems: Mechanical devices for splicing reinforcing bars; capable of developing full steel reinforcing design strength in tension and compression.
 1. Products:
 - a. Dayton Superior Corporation: www.daytonsuperior.com/#sle.
 - b. Substitutions: See Section 01 6000 - Product Requirements.

- B. Dowel Bar Splicer with Dowel-Ins: Mechanical devices for connecting dowels; capable of developing full steel reinforcing design strength in tension and compression.
 - 1. Products:
 - a. Dayton Superior Corporation: www.daytonsuperior.com/#sle.
 - b. Substitutions: See Section 01 6000 - Product Requirements.
- C. Taper Tie Hole Plug: Mechanical device for plugging tie holes; anchors optional flush or recessed grout.
 - 1. Products:
 - a. Dayton Superior Corporation: www.daytonsuperior.com/#sle.
 - b. Substitutions: See Section 01 6000 - Product Requirements.

2.03 FABRICATION

- A. Fabricate concrete reinforcing in accordance with CRSI (DA4) - Manual of Standard Practice.
- B. Welding of reinforcement is not permitted.
- C. Welding of reinforcement is permitted only with the specific approval of Engineer. Perform welding in accordance with AWS D1.4/D1.4M.
- D. Fabricate and handle epoxy-coated reinforcing in accordance with ASTM D3963/D3963M.
- E. Locate reinforcing splices not indicated on drawings at point of minimum stress.
 - 1. Review locations of splices with Engineer.
- F. General: Fabricate reinforcing bars to conform to required shapes and dimensions, with fabrication tolerances complying with ACI Manual. In case of fabricating errors, do not rebend or straighten reinforcement in a manner that will injure or weaken the material. If clearances for reinforcing require hooks shorter than standard hooks, fabricator shall be responsible for providing shorter hooks, as required.
- G. Unacceptable materials: Reinforcement with any of the following defects will not be permitted in the Work:
 - 1. Bar lengths, depths and bends exceeding specified fabrication tolerances.
 - 2. Bends or kinks not indicated on Drawings or Final Shop Drawings.
 - 3. Bars with reduced cross-section due to excessive rusting or other cause.

PART 3 EXECUTION

3.01 PLACEMENT

- A. Place, support and secure reinforcement against displacement. Do not deviate from required position.
- B. Do not displace or damage vapor barrier.
- C. Accommodate placement of formed openings.
- D. Place reinforcement as follows with the following clear cover, unless noted otherwise on drawings:
 - 1. Below Grade
 - a. Unformed 3"
 - b. Formed 2"
 - 2. Walls/Joists $\frac{3}{4}$ "
 - 3. Columns 1 $\frac{1}{2}$ "
 - 4. Beams/Girders 1 $\frac{1}{2}$ "
 - 5. Slabs $\frac{3}{4}$ "
 - 6. Exposed Columns 2"
 - 7. Exposed Beam/Girders 2"
 - 8. Exposed Slabs #5 and smaller, 2" otherwise.
 - a. Top 1 $\frac{1}{2}$ "

- b. Bottom 1 ½"
- E. Comply with applicable code for concrete cover over reinforcement.
- F. Bond and ground all reinforcement to requirements of Section 26 0526.

3.02 INSPECTION

- A. Examine the substrate, formwork, and the conditions under which concrete reinforcement is to be placed, and correct conditions which would prevent proper and timely completion of the Work. Do not proceed with the work until unsatisfactory conditions have been corrected.
- B. Inspection: Before placement of concrete, a representative of the Owner shall observe the placement of all reinforcing and give his approval.

3.03 FIELD QUALITY CONTROL

- A. An independent testing agency, as specified in Section 01 4000 - Quality Requirements, will inspect installed reinforcement for compliance with contract documents before concrete placement.

3.04 SCHEDULES

- A. Reinforcement For Superstructure Framing Members: Deformed bars, unfinished.
- B. Reinforcement For Foundation Wall Framing Members and Slab-on-Grade: Deformed bars, unfinished.
- C. Reinforcement For Parking Structure Framing Members: Deformed bars, epoxy coated finish.

3.05 INSTALLATION

- A. General:
 - 1. Standards for details and methods of reinforcement placement and supports shall be in accordance with ACI requirements, CRSI Recommended Practices for Placing Reinforcing Bars, and as herein specified.
 - 2. Clean reinforcement to remove loose rust and mill scale, earth, and other materials which reduce or destroy bond with concrete.
 - 3. Position, support, and secure reinforcement and embedments against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcing by metal or plastic chairs, runners, bolsters, spacers, and hangers, as required and recommended by CRSI.
 - 4. Place reinforcement to obtain the minimum coverages for concrete protection. Arrange, space and securely tie bars and bar supports together with 16 gauge wire to hold reinforcement accurately in position during concrete placement operations. Set wire ties so that twisted ends are directed away from exposed concrete surfaces.
 - 5. Install welded wire reinforcement in as long lengths as practicable. Lap adjoining pieces minimum of 8 inches. Welded wire fabric shall be continuously supported at 36" on center (O.C.) maximum.
 - 6. Provide sufficient numbers of supports and of strength to carry reinforcement. Do not place reinforcing bars more than 2" beyond the last leg of any continuous bar support. Do not use supports as bases for runways for concrete conveying equipment and similar construction loads.
 - 7. All vertical reinforcing shall be doweled to footings or the structure below. Dowels shall be the same size and at the same spacing as the vertical reinforcing scheduled or detailed for the element above, unless otherwise indicated on the plans.
 - 8. Dowels extending into footings shall terminate with a 90° standard ACI hook and shall extend to within 4-inches of the bottom of the footing.
 - 9. All embedments and dowels shall be securely tied to formwork or the adjacent reinforcing prior to the placement of concrete.

- B. Splices: Provide standard reinforcement splices by lapping ends, placing bars in contact, and tightly tying wire. Reinforcement shall be spliced only as shown or noted in the plans or specifications. Splices at other locations may be used only when approved in writing by the structural engineer.
1. Horizontal wall reinforcing shall terminate at ends of walls and openings into the far end of the jamb column with a 90-degree hook plus a 6 bar diameter extension, unless otherwise shown on the Plans.
 2. Lap horizontal bars as noted above or as shown on the Plans. Horizontal wall reinforcing shall be continuous through construction and control joints. Splices in horizontal reinforcement shall be staggered so that the splice laps do not occur along a single line. Splices in two curtains of reinforcing, where used, shall not occur in the same location. Splice laps shall not overlap other splices.
 3. Mechanical bar splices capable to develop at least 125 percent of the specified yield strength of the bar(s) may be used in lieu of contact lap splices where approved by the Engineer. Unless specifically noted otherwise, the connectors shall meet most restrictive of the requirements for a Type 2 as defined by ACI 318 Sections 21.2.6 or ICC Elevation Service AC 133. A submittal for the bar splices is required.
- C. Welding: Reinforcing bars shall not be welded unless specifically indicated on the plans.
- D. Detailing:
1. Unless specific additional reinforcement around wall openings is shown on the drawings, provide additional reinforcing steel as follows:
 - a. Walls with single layer of reinforcing steel located in center of wall:
 - 1) Provide additional reinforcing steel on each side of the opening equivalent to one half of the cross-sectional area of the reinforcing steel interrupted by the opening, or a minimum of 2-#5 bars. The bars shall have sufficient length to develop bond at each end beyond the opening or penetration.
 - 2) Provide diagonal reinforcing steel, 2-#5 x 4'-0" centered on the corners of the opening. Locate one #5 bar on either face of the center reinforcing steel.
 - b. Walls with single layer of reinforcing steel located on one face of wall:
 - 1) Provide additional reinforcing steel on one side of the opening equivalent to one half of the cross-sectional area of the reinforcing steel interrupted by the opening, or a minimum of 2-#5 bars. These additional reinforcing bars to be in same plane as the interrupted reinforcing steel. The bars shall have sufficient length to develop bond at each end beyond the opening or penetration.
 - 2) Provide additional reinforcing steel on the other (unreinforced) side of the wall of 2-#5 horizontal or vertical at each edge of the opening. Extend 2 feet beyond the opening.
 - 3) Provide diagonal reinforcing steel, add 2-#5 x 4'-0" centered on the corners of the opening. Locate one bar in each face to each of the other layers of interior reinforcing.
 - c. Walls with reinforcing steel located in both faces of the wall:
 - 1) Provide additional reinforcing steel on each side of the opening equivalent to one half of the cross-sectional area of the reinforcing steel interrupted by the opening for that particular face, or a minimum of 2-#5 bars in each face horizontal and vertical. The bars shall have sufficient length to develop bond at each end beyond the opening or penetration.
 - 2) Provide diagonal reinforcing steel, add 4-#5 x 4'-0" centered on the corners of the opening. Locate 2-#5 in each face interior to each of the other layers of reinforcing.
 - d. All recesses in concrete walls that interrupt the reinforcing steel shall be reinforced as if the recess were an opening.

2. All openings in slabs that are not shown on the structural Plans must be approved by the engineer, in writing.
3. Embedded pipes, ducts, or conduits: The maximum diameter for embedded pipes, ducts, or conduits shall be $\frac{1}{3}$ of the slab or wall thickness, spaced at a minimum of 3 conduit diameters on center.
4. Concrete Columns: All tied and spiral reinforced columns shall have ties or spirals spaced at one-half the required tie spacing for a distance of one-sixth of the column height above and below all floor (or beam) and roof (or beam) levels or any other point of lateral support, unless specifically indicated otherwise on the structural plans.

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.
- B. Section 03 2000 - Concrete Reinforcing.

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 Structural Concrete; 2010 (Errata 2012).
- 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; 2023.
- 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. 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.
- B. 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.
- C. Submit Shop Drawings to the Engineer for review, prior to release to field. Fabrication of reinforcing steel shall not be started until Drawings have been reviewed and stamped.
- D. 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.
- E. 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.
- F. 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.
- G. Test Reports: Submit report for each test or series of tests specified.
- H. Manufacturer's Installation Instructions: For concrete accessories, indicate installation procedures and interface required with adjacent construction.
- I. Project Record Documents: Accurately record actual locations of embedded utilities and components that will be concealed from view upon completion of concrete work.
- J. 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 Owner or 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 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 Engineer to contain defective concrete shall be removed and reconstructed in a manner satisfactory to the 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 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, 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 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 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 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 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 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 REINFORCEMENT MATERIALS

- A. Comply with requirements of Section 03 2000.

2.03 CONCRETE MATERIALS

- A. Cement: ASTM C150/C150M, Type I - Normal Portland type.
 - 1. Acquire cement for entire project from same source.
- B. Fine and Course 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. 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.

2.04 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.

2.05 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.

2.06 BONDING AND JOINTING PRODUCTS

- A. Epoxy Bonding System:
 - 1. Comply with ASTM C881/C881M and of Type required for specific application.
- B. Sealant and Primer: As specified in Section 07 9200.

2.07 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.

2.08 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.
- 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.

2.09 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 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.

2.10 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 INSTALLING REINFORCEMENT AND OTHER EMBEDDED ITEMS

- A. Fabricate and handle epoxy-coated reinforcing in accordance with ASTM D3963/D3963M.
- B. Comply with requirements of ACI 301. Clean reinforcement of loose rust and mill scale, and accurately position, support, and secure in place to achieve not less than minimum concrete coverage required for protection.
- C. Install welded wire reinforcement in maximum possible lengths, and offset end laps in both directions. Splice laps with tie wire.
- D. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with concrete placement.

3.04 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, 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.

For thin walls or inaccessible portions, concrete shall be worked into place by vibrating or other approved method: Care shall be taken so as not to work the concrete to the point where segregation occurs.
- 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.

3.05 SLAB JOINTING

- A. Locate joints in slabs on grade as indicated on the drawings.
- B. Anchor joint fillers and devices to prevent movement during concrete placement.
- C. Isolation Joints: Use preformed joint filler with removable top section for joint sealant, total height equal to thickness of slab, set flush with top of slab.
 - 1. Install wherever necessary to separate slab from other building members, including columns, walls, equipment foundations, footings, stairs, manholes, sumps, and drains.
- D. Load Transfer Construction and Control Joints: Install load transfer devices as indicated; saw cut joint at surface as indicated for control joints.
- E. Provide reinforcing dowels to match the reinforcing at the joint, unless noted otherwise.
- F. Saw Cut Control Joints: Saw cut joints before concrete begins to cool, within 4 to 12 hours after placing; use 3/16 inch thick blade and cut at least 1 inch deep but not less than one quarter (1/4) the depth of the slab or as indicated on the drawings.
- G. Construction Joints: Where not otherwise indicated, use metal combination screed and key form, with removable top section for joint sealant.

3.06 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.

3.07 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. Curing Slabs and Surfaces Not in Contact with Forms:
 1. Initial Curing: Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less than 7 day and then begin final curing.
 2. Final Curing: Begin final curing procedures immediately following initial curing and before concrete has dried. Continue final curing for at least 7 days in accordance with ACI 301 procedures. Avoid rapid drying at end of final curing period.
- D. 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.

- E. 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).
- F. Curing Methods: Perform curing of concrete by moist curing, by moisture-retaining sheet curings, by curing compound, and by combinations thereof, as herein specified.
- G. 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 Engineer. Final cure these concrete surfaces by use of moisture-retaining sheet, unless otherwise directed.

3.08 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.

3.09 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 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 plane 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.

3.10 PROTECTION

- A. Do not permit traffic over unprotected concrete floor surface until fully cured.

3.11 SCHEDULE - CONCRETE TYPES AND FINISHES

- A. Refer to design drawings for schedule of types of concrete such as footings, foundation walls, piers, slab-on-grade, walls, columns, structural slabs, etc., and requirements for concrete strength, aggregate and air entrainment, etc.

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 7000 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products.
- B. Section 31 2200 - Grading: Topsoil removal.
- C. Section 31 2323 - Fill: Fill material for filling holes, pits, and excavations generated as a result of removal operations.
- D. Section 32 9300 - Plants: Relocation of existing trees, shrubs, and other plants.

1.03 PRICE AND PAYMENT PROCEDURES - LUMP SUM

- A. Compensation for this project will be on the basis of a single Lump Sum Price. There will be no measurement for payment for individual items of work.

1.04 SUBMITTALS

- A. 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.
 - 2. Trees: Sell if marketable; if not, treat as specified for other vegetation removed; remove stumps and roots to depth of 18 inches.
 - 3. Existing Stumps: Treat as specified for other vegetation removed; remove stumps and roots to depth of 18 inches.
 - 4. Sod: Re-use on site if possible; otherwise sell if marketable, and if not, treat as specified for other vegetation removed.
 - 5. Fill holes left by removal of stumps and roots, using suitable fill material, with top surface neat in appearance and smooth enough not to constitute a hazard to pedestrians.
- G. Dead Wood: Remove all dead trees (standing or down), limbs, and dry brush on entire site; 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 the site for work as indicated on drawings.
- C. Topsoil and finish grading. 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: Trenching and backfilling for utilities.
- D. Section 31 2323 - Fill: Filling and compaction.
- E. Section 32 9219 - Seeding: Finish ground cover.

1.03 PRICE AND PAYMENT PROCEDURES - UNIT PRICE

- A. 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.
- B. 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, Public Works Department, or local Highway Department.

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.
- C. The material to be used for topsoil shall be tested by a laboratory under the supervision of an Agronomist or soil scientist to determine what, if any, amendments the soil requires. The amendments shall be blended into the topsoil as it is spread.

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, sidewalks, paving, and curbs, from damage by grading equipment and vehicular traffic.
- G. Protect trees to remain by providing substantial fencing around entire tree at the outer tips of its branches; no grading is to be performed inside this line.
- H. Protect plants, lawns, rock outcroppings, and other features to remain as a portion of final landscaping.

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; remove remainder from site.
- B. Stockpile subsoil to be re-used on site; remove remainder from 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 building and trench backfilling have been inspected.
 - 2. Verify subgrade has been contoured and compacted.
- B. Remove debris, roots, branches, stones, in excess of 1/2 inch in size. Remove soil contaminated with petroleum products.
- 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, sodding, and planting are indicated.
- F. Place topsoil to the following compacted thicknesses:
 - 1. Areas to be Seeded with Grass: 6 inches.
 - 2. Areas to be Sodded: 4 inches.
 - 3. Shrub Beds: 18 inches.
 - 4. Flower Beds: 12 inches.
 - 5. Planter Boxes: To within 3 inches of box rim.

6. In areas where mulch will be placed, the topsoil shall be placed 4 inches below finished grade.
- G. Place topsoil during dry weather.
- H. Remove roots, weeds, rocks, and foreign material while spreading.
- I. Near plants, buildings, and appurtenances spread topsoil manually to prevent damage.
- J. Fine grade topsoil to eliminate uneven areas and low spots. Maintain profiles and contour of subgrade.
- K. Roll placed topsoil.
- L. 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 (1-3/16 inches) from required elevation.
- B. Top Surface of Finish Grade: Plus or minus 0.04 foot (1/2 inch).

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.
- B. Leave site clean and raked, ready to receive landscaping.

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 utilities within the building.
- B. Trenching for utilities outside the building to utility main connections.

1.02 RELATED REQUIREMENTS

- A. 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.
- B. Section 31 2200 - Grading.
- C. Section 31 2316.13 - Trenching.
- D. Section 31 2316.26 - Rock Removal: Removal of rock during excavating.
- E. Section 31 2323 - Fill: Fill materials, backfilling, and compacting.

1.03 PRICE AND PAYMENT PROCEDURES

- A. Payment for common excavation shall be made at the contract Unit Price Per Cubic Yard, Item No. 203-01.
- B. Payment for structural excavation shall be made at the contract Unit Price Per Cubic Yard, Item No. 204-04.10.
- 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. Structural excavation shall include the removal of material for foundation preparation and provide the minimum clearances needed to place forms for structures. Excavation for minor structures, pipe culverts, utility conduits and sewers will not be measured for payment but the cost will be incidental to other items of payment.
 - 3. Undercutting will 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.

1.04 SUBMITTALS

- A. Field Quality Control Submittals: Document visual inspection of load-bearing excavated surfaces.

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, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.
- F. Protect plants, lawns, rock outcroppings, and other features to remain.
- G. 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. Underpin adjacent structures that could be damaged by excavating work.
- C. Excavate to accommodate new structures and construction operations.
- D. Notify Engineer of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.
- E. Preparation for Piling Work: Excavate to working elevations. Coordinate special requirements for piling.
- F.
- G. Slope banks of excavations deeper than 4 feet to angle of repose or less until shored.
- H. Do not interfere with 45 degree bearing splay of foundations.
- I. Cut utility trenches wide enough to allow proper installation and inspection of installed utilities.
- J. Hand trim excavations. Remove loose matter.
- K. 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.
- L. Correct areas that are over-excavated and load-bearing surfaces that are disturbed; See Section 31 2323.
- M. 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.
- N. Remove excavated material that is unsuitable for re-use from site.
- O. Stockpile excavated material to be re-used in area designated on site in accordance with Section 31 2200.
- P. Remove excess excavated material from site.

3.03 FIELD QUALITY CONTROL

- A. Provide for visual inspection of load-bearing excavated surfaces by Engineer before placement of foundations.

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.
- D. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.
- E. Keep excavations free of standing water and completely free of water during concrete placement.

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

- A. 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 Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop; 2022, with Errata .
- 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 (Reapproved 2021).
- 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 (Reapproved 2021).
- E. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method; 2015.
- 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 Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth); 2023.

1.06 SUBMITTALS

- A. Samples: 10 pound sample of each type of fill; submit in air-tight containers to testing laboratory.
- 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 Architect/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 1/2"	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: Non-biodegradable, nonwoven having a maximum EOS of 100.

2.04 SOURCE QUALITY CONTROL

- A. Where fill materials are specified by reference to a specific standard, testing of samples for compliance will be provided before delivery to site.
- B. If tests indicate materials do not meet specified requirements, change material and retest.
- C. 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 relocate utilities when so noted in the construction documents..
- D. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.
- E. Protect plants, lawns, rock outcroppings, and other features to remain.
- F. 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.
- G. 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 Architect/Engineer.
 - 4. Devise plans for performing this work subject to the approval of the Architect/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. Do not interfere with 45 degree bearing splay of foundations.
- D. Trench width: minimum is pipe diameter plus 1 foot; the maximum is outside diameter of the pipe plus 4 feet.
- E. Cut pavement along neat, straight lines with either a pavement breaker or pavement saw.
- F. 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.
- G. 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 Architect/Engineer.
- H. Hand trim excavations. Remove loose matter.
- I. Remove large stones and other hard matter that could damage piping or impede consistent backfilling or compaction.
- J. 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.

- K. Remove excavated material that is unsuitable for re-use from site.
- L. Stockpile excavated material to be re-used in area designated in Section 31 2200.
- M. Remove excess excavated material from site.
- N. 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.
- O. 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.
- P. 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.
- Q. 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.
- R. 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% 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 inches in 10 feet, 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 97 percent of maximum dry density.
- J. Compaction Density Unless Otherwise Specified or Indicated:
 - 1. Under paving, slabs-on-grade, and similar construction: ___ 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. Utility Piping, Conduits, and Duct Bank:
 - 1. Bedding: Use Fill Type B.
 - 2. Cover with general fill.
 - 3. Fill up to finish grade elevation.
 - 4. Compact in maximum 8 inch lifts to 95 percent of maximum dry density.
- C. Sanitary Sewer Pipe
 - 1. All sanitary sewer pipe 15" diameter or less whether classified as flexible or rigid shall be installed using Type "B" bedding.
 - 2. Sewer pipe with a diameter greater than 15" classified as flexible (PVC, HDPE, etc.) shall be installed using Type "B" bedding.
 - 3. Sewer pipe with a diameter greater than 15" classified as rigid (RCP, DI, etc.) may be installed using Type "D" bedding, unless otherwise noted on the construction drawings.
- D. 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.
- E. 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 0.4' from required elevations.

3.09 FIELD QUALITY CONTROL

- A. 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.
- B. Perform compaction density testing on compacted fill in accordance with ASTM D1556, ASTM D2167, or ASTM D6938.
- C. 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").
- D. If tests indicate work does not meet specified requirements, remove work, replace and retest.
- E. 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 site structures, utilities, and to establish finished grades throughout the site..
- B. Backfilling and compacting for utilities outside the building to utility main connections.
- C. Filling holes, pits, and excavations generated as a result of removal (demolition) operations.

1.02 RELATED REQUIREMENTS

- A. Section 31 2200 - Grading: Removal and handling of soil to be re-used.
- B. Section 31 2316 - Excavation: Removal and handling of soil to be re-used.
- C. Section 31 2316.13 - Trenching: Excavating for utility trenches outside the building to utility main connections.

1.03 PRICE AND PAYMENT PROCEDURES - UNIT PRICE

- A.
- 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 borrow fill will be made. The volume of borrow fill will be addressed during the measurements for payment for borrow excavation - Section 31 2316.
- D. Payment for structural fill will be made based upon the type (s) specified on the project plans.
 - 1. Payment for select fill material meeting a specific gradation as specified on the plans and/or standard drawings, shall be made at the contract Unit Price Per Ton; Item No. 203-03.05.
 - 2. Payment for crushed stone shall be made at the contract Unit Price Per Ton for the material specified on the plans and/or standard drawings.
 - a. Size # 57, Item No. 303-10.01.
 - b. Size # 2, Item No. 303-10.02.
 - c. Size # 68, Item No. 303-10.03.
 - d. Size # CR6-10, Item No. 303-10.05.

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 Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop; 2022, with Errata .
- B. ASTM C136/C136M - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates; 2019.
- 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 (Reapproved 2021).
- 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 (Reapproved 2021).

- F. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method; 2015.
- G. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System); 2017, with Editorial Revision (2020).
- H. ASTM D4318 - Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils; 2017, with Editorial Revision (2018).
- I. ASTM D6938 - Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth); 2023.

1.06 SUBMITTALS

- A. Materials Sources: Submit name of imported materials source.
- B. Fill Composition Test Reports: Results of laboratory tests on proposed and actual materials used, including manufactured fill.
- C. 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 designated.
 - 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: Complying with State of Tennessee Highway Department standard.
- B. Structural Fill: Complying with State of Tennessee Highway Department standard.
- C. 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.
- D. 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.
- E. Topsoil: See Section 31 2200.

2.02 ACCESSORIES

- A. Geotextile: Non-biodegradable, nonwoven with a maximum EOS 100.
- B. Vapor Retarder: 10 mil thick, polyethylene.

2.03 SOURCE QUALITY CONTROL

- A. Where fill materials are specified by reference to a specific standard, test and analyze samples for compliance before delivery to site.
- B. If tests indicate materials do not meet specified requirements, change material and retest.
- C. 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 subdrainage, dampproofing, or waterproofing installation has been inspected.
- E. Verify structural ability of unsupported walls to support imposed loads by the fill.
- F. Verify underground tanks are anchored to their own foundations to avoid flotation after backfilling.
- G. Verify areas to be filled are not compromised with surface or ground water.

3.02 PREPARATION

- A. Scarify and proof roll subgrade surface to a depth of 6 inches to identify soft spots.
- 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. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, 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 8 inches compacted depth.
- H. Slope grade away from building minimum 2 inches in 10 feet, unless noted otherwise. Make gradual grade changes. Blend slope into level areas.
- I. Correct areas that are over-excavated.
 - 1. Load-bearing foundation surfaces: Fill with concrete.
 - 2. Load-bearing foundation surfaces: Use granular fill, flush to required elevation, compacted to 100 percent of maximum dry density.
 - 3. Other areas: Use general fill, flush to required elevation, compacted to minimum 98 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.
- L. 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 ft. from required elevations.
- B. Top Surface of Filling Under Paved Areas and under slabs on grade: Plus or minus 0.4 ft. from required elevations.

3.05 FIELD QUALITY CONTROL

- A. Soil Fill Materials:
 - 1. Perform compaction density testing on compacted fill in accordance with ASTM D1556, ASTM D2167, or ASTM D6938.
 - 2. Results will be evaluated in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D698 ("standard Proctor"), ASTM D1557 ("modified Proctor"), or AASHTO T 180.
 - 3. If tests indicate work does not meet specified requirements, remove work, replace and retest.
 - 4. Frequency of Tests: Minimum 5 tests per 10,000 square yards for each lift.
 - 5. Proof roll compacted fill at surfaces that will be under slabs-on-grade.

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 32 9219
SEEDING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Preparation of subsoil.
- B. Placing topsoil.
- C. Seeding, mulching and fertilizer.
- D. Maintenance.
- E. Watering

1.02 RELATED REQUIREMENTS

- A. Section 31 2200 - Grading: Preparation of subsoil topsoil in preparation for the work of this section.

1.03 PRICE AND PAYMENT PROCEDURES

- A. Topsoil:
 - 1. Basis of Measurement: By the cubic yard.
 - 2. Basis of Payment: Includes topsoil, placing topsoil.
- B. Grassed Areas:
 - 1. Basis of Measurement: By the square yard.
 - 2. Basis of Payment: Includes preparation of subsoil, placing topsoil, seeding, watering and maintenance to specified time limit.

1.04 DEFINITIONS

- A. Weeds: Include Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel, and Brome Grass.

1.05 SUBMITTALS

- A. Topsoil samples.
- B. Maintenance Data: Include maintenance instructions, cutting method and maximum grass height; types, application frequency, and recommended coverage of fertilizer.
- C. Maintenance Contract.
- D. Furnish the Engineer a certified laboratory report showing the analysis of the seed to be furnished. The report shall bear the signature of a senior seed technologist.

1.06 REGULATORY REQUIREMENTS

- A. Comply with regulatory agencies for fertilizer and herbicide composition.
- B. Provide certificate of compliance from authority having jurisdiction indicating approval of seed mixture.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver grass seed mixture in sealed containers. Seed in damaged packaging is not acceptable. Deliver seed mixture in containers showing percentage of seed mix, year of production, net weight, date of packaging, and location of packaging.
- B. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.

PART 2 PRODUCTS**2.01 SEED MIXTURE**

- A. Group "A":
 - 1. "Sunstar" Bermuda: 75 percent.
 - 2. Rye: 25 percent.
- B. Group "B"
 - 1. Bermuda (Hulled): 25 percent.
 - 2. Rye: 75 percent.
- C. All seed shall meet the requirements of the Tennessee Department of Agriculture.

2.02 SOIL MATERIALS

- A. Topsoil: as specified in Section 31 2200.
- B. Topsoil: Fertile, agricultural soil, typical for locality, capable of sustaining vigorous plant growth, taken from drained site; free of subsoil, clay or impurities, plants, weeds and roots; pH value of minimum 5.4 and maximum 7.0.
- C. Topsoil: Excavated from site and free of weeds.

2.03 ACCESSORIES

- A. Mulching Material: Oat or wheat straw, free from weeds, foreign matter detrimental to plant life, and dry. Hay or chopped cornstalks are not acceptable.
- B.
- C. Water: Clean, fresh and free of substances or matter that could inhibit vigorous growth of grass.
- D. Erosion Fabric: Jute matting, open weave.
- E. Stakes: Softwood lumber, chisel pointed.
- F. String: Inorganic fiber.
- G. Edging: Galvanized steel.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify that prepared soil base is ready to receive the work of this Section.

3.02 PREPARATION

- A. Prepare subgrade in accordance with Section 31 2200.
- B. Place topsoil in accordance with Section 31 2200.
- C. Install edging at periphery of seeded areas in straight lines to consistent depth.

3.03 FERTILIZING

- A. Apply fertilizer in accordance with manufacturer's instructions.
- B. Apply after smooth raking of topsoil and prior to roller compaction.
- C. Do not apply fertilizer at same time or with same machine as will be used to apply seed.
- D. Mix thoroughly into upper 2 inches of topsoil.
- E. Lightly water to aid the dissipation of fertilizer.

3.04 SEEDING

- A. Apply seed at a rate of 3 lbs (if unhulled) and 5 lbs (if hulled) per 1,000 sq. ft. evenly in two intersecting directions. Rake in lightly.

- B. Do not seed areas in excess of that which can be mulched on same day.
- C. Do not sow immediately following rain, when ground is too dry, or during windy periods.
- D. Roll seeded area with roller not exceeding 112 lbs.
- E. Immediately following seeding and compacting, apply mulch to a thickness of 1/8 inches. Maintain clear of shrubs and trees.
- F. Apply water with a fine spray immediately after each area has been mulched. Saturate to 4 inches of soil.
- G. Following germination, immediately re-seed areas without germinated seeds that are larger than 4 by 4 inches.
- H. Use Group "A" seed from February 1 to August 1.
- I. Use Group "B" seed from August 1 to December 1, with the exception that either Group "A" or "B" may be used during the month of August.
- J. Scarify, disc, harrow, rake, or otherwise work each area to be seeded until it has been loosened and pulverized to a depth as directed by the Engineer.
- K. Uniformly incorporate fertilizer into the soil for a depth of approximately 1/2" at the rate of:
 - 1. Not less than 20 pounds per 1000 square feet for grade 10-10-10 or equivalent.
 - 2. Not less than 100 pounds per 1000 square feet for agricultural limestone.
- L. Fertilizer need not be incorporated in the soil as specified above when mixed with seed in water and applied with power sprayer equipment.
- M. Sow seed of the specified group as soon as preparation of the seedbed has been completed.
- N. Sow uniformly by means of a rotary seeder, hydraulic equipment, or other satisfactory means at the rate of 1 1/2 pounds per 1,000 square feet, unless otherwise specified.
- O. Inoculate Group "B" seed and seeds of legumes, when sown alone, before sowing in accordance with the recommendations of the manufacturer of the inoculant.
- P. Do not perform seeding during windy weather, or when the ground surface is frozen, wet, or otherwise non-tillable. No seeding shall be performed during December through February unless otherwise permitted.
- Q. When specified, provide seeding with mulch:
 - 1. Spread hay or straw mulch evenly over the seeded area at an approximate rate of 75 pounds per 1,000 square feet immediately following the seeding operations. This rate may be varied by the Architect/Engineer, depending on the texture and condition of the mulch material and the characteristics of the area seeded.
 - 2. Hold hay or straw mulch in place by the use of a mulch binder applied at the approximate rate of 4 gallons per 1,000 square feet as required.
 - 3. Cover bridges, guardrails, signs, and appurtenances, if the mulch binder is applied in such a way that it would come in contact with or discolor the structures.
 - 4. When wood fiber mulch is used, uniformly apply at the rate of 28 to 35 pounds per 1,000 square feet with hydraulic mulching equipment.

3.05 HYDROSEEDING

- A. Apply seeded slurry with a hydraulic seeder at a rate of 2 lbs per 1000 sq ft evenly in two intersecting directions.
- B. Do not hydroseed area in excess of that which can be mulched on same day.
- C. Immediately following seeding, apply mulch to a thickness of 1/8 inches. Maintain clear of shrubs and trees.
- D. Apply water with a fine spray immediately after each area has been mulched. Saturate to 4 inches of soil.

- E. Following germination, immediately re-seed areas without germinated seeds that are larger than 4 by 4 inches.

3.06 MAINTENANCE

- A. See Section 01 7000 - Execution Requirements, for additional requirements relating to maintenance service.
- B. Provide a separate maintenance contract for specified maintenance service.
- C. Provide maintenance of seeded areas for three months from Date of Substantial Completion.
- D. Maintain seeded areas immediately after placement until grass is well established and exhibits a vigorous growing condition.
- E. Mow grass at regular intervals to maintain at a maximum height of 2-1/2 inches. Do not cut more than 1/3 of grass blade at any one mowing.
- F. Neatly trim edges and hand clip where necessary.
- G. Immediately remove clippings after mowing and trimming.
- H. Water to prevent grass and soil from drying out.
- I. Roll surface to remove minor depressions or irregularities.
- J. Control growth of weeds. Apply herbicides in accordance with manufacturer's instructions. Remedy damage resulting from improper use of herbicides.
- K. Immediately reseed areas that show bare spots.
- L. Protect seeded areas with warning signs during maintenance period.

END OF SECTION

**SECTION 33 0110.58
DISINFECTION OF WATER UTILITY PIPING SYSTEMS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Disinfection of 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 REFERENCE STANDARDS

- A. AWWA B300 - Hypochlorites; 2018.
- B. AWWA B301 - Liquid Chlorine; 2018.
- C. AWWA B302 - Ammonium Sulfate; 2023.
- D. AWWA B303 - Sodium Chlorite; 2018.
- E. AWWA C651 - Disinfecting Water Mains; 2014, with Addendum (2020).

1.04 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 Tennessee Department of Environment and Conservation.

1.05 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, and AWWA B303 Sodium Chlorite.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify that piping system and water well 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 pressure required by the Tennessee Department of Environment and Conservation . Repair leaks and re-test.

3.03 FIELD QUALITY CONTROL

- A. Perform field inspection and testing 01 4000.
- B. Test samples in accordance with AWWA C651.

END OF SECTION

**SECTION 33 0516
RAILROAD AND HIGHWAY CROSSINGS - UTILITY CASING PIPE**

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

- A. The General Conditions, Special Conditions and all other herein bound and accompanying documents are part of these specifications and of the Contract. Submission of proposal implies that the Bidder is fully conversant with all requirements of said documents. All materials are subject to the Engineer's approval.

1.02 APPLICABLE PUBLICATIONS

- A. Standards of the American Society for Testing and Materials (ASTM), latest edition; Standard Specifications of American Standards Association (ASA), latest edition; State Highway Department Standard Specifications for Road and Bridge Construction, latest edition.

1.03 SCOPE

- A. The work under this section consists of furnishing all materials, accessories, equipment, tools, transportation, services, labor and performing all operations necessary to completely execute Railroad Crossing work for this project, all as indicated on the drawings, approved shop drawings and as herein specified.
- B. At highway crossings, all requirements of the State Highway Department shall be met by the Contractor. Lights and barricades of the required number shall be placed to reduce traffic hazards and these shall be maintained until the work is completed.
- C. At railway crossings, all requirements of the Railroad shall be fulfilled by the Contractor. Lights of the required number shall be maintained at the site.
- D. All work on railway right-of-way, including any necessary supporting of tracks, shall be under the supervision of the Chief Engineer of the Railway or his authorized representative, who shall be notified at least 15 days before actual work of installation is begun. This work shall be done only in the presence of the authorized representative of the Chief Engineer and no work shall be done or methods used which will, in his opinion, be hazardous in any way to the Railway.

PART 2 – PRODUCTS

2.01 PIPE SIZES

- A. At highway and railroad crossings, carrier pipe and casing pipe sizes shall be as follows:

CARRIER PIPE	CASING	CASING PIPE
NORMAL SIZE	NORMAL SIZE	MINIMUM WALL THICKNESS
10"	16"	0.325"
8"	12"	0.250"
6"	10"	0.188"
4"	8"	0.188"

2.02 CASING PIPE

- A. All casing pipe shall be steel having a minimum yield strength of 35,000 psi.
- B. The casing pipe shall have a protective coating not less than a coal-tar primer coat, followed by a single application of hot coal tar enamel 3/34 inches plus or minimum 1/32 inch thick plus a bonded 15 lb. asbestos felt wrap, or in lieu of the above, the coating shall be an approved substitute equal to this combination protective coating.

- C. Casing pipe joints shall be made by continuous weld completely around the perimeter of the pipe, shall be watertight and shall provide a strength through the joint equal to that of the casing pipe shell.
- D. Casing pipe shall be so constructed as to prevent leakage of any substance from the casing throughout its length except at ends.

2.03 CARRIER PIPE

- A. Carrier pipe shall be specified under the Applicable Utility Section.

PART 3 - EXECUTION

3.01 DRY BORING AND JACKING OPERATIONS

- A. All boring and jacking operations of steel casing pipes, also installation of sewer and water pipes in casing pipes are included in this Contract, all as shown on drawings, approved shop drawings and as herein specified. Such installation will generally be for crossing under railroads, both casing pipe and carrier pipes shall be provided in lengths short enough for proper placement and handling in the jacking pit.
- B. The work specified herein covers two (2) basic methods of installing casing pipe mechanically (and in which diameter of casing pipe is too small to permit hand working at heading of casing pipe).
 - 1. Pushing casing pipe into fill or earth simultaneously with boring auger, as it drills the earth.
 - 2. Drilling hole through the earth of fill and pushing casing and carrying pipe into the hole after drill auger has completed bore.
- C. Open a suitable trench adjacent to slope of embankment or adjacent to bored or jacked section, as shown on drawings. Length of approach trench: sufficient to accommodate selected lengths of pipe sections to be jacked and wide enough to provide sufficient working space. Set and maintain guide timbers of rails accurately in bottom of approach trench, in order to keep casing pipe on correct line and grade. Provide and install heavy, timber backstop supports at rear of approach trench, adequate to take thrust of jacks without movement or distortion. It is requisite to securing of tolerance limits of boring and jacking operation to set all rails, guides and jacks exactly, so that casing pipe in final position is within limits of acceptability, as noted on drawings and approved by the Engineer.
- D. Casing shall be so installed as to prevent the formulation of a waterway, with an even bearing throughout its length, and shall slope to one end (except for longitudinal occupancy).

END OF SECTION

**SECTION 33 1416
SITE WATER UTILITY DISTRIBUTION PIPING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Water pipe for site conveyance lines.
- B. Pipe valves.
- C. Fire hydrants.

1.02 RELATED REQUIREMENTS

- A. Section 09 9113 - Exterior Painting.
- B. Section 21 1100 - Facility Fire-Suppression Water-Service Piping.
- C. Section 31 2316.13 - Trenching: Excavating, bedding, and backfilling.
- D. Section 33 0110.58 - Disinfection of Water Utility Piping Systems: Disinfection of site service utility water piping.

1.03 PRICE AND PAYMENT PROCEDURES

- A. See Section 01 2200 - Unit Prices, for additional unit price requirements.

1.04 REFERENCE STANDARDS

- A. AWWA C600 - Installation of Ductile-Iron Mains and Their Appurtenances; 2017.
- B. AWWA C606 - Grooved and Shouldered Joints; 2022.

1.05 ADMINISTRATIVE REQUIREMENTS

1.06 SUBMITTALS

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

1.07 QUALITY ASSURANCE

- A. Perform Work in accordance with utility company requirements.

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

2.02 VALVES

2.03 HYDRANTS

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

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 feet 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:
 - c. Rigid pavement - flush with finished grade.
 - 1) Flexible pavement - top of pad 2" below final grade.
 - d. Access lid legend: "WATER"
- C. Set hydrants plumb; locate pumper nozzle perpendicular to and facing roadway.
- D. Set hydrants to grade, with nozzles at least 20 inches above ground²¹ 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 Town of Halls Public Works Department criteria 09 9113.

3.06 FIELD QUALITY CONTROL

- A. 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.
 - 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 Non-emergency Procedures	Initial Chlorine Dose (mg/L)	Minimum Contact Time	Minimum Chlorine Resid. (mg/L)
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.
- B. 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.
- C. 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 redisinfecting and retested as necessary to obtain satisfactory results, no additional cost to the utility.
- D. 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.

3.07 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.

3.08 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 3123
SANITARY SEWERAGE FORCE MAIN PIPING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Sanitary sewerage force main piping, fittings, and accessories.
- B. Valves, Valve Vaults, Valve Manholes, and Thrust Restraints.
- C. Connection of facility sanitary force main system to wastewater network.

1.02 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete: Concrete for manhole base pad construction.
- B. Section 03 3000 - Cast-in-Place Concrete: Concrete for thrust restraints.
- C. Section 31 2316 - Excavation: Excavating of trenches.
- D. Section 31 2316.13 - Trenching: Excavating, bedding, and backfilling.
- E. Section 31 2323 - Fill: Bedding and backfilling.
- F. Section 33 0561 - Concrete Manholes.
- G. Section 33 3113 - Site Sanitary Sewerage Gravity Piping.

1.03 DEFINITIONS

- A. Bedding: Fill placed under, beside and directly over pipe, prior to subsequent backfill operations.

1.04 REFERENCE STANDARDS

- A. AASHTO HB - Standard Specifications for Highway Bridges; 2005, with Errata.
- B. ASTM C478/C478M - Standard Specification for Circular Precast Reinforced Concrete Manhole Sections; 2020.
- C. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120; 2021a.
- D. ASTM D2241 - Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series); 2020.
- E. ASTM D2564 - Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems; 2020.
- F. ASTM D2774 - Standard Practice for Underground Installation of Thermoplastic Pressure Piping; 2021a.
- G. ASTM D3139 - Standard Specification for Joints for Plastic Pressure Pipes using Flexible Elastomeric Seals; 2019.
- H. ASTM D3308 - Standard Specification for PTFE Resin Skived Tape; 2012 (Reapproved 2022).
- I. ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe; 2014 (Reapproved 2021).
- J. AWWA C105/A21.5 - Polyethylene Encasement for Ductile-Iron Pipe Systems; 2018.
- K. AWWA C111/A21.11 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings; 2023.
- L. AWWA C508 - Swing-Check Valves for Waterworks Service, 2-In. Through 48-In. (50-mm Through 1,200-mm) NPS; 2017.
- M. AWWA C600 - Installation of Ductile-Iron Mains and Their Appurtenances; 2017.
- N. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. through 60 In. (100 mm through 1500 mm); 2022.

1.05 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate the installation of the force main with size, location and installation of service utilities.
- B. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by all affected installers.
- C. Sequencing: Execute utility connections in an orderly and expeditious manner.

1.06 SUBMITTALS

- A. See Section 01 3300 - Submittal Procedures, for submittal procedures.
- B. Product Data: Provide data indicating pipe, pipe accessories.
- C. Product Data: Manufacturer's data sheets for each item of equipment and material provided, showing compliance with requirements; include materials, pressure ratings, seats and seals, clearances for operation and maintenance, and other characteristics.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Manufacturer's Installation Instructions: Indicate special procedures required to install Products specified.
- F. Hydrostatic Test Report: Document results of field quality control testing. Submit copies of all reports of field tests.
- G. Project Record Documents:
 - 1. Record location of piping, connections, valves, valve vaults, valve manholes, thrust restraints, and invert elevations.
 - 2. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.
- H. Maintenance Materials:
 - 1. For Each Type and Size of Valve:
 - a. Lubricator, lubricant of appropriate temperature rating, lubricator/isolating valve.
 - b. Gaskets; two each.
 - c. O-ring seals; two each.
 - d. Diaphragms (molded); two each.
 - e. Other parts made of elastomeric materials; two each.
 - f. Stem packing; two each.
 - g. Seat rings; two each and seat ring pulling tool.
 - 2. One set of special tools necessary for adjustment, operation, maintenance and disassembly.
- I. One set of special tools necessary for adjustment, operation, maintenance and disassembly.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Do not damage pipe, fittings and accessories, and pipe coatings during delivery, handling, and storage.
- B. Do not place materials on private property without written permission of property owner.

PART 2 PRODUCTS**2.01 FORCE MAIN PIPE MATERIALS**

- A. Provide products that comply with applicable code(s).
- B. PVC Pipe:
 - 1. PVC Pipe and Fittings: Less than 4 inches diameter: ASTM D2241, SDR 21, with push-on joints, or solvent weld joints.

2. PVC Pipe and Fittings: 4 inches, diameter and larger: ASTM D2241, SDR 21, with push-on joints.
3. Joints:
 - a. Push-On Joint Fittings: ASTM D3139, with ASTM F477 gaskets.
 - b. Solvent Cement: ASTM D2564.
 - c. Couplings for use with plain end pipe with centering rings or stops to center the coupling on the joint.
- C. Fittings: PVC pipe less than 4 inches solvent weld for all other pipe use ductile iron fittings, ANSI/AWWA A21/C110, coated inside and out with fusion bonded epoxy, mechanical joint or as called for in the plans.

2.02 PIPE ACCESSORIES

- A. Trace Wire: The trace wire shall have the following qualities:
 1. Open Trench Application: #12 AWG copper clad steel; high strength with a minimum 450 lb break load; minimum 30 mil thick HDPE insulation.
 2. Directional Drilling/Boring: #12 AWG copper clad steel; extra high strength with a minimum 1,150 lb break load; minimum 30 mil thick HDPE insulation.
 3. Pipe Bursting/Slip Lining: 7 X #7 stranded copper clad steel: extreme strength with a minimum 4,700 lb break load; minimum 50 mil thick HDPE insulation.
- B. Locator Tape: 4 inch wide 4 mil thick polyethylene plastic underground warning tape, Green color with Black lettering reading "CAUTION FORCE MAIN BURIED BELOW".

2.03 VALVE APPLICATIONS

- A. Valve Applications: Provide valves as shown on layout drawings.
- B. Do not direct-bury flanged valves; provide valve vault as indicated on drawings.

2.04 REQUIREMENTS APPLICABLE TO ALL VALVES

- A. See layout drawings for valve sizes.
- B. Provide valves suitable for the service indicated and coordinated to piping system.
 1. Provide valves that will withstand working pressure indicated or working pressure of pipe to which valve is connected, whichever is greater.
 2. Provide valves of sizes indicated or of port diameter/area equal to that of pipe to which valve is connected, whichever is larger.
 3. Provide valves that open by turning the direction as coordinated with the utility provider, with direction of opening integrally marked on operating nut or operator.
 4. Valve End Connections: As indicated; if not indicated, provide end connections of the same type as indicated for joints in pipe to which valve is connected.
 5. Factory install operators and accessories.
 6. All valves shall be resilient seat.
 7. All valves shall be fusion bonded epoxy coated inside and out.

2.05 CHECK VALVES

- A. Manufacturers:
 1. American Flow Control: www.american-usa.com.
 2. Flomatic Valves: www.flomatic.com.
 3. M & H Valve Company: www.mh-valve.com.
 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Check Valves - General Requirements: These requirements apply to all check valves unless otherwise indicated.
 1. Function: Permit free flow forward and provide positive check against backflow.
 2. Rating: as indicated on the drawings.
 3. Body: Ductile Iron coated inside and out with fusion bonded epoxy.

4. When called for on the drawings provide valves with outside lever and spring.
 5. Identification: Directly cast on body; manufacturer's name, initials, or trademark; size of valve, working pressure; direction of flow.
- C. Swing Check Valves - Sizes 2 inch through 12 inch:
1. Comply with AWWA C508.
 2. Resilient seated check valves shall be manufactured from ductile iron meeting or exceeding ASTM A536.
 3. Valve disks shall be ductile iron fully encapsulated with EPDM rubber and shall seal drip tight at pressures above 5 psig.
 4. Coated with fusion-bonded epoxy on all internal and external ferrous surfaces.
 5. Bronze seat rings are not allowed. Disc shall be only allowable moving part. No O-rings, pivot pins or other bearings are allowed.
 6. All fasteners shall be 304 stainless steel.
 7. End Connections: Flanged.

2.06 COMBINATION AIR VALVES FOR WASTEWATER

- A. Manufacturers:
1. Cla-Val Company: www.cla-val.com/#sle.
 2. Val-Matic Valve & Mfg. Corp.: www.val-matic.com.
 3. APCO Valves by DeZurik: www.dezurik.com.
 4. Aquestia A.R.I.: www.aquestia.com.
 5. Substitutions: See Section 01 6000 - Product Requirements.
- B. Combination Air Valves:
1. Installed at high points or grade changes in the pipe line.
 2. Function: Discharges air (gasses) during the filling or charging of the system, admits air into the system while it is being emptied of liquid and releases accumulated air (gasses) from the system while it is under pressure and operating.
 3. Designed to operate with liquids carrying solid particles such as wastewater and effluents. Valve body made of ductile iron ASTM A536 60-40-18 or stainless steel SAE 316.
 4. Valve Coating; fusion-bonded epoxy .
 5. All inner metal parts made of stainless steel.
 6. Rating: 150 psig working pressure.

2.07 VALVE VAULTS

- A. Concrete, except design concrete vaults installed in locations subject to vehicular traffic to withstand AASHTO load designation as outlined in AASHTO HB.
- B. Lid and Frame: Cast iron construction, hinged lid.
1. Nominal Lid and Frame Size: 26 inches.
 2. Cast word "FORCE MAIN" in cover.
- C. Shaft Construction and Concentric Cone Top Section: Reinforced precast Concrete pipe sections, lipped male/female dry joints, nominal shaft diameter of 36 inches. Comply with ASTM C478/C478M.
- D. Base Pad: Cast-in-place concrete of type specified in Section 03 3000, levelled top surface to receive concrete shaft sections, sleeved to receive sanitary force main pipe sections.

2.08 MISCELLANEOUS MATERIALS AND ACCESSORIES

- A. Concrete for Thrust Restraints: Concrete type specified in Section 03 3000.
- B. Joint Lubricants: As recommended by the pipe manufacturer.
- C. Bolts, Nuts, Rods, Brackets, and Glands: Comply with AWWA C111/A21.11.
- D. Joint Compound: A stiff mixture of graphite and oil or inert filler and oil.

- E. Joint Tape: Comply with ASTM D3308.
- F. Polyethylene Jackets: AWWA C105/A21.5 polyethylene jacket. Single layer, lapped over pipe joint 1 foot minimum, and secured with 10 mil polyethylene tape.
- G. Bond Wire: Bond wire type RHW or USE, Size 1/0 AWG, neoprene jacketed copper conductor shaped to stand clear of the joint.

2.09 BEDDING AND COVER MATERIALS

- A. Pipe Bedding Material: As specified in Section 31 2316.13.
- B. Pipe Cover Material: As specified in Section 31 2316.13.

PART 3 EXECUTION

3.01 GENERAL

- A. Perform work in accordance with applicable code(s).

3.02 EXCAVATION, TRENCHING, AND BACKFILLING

- A. Hand trim excavation for accurate placement of pipe to elevations indicated.
- B. Form and place concrete for pipe thrust restraints at bends, tees, and each change of pipe direction. Place concrete to permit full access to pipe and pipe accessories.
- C. Backfill around sides and to top of pipe with cover fill, tamp in place and compact, then complete backfilling. Correct over-excavation. See Section 31 2316.13 for additional requirements.

3.03 PREPARATION

- A. Cut pipe ends square with mechanical cutters. Use wheel cutters where practicable. Remove burrs, sharp and rough edges and grind smooth. Remove loose material from pipe before laying.

3.04 INSTALLATION - PIPE

- A. Maintain horizontal and vertical separation of force main from water main piping in accordance with code.
- B. Verify trench cut is ready to receive work and excavations, dimensions, and elevations are as indicated on drawings.
- C. Before lowering and while suspended, inspect pipe and each fitting for defects. Installation of defective material is not permitted.
- D. Where pipe, fittings or joint materials have been soiled by earth in handling, thoroughly clean soiled surfaces by wire brushing and wiping until all traces of earth are removed before joining pipe.
- E. Maintain interior of all pipes thoroughly clean. After each line of pipe has been laid, carefully inspect, identify and remove dirt, trash, rags and other foreign matter from interior. Protect completed work.
- F. Lay pipe with bell ends facing the direction of laying, against the direction of flow.
 - 1. Where pipe is laid on a grade of ten percent or greater, start at bottom and proceed upward with bell ends of pipe upgrade.
- G. Begin pipe laying from discharge end and proceed toward Pump Station with bell ends facing upstream.
- H. Install force mains with a minimum grade of one percent downhill slope away from sewage air release valve to force entrapped air to accumulate at air release valve.
- I. Install pipe, fittings, and accessories at the locations indicated on drawings and in accordance with manufacturer's instructions. Seal watertight.

1. Ductile Iron: Comply with AWWA C600.
 2. Steel: Comply with AWWA C600.
 3. Polyethylene (PE) Plastic Pipe: Comply with ASTM D2774.
 4. Polypropylene: Comply with ASTM D2774.
- J. Lay pipe to slope gradients noted on layout drawings.
- K. Route piping in straight, true line.
- L. Backfill trenches immediately after the pipe has been installed. Do not displace or damage pipe when compacting.
- M. Connect to building sanitary sewer outlet and municipal sewer system, through installed sleeves.
- N. Install trace wire attached to pipe with nylon straps between the 3 o'clock and 6 o'clock positions.

3.05 ADJACENT FACILITIES

- A. Installation of force mains near adjacent facilities: see Section 33 3113.

3.06 JOINTING

- A. Joints for Ductile Iron Pipe:
1. Installation of Mechanical Joints: Comply with AWWA C600 and manufacturer's instructions.
 2. Installation of Push-On Type Joints: Comply with AWWA C600 and manufacturer's instructions.
 3. Installation of Flanged Joints: Comply with manufacturer's instructions.
- B. Polypropylene (PP) Pipe:
1. Heat Fusion Joints: Comply with manufacturer's instructions concerning equipment, temperature, melt time, heat coat, and joining time.
- C. PVC Pipe:
1. Push-On Joints: Bevel ends of pipe to facilitate assembly. Mark pipe to indicate when the pipe is fully seated. Lubricate gaskets to prevent displacement. Place gasket in proper position in bell or coupling while joint is made.
 2. Solvent-Weld Joints: Comply with manufacturer's instructions.
- D. Polyethylene (PE) Pipe:
1. Heat Fusion Joints: Comply with manufacturer's instructions concerning equipment, temperature, melt time, heat coat, and joining time.
 2. Installation of Mechanical Joints: Comply with manufacturer's instructions.
 3. Installation of Flanged Joints: Comply with manufacturer's instructions.

3.07 THRUST RESTRAINT

- A. Thrust restraints are specified in Section 33 1416.
- B. Thrust Restraints:
1. Provide thrust restraint for plugs, caps, tees and bends deflecting 11-1/4 degrees or more, either vertically or horizontally.
 2. Provide thrust restraints at valves, unless otherwise securely anchored to prevent movement.
- C. Concrete Thrust Restraints:
1. Provide as indicated on drawings.
 2. Place concrete between solid ground and the fitting to be anchored. Unless otherwise indicated, pour base and thrust bearing sides of thrust restraints directly against undisturbed earth. The sides of thrust restraints not subject to thrust may be poured against forms. Place concrete so fitting joints are accessible for repair.

3. Anchor vertical down bends into gravity thrust restraints with steel rods and clamps, protected by coating with bituminous paint.

3.08 FIELD QUALITY CONTROL

- A. Perform field inspection and testing in accordance with Section 01 4115 - Regulatory Requirements.
 1. If tests indicate Work does not meet specified requirements, remove defective Work, replace and retest at no cost to Owner.
 2. Schedule tests to allow the Owner to witness the event.
- B. Hydrostatic Tests
 1. Pipeline testing includes both a pressure test and a leakage test.
 - a. Submit proposed method for disposal of waste water from hydrostatic tests to Owner for approval.
 - b. Testing is the responsibility of the Contractor.
 - c. Perform testing using an independent testing laboratory approved by the Owner.
 - d. Notify Owner at least seven days in advance of test date.
 - e. Deliver the final test report to the Owner within 30 days of the test.
 2. Pressure Test: Test in accordance with TDEC requirements.
 - a. After the pipe has been installed, joints completed, thrust restraints have been in place for at least five days, and the trench has been partially backfilled, leaving the joints exposed for examination, fill pipe with water to expel all air.
 - b. Subject pipeline to a test pressure of 150 psi or 150 percent of the working pressure, whichever is greater, for a period of at least one hour.
 - c. Open and close each valve several times during the test.
 - d. Examine exposed pipe, joints, fitting, and valves for leaks.
 - e. Stop visible leaks or replace the defective pipe, fitting, joints, or valve.
 3. Leakage Test: Test in accordance with TDEC requirements.
 - a. Conduct leakage test subsequent to, or concurrently with, the pressure test.
 - b. Place the volume of water permitted as leakage for the line in a sealed container attached to the supply side of the test pump.
 - c. No other source of supply is permitted to be applied to the pump or line under test.
 - d. Pump water into line by test pump, as required, to maintain the specified test pressure as described for pressure test for a two hour period.
 - e. Exhaustion of the supply or the inability to maintain the required pressure is considered test failure.
 - f. Anticipate the issue PE pipe can experience diametric expansion and pressure elongation during initial testing.
 - g. Consult manufacturer prior to testing for special testing considerations.
 - h. Allowable leakage shall be determined by following I-P formula; $L = NDP/K$.
 Where letters in formula are equivalent to the following:
 - L = Allowable leakage in gallons per hour.
 - N = Number of joints in length of pipeline tested.
 - D = Nominal diameter of the pipe in inches.
 - P = Square root of the test pressure in psig.
 - K = 7400 for pipe materials.
 At conclusion of test, measure amount of water remaining in container and record results in test report.
4. Retesting:
 - a. If any deficiencies are revealed during any test, identify and correct deficiencies and reconduct tests and correct new deficiencies revealed until the results of the tests are within specified allowances, without additional cost to the Owner.

3.09 PROTECTION

- A. Water is not permitted to run or stand in trench while pipe laying is in progress, before the joints are completely set, or before trench has been backfilled.
- B. Protect pipe and bedding cover from damage or displacement until backfilling operation is in progress.

END OF SECTION

**SECTION 33 3213
PACKAGED WASTEWATER PUMPING STATIONS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pre-engineered, prefabricated assemblies comprising pump(s), valve(s), internal piping, and controls.
- B. Wet well and pump chamber construction.

1.02 RELATED REQUIREMENTS

- A. Section 31 2316 - Excavation.
- B. Section 31 2323 - Fill: Backfilling.
- C. Section 33 3123 - Sanitary Sewerage Force Main Piping.

1.03 REFERENCE STANDARDS

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.
- B. ASTM A126 - Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings 2004 (Reapproved 2014).
- C. ASTM C443 - Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets 2012.
- D. ASTM C443M - Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets (Metric) 2011.
- E. ASTM C478 - Standard Specification for Circular Precast Reinforced Concrete Manhole Sections 2015.
- F. ASTM C478M - Standard Specification for Circular Precast Reinforced Concrete Manhole Sections [Metric] 2015.
- G. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete 2019.
- H. ASTM C989/C989M - Standard Specification for Slag Cement for Use in Concrete and Mortars 2018a.
- I. AWWA C110/A21.10 - Ductile-Iron and Gray-Iron Fittings 2012.
- J. AWWA C500 - Metal-Seated Gate Valves for Water Supply Service 2009.
- K. AWWA C509 - Resilient-Seated Gate Valves for Water Supply Service 2009.
- L. HI M100 - HI Pump Standards Set; Hydraulic Institute 2009.
- M. IEEE C62.11 - Standard for Metal-Oxide Surge Arresters for Alternating Current Power Circuits (>1kV) 2012.
- N. ISO 1940-1 - Mechanical Vibration - Balance Quality Requirements for Rotors in a Constant (Rigid) State - Part 1: Specification and Verification of Balance 2003; Cor 2005.
- O. NEMA MG 1 - Motors and Generators 2014.
- P. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- Q. UL 1449 - Standard for Surge Protective Devices Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. Product Data: Manufacturer's technical literature for prefabricated assemblies and pump chamber and access way; include installation instructions.

1. Control and power instrumentation and panels.
 2. Pump curves.
 3. Motor data.
 4. Specimen warranty.
 5. Provide the following motor/pumps design information prior to final turnover - number of motor rotor bars and stator slots; number of cooling fan blades; RPM of motor; bearings, bearing manufacturer, bearing type, bearing style and number of balls/elements; number of commutator bars and commutator brushes; SCR firing frequencies; and number of pump impellers.
- B. Shop Drawings: Detailed drawings of entire pumping station, combining components furnished by different manufacturers, if any.
1. Control panel schematic diagrams.
 2. Show the design of the chamber, with dimensions, types, and thicknesses of materials, and elevation levels with reference to those elevations indicated.
- C. Source quality control test report.
- D. Field quality control test reports.
- E. Operating and Maintenance Data:
1. Submit preventative maintenance and inspection procedure for package lift stations.
 2. Include in procedures the frequency of preventative maintenance, inspection, adjustment, lubrication, and cleaning necessary to minimize corrective maintenance and repair.
 3. Submit spare parts data, including a complete list of parts and supplies with current unit prices and source of supply.
 4. List parts and supplies that are either normally furnished at no extra cost with the purchase of equipment, or specified to be furnished as a part of the contract, and list additional items recommended by the manufacturer to ensure an efficient operation for a period of one year.

1.05 WARRANTY

- A. Warranty: Provide manufacturer's warranty for packaged pump station, with itemized list of components covered by warranty; include list of specific operation and maintenance procedures that are required to keep warranty valid.

PART 2 PRODUCTS

2.01 WET WELL CONSTRUCTION

- A. Construction: Concrete construction.
- B. Concrete Construction: Precast concrete sections complying with ASTM C478 (ASTM C478M).
1. Provide a single unit comprising base, walls, and access way.
 2. Provide single bottom unit comprising base and walls.
 3. Access way may be separate unit from wet well.
 4. Minimum Wall Thickness: 5 inches (127 mm).
 5. Concrete: 5000 psi (35 MPa) at 28 days.
 6. Joint Gaskets: ASTM C443 (ASTM C443M) Type B.
 7. Exposed Steel Components: Hot-dipped galvanized in accordance with ASTM A123/A123M.
 8. Cast-in-place concrete may be used in lieu of precast concrete.
 9. Fly ash complying with ASTM C618, Class F may be used for replacement of cement not to exceed 20 percent by weight (maximum one part fly ash to four parts cement).
 10. Ground granulated blast furnace slag complying with ASTM C989/C989M, Grade 120 may be used for between 25 to 50 percent maximum cement replacement by weight.
- C. Concrete Bases and Foundations: Provide concrete bases and foundations for equipment provided in this section.

- D. Base Material: Crushed stone covered with polyethylene vapor barrier.
- E. Access Hatch Covers: Aluminum, with lifting mechanism, automatic hold open arm, slam lock with handle, and flush lift handle with red vinyl grip.
 - 1. Use automatic hold open arm that locks in 90 degree position.
 - 2. Construction: 1/4 inch (6 mm) thick diamond pattern plate with 1/4 inch (6 mm) channel frame and continuous anchor flange
 - 3. Live Load Capacity: 300 pounds per square foot (1500 kg per square meter).
 - 4. Locking: Stainless steel cylinder lock with two keys per lock; key all locks the same.
- F. Access Ladder: Stainless steel construction.

2.02 VALVES AND PIPING

- A. Valves: Provide one gate valve and one check valve on each pump discharge line.
- B. Gate Valves:
 - 1. Type: Outside-screw-and-yoke rising-stem type with flanged connections; AWWA C500 with double disc gates, or AWWA C509.
 - 2. Provide valves with hand wheels that open by counterclockwise rotation.
 - 3. Provide with stuffing boxes that permit easy removal of parts for repair.
 - 4. Use valves from only one manufacturer.
- C. Check Valves:
 - 1. Rated Working Pressure: 175 psi (1.21 mPa).
 - 2. Sizes Less Than 4 inches (100 mm): Neoprene ball check valve with integral hydraulic sealing flange.
 - 3. Sizes 4 inches (100 mm) and Larger: Non-clogging, positive horizontal swing check type valve capable of passing 3 inch (76 mm) diameter solids; ASTM A126 cast iron body,
 - a. Bronze gate, gate seats, shaft, studs, and nuts.
 - b. Buna-N disc and integral seat.
 - c. AWWA C110/A21.10 flanged ends conforming to.
 - d. Removable cover for inspection and removal of gate assembly.

2.03 PIPING

- A. Inlet and Outlet Piping: Same type of pipe and jointing as specified for sanitary sewer to which pump station will be connected.
- B. Inlet and Outlet Piping: See Section 33 3123.
- C. Use flanged connections for exposed piping and mechanical connections for buried piping.
- D. Terminate discharge lines 5 feet (1.5 m) outside wet well.
- E. Internal Piping: Ductile iron, VC, or CPVC as specified in Section 33 3123.
 - 1. Manufacturer's standard jointing system.
 - 2. Fittings of pressure rating not less than that of pipe.
 - 3. Separate piping of dissimilar metals with rubber gasket or other approved type of insulating joint or dielectric coupling to effectively prevent metal-to-metal contact between adjacent sections of piping.
- F. Accessories: Provide fittings, flanges, connecting pieces, transition glands, transition sleeves, and other adapters as required.
- G. Flexible Flanged Couplings: As indicated.
 - 1. Rated Working Pressure: 350 psi (2.41 MPa).

2.04 SOURCE QUALITY CONTROL

- A. Test pump, valve, and piping assembly in factory prior to shipping, at test pressure equal to 50 percent more than pump discharge pressure or total dynamic head, whichever is greater.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify existing conditions before starting work.
- B. Verify inlet and discharge piping connection match size, location, and elevation shown on Drawings.

3.02 PREPARATION

- A. Establish elevations of packaged pumping station with minimum two feet of cover.
- B. Establish minimum separation of 10 feet from other services piping in accordance with State code.

3.03 INSTALLATION

- A. Install as indicated, in accordance with drawings and manufacturer's instructions.
- B. Where equipment is mounted on concrete, grout attachments before connecting piping.
- C. Set water level controls at elevations indicated; if not indicated, obtained Owner's instructions as to levels.
- D. Attach final as-built drawings of components in wet well, components above ground, and controls, laminated in mylar, to inside of pump station front door; include legends and pump nameplate data.
- E. Install on or near pump station, complete package of posted instructions, consisting of labels, signs, and operating instructions.

3.04 MANUFACTURER FIELD SERVICES

- A. Provide the services of equipment manufacturer's technical representative to direct startup of station and instruct Owner's personnel in startup, operation, and maintenance procedures.

3.05 FIELD QUALITY CONTROL

- A. Where components are mounted on or in concrete, wait minimum of 5 days after concrete placement before testing.
- B. After installation but before backfilling or connecting to sewer piping, test pump, valve, and piping assemblies under test pressure equal to 50 percent more than pump discharge pressure or total dynamic head, whichever is greater, using clean water.
 - 1. Simulate varying water level conditions to show that pump controls are working properly.
 - 2. Activate each control function to check for proper operation and indication.
 - 3. Include alarm conditions to show that alarms are correctly connected and functioning.
- C. Grinder Pumps:
 - 1. Test pumps and controls, in operation, under design conditions to insure proper operation of all equipment.
 - 2. Provide all appliances, materials, water, and equipment for testing, and bear all expenses in connection with the testing.
 - 3. Conduct testing after all equipment is properly installed, electrical services and piping are installed, liquid is flowing, and the pump station is ready for operation.
 - 4. Correct all defects discovered to the satisfaction of the Owner, and all tests repeated, at the expense of the Contractor, until the equipment is in proper working order
- D. After connecting to sewer piping, monitor operation for 10 days and submit report.

END OF SECTION

**SECTION 33 5216
GAS HYDROCARBON PIPING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pipe and fittings for natural gas distribution on site outside buildings.
- B. Propane storage tanks.

1.02 REFERENCE STANDARDS

- A. NFPA 58 - Liquefied Petroleum Gas Code; 2024.

1.03 SUBMITTALS

- A. Product Data: Provide data on pipe materials, pipe fittings, valves and accessories.
- B. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- C. Project Record Documents: Record actual locations of pipe mains, valves, connections, and invert elevations. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.04 QUALITY ASSURANCE

- A. Perform Work in accordance with utility company requirements.
- B. Comply with NFPA 58.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store valves in shipping containers with labeling in place.

PART 2 PRODUCTS

2.01 PIPE

- A. Fittings: ASME B16.18 cast copper, ASME B16.22, wrought copper, or ASME B16.26, cast copper, internally tinned.
 - 1. Joint: ASTM B32, Solder.
- B. Polyethylene Pipe: ASTM D2513, SDR11:
 - 1. Fittings: ASTM D2513.
 - 2. Joints: Mechanical or compression fit.
- C. Trace Wire: Magnetic detectable conductor, clear plastic covering, imprinted with "Natural Gas Service " in large letters.

2.02 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 EXAMINATION

- A. Verify that building service connection and utility gas main size, location and invert are as indicated.

3.02 PREPARATION

- A. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, remove burrs. Bevel plain end ferrous pipe over 2 inches diameter Thread ferrous pipe 2 inches diameter and under.
- B. Remove scale and dirt on inside and outside before assembly.
- C. Prepare piping connections with flanges and unions.

3.03 TRENCHING

- A. See Section 31 2316.13 for additional requirements.
- B. Hand trim excavation for accurate placement of pipe to elevations indicated.
- C. Backfill around sides and to top of pipe with cover fill, tamp in place and compact, then complete backfilling.

3.04 INSTALLATION - PIPING

- A. Maintain separation of gas line from sewer piping in accordance with Town of Halls Public Works and Tennessee Department of Transportation code.
- B. Group piping with other site piping work whenever practical.
- C. Route piping in straight line.
- D. Install piping to conserve space and not interfere with use of site space.
- E. Install piping to allow for expansion and contraction without stressing pipe or joints.
- F. Install cocks and other fittings.
- G. Establish elevations of buried piping to ensure not less than 24 inches of cover in non-travelled areas and 48 inches of cover in driveways and parking areas.
- H. Install trace wire 6 inches above top of pipe; coordinate with Section 31 2316.13.
- I. Center and plumb valve box over valve. Set box cover flush with finished ground surface. Prevent shock or stress from being transmitted through valve box to valve.
- J. Wrap valve and valve box with polyethylene tape and heat shrink.
- K. Paint valves and valve boxes with rust inhibitive primer and one coat of epoxy paint.

3.05 SERVICE CONNECTIONS

- A. Provide sleeve in foundation wall for gas service main. Seal enlarged sleeve watertight.
- B. Anchor service main to interior surface of foundation wall.
- C. Install service regulator adjacent to building wall in specified location.
- D. Install service regulator and riser pipe to prevent undue stress upon service pipe. For plastic service pipe, use steel pipe riser from below ground to regulator.
- E. Provide regulator vent with rain and insect proof opening, terminating away from building openings.
- F. Install weatherproof control box for vaporizer 40 inches above ground surface. Install to 4 by 4 inch cedar post, driven into ground 40 inches.
- G. Install wiring in accordance with Section 26 2717. Install from vaporizer to control box 20 inches below ground surface. Install service wiring 24 inches below ground from control box to building.

3.06 FIELD QUALITY CONTROL

- A. Perform field inspection and testing.
- B. Pressure test gas piping to local and State requirements
- C. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.

END OF SECTION

