

Project Manual for:

2024 ARC Grant Jamestown Tank Rehabilitation

Bid# J-2026-1

City of Jamestown

Harvey Stowers, Mayor
Sherri Bowden, Alderman
Kaye Bridges, Alderman
James Cooper, Alderman
Becky Duncan, Alderman
Steve McCoy, Alderman

PREPARED BY:



March 2026

Set Number _____

CITY OF JAMESTOWN

2024 ARC GRANT JAMESTOWN TANK REHABILITATION

TO BID, CONTRACTOR MUST OBTAIN DOCUMENTS FROM ISSUING OFFICE

SPECIFICATIONS

The Work consists of the rehabilitation of a 1,000,000 gallon Fluted Column Elevated Storage Tank (City Hall Tank) that involves repainting all interior and exterior surfaces, replacement of issues that currently exist on the tank, and replacement of tank lighting.

City of Jamestown

List of Contracts

DW20260109

J-2026-1

Rye Engineering, PLC
4210 West Main Street
Erin, TN 37061

ADVERTISEMENT FOR BIDS

Project No. J-2026-1

City of Jamestown (Owner)

Separate sealed bids for 2024 ARC Grant Jamestown Tank Rehabilitation for
the rehabilitation of the City Hall 1.0 MG Elevated Water Storage Tank
will be received by City of Jamestown
at the office of Jamestown City Hall; 314 E Central Ave, Jamestown TN 38556
until 10:00 o'clock A.M., C.S.T. May 5th, 2026, and then at said office
publicly opened and read aloud.

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:

Online at ryeengineering.com or at the Issuing Office, Monday through Friday between the hours of 8:30 am - 4:00 pm

and may obtain copies of the Bidding Documents as described below.

Copies may be obtained at the office of Rye Engineering, PLC
located at 4210 West Main Street, Erin, TN 37061 upon payment of \$ 100.00
for each set. Any unsuccessful bidder, upon returning each set promptly and in good
condition, will be refunded his payment, and any non-bidder upon so returning such a set
will be refunded \$ 100.00.

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.

All bidders must be licensed General Contractors as required by the Contractor's
Licensing Act of 1994 of the General Assembly of the State of Tennessee, and qualified
for the type of construction being bid upon.

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,
Section 3, Segregated Facility, Section 109 and E.O. 11246.

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

03/31/2026 (Date) Harvey Stowers, Mayor

INFORMATION FOR BIDDERS

1. Receipt and Opening of Bids

The City of Jamestown (herein called the "Owner"), invites bids on the form attached hereto, all blanks of which must be appropriately filled in. Bids will be received by the Owner at the office of

City of Jamestown until 10:00 o'clock A.M.
March 5th 2026 and then at said office publicly opened and read aloud. The envelopes containing the bids must be sealed, addressed to Mayor Harvey Stowers at 314 E Central Ave. Jamestown, TN 38556 and designated as a bid for 2024 ARC Grant Jamestown Tank Rehabilitation.

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 and accompanied by Certification of Bidder Regarding Equal Employment Opportunity, Acknowledgment Regarding Bidder SAM Registration, Certification of Bidder Regarding Section 3 and Segregated Facilities, and Drug-Free Workplace Affidavit. All blank spaces for bid prices must be filled in, in ink or typewritten, in both words and figures, and the foregoing Certifications must be fully completed and executed when submitted.

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, license number, expiration date thereof, and license classification of the contractor applying to bid for the prime contract, and for the electrical, plumbing, heating, ventilation, and air conditioning contracts, and all other information required by State law..

All bidders must be licensed General Contractors as required by the Contractor's Licensing Act of 1994 of the General Assembly of the State of Tennessee, and qualified for the type of construction being bid upon. Each bidder shall write on the outside of the envelope containing its bid: 1) its Contractor's license number; 2) that part of the classification applying to the bid. If this is not done, the bid will not be opened.

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:

- a. Must be acceptable to the owner; and
- b. Must submit Certification by Proposed Subcontractor Regarding Equal Employment Opportunity, and Certification of Proposed Subcontractor Regarding Section 3 and Segregated Facilities. Approval of the proposed subcontract award cannot be given by the owner unless and until the proposed subcontractor has submitted the Certifications and/or other evidence showing that it has fully complied with any reporting requirements to which it is or was subject.

Although the bidder is not required to attach such Certifications by proposed subcontractors to his/her bid, the bidder is here advised of this requirement so that appropriate action can be taken to prevent subsequent delay in subcontract awards.

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 prices 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 the following bid(s):

Unit Price

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 he/she 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 to refuse to execute and deliver the contract and bonds required within 10 days after she/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 180 consecutive calendar days thereafter. Bidder must agree also to pay as liquidated damages, the sum of \$ 250.00 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 Seth W. Rye, P.E. and Micah Westerman, P.E. at srye@ryeengineering.com and mwesterman@ryeengineering.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 or emailed to all prospective bidders (at the respective addresses furnished for such purposes), not later than two 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. Stated 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 Qualified Bidder:

After receiving bids and determining the amount of funds estimated by the OWNER as available to finance the contract, the OWNER will award the contract to the lowest responsible bidder. The lowest responsible bidder will be determined upon the basis of the lowest base bid or lowest base bid combined with alternates (additive or deductive). If the contract is to be awarded based on the lowest base bid with alternates, alternates will be accepted in the numerical order in which they are listed in the Form of Bid.

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 or 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.

BID BOND

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

as Principal, and _____
as Surety, are hereby held and firmly bound unto _____
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

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 his 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 and agrees that the obligations of said Surety and its bond shall be in no way impaired or affected by an 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 hand 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.

SEAL

_____(L.S.)
Principal

Surety
By: _____

BID FOR UNIT PRICE CONTRACTS

Place _____

Date _____

Project No. J-20261

Proposal of _____ (hereinafter called "Bidder")¹ a corporation, organized and existing under the laws of the State of _____, partnership, or an individual doing business as _____.

To the _____ (hereinafter called "Owner")

Gentlemen:

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

_____, 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 _____ consecutive calendar days thereafter as stipulated in the specifications. Bidder further agrees to pay as liquidated damages the sum of \$_____ for each consecutive calendar day thereafter as hereinafter provided in Paragraph 3.c. of the Supplemental General Conditions.

¹ _____
Insert corporation, partnership or individual as applicable.

Bidder acknowledges receipt of the following addendum:

Bidder agrees to perform all the _____ work described in the specifications and shown on the plans, for the following unit prices:

Base Bid:

Item	Description	Quantity	Unit	Unit Price	Total Price
1	Complete Rehabilitation of the Jamestown City Hall One Million Gallon Elevated Fluted Column Water Storage Tank, including interior and exterior sandblasting, cleaning, and recoating of all tank surfaces, and all appurtenances and incidentals required for a complete rehabilitation in accordance with the plans and specifications.	1	LS		
				Dollars & Cents	Dollars & Cents
				(\$)	(\$)
2	Electrical / Lighting Improvements, including removal and replacement of existing tank lighting, complete in accordance with the plans and specifications.	1	LS		
				Dollars & Cents	Dollars & Cents
				(\$)	(\$)
3	Containment System, including provision of full containment for blasting and coating operations, complete in accordance with the plans and specifications.	1	LS		
				Dollars & Cents	Dollars & Cents
				(\$)	(\$)
4	Pit Filling as required for work not included in other bid items.	150	SI		
				Dollars & Cents	Dollars & Cents
				(\$)	(\$)

5	Pit Welding as required for work not included in other bid items.	150	SI		
				Dollars & Cents	Dollars & Cents
				(\$)	(\$)
6	Seam Welding as required for work not included in other bid items.	100	LF		
				Dollars & Cents	Dollars & Cents
				(\$)	(\$)
7	Plate Welding as required for work not included in other bid items.	25	SF		
				Dollars & Cents	Dollars & Cents
				(\$)	(\$)
Total of All Base Bid Items					(\$)

Total of All Base Bid Items Written (Dollars & Cents)

(Amounts are to 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.

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 days after the scheduled closing time for receiving bids.

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

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

Respectfully submitted,

By: _____
(Title)

(SEAL - if bid is by a corporation)

ACKNOWLEDGEMENT REGARDING BIDDER SAM REGISTRATION

Pursuant to 2 CFR Parts 183 and 215 and the requirement of the U.S. Department of Housing and Urban Development (HUD), contractors procured directly by grantees, sub-grantees, and/or sub-recipients of HUD funds, including CDBG are required to have an active registration in the System of Award Management (SAM). This document shall be completed and submitted as part of the bid proposal.

1. By submitting this proposal, the prospective bidder acknowledges that it must have an active SAM UEI (Unique Entity ID) to be awarded this contract and that without an active SAM UEI the bidder's proposal may be disallowed.
2. By submitting this proposal, the prospective bidder certifies neither it, its principals nor affiliates, is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.
3. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that an erroneous certification was rendered, in addition to other remedies available to the Federal Government, the Department or agency with which this transaction originated may pursue available remedies.
4. Further, the prospective bidder shall provide immediate written notice to the person to which this proposal is submitted if at any time the Participant learns that this certification was erroneous when submitted or has become erroneous by reason of changed circumstances.
5. By submitting this proposal, it is agreed that should the proposed covered transaction be entered into, the prospective bidder will not knowingly enter into any lower-tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction unless authorized by the agency with which this transaction originated.
6. It is further agreed that by submitting this proposal, the prospective bidder will include Certification of Subcontractor Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion without modification, in all lower-tier covered transactions and in all solicitations for lower-tier covered transactions.

Provide the following information as detailed in the prospective bidder's SAM registration:

Entity Name: _____

Address: _____

City: _____ State: _____ Zip: _____

SAM Entity ID: _____ Expiration Date: _____

Active Exclusions: ☐ Yes ☐ No

CERTIFICATION OF BIDDER REGARDING EQUAL EMPLOYMENT OPPORTUNITY

This certification is required pursuant to Executive Order 11246 (30 F. R. 12319-25). The implementing rules and regulations provide that any bidder or prospective contractor, or any of their proposed subcontractors, shall state as an initial part of the bid or negotiations of the contract whether it has participated in any previous contract or subcontract subject to the equal opportunity clause; and, if so, whether it has filed all compliance reports due under applicable instructions.

Where the certification indicates that the bidder has not filed a compliance report due under applicable instructions, such bidder shall be required to submit a compliance report within seven calendar days after bid opening. No contract shall be awarded unless such report is submitted.

Certification by Bidder

Bidder/Firm: _____

Address: _____

City: _____ State _____ Zip _____

1. Bidder has participated in a previous contract or subcontract subject to the Equal Opportunity Clause. ☐ Yes ☐ No
2. Compliance reports were required to be filed in connection with such contract or subcontract. ☐ Yes ☐ No
3. Bidder has filed all compliance reports due under applicable instructions, including SF-100. ☐ Yes ☐ No ☐ None Req.
4. Have you ever been or are you being considered for sanction due to violation of Executive Order 11246, as amended? ☐ Yes ☐ No

Bidder Name: _____

Title: _____

Signature: _____

Date: _____

CERTIFICATION OF BIDDER REGARDING USE OF FEMALE/MINORITY SUBCONTRACTORS

This certification is required for the contractor to demonstrate that when subcontractors are to be used on this project, an attempt will be made to utilize female/minority owned firms.

Documentation must be on file to show who has been contacted.

Certification by Bidder

Bidder/Firm: _____

Address: _____

City: _____ State: _____ Zip: _____

I, _____, certify that every attempt was made to utilize female/minority contractors on this project.

Bidder Name: _____

Title: _____

Signature: _____

Date: _____

CERTIFICATION OF SUBCONTRACTOR REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND EXCLUSION

Pursuant to 2 CFR Parts 183, 215, and 2424, and the requirement of the U.S. Department of Housing and Urban Development (HUD), subcontractors for projects that are funded in whole or in part by HUD funds must provide information concerning the entity's debarment, suspension, ineligibility or exclusion status. This document shall be completed and provided to the prime contractor.

1. By signing and submitting this proposal, the prospective lower-tier participant certifies that neither it, its principals nor affiliates, is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency. Further, the Participant provides the certification set out below:
2. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that an erroneous certification was rendered, in addition to other remedies available to the Federal Government, the Department or agency with which this transaction originated may pursue available remedies.
3. Further, the Participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the Participant learns that this certification was erroneous when submitted or has become erroneous by reason of changed circumstances.
4. By submitting this document, it is agreed that should the proposed covered transaction be entered into, the Participant will not knowingly enter into any lower-tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction unless authorized by the agency with which this transaction originated.

The subcontracting entity may satisfy the requirement of this document via one of the two options below:

Option 1: SAM.gov Active Registration

Entity Name: _____

Address: _____

City: _____ State: _____ Zip: _____

SAM Entity ID: _____ Expiration Date: _____

Active Exclusions: ☐ Yes ☐ No

Option 2: Signed Certification

Entity Name: _____

Address: _____

City: _____ State: _____ Zip: _____

Entity Representative: _____ Title: _____

Signature: _____

CERTIFICATION OF BIDDER REGARDING SECTION 3 AND SEGREGATED FACILITIES

NAME OF PRIME CONTRACTOR: _____

PROJECT NUMBER: J-2026-1

The undersigned hereby certifies that

- Section 3 provisions are included in the Contract.
- This grant project exceeds \$200,000 of CDBG assistance, and the contractor will comply with all Section 3 requirements detailed in the CDBG Manual, including:
 - reporting total labor hours worked,
 - reporting total labor hours worked by Section 3 workers,
 - reporting total labor hours worked by Targeted Section 3 workers,
 - Providing documentation of Section 3 worker status as required for all workers for the project under the covered contract.
- No segregated facilities will be maintained as required by Title VI of the Civil Rights Act of 1964.

Name & Title of Signer (Print or Type)

Signature

Date

DRUG-FREE WORKPLACE AFFIDAVIT

STATE OF _____

COUNTY OF _____

The undersigned, principal officer of _____, an employer of five (5) or more employees contracting with _____ 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____.

My commission expires: _____

Notary Public

CERTIFICATION BY PROPOSED SUBCONTRACTOR REGARDING EQUAL EMPLOYMENT OPPORTUNITY

NAME OF PRIME CONTRACTOR: _____

PROJECT NUMBER: J-2026-1

This certification is required pursuant to Executive Order 11246 (30 F. R. 12319-25). The implementing rules and regulations provide that any bidder or prospective contractor, or any of their proposed subcontractors, shall state as an initial part of the bid or negotiations of the contract whether it has participated in any previous contract or subcontract subject to the equal opportunity clause; and, if so, whether it has filed all compliance reports due under applicable instructions.

Where the certification indicates that the subcontractor has not filed a compliance report due under applicable instructions, such subcontractor shall be required to submit a compliance report before the owner approves the subcontract or permits work to begin under the subcontract.

SUBCONTRACTOR'S CERTIFICATION

Subcontractor Name: _____

Address: _____

City: _____ State _____ Zip _____

1. Bidder has participated in a previous contract or subcontract subject to the Equal Opportunity Clause. ☐ Yes ☐ No
2. Compliance reports were required to be filed in connection with such contract or subcontract. ☐ Yes ☐ No
3. Bidder has filed all compliance reports due under applicable instructions, including SF-100. ☐ Yes ☐ No ☐ None Req.
4. Have you ever been or are you being considered for sanction due to violation of Executive Order 11246, as amended? ☐ Yes ☐ No

Name: _____

Title: _____

Signature: _____

Date: _____

CERTIFICATION OF PROPOSED SUBCONTRACTOR REGARDING SECTION 3 AND SEGREGATED FACILITIES

NAME OF SUBCONTRACTOR: _____

PROJECT NUMBER: J-2026-1

The undersigned hereby certifies that

- Section 3 provisions are included in the Contract.
- If contract equals or exceeds \$200,000, the contractor will comply with all Section 3 requirements detailed in the CDBG Manual, including:
 - reporting total labor hours worked,
 - reporting total labor hours worked by Section 3 workers,
 - reporting total labor hours worked by Targeted Section 3 workers,
 - Providing documentation of Section 3 worker status as required for all workers for the project under the covered contract.
- No segregated facilities will be maintained as required by Title VI of the Civil Rights Act of 1964.
-

Name & Title of Signer (Print or Type)

Signature

Date

STATEMENT OF COMPLIANCE CERTIFICATE ILLEGAL IMMIGRANT

EACH CONTRACTOR BIDDING SHALL FILL IN AND SIGN THE FOLLOWING

Bidder Name: _____

Address: _____

City: _____ State _____ Zip _____

This is to certify that _____ have fully complied with all the requirements of T.C.A. § 12-3-309, stating:

- (1) No state governmental entity shall contract to acquire goods or services from any person who knowingly utilizes the services of illegal immigrants in the performance of a contract for goods or services entered into with a state governmental entity;
- (2) No person may contract to supply goods or services to a state governmental entity if that person knowingly utilizes the services of illegal immigrants in the performance of a contract to supply goods or services entered into with the state or a state entity.

All Bidders for construction services on this project shall be required to submit an affidavit (by executing this compliance document) as part of their bid, that attests that such Bidder shall comply with requirements of T.C.A. § 12-3-309.

Name: _____

Title: _____

Signature: _____

Date: _____

CERTIFICATION OF NON-BOYCOTT OF ISRAEL

The Bidder certifies that it is not currently engaged in, and will not for the duration of the contract engage in, a boycott of Israel as defined by Tenn. Code Ann. § 12-4-119. This provision shall not apply to contracts with a total value of less than two hundred fifty thousand dollars (\$250,000) or to contractors with less than ten (10) employees.

According to the law, a boycott of Israel means engaging in refusals to deal, terminating business activities, or other commercial actions that are intended to limit commercial relations with Israel, or companies doing business in or with Israel or authorized by, licensed by, or organized under the laws of the State of Israel to do business, or persons or entities doing business in Israel, when such actions are taken:

- 1) In compliance with, or adherence to, calls for a boycott of Israel, or
- 2) In a manner that discriminates on the basis of nationality, national origin, religion, or other unreasonable basis, and is not based on a valid business reason. Tenn. Code Ann. § 12-4-119.

I certify this statement to be true and correct.

Bidder Name Printed

Date

Signature of Bidder

Company

SECTION 00412

IRAN DIVESTMENT ACT CERTIFICATION

SUBJECT CONTRACT NUMBER(S): J-2026-1

CONTRACTOR LEGAL ENTITY NAME:

EDISON SUPPLIER IDENTIFICATION NUMBER:

The Iran Divestment Act, Tenn. Code Ann. § 12-12-101 et. seq. requires a person that attempts to contract with the state, including a contract renewal or assumption, to certify at the time the bid is submitted or the contract is entered into, renewed, or assigned, that the person or the assignee is not identified on a list created pursuant to § 12-12-106.

Currently, the list is available online at the following website: <https://www.tn.gov/generalservices/procurement/central-procurement-office--cpo-/library-/public-information-library.html>

The Contractor, identified above, certifies by signature below that it is not included on the list of persons created pursuant to Tenn. Code Ann. § 12-12-106 of the Iran Divestment Act.

CONTRACTOR SIGNATURE

NOTICE: This certification MUST be signed by an individual with legal capacity to contractually bind the Contractor.

PRINTED NAME AND TITLE OF SIGNATORY

DATE

CERTIFICATION OF COMPLIANCE WITH THE BUILD AMERICA, BUY AMERICA ACT (BABA)

This document is used to certify that, as required by the Build America, Buy America (BABA) Act, all of the iron, steel, manufactured products, and construction materials incorporated into an infrastructure project are produced in the United States, unless exempted by a HUD general waiver or a project-/product-specific waiver approved by the Made in America Office (MIAO) at the Office of Management and Budget (OMB).

For covered materials not otherwise exempted from the Buy America Preference (BAP), the undersigned certifies the following:

- All iron and steel used in the project are produced in the United States. This means all manufacturing processes, from the initial melting stage through the application of coatings, occurred in the United States;
- All manufactured products used in the project are produced in the United States. This means the manufactured product was manufactured in the United States, and the cost of the components of the manufactured product that are mined, produced, or manufactured in the United States is greater than 55 percent of the total cost of all components of the manufactured product, unless another standard that meets or exceeds this standard has been established under applicable law or regulation for determining the minimum amount of domestic content of the manufactured product;
- All construction materials used in the project are manufactured in the United States. This means that all manufacturing processes for the construction material occurred in the United States.

All BAP covered materials are noted within these plans and specifications. The signatory shall provide a list of all covered materials using the provided "BABA Covered Materials and Manufactured Goods List" document.

I hereby certify this information is complete and accurate and agree to provide documentation collected on the country of origin for all covered materials I caused to be incorporated into or affixed to an infrastructure project.

Bidder Name Printed

Date

Signature of Bidder

Company

**Certification
of
Compliance with Minimum Standards for Accessibility by the Physically Handicapped**

Contract No. J-2026-1

Project Name: 2024 ARC Grant Jamestown Tank Rehabilitation

Address: City of Jamestown

Pursuant to the requirements of the Architectural Barriers Act of 1968, 42 USC 4151, and the regulations issued subsequent thereto, the undersigned certifies that the design of the above-mentioned project is in conformance with the minimum standards contained in the American Standard Specifications for Making Buildings and Facilities Accessible To and Usable by the Physically Handicapped, Number A-117.1R-1971 (as modified by 41 CFR 101-19.603).

Professional Registrant for the Project:

Seth W. Rye

Legal Name and Address:

Seth W. Rye

4210 West Main Street

Erin, TN 37061

Registration Number:

106804

Name:

Seth W. Rye

(Signature)

Date:

11/12/25

Local Government Official:

(Signature)

Status of Land Acquisition

All permanent easements, land purchases, city/county/state right of ways, Department of Transportation, Corps of Engineers and railroad permits and any other land access agreements must be obtained and recorded (if applicable) with the appropriate agencies prior to ECD approval of plans and specifications.

Please check the following boxes and sign below:

Yes No N/A

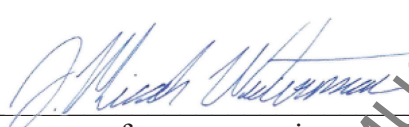
☐ ☐ ☒ All permanent easements necessary for the construction of this project have been acquired and recorded with the appropriate agency.

☐ ☐ ☒ All land acquisition necessary for the construction of this project has been acquired and recorded with the appropriate agency.

☐ ☐ ☒ All right-of-ways, permits, and land access agreements necessary for the construction of this project have been acquired and recorded with the appropriate agency(s).

OR

☐ ☐ ☒ The construction of this project requires no acquisition of land, permanent easements, right-of-ways, permits or land access agreements.



Signature of grantee, engineer/architect,
or project administrator

03/20/2026

Date

**This form must be sent to ECD before we
can approve plans and specifications.**



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 determined to be non-responsive bidders/offers pursuant to the New York State Iran Divestment Act of 2012."

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 Melli Iran
6. Bank Saderat Iran
7. Bank Sepah
8. Bank Tejarat
9. China Precision Machinery Import- Export Corporation (CPMIEC)
10. ChinaOil (China National United Oil Corporation)
11. China National Offshore Oil Corporation (CNOOC)
12. China National Petroleum Corporation (CNPC)
13. Indian Oil Corporation
14. Kingdream PLC
15. Naftiran Intertrade Co. (NICO)
16. National Iranian Tanker Co. (NITC)
17. Oil and Natural Gas Corporation (ONGC)
18. Oil India, Ltd.
19. Persia International Bank
20. Petroleos de Venezuela (PDVSA Petróleo, SA)
21. PetroChina Co., Ltd.
22. Petronet LNG, Ltd.
23. Sameh Alzar 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. Unipet (China International United Petroleum & Chemicals Co., Ltd.)
31. Zhuhai Zhenrong Co.

"General Decision Number: TN20260157 01/02/2026

Superseded General Decision Number: TN20250157

State: Tennessee

Construction Type: Building

BUILDING CONSTRUCTION PROJECTS (does not include single family homes or apartments up to and including 4 stories)

Counties: Fentress and Hancock Counties in Tennessee.

BUILDING CONSTRUCTION PROJECTS (does not include single family homes or apartments up to and including 4 stories).

Modification Number Publication Date
0 01/02/2026

ENGI0917-002 05/01/2024

	Rates	Fringes
POWER EQUIPMENT OPERATOR (Crane).....	\$ 36.25	13.40

ENGI0917-006 05/01/2024

	Rates	Fringes
POWER EQUIPMENT OPERATOR Backhoe/Trackhoe/Excavator..	\$ 33.23	13.40
Bulldozer.....	\$ 33.23	13.40

SHEE0005-001 05/01/2025

	Rates	Fringes
SHEET METAL WORKER.....	\$ 37.70	17.40

SUTN2017-010 04/16/2021

	Rates	Fringes
CARPENTER.....	\$ 16.12	0.00
CEMENT MASON/CONCRETE FINISHER...	\$ 19.00	0.00
ELECTRICIAN.....	\$ 22.00	11.77
IRONWORKER, STRUCTURAL.....	\$ 19.83	0.00
LABORER: Common or General.....	\$ 11.94	0.00
LABORER: Mason Tender - Cement/Concrete.....	\$ 15.00	0.00
PAINTER (Brush and Roller).....	\$ 14.07	0.00
PLUMBER.....	\$ 18.96	0.00

WELDERS - Receive rate prescribed for craft performing

operation to which welding is incidental.

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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>.

Note: Executive Order 13658 generally applies to contracts subject to the Davis-Bacon Act that were awarded on or between January 1, 2015 and January 29, 2022, and that have not been renewed or extended on or after January 30, 2022. Executive Order 13658 does not apply to contracts subject only to the Davis-Bacon Related Acts regardless of when they were awarded. If a contract is subject to Executive Order 13658, the contractor must pay all covered workers at least \$13.30 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 2025. The applicable Executive Order minimum wage rate will be adjusted annually. Additional information on contractor requirements and worker protections under Executive Order 13658 is available at www.dol.gov/whd/govcontracts.

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 classifications and wage rates that have been found to be prevailing for the type(s) of construction and geographic area covered by the wage determination. The classifications are listed in alphabetical order under rate identifiers indicating whether the particular rate is a union rate (current union negotiated rate), a survey rate, a weighted union average rate, a state adopted rate, or a supplemental classification rate.

Union Rate Identifiers

A four-letter identifier beginning with characters other than ""SU"", ""UAVG"", ?SA?, or ?SC? denotes that a union rate was prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2024. PLUM is an identifier of the union whose collectively bargained rate 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. The date, 07/01/2024 in the example, is the effective date of the most current negotiated rate.

Union prevailing wage rates are updated to reflect all changes over time that are reported to WHD in the rates in the collective bargaining agreement (CBA) governing the classification.

Union Average Rate Identifiers

The UAVG identifier indicates that no single rate prevailed for those classifications, but that 100% of the data reported for the classifications reflected union rates. EXAMPLE:

UAVG-OH-0010 01/01/2024. UAVG indicates that the rate is a weighted union average rate. OH indicates the State of Ohio. The next number, 0010 in the example, is an internal number used in producing the wage determination. The date, 01/01/2024 in the example, indicates the date the wage determination was updated to reflect the most current union average rate.

A UAVG rate will be updated once a year, usually in January, to reflect a weighted average of the current rates in the collective bargaining agreements on which the rate is based.

Survey Rate Identifiers

The ""SU"" identifier indicates that either a single non-union rate prevailed (as defined in 29 CFR 1.2) for this classification in the survey or that the rate was derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As a weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SUFL2022-007 6/27/2024. SU indicates the rate is a single non-union prevailing rate or a weighted average of survey data for that classification. FL indicates the State of Florida. 2022 is the year of the 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. The date, 6/27/2024 in the example, indicates the survey completion date for the classifications and rates under that identifier.

?SU? wage rates typically remain in effect until a new survey is conducted. However, the Wage and Hour Division (WHD) has the discretion to update such rates under 29 CFR 1.6(c)(1).

State Adopted Rate Identifiers

The ""SA"" identifier indicates that the classifications and prevailing wage rates set by a state (or local) government were adopted under 29 C.F.R 1.3(g)-(h). Example: SAME2023-007 01/03/2024. SA reflects that the rates are state adopted. ME refers to the State of Maine. 2023 is the year during which the state completed the survey on which the listed classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. The date, 01/03/2024 in the example, reflects the date on which the classifications and rates under the ?SA? identifier took effect under state law in the state from which the rates were adopted.

WAGE DETERMINATION APPEALS PROCESS

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

- a) a survey underlying a wage determination
- b) an existing published wage determination
- c) an initial WHD letter setting forth a position on a wage determination matter
- d) an initial conformance (additional classification and rate) determination

On survey related matters, initial contact, including requests for summaries of surveys, should be directed to the WHD Branch of Wage Surveys. Requests can be submitted via email to davisbaconinfo@dol.gov or by mail to:

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

Regarding any other wage determination matter such as conformance decisions, requests for initial decisions should be directed to the WHD Branch of Construction Wage Determinations. Requests can be submitted via email to BCWD-Office@dol.gov or by mail 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 an initial decision has been issued, then any interested party (those affected by the action) that disagrees with the decision can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Requests for review and reconsideration can be submitted via email to dba.reconsideration@dol.gov or by mail 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 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.

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END OF GENERAL DECISION

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TO BID, CONTRACTOR MUST OBTAIN DOCUMENTS FROM ISSUING OFFICE

"General Decision Number: TN20260122 01/02/2026

Superseded General Decision Number: TN20250122

State: Tennessee

Construction Type: Heavy
Including Water and Sewer Line Construction

Counties: Campbell, Claiborne, Clay, Cumberland, De Kalb,
Fentress, Hancock, Jackson, Morgan, Overton, Pickett, Putnam
and White Counties in Tennessee.

HEAVY CONSTRUCTION PROJECTS (including sewer/water
construction).

Modification Number Publication Date
0 01/02/2026

ENGI0917-021 05/01/2024

	Rates	Fringes
Operating Engineers:		
Bulldozer and Crane.....	\$ 33.23	13.40

SUTN2009-121 12/02/2009		

	Rates	Fringes
ELECTRICIAN.....	\$ 20.06	0.00
LABORER: Common or General.....	\$ 10.00	0.00
LABORER: Flagger.....	\$ 10.50	0.00
LABORER: Pipelayer.....	\$ 11.90	0.79
OPERATOR:		
Backhoe/Excavator/Trackhoe.....	\$ 16.48	0.48
TRUCK DRIVER: Dump Truck.....	\$ 11.63	0.81

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

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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>.

Note: Executive Order 13658 generally applies to contracts subject to the Davis-Bacon Act that were awarded on or between January 1, 2015 and January 29, 2022, and that have not been renewed or extended on or after January 30, 2022. Executive Order 13658 does not apply to contracts subject only to the Davis-Bacon Related Acts regardless of when they were awarded. If a contract is subject to Executive Order 13658, the contractor must pay all covered workers at least \$13.30 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 2025. The applicable Executive Order minimum wage rate will be adjusted annually. Additional information on contractor requirements and worker protections under Executive Order 13658 is available at www.dol.gov/whd/govcontracts.

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A UAVG rate will be updated once a year, usually in January, to reflect a weighted average of the current rates in the collective bargaining agreements on which the rate is based.

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WAGE DETERMINATION APPEALS PROCESS

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

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

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

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END OF GENERAL DECISION

"

AGREEMENT

THIS AGREEMENT, made this _____ day of _____, 20____, by and between The City of Jamestown, herein called "Owner", acting herein through its _____, and _____,

STRIKE OUT (a corporation) (a partnership)
INAPPLICABLE (an individual doing business as _____)
TERMS

of _____, County of _____ and State 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: 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 _____, 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 180 consecutive calendar days thereafter. The Contractor further agrees to pay, as liquidated damages, the sum of \$ 250.00 for each consecutive calendar day thereafter as hereinafter provided in Paragraph 3 of the Supplemental General Conditions.

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.

(Seal)
ATTEST:

(Owner)

(Secretary)

By: _____

(Witness)

(Title)

(Seal)

(Contractor)

(Secretary)

By: _____

(Witness)

(Title)

(Address, City, State, and Zip Code)

BONDING AND INSURANCE

1. This Attachment sets forth bonding and insurance requirements for grants. No other bonding and insurance requirements shall be imposed other than those normally required by the grantee.
2. Except as otherwise required by law, a grant that requires the contracting (or subcontracting) for construction or facility improvements shall provide for the grantee to follow its own requirements relating to bid guarantees, performance bonds, and payment bonds unless the construction contract or subcontract exceeds \$150,000 (See 2 CFR 200.88). For those contracts or subcontracts exceeding \$150,000, the Federal agency may accept the bonding policy and requirements of the grantee provided the Federal agency has made a determination that the Government's interest is adequately protected. If such a determination has not been made, the minimum requirements shall be as follows:
 - a. A bid guarantee from each bidder equivalent to five percent of the bid price. The "bid guarantee" shall consist of a firm commitment such as a bid bond, certified check, or other negotiable instrument accompanying a bid as assurance that the bidder will, upon acceptance of his bid, execute such contractual documents as may be required within the time specified.
 - b. A performance bond on the part of the contractor for 100 percent of the contract price. A "performance bond" is one executed in connection with a contract to secure fulfillment of all the contractor's obligations under such contract.
 - c. A payment bond on the part of the contractor for 100 percent of the contract price. A "payment bond" is one executed in connection with a contract to assure payment as required by law of all persons supplying labor and material in the execution of the work provided for in the contract.
3. Where the Federal Government guarantees or insures the repayment of money borrowed by the grantee, the Federal agency, at its discretion, may require adequate bonding and insurance if the bonding and insurance requirements of the grantee are not deemed adequate to protect the interest of the Federal Government.
4. Where bonds are required in the situations described above, the bonds shall be obtained from companies holding certificates of authority as acceptable sureties (31 CFR 223).

NOTE: AIA Document A311 is acceptable for use as Performance and Payment Bonds.

CERTIFICATE OF OWNER'S ATTORNEY

I, the undersigned, _____, the duly authorized
and acting legal representative of the City of Jamestown
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 to 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: _____

Community Development Block Grant Program GENERAL CONDITIONS

1. Contract and Contract Documents

The project to be constructed and pursuant to this contract will be financed with assistance from the Tennessee Community Development Block 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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5	BONDS AND INSURANCE	15
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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:

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

1.2. *Agreement*--The written contract 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.

1.3. *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 be accompanied by such supporting documentation as is required by the Contract Documents.

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

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

1.6. *Bidding Documents*--The advertisement or invitation to Bid, instructions to bidders, the Bid form, and the proposed Contract Documents (including all Addenda issued prior to receipt of Bids).

1.7. *Bidding Requirements*--The advertisement or invitation to Bid, instructions to bidders, and the Bid form.

1.8. *Bonds*--Performance and Payment bonds and other instruments of security.

1.9. *Change Order*--A document recommended by ENGINEER, which is signed by CONTRACTOR and OWNER and authorizes an addition, deletion or revision in the Work or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement.

1.10. *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 Notice to Proceed, 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 Written Amendments, Change Orders, Work Change Directives, Field Orders and ENGINEER's written interpretations and classifications issued pursuant to paragraphs 3.5, 3.6.1, and 3.6.3 on or after the Effective Date of the Agreement. Shop Drawing submittals approved pursuant to paragraphs 6.26 and 6.27 and the reports and drawings referred to in paragraphs 4.2.1.1 and 4.2.2.2 are not Contract Documents.

1.11. *Contract Price*--The moneys payable by OWNER to CONTRACTOR for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of paragraph 11.9.1 in the case of Unit Price Work).

1.12. *Contract Times*--The numbers of days or the dates stated in the Agreement: (i) to achieve Substantial Completion, and (ii) to complete the Work so that it is ready for final payment as evidenced by ENGINEER's written recommendation of final payment, in accordance with paragraph 14.13.

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

1.14. *defective*--An adjective which when modifying the word Work refers to Work that is unsatisfactory, faulty or deficient, in that it 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).

1.15. *Drawings*--The drawings which show the scope, extent and character of the Work to be furnished and performed by CONTRACTOR and which have been prepared or approved by ENGINEER and are referred to in the Contract Documents. Shop drawings are not Drawings as so defined.

1.16. *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.

1.17. *ENGINEER*--The person, firm or corporation named as such in the Agreement.

1.18. *ENGINEER's Consultant*--A person, firm, or corporation having a contract with ENGINEER to furnish services as ENGINEER's independent professional associate or consultant with respect to the Project and who is identified as such in the Supplementary Conditions.

1.19. *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 Times.

1.20. *General Requirements*--Sections of Division 1 of the Specifications.

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

1.22. *Laws and Regulations: Laws or Regulations*--Any and all applicable laws, rules, regulations, ordinances, codes and orders of any and all governmental bodies, agencies, authorities and courts having jurisdiction.

1.23. *Liens*--Liens, charges, security interests or encumbrances upon real property or personal property.

1.24. *Milestone*--A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.

1.25. *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.

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

1.27. *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.

1.28. *Partial Utilization*--Use by OWNER of a substantially completed part of the Work for the purpose for which it is intended (or a related purpose) prior to Substantial Completion of all the Work.

1.29. *PCBs*--Polychlorinated biphenyls.

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

1.31. *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.

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

1.33. *Resident Project Representative*--The authorized representative of ENGINEER who may be assigned to the site or any part thereof.

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

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

1.36. *Specification*--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.

1.37. *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.

1.38. *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 purposes for which it is intended; or if no such certificate is issued, when the Work is complete and ready for final payment as evidenced by ENGINEER's written recommendation of final payment in accordance with paragraph 14.13. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion thereof.

1.39. *Supplementary Conditions*--The part of the Contract Documents which amends or supplements these General Conditions.

1.40. *Supplier*--A manufacturer, fabricator, supplier, distributor, materialman or vendor having a direct contract with CONTRACTOR or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by CONTRACTOR or any Subcontractor.

1.41. *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.

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

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

1.44. *Work Change Directive*--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 6.23. A Work Change Directive will not change the Contract Price or the Contract Times, but is evidence that the parties expect that the change directed or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times as provided in paragraph 10.2.

1.45. *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 construction-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 Times; Notice to Proceed:

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

Starting the Work:

2.4. CONTRACTOR shall start to perform the Work on the date when the Contract Times commence to run, but no Work shall be done at the site prior to the date on which the Contract Times commence 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, ambiguity 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, ambiguity or discrepancy in the Contract Documents, unless CONTRACTOR knew or reasonably should 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. a preliminary progress schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract Documents;

2.6.2. a preliminary schedule for Shop Drawing and Sample submittals which will list each required submittal and the times for submitting, reviewing and processing such submittal;

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.

2.7. Before any Work at the site is started, CONTRACTOR and OWNER shall each deliver to the other, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance which either of them or any additional insured may reasonably request) which CONTRACTOR and OWNER respectively are required to purchase and maintain in accordance with paragraphs 5.4, 5.6 and 5.7.

Preconstruction Conference:

2.8. Within twenty days after the Contract Times start to run, but before any Work at the site is started, a conference attended by CONTRACTOR, ENGINEER and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in paragraph 2.6, procedures for handling Shop Drawings and other submittals, processing Applications for Payment and maintaining required records.

Initially Acceptable Schedules:

2.9. Unless otherwise provided in the Contract Documents, 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 review for acceptability to ENGINEER as provided below the schedules submitted in accordance with paragraph 2.6. CONTRACTOR shall have an additional ten days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to CONTRACTOR until the schedules are submitted to and acceptable to ENGINEER as provided below. The progress schedule will be acceptable to ENGINEER as providing an orderly progression of the Work to completion within any specified Milestones and the Contract Times, but such acceptance will neither impose on ENGINEER responsibility for the sequencing, scheduling or progress of the Work nor interfere with or relieve CONTRACTOR from CONTRACTOR's full responsibility therefore. CONTRACTOR's schedule of Shop Drawing and Sample submissions will be acceptable to ENGINEER as providing a workable arrangement for reviewing and processing the required submittals. CONTRACTOR's schedule of values will be acceptable to ENGINEER as to form and substance.

ARTICLE 3--CONTRACT DOCUMENT: 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 or from prevailing custom or trade usage as being required to produce the intended result will be furnished and performed whether or not specifically called for. When words or phrases which have a well-known technical or construction industry or trade meaning are used to describe Work, materials or equipment, such words or phrases shall be interpreted in accordance with that meaning. Clarifications and interpretations of the Contract Documents shall be issued by ENGINEER as provided in paragraph 9.4.

3.3. Reference to Standards and Specifications of Technical Societies; Reporting and Resolving Discrepancies:

3.3.1. Reference to standards, 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 in the Contract Documents.

3.3.2. If, during the performance of the Work, CONTRACTOR discovers any conflict, error, ambiguity or discrepancy within the Contract Documents or between the Contract Documents and any provision of any such Law or Regulation applicable to the performance of the Work or of any such standard, specification, manual or code or of any instruction of any Supplier referred to in paragraph 6.5, CONTRACTOR shall report it to ENGINEER in writing at once, and, CONTRACTOR shall not proceed with the Work affected thereby (except in an emergency as authorized by paragraph 6.23) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in paragraph 3.5 or 3.6; provided, however, that CONTRACTOR shall not be liable to OWNER or ENGINEER for failure to report any such conflict, error, ambiguity or discrepancy unless CONTRACTOR knew or reasonably should have known thereof.

3.3.3. Except as otherwise specifically stated in the Contract Documents or as may be provided by amendment or supplement thereto issued by one of the methods indicated in paragraph 3.5 or 3.6, the provisions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity or discrepancy between the provisions of the Contract Documents and:

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

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

No provision of any such standard, specification, manual, code or instruction shall be effective to change the duties and responsibilities of OWNER, CONTRACTOR or ENGINEER, or any of their subcontractors, consultants, agents, or employees from those set forth in the Contract Documents, nor shall it be effective to assign to OWNER, 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 inconsistent with the provisions of paragraph 9.13 or any other provision of the Contract Documents.

3.4. Whenever 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, in general, the completed Work for compliance with the requirements of and information in the Contract Documents and conformance with the

design concept of the completed Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective 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 9.13 or any other provision of the Contract Documents.

Amending and Supplementing Contract Documents:

3.5. 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:

3.5.1. a formal Written Amendment.

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

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

3.6. 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:

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

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

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

Reuse of Documents:

3.7. CONTRACTOR, and any Subcontractor or Supplier or other person or organization performing or furnishing any of the Work under a direct or indirect contract with OWNER (i) shall not have or acquire any title to or ownership rights in any of the Drawings, Specifications or other documents (or copies of any thereof) prepared by or bearing the seal of ENGINEER or ENGINEER's Consultant, and (ii) shall not reuse any of such Drawings, Specifications, other documents or copies on extensions of the Project or any other project without written consent of OWNER and ENGINEER and specific written verification or adaption by ENGINEER.

ARTICLE 4--AVAILABILITY OF LANDS; SUBSURFACE AND 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. Upon reasonable written request, OWNER shall furnish CONTRACTOR with a correct statement of record legal title and legal description of the lands upon which the Work is to be performed and OWNER's interest therein as necessary for giving notice of or filing a mechanic's lien against such lands in accordance with applicable Laws and Regulations. OWNER shall identify any encumbrances or restrictions not of general application but

specifically related to use of lands so furnished with which CONTRACTOR will have to comply in performing the Work. 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 and OWNER are unable to agree on entitlement to or the amount or extent of any adjustments in the Contract Price or the Contract Times as a result of any delay in OWNER's furnishing these lands, rights-of-way or easements, CONTRACTOR may make a claim therefore as provided in Articles 11 and 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.

4.2. Subsurface and Physical Conditions:

4.2.1. *Reports and Drawings:* Reference is made to the Supplementary Conditions for identification of:

4.2.1.1. *Subsurface Conditions:* Those reports of explorations and tests of subsurface conditions at or contiguous to the site that have been utilized by ENGINEER in preparing the Contract Documents; and

4.2.1.2. *Physical Conditions:* Those drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the site (except Underground Facilities) that have been utilized by ENGINEER in preparing the Contract Documents.

4.2.2. *Limited Reliance by CONTRACTOR Authorized: Technical Data:* CONTRACTOR may rely upon the general accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," CONTRACTOR may not rely upon or make any claim against OWNER, ENGINEER or any of ENGINEER's Consultants with respect to:

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

4.2.2.2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings, or

4.2.2.3. any CONTRACTOR interpretation of or conclusion drawn from any "technical data" or any such data, interpretations, opinions or information.

4.2.3. *Notice of Differing Subsurface or Physical Conditions:* If CONTRACTOR believes that any subsurface or physical condition at or contiguous to the site that is uncovered or revealed either:

4.2.3.1. is of such a nature as to establish that any "technical data" on which CONTRACTOR is entitled to rely as provided in paragraphs 4.2.1 and 4.2.2 is materially inaccurate, or

4.2.3.2. is of such a nature as to require a change in the Contract Documents, or

4.2.3.3. differs materially from that shown or indicated in the Contract Documents, or

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

CONTRACTOR shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as permitted by paragraph 6.23), notify OWNER and ENGINEER in writing about such condition. CONTRACTOR shall not further disturb such conditions or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.

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

4.2.5. *Possible Contract Documents Change:* If ENGINEER concludes that a change in the Contract Documents is required as a result of a condition that meets one or more of the categories in paragraph 4.2.3, a Work Change Directive or a Change Order will be issued as provided in Article 10 to reflect and document the consequences of such change.

4.2.6. *Possible Price and Times Adjustments:* An equitable adjustment in the Contract Price or in the Contract Times, or both, will be allowed to the extent that the existence of such uncovered or revealed condition causes an increase or decrease in CONTRACTOR's cost of, or time required for performance of, the Work; subject, however, to the following:

4.2.6.1. such condition must meet any one or more of the categories described in paragraphs 4.2.3.1 through 4.2.3.4, inclusive;

4.2.6.2. a change in the Contract Documents pursuant to paragraph 4.2.5 will not be an automatic authorization of nor a condition precedent to entitlement to any such adjustment;

4.2.6.3. with respect to Work that is paid for on a Unit Price Basis, any adjustment in Contract Price will be subject to the provisions of paragraphs 9.10 and 11.9; and

4.2.6.4. CONTRACTOR shall not be entitled to any adjustment in the Contract Price or Times if;

4.2.6.4.1. CONTRACTOR knew of the existence of such conditions at the time CONTRACTOR made a final commitment to OWNER in respect of Contract Price and Contract Times by the submission of a bid or becoming bound under a negotiated contract; or

4.2.6.4.2. the existence of such condition could reasonably have been discovered or revealed as a result of any examination, investigation, exploration, test or study of the site and contiguous areas required by the Bidding Requirements or Contract Documents to be conducted by or for CONTRACTOR prior to CONTRACTOR's making such final commitment; or

4.2.6.4.3. CONTRACTOR failed to give the written notice within the time and as required by paragraph 4.2.3.

If OWNER and CONTRACTOR are unable to agree on entitlement to or as to the amount or length of any such equitable adjustment in the Contract Price or Contract Times, a claim may be made therefore as provided in Articles 11 and 12. However, OWNER, ENGINEER and ENGINEER's Consultants shall not be liable to CONTRACTOR for any claims, costs, losses or damages sustained by CONTRACTOR on or in connection with any other project or anticipated project.

4.3. 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. The cost of all of the following will be included in the Contract Price and CONTRACTOR shall have full responsibility for: (i) reviewing and checking all such information and data, (ii) locating all Underground Facilities shown or indicated in the Contract Documents, (iii) coordination of the Work with the owners of such Underground Facilities during construction, and (iv) the safety and protection of all such Underground Facilities as provided in paragraph 6.20 and repairing any damage thereto resulting from the Work.

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, CONTRACTOR shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by paragraph 6.23), identify the owner of such Underground Facility and give written notice to that owner and to OWNER and ENGINEER. ENGINEER will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence of the Underground Facility. If ENGINEER concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued as provided in Article 10 to reflect and document such consequences. 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 Times, 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 that CONTRACTOR did not know of and could not reasonably have been expected to be aware of or to have anticipated. If OWNER and CONTRACTOR are unable to agree on entitlement to or the amount or length of any such adjustment in Contract Price or Contract Times, CONTRACTOR may make a claim therefore as provided in Articles 11 and 12. However, OWNER, ENGINEER and ENGINEER's Consultants shall not be liable to CONTRACTOR for any claims, costs, losses or damages incurred or sustained by CONTRACTOR on or in connection with any other project or anticipated project.

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, 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.

4.5. Asbestos, PCBs, Petroleum, Hazardous Waste or Radioactive Material:

4.5.1. OWNER shall be responsible for any Asbestos, PCBs, Petroleum, Hazardous Waste or Radioactive Material uncovered or revealed at the site which was not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work and which may present a substantial danger to persons or property exposed thereto in connection with the Work at the site. OWNER shall not be responsible for any such materials brought to the site by CONTRACTOR, Subcontractors, Suppliers or anyone else for whom CONTRACTOR is responsible.

4.5.2. CONTRACTOR shall immediately: (i) stop all Work in connection with such hazardous condition and in any area affected thereby (except in an emergency as required by paragraph 6.23), and (ii) notify OWNER and ENGINEER (and thereafter confirm such notice in writing). OWNER shall promptly consult with ENGINEER concerning the necessity for OWNER to retain a qualified expert to evaluate such hazardous condition or take corrective action, if any. CONTRACTOR shall not be required to resume Work in connection with such hazardous condition or in any such affected area until after OWNER has obtained any required permits related thereto and delivered to CONTRACTOR special written notice: (i) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work, or (ii) specifying any special conditions under which such Work may be resumed safely. If OWNER and CONTRACTOR cannot agree as to entitlement to or the amount or extent of an adjustment, if any, in Contract Price or Contract Times as a result of such Work stoppage or such special conditions under which Work is agreed by CONTRACTOR to be resumed, either party may make a claim therefore as provided in Articles 11 and 12.

4.5.3. If after receipt of such special written notice CONTRACTOR does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then OWNER may order such portion of the Work that is in connection with such hazardous condition or in such affected area to be deleted from the Work. If OWNER and CONTRACTOR cannot agree as to entitlement to or the amount or extent of an adjustment, if any, in Contract Price or Contract Times as a result of deleting such portion of the Work, then either party may make a claim therefore as provided in Articles 11 and 12. OWNER may have such deleted portion of the Work performed by OWNER's own forces or others in accordance with Article 7.

4.5.4. To the fullest extent permitted by Laws and Regulations, OWNER shall indemnify and hold harmless CONTRACTOR, Subcontractors, ENGINEER, ENGINEER's Consultants and the officers, directors, employees, agents, other consultants and subcontractors of each and any of them from and against all

claims, costs, losses and damages arising out of or resulting from such hazardous condition, provided that: (i) any such claim, cost, loss or damage is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting there from, and (ii) nothing in this subparagraph 4.5.4 shall obligate OWNER to indemnify any person or entity from and against the consequences of that person's or entity's own negligence.

4.5.5. The provisions of paragraphs 4.2 and 4.3 are not intended to apply to Asbestos, PCBs, Petroleum, Hazardous Waste or Radioactive Material uncovered or revealed at the site.

ARTICLE 5--BONDS AND INSURANCE

Performance, Payment 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 provided otherwise by Laws or Regulations 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 form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the 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 Government Financial Operations, U.S. Treasury Department. All Bonds signed by an agent must be accompanied by a certified copy of such agent's 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 ten days thereafter substitute another Bond and surety, both of which must be acceptable to OWNER.

5.3. Licensed Sureties and Insurers; Certificates of Insurance:

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

5.3.2. CONTRACTOR shall deliver to OWNER, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by OWNER or any other additional insured) which CONTRACTOR is required to purchase and maintain in accordance with paragraph 5.4. OWNER shall deliver to CONTRACTOR, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by CONTRACTOR or any other additional insured) which OWNER is

required to purchase and maintain in accordance with paragraphs 5.6 and 5.7 hereof.

CONTRACTOR's Liability Insurance:

5.4. CONTRACTOR shall purchase and maintain such liability and other insurance as is appropriate for the Work being performed and furnished and as will provided 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, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform or furnish any of the Work, or by anyone for whose acts any of them may be liable:

5.4.1. claims under workers' compensation, disability benefits and other similar employee benefit acts;

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

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

5.4.4. claims for damages insured by customary personal injury liability coverage which are sustained: (i) by any person as a result of an offense directly or indirectly related to the employment of such person by CONTRACTOR, or (ii) by any other person for any other reason;

5.4.5. 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 there from; and

5.4.6. claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle.

The policies of insurance so required by this paragraph 5.4 to be purchased and maintained shall:

5.4.7. with respect to insurance required by paragraphs 5.4.3. through 5.4.6 inclusive, include as additional insured (subject to any customary exclusion in respect of professional liability) OWNER, ENGINEER, ENGINEER's Consultants and any other persons or entities identified in the Supplementary Conditions, all of whom shall be listed as additional insured, and include coverage for the respective officers and employees of all such additional insured;

5.4.8. include the specific coverages and be written for not less than the limits of liability provided in the Supplementary Conditions or required by Laws or Regulations, whichever is greater;

5.4.9. include completed operations insurance;

5.4.10. include contractual liability insurance covering CONTRACTOR's indemnity obligations under paragraphs 6.12, 6.16 and 6.31 through 6.33;

5.4.11. 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 CONTRACTOR and to each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued (and the certificates of insurance furnished by the CONTRACTOR pursuant to paragraph 5.3.2 will so provide);

5.4.12. remain in effect at least until final payment and at all times thereafter when CONTRACTOR may be correcting, removing or replacing defective Work in accordance with paragraph 13.12; and

5.4.13. with respect to completed operations insurance, and any insurance coverage written on a claims-made basis, remain in effect for at least two years after final payment (and CONTRACTOR shall furnish OWNER and each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued evidence satisfactory to OWNER and any such additional insured of continuation of such insurance at final payment and one year thereafter).

OWNER's Liability Insurance:

5.5. In addition to the insurance required to be provided by CONTRACTOR under paragraph 5.4, OWNER, at OWNER's option, may purchase and maintain at OWNER's expense OWNER's own liability insurance as will protect OWNER against claims which may arise from operations under the Contract Documents.

Property Insurance:

5.6. Unless otherwise provided in the Supplementary Conditions, OWNER shall purchase and maintain property insurance upon the Work at the site in the amount of the full replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:

5.6.1. include the interests of OWNER, CONTRACTOR, Subcontractors, ENGINEER, ENGINEER's Consultants and any other persons or entities identified in the Supplementary Conditions, each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured;

5.6.2. be written on a Builder's Risk "all-risk" or open peril or special causes of loss policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, false work and Work in transit and shall insure against at least the following perils fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage, and such other perils as may be specifically required by the Supplementary Conditions;

5.6.3. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);

5.6.4. cover materials and equipment stored at the site or at another location that was agreed to in writing by OWNER prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by ENGINEER; and

5.6.5. be maintained in effect until final payment is made unless otherwise agreed to in writing by OWNER, CONTRACTOR and ENGINEER with thirty days written notice to each other additional insured to whom a certificate of insurance has been issued.

5.7. OWNER shall purchase and maintain such trailer 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, ENGINEER's Consultants and any other persons or entities identified in the Supplementary Conditions, each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured.

5.8. All the policies of insurance (and 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 canceled or materially changed or renewal refused until at least thirty days' prior written notice has been given to OWNER and CONTRACTOR and to each other additional insured to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with paragraph 5.11.

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 identified in the Supplementary Conditions. The risk of loss within such identified 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 policies provided under paragraphs 5.6 or 5.7, 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.

5.11. Waiver of Rights:

5.11.1. OWNER and CONTRACTOR intend that all policies purchased in accordance with paragraphs 5.6 and 5.7 will protect OWNER, CONTRACTOR, Subcontractors, ENGINEER, ENGINEER's Consultants and all other persons or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds in such policies and will provide primary coverage for all losses and damages caused by the perils covered thereby. All such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or additional insureds thereunder. OWNER and CONTRACTOR waive all rights against each other and their respective officers, directors, employees and agents for all losses and damages caused by, arising out of or resulting from any of the perils covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Subcontractors, ENGINEER, ENGINEER's Consultants and all other persons or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds under such policies for losses and damages so caused. None of the above waivers shall extend to the

rights that any party making such waiver may have to the proceeds of insurance held by OWNER as trustee or otherwise payable under any policy so issued.

5.11.2. In addition, OWNER waives all rights against CONTRACTOR, Subcontractors, ENGINEER, ENGINEER's Consultants and the officers, directors, employees and agents of any of them, for:

5.11.2.1. loss due to business interruption, loss of use or other consequential loss extending beyond direct physical loss or damage to OWNER's property or the Work caused by, arising out of or resulting from fire or other peril, whether or not insured by OWNER; and

5.11.2.2. loss or damage to the completed Project or part thereof caused by, arising out of or resulting from fire or other insured peril covered by any property insurance maintained on the completed Project or part thereof by OWNER during partial utilization pursuant to paragraph 14.10, after substantial completion pursuant to paragraph 14.8 or after final payment pursuant to paragraph 14.13.

Any insurance policy maintained by OWNER covering any loss, damage or consequential loss referred to in this paragraph 5.11.2 shall contain provisions to the effect that in the event of payment of any such loss, damage or consequential loss the insurers will have no rights of recovery against any of CONTRACTOR, Subcontractors, ENGINEER, ENGINEER's Consultants and the officers, directors, employees and agents of any of them.

Receipt and Application of Insurance 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 fiduciary 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 fiduciary shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within fifteen days after the occurrence of loss to OWNER's exercise of this power. If such objection be made, OWNER as fiduciary shall make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If no such agreement among the parties in interest is reached, OWNER as fiduciary shall adjust and settle the loss with the insurers and, if required in writing by any party in interest, OWNER as fiduciary shall give bond for the proper performance of such duties.

Acceptance of Bonds and Insurance; Option to Replace;

5.14. If either party (OWNER or CONTRACTOR) has any objection to the coverage afforded by or other provisions of the Bonds or insurance required to be purchased and maintained by the other party in accordance with Article 5 on the basis of non-conformance with the Contract Documents, the objecting party shall so notify the other party in writing within ten days after receipt of the certificates (or other evidence requested) required by paragraph 2.7. OWNER and

CONTRACTOR shall each provide to the other such additional information in respect of insurance provided as the other may reasonably request. If either party does not purchase or maintain all of the Bonds and insurance required of such party by the Contract Documents, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage. Without prejudice to any other right or remedy, the other party may elect to obtain equivalent Bonds or insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and a Change Order shall be issued to adjust the Contract Price accordingly.

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 any changes in coverage necessitated thereby. The insurers providing the property insurance shall consent by endorsement on the policy or policies, but the property insurance shall not be cancelled or permitted to lapse on account of any such partial use or occupancy.

ARTICLE 6--CONTRACTOR'S RESPONSIBILITIES

Supervision and Superintendence:

6.1. CONTRACTOR shall supervise, inspect and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. CONTRACTOR shall be solely responsible for the means, methods, techniques, sequences and procedures of construction, but CONTRACTOR shall not be responsible for the negligence of others in the design or specification of a specific means, method, technique, sequence or procedure of construction which is shown or indicated in and expressly required by the Contract Documents. CONTRACTOR shall be responsible to see that the completed 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 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, lay out and construct the Work as required by the Contract Documents. CONTRACTOR shall at all times maintain good discipline and order at the site. Except as otherwise required for the safety or protection of persons or the Work or property at the site or adjacent thereto, and except as otherwise 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. All warranties and guarantees specifically called for by the Specifications shall expressly run to the benefit of OWNER. If required by ENGINEER, CONTRACTOR shall furnish satisfactory evidence (including reports of required tests) as to the kind and quality of materials and equipment. All materials and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned in accordance with instructions of the applicable Supplier, except as otherwise provided in the Contract Documents.

Progress Schedule:

6.6. CONTRACTOR shall adhere to the progress schedule established in accordance with paragraph 2.9 as it may be adjusted from time to time as provided below:

6.6.1. CONTRACTOR shall submit to ENGINEER for acceptance (to the extent indicated in paragraph 2.9) proposed adjustments in the progress schedule that will not change the Contract Times (or Milestones). Such adjustments will conform generally to the progress schedule then in effect and additionally will comply with any provisions of the General Requirements applicable thereto.

6.6.2. Proposed adjustments in the progress schedule that will change the Contract Times (or Milestones) shall be submitted in accordance with the requirements of paragraph 12.1. Such adjustments may only be made by a Change Order or Written Amendment in accordance with Article 12.

6.7. Substitutes and "Or-Equal" Items:

6.7.1. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent or "or-equal" item or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be accepted by ENGINEER under the following circumstances:

6.7.1.1. *"Or-Equal"*: If in ENGINEER's sole discretion an item of material or equipment proposed by CONTRACTOR is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by ENGINEER as an "or-equal" item, in which case review and approval of the proposed item may, in ENGINEER's sole discretion, be accomplished without compliance with some or all of the requirements for acceptance of proposed substitute items.

6.7.1.2. *Substitute Items*: If in ENGINEER's sole discretion an item of material or equipment proposed by CONTRACTOR does not qualify as an "or-equal" item under

subparagraph 6.7.1.1., it will be considered a proposed substitute item. CONTRACTOR shall submit sufficient information as provided below to allow ENGINEER to determine that the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefore. The procedure for review by the ENGINEER will include the following as supplemented in the General Requirements and as ENGINEER may decide is appropriate under the circumstances. Requests for review of proposed substitute items of material or 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 first 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 in substance to that specified and be suited to the same use as that specified. The application will state the extent, if any, to which the evaluation and acceptance of the proposed substitute will 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 or credits 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 will be considered by ENGINEER in evaluating the proposed substitute. ENGINEER may require CONTRACTOR to furnish additional data about the proposed substitute.

6.7.1.3. *CONTRACTOR's Expense*: All data to be provided by CONTRACTOR in support of any proposed "or-equal" or substitute item will be at CONTRACTOR's expense.

6.7.2. *Substitute Construction Methods or Procedures*: If a specific means, method, technique, sequence or procedure of construction is shown or indicated in and expressly required by the Contract Documents, CONTRACTOR may furnish or utilize a substitute means, method, technique, sequence or procedure of construction acceptable to ENGINEER. CONTRACTOR shall submit sufficient information to allow ENGINEER, in ENGINEER's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The procedure for review by ENGINEER will be similar to that provided in subparagraph 6.7.1.2.

6.7.3. *Engineer's Evaluation*: ENGINEER will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to paragraphs 6.7.1.2 and 6.7.2. ENGINEER will be the sole judge of acceptability. No "or-equal" or 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 "or-equal" or substitute. ENGINEER will record time required by ENGINEER and ENGINEER's Consultants in

evaluating substitutes proposed or submitted by CONTRACTOR pursuant to paragraphs 6.7.1.2 and 6.7.2 and in making changes in the Contract Documents (or in the provisions of any other direct contract with OWNER for work on the Project) occasioned thereby. Whether or not ENGINEER accepts a substitute item so proposed or submitted by CONTRACTOR, CONTRACTOR shall reimburse OWNER for the charges of ENGINEER and ENGINEER's Consultants for evaluating each such proposed substitute item.

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 organization (including those who are to furnish the principal items of materials or 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 removed on the basis of reasonable objection after due investigation, in which case CONTRACTOR shall submit an acceptable substitute, the Contract Price will be adjusted 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.

6.9.1. 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 for the benefit of any such Subcontractor, Supplier or other person or organization any contractual relationship between OWNER and ENGINEER and any such Subcontractor, Supplier or other person or organization, nor 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.

6.9.2. CONTRACTOR shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers and other persons and organizations performing or furnishing any of the work under a direct or indirect contract with CONTRACTOR. CONTRACTOR shall require all Subcontractors, Suppliers and such other persons and organizations performing or furnishing any of the Work to communicate with the ENGINEER through CONTRACTOR.

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 or Supplier will be pursuant to an appropriate agreement between CONTRACTOR and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of OWNER and ENGINEER. Whenever any such agreement is with a Subcontractor or Supplier who is listed as an additional insured on the property insurance provided in paragraph 5.6 or 5.7, the agreement between the CONTRACTOR and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against OWNER, CONTRACTOR, ENGINEER, ENGINEER's Consultants and all other additional insureds for all losses and damages caused by, arising out of or resulting from any of the perils covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, CONTRACTOR will obtain the same.

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. To the fullest extent permitted by Laws and Regulations, CONTRACTOR shall indemnify and hold harmless OWNER, ENGINEER, ENGINEER's Consultants and the officers, directors, employees, agents and other consultants of each and any of them from and against all claims, costs, losses and damages arising out of or resulting from any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product or device not specified in the Contract Documents.

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 performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, CONTRACTOR shall bear all claims, costs, losses and damages caused by, arising out of or resulting there from; however, it shall not be CONTRACTOR's primary responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve CONTRACTOR or CONTRACTOR's obligations under paragraph 3.3.2.

Taxes:

6.15. CONTRACTOR shall pay all sales, consumer, use and other similar taxes required to be paid by CONTRACTOR in accordance with 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 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 thereof or of any adjacent land or areas, resulting from the performance of the Work. Should any claim be made by any such owner or occupant because of the performance of the Work, CONTRACTOR shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law. CONTRACTOR shall, to the fullest extent permitted by Laws and Regulations, indemnify and hold harmless OWNER, ENGINEER, ENGINEER's Consultant and anyone directly or indirectly employed by any of them from and against all claims, costs, losses and damages arising out of or resulting from any claim or action, legal or equitable, brought by any such owner or occupant against OWNER, ENGINEER or any other party indemnified hereunder to the extent caused by or based upon CONTRACTOR's performance of the Work.

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. CONTRACTOR shall leave the site clean and ready for occupancy by OWNER at Substantial Completion of the Work. 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 Change Directives, 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 counter part 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 persons on the Work site or who may be affected by the Work;

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, lawns, walks, pavements, roadways, structures, utilities and Underground Facilities not designated for removal, relocation or replacement in the course of construction.

CONTRACTOR shall comply with all applicable Laws and Regulations of any public body having jurisdiction for 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 ENGINEER's Consultant or anyone employed by any of them or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of CONTRACTOR or any Subcontractor, Supplier or other person or organization directly or indirectly employed by any of them). CONTRACTOR's duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and ENGINEER has issued a notice to OWNER and CONTRACTOR in accordance with paragraph 14.13 that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

Safety Representative:

6.21. CONTRACTOR shall designate a qualified and experienced safety representative at the site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

Hazard Communication Program:

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

Emergencies:

6.23. 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 OWNER or ENGINEER, 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 by CONTRACTOR in response to such an emergency, a Work Change Directive or Change Order will be issued to document the consequences of such action.

6.24. Shop Drawings and Samples:

6.24.1. CONTRACTOR shall submit Shop Drawings to ENGINEER for review and approval in accordance with the accepted schedule of Shop Drawings and Sample submittals (see paragraph 2.9). All submittals will be identified as ENGINEER may require and in the number of copies specified in the General Requirements. 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 show ENGINEER the materials and equipment CONTRACTOR proposes to provide and to enable ENGINEER to review the information for the limited purposes required by paragraph 6.26.

6.24.2. CONTRACTOR shall also submit Samples to ENGINEER for review and approval in accordance with said accepted schedule of Shop Drawings and Sample submittals. Each Sample will be identified clearly as to material, Supplier, pertinent data such as catalog numbers and the use for which intended and otherwise as ENGINEER may require to enable ENGINEER to review the submittal for the limited purposes required by paragraph 6.26. The numbers of each Sample to be submitted will be as specified in the Specifications.

6.25. Submittal Procedures:

6.25.1. Before submitting each Shop Drawing or Sample, CONTRACTOR shall have determined and verified:

6.25.1.1. all field measurements, quantities, dimensions, specified performance criteria, installation requirements, materials, catalog numbers and similar information with respect thereto.

6.25.1.2. all materials with respect to intended use, fabrication, shipping, handling, storage, assembly and installation pertaining to the performance of the Work, and

6.25.1.3. all information relative to CONTRACTOR's sole responsibilities in respect of means, methods, techniques, sequences and procedures of construction and safety precautions and programs incident thereto.

CONTRACTOR shall also have reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents.

6.25.2. Each submittal will bear a stamp or specific written indication that CONTRACTOR has satisfied CONTRACTOR's obligations under the Contract Documents with respect to CONTRACTOR's review and approval of that submittal.

6.25.3. At the time of each submission, CONTRACTOR shall give ENGINEER specific written notice of such variations, if any, that the Shop Drawings or Sample submitted may have from the requirements of the Contract Documents, such notice to be in a written communication separate from the submittal; and, in addition, shall cause a specific notation to be made on each Shop Drawing and Sample submitted to ENGINEER for review and approval of each such variation.

6.26. ENGINEER will review and approve Shop Drawings and Samples in accordance with the schedule of Shop Drawings and Sample submittals accepted by ENGINEER as required by paragraph 2.9. ENGINEER's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed project as a functioning whole as indicated by the Contract Documents. ENGINEER's review and approval will not extend to means, methods, techniques, sequences or procedures of construction (except where particular means, method, technique, sequence or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions. 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 6.25.3 and ENGINEER has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample approval; nor will any approval by ENGINEER relieve CONTRACTOR from responsibility for complying with the requirements of paragraph 6.25.1.

6.28. Where a Shop Drawing or Sample is required by the Contract Documents or the schedule of Shop Drawings and Sample submissions accepted by ENGINEER as required by paragraph 2.9, any related Work performed prior to ENGINEER's review and approval of the pertinent submittal will be at the sole expense and responsibility of CONTRACTOR.

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 OWNER and CONTRACTOR may otherwise agree in writing.

6.30. CONTRACTOR's General Warranty and Guarantee

6.30.1. CONTRACTOR warrants and guarantees to OWNER, ENGINEER and ENGINEER's Consultants that all Work will be in accordance with the Contract Documents and will not be defective. CONTRACTOR's warranty and guarantee hereunder excludes defects or damage caused by:

6.30.1.1. abuse, modification or improper maintenance or operation by persons other than CONTRACTOR, Subcontractors or Suppliers; or

6.30.1.2. normal wear and tear under normal usage.

6.30.2. CONTRACTOR's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of CONTRACTOR's obligation to perform the Work in accordance with the Contract Documents:

6.30.2.1. observations by ENGINEER;

6.30.2.2. recommendation of any progress or final payment by ENGINEER;

6.30.2.3. the issuance of a certificate of Substantial Completion or any payment by OWNER to CONTRACTOR under the Contract Documents;

6.30.2.4. use or occupancy of the Work or any part thereof by OWNER;

6.30.2.5. any acceptance by OWNER or any failure to do so;

6.30.2.6. any review and approval of a Shop Drawing or Sample submittal or the issuance of a notice of acceptability by ENGINEER pursuant to paragraph 14.13;

6.30.2.7. any inspection, test or approval by others; or

6.30.2.8. any correction of defective Work by OWNER.

Indemnification:

6.31. To the fullest extent permitted by Laws and Regulations, CONTRACTOR shall indemnify and hold harmless OWNER, ENGINEER, ENGINEER's Consultants and the officers, directors, employees, agents and other consultants of each and any of them from and against all claims, costs, losses and damages (including but not limited to all fees and charges of engineers, architects, attorneys and other professionals and all court or arbitration or other dispute resolution costs) caused by, arising out of or resulting from the performance of the Work, provided that any such claim, cost, loss or damage: (i) 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 (ii) is caused in whole or in part by any negligent act or omission of CONTRACTOR, any Subcontractor, any Supplier, 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 caused in part by any negligence or omission of a person or entity indemnified hereunder or whether liability is imposed upon such indemnified party by Laws and Regulations regardless of the negligence of any such person or entity.

6.32. In any and all claims against OWNER or ENGINEER or any of their respective consultants, agents, officers, directors or employees by any employee (or the survivor or personal representative of such employee) of CONTRACTOR, any Subcontractor, any Supplier, 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 6.31 shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for CONTRACTOR or any such Subcontractor, Supplier or other person or organization under workers' compensation acts, disability benefit acts or other employee benefit acts.

6.33. The indemnification obligations of CONTRACTOR under paragraph 6.31 shall not extend to the liability of ENGINEER and ENGINEER's Consultants, officers, directors, employees or agents caused by the professional negligence errors or omissions of any of them.

Survival of Obligations:

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

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, or let other direct contracts therefore which shall contain General Conditions similar to these, or have other work performed by utility owners. If the fact that such other work is to be performed was not noted in the Contract Documents, then: (i) written notice thereof will be given to CONTRACTOR prior to starting any such other work, and (ii) CONTRACTOR may make a claim therefore as provided in Articles 11 and 12 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 amount or extent thereof.

7.2. CONTRACTOR shall afford each other contractor who is a party to such a direct contract and each utility owner (and 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 other work and shall properly connect and coordinate the Work with theirs. Unless otherwise provided in the Contract Documents, 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 the proper execution or results of any part of CONTRACTOR's Work depends upon work performed by others under this Article 7, CONTRACTOR shall inspect such other work and promptly report to ENGINEER in writing any delays, defects or deficiencies in such other work that render it unavailable or unsuitable

for the proper execution and results of CONTRACTOR's Work. CONTRACTOR's failure so to report will constitute an acceptance of such other work as fit and proper for integration with CONTRACTOR's Work except for latent or nonapparent defects and deficiencies in such other work.

Coordination:

7.4. If OWNER contracts with others for the performance of other work on the Project at the site, the following will be set forth in Supplementary Conditions:

7.4.1. the person, firm or corporation who will have authority and responsibility for coordination of the activities among the various prime contractors will be identified;

7.4.2. the specific matters to be covered by such authority and responsibility will be itemized; and

7.4.3. the extent of such authority and responsibilities will be provided.

Unless otherwise provided in the Supplementary Conditions, OWNER shall have sole authority and responsibility in respect of such coordination.

ARTICLE 8--OWNER'S RESPONSIBILITIES

8.1. Except as otherwise provided in these General Conditions, 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.

8.3. OWNER shall furnish the data required of OWNER under the Contract Documents promptly and shall make payments to CONTRACTOR promptly when 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 drawings of physical conditions in existing structures at or contiguous to the site that have been utilized by ENGINEER in preparing the Contract Documents.

8.5. OWNER's responsibilities in respect of purchasing and maintaining liability and property insurance are set forth in paragraphs 5.5 through 5.10.

8.6. OWNER is obligated to execute Change Orders as indicated in paragraph 13.4.

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.

8.9. The OWNER shall not supervise, direct or have control or authority over, nor be responsible for, CONTRACTOR's means, methods, techniques, sequences or procedures of construction or the safety precautions and programs incident thereto, or for any failure of CONTRACTOR to comply with Laws and Regulations applicable to the furnishing or performance of the Work. OWNER will not be responsible for CONTRACTOR's failure to perform or furnish the Work in accordance with the Contract Documents.

8.10. OWNER's responsibility in respect of undisclosed Asbestos, PCBs, Petroleum, Hazardous Waste or Radioactive Materials uncovered or revealed at the site is set forth in paragraph 4.5.

8.11. If and to the extent OWNER has agreed to furnish CONTRACTOR reasonable evidence that financial arrangements have been made to satisfy OWNER's obligations under the Contract Documents, OWNER's responsibility in respect thereof will be as set forth in the Supplementary Conditions.

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 as ENGINEER deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of CONTRACTOR's executed Work. Based on information obtained during such visits and observations, ENGINEER will endeavor for the benefit of OWNER 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 generally to the Contract Documents. On the basis of such visits and on-site observations, ENGINEER will keep OWNER informed of the progress of the Work and will endeavor to guard OWNER against defective Work. ENGINEER's visits and on-site observations are subject to all the limitations on ENGINEER's authority and responsibility set forth in paragraph 9.13, and particularly, but without limitation, during or as a result of ENGINEER's on-site visits or observations of CONTRACTOR's Work ENGINEER will not supervise, direct, control or have authority over or be responsible for CONTRACTOR's means, methods, techniques, sequences or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of CONTRACTOR to comply with Laws and Regulations applicable to the furnishing or performance of the Work.

Project Representative:

9.3. If OWNER and ENGINEER agree, ENGINEER will furnish a Resident Project Representative to assist ENGINEER in providing more continuous observation of the Work. The responsibilities and authority and limitations thereon of any such Resident Project Representative and assistants will be as provided in paragraph 9.13 and in the Supplementary Conditions. If OWNER designates another representative or agent to represent OWNER at the site who is not ENGINEER's Consultant, agent or employee, the responsibilities and authority and limitations thereon of such other 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 the intent of and reasonably inferable from Contract Documents. Such written clarifications and interpretations will be binding on OWNER and CONTRACTOR. If OWNER or CONTRACTOR believes that a written clarification or interpretation justifies an adjustment in the Contract Price or the Contract Times and the parties are unable to agree to the amount or extent thereof, if any, OWNER or CONTRACTOR may make a written claim therefore 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 Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. These may be accomplished by a Field Order and will be binding on OWNER and also on CONTRACTOR who shall perform the Work involved promptly. If OWNER or CONTRACTOR believes that a Field Order justifies an adjustment in the Contract Price or the Contract Times and the parties are unable to agree as to the amount or extent thereof, OWNER or CONTRACTOR may make a written claim therefore 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 or that ENGINEER believes will not produce a completed Project that conforms to the Contract Documents or that will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. ENGINEER will also have authority to require special inspection or testing of the Work as provided in paragraph 13.9, whether or not the Work is fabricated, installed or completed.

Shop Drawings, Change Orders and Payments:

9.7. In connection with ENGINEER's authority as to Shop Drawings and Samples, see paragraphs 6.24 through 6.28 inclusive.

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

9.9. In connection with ENGINEER's authority as to Applications for Payment, see Article 14.

Determinations 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 the ENGINEER's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). ENGINEER's written decision thereon will be final and binding upon OWNER and CONTRACTOR, unless, within ten days after the date of any such decision, either OWNER or CONTRACTOR delivers to the other and to ENGINEER written notice of intention to appeal from ENGINEER's decision and: (i) an appeal from ENGINEER's decision is taken within the time limits and in accordance with the procedures set forth in Exhibit GC-A, "Dispute Resolution Agreement," entered into between OWNER and CONTRACTOR pursuant to Article 16, or (ii) if no such Dispute Resolution Agreement has been entered into, a formal proceeding is instituted by the appealing party in a forum of competent jurisdiction to exercise such rights or remedies as the appealing party may have with respect to ENGINEER's decision, unless otherwise agreed in writing by OWNER and CONTRACTOR. Such appeal will not be subject to the procedures of paragraph 9.11.

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 Times will be referred initially to ENGINEER in writing with a request for a formal decision in accordance with this paragraph. Written notice of each such claim, dispute or 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 start of the occurrence or event giving rise thereto, and written supporting data will be submitted to ENGINEER and the other party within sixty days after the start of such occurrence or event unless ENGINEER allows an additional period of time for the submission of additional or more accurate data in support of such claim, dispute or other matter. The opposing party shall submit any response to ENGINEER and the claimant within thirty days after receipt of the claimant's last submittal (unless ENGINEER allows additional time). ENGINEER will render a formal decision in writing within thirty days after receipt of the opposing party's submittal, if any, in accordance with this paragraph. ENGINEER's written decision on such claim, dispute or other matter will be final and binding upon OWNER and CONTRACTOR unless: (i) an appeal from ENGINEER's decision is taken within the time limits and in accordance with the procedures set forth in EXHIBIT GC-A, "Dispute Resolution Agreement," entered into between OWNER and CONTRACTOR pursuant to Article 16, or (ii) if no such Dispute Resolution Agreement has been entered into, a written notice of intention to appeal from ENGINEER's written decision is delivered by OWNER or CONTRACTOR to the other and to ENGINEER within thirty days after the date of such decision and a formal proceeding is instituted by the appealing party in a forum of competent jurisdiction to exercise such rights or remedies as the appealing party may have with respect to such claim, dispute or other matter in accordance with applicable Laws and Regulations within sixty days of the date of such decision, unless otherwise agreed in writing by OWNER and CONTRACTOR.

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 or

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 pursuant to Article 16.

9.13. Limitations on ENGINEER's Authority and Responsibilities:

9.13.1. Neither ENGINEER's authority or responsibility under this Article 9 or under any other provision of the Contract Documents nor any decision made by ENGINEER in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise or performance of any authority or responsibility by ENGINEER shall create, impose or give rise to any duty owed by ENGINEER to CONTRACTOR, any Subcontractor, any Supplier, any other person or organization, or to any surety for or employee or agent of any of them.

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

9.13.3. 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.

9.13.4. ENGINEER's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds and certificates of inspection, tests and approvals and other documentation required to be delivered by paragraph 14.12 will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests and approvals that the results certified indicate compliance with, the Contract Documents.

9.13.5. The limitations upon authority and responsibility set forth in this paragraph 9.13 shall also apply to ENGINEER's Consultants, Resident Project Representative and assistants.

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. Such additions, deletions or revisions will be authorized by a Written Amendment, a Change Order, or a Work Change Directive. Upon receipt of any such document, CONTRACTOR shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).

10.2. If OWNER and CONTRACTOR are unable to agree as to the extent, if any, of an adjustment in the Contract Price or an adjustment of the Contract Times that should be allowed as a result of a Work

Change Directive, a claim may be made therefore 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 Times with respect to any Work performed that is not required by the Contract Documents as amended, modified and supplemented as provided in paragraphs 3.5 and 3.6 except in the case of any emergency as provided in paragraph 6.23 or in the case of uncovering Work as provided in paragraph 13.9.

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

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

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

10.4.3. changes in the Contract Price or Contract Times 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 Times) 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 CONTRACTOR's 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 adjustment 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 start of the occurrence or 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 the start of such occurrence or event (unless ENGINEER allows additional time for claimant to submit additional or more accurate data in support of the claim) and shall be accompanied by claimant's written statement that the adjustment claimed covers all known amounts to which the claimant is entitled as a result of said occurrence or 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 adjustment in the Contract Price will be determined as follows:

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

11.3.2. where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with paragraph 11.6.2);

11.3.3. where the Work involved is not covered by unit prices contained in the Contract Documents and agreement to a lump sum is not reached under paragraph 11.3.2, 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 paragraph 11.6).

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 amount 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. Such employees shall include without limitation superintendents, foremen and other personnel employed full-time at the site. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits which shall include social security contributions, unemployment, excise and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. The expenses of performing Work 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 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 or furnished by Subcontractors. If required by OWNER, CONTRACTOR shall

obtain competitive bids from subcontractors acceptable to OWNER and CONTRACTOR and shall deliver such bids to OWNER who will then determine, with the advice of ENGINEER, which bids, if any, will be accepted. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work Plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as CONTRACTOR's Cost of the Work and fee as provided in paragraphs 11.4, 11.5, 11.6 and 11.7. 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 the terms of said rental agreements. The rental of any such equipment, machinery or parts shall cease when the use thereof is no longer necessary for the Work.

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) caused by damage to the Work, not compensated by insurance 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.

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 part 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 subparagraph 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.

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

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

11.7. Whenever the cost of any Work is to be determined pursuant to paragraphs 11.4 and 11.5, CONTRACTOR will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in form acceptable to ENGINEER an itemized cost breakdown together with supporting data.

Cash Allowance:

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 furnished and performed for such sums as may be acceptable to OWNER and 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 cost 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 and no demand for additional payment on account of any of the foregoing 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.

11.9. 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 price 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. OWNER or CONTRACTOR may make a claim for an adjustment in the Contract Price in accordance with Article 11 if:

11.9.3.1. the quantity of any item of Unit Price Work performed by CONTRACTOR differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and

11.9.3.2. there is no corresponding adjustment with respect to any other item of Work; and

11.9.3.3. if CONTRACTOR believes that CONTRACTOR is entitled to an increase in Contract Price as a result of having incurred additional expense or OWNER believes that OWNER is entitled to a decrease in Contract Price and the parties are unable to agree as to the amount of any such increase or decrease.

ARTICLE 12--CHANGE OF CONTRACT TIMES

12.1. The Contract Times (or Milestones) may only be changed by a Change Order or a Written Amendment. Any claim for an adjustment of the Contract Times (or Milestones) 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 Times (or Milestones) 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 Times (or Milestones) will be valid if not submitted in accordance with the requirements of this paragraph 12.1.

12.2. All time limits stated in the Contract Documents are of the essence of the Agreement.

12.3. Where CONTRACTOR is prevented from completing any part of the Work within the Contract Times (or Milestones) due to delay beyond the control of CONTRACTOR, the Contract Times (or Milestones) will be extended in an amount equal to the time lost due to such delay if a claim is made therefore as provided in paragraph 12.1. Delays beyond the control of CONTRACTOR shall include, but not be limited to, acts or neglect by OWNER, acts or neglect of utility owners or other contractors performing other work as contemplated by Article 7, fires, floods, epidemics, abnormal weather conditions or acts of God. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of CONTRACTOR.

12.4. Where CONTRACTOR is prevented from completing any part of the Work within the Contract Times (or Milestones) due to delay beyond the control of both OWNER and CONTRACTOR, an extension of the Contract Times (or Milestones) in an amount equal to the time lost due to such delay shall be CONTRACTOR's sole and exclusive remedy for such delay. In no event shall OWNER be liable to CONTRACTOR, any Subcontractor, any Supplier, any other person or organization, or to any surety for or employee or agent of any of them, for damages arising out of or resulting from (i) delays caused by or within the control of CONTRACTOR, or (ii) delays beyond the control of both parties including but not limited to fires, floods,

epidemics, abnormal weather conditions, acts of God or acts or neglect by utility owners or other contractors performing other work as contemplated by Article 7.

ARTICLE 13--TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

13.1. *Notice of Defects:* Prompt notice of all defective Work of which OWNER or ENGINEER have actual knowledge will be given to CONTRACTOR. All defective Work may be rejected, corrected or accepted as provided in this Article 13.

Access to Work:

13.2. OWNER, ENGINEER, ENGINEER's Consultants, other representatives and personnel of OWNER, independent testing laboratories and governmental agencies with jurisdiction interests will have access to the Work at reasonable times for their observation, inspecting and testing. CONTRACTOR shall provide them proper and safe conditions for such access and advise them of CONTRACTOR's site safety procedures and programs so that they may comply therewith as applicable.

Tests and Inspections:

13.3. CONTRACTOR shall give ENGINEER timely notice of readiness of the Work for all required inspections, tests or approvals, and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.

13.4. OWNER shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by the Contract Documents except:

13.4.1. for inspections, tests or approvals covered by paragraph 13.5 below;

13.4.2. that costs incurred in connection with tests or inspections conducted pursuant to paragraph 13.9 below shall be paid as provided in said paragraph 13.9; and

13.4.3. as otherwise specifically provided in the Contract Documents.

13.5. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested or approved by an employee or other representative of such public body, CONTRACTOR shall assume full responsibility for arranging and obtaining such inspections, tests or approvals, pay all costs in connection therewith, and furnish ENGINEER the required certificates of inspection, or approval. CONTRACTOR shall also be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests or approvals required for OWNER's and ENGINEER's acceptance of materials or equipment to be incorporated in the Work, or of materials, mix designs, or equipment submitted for approval prior to CONTRACTOR's purchase thereof for incorporation in the Work.

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

13.7. Uncovering Work as provided in paragraph 13.6 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.

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 pay all claims, costs, losses and damages caused by, arising out of or resulting from such uncovering, exposure, observation, inspection and testing and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and OWNER shall be entitled to an appropriate decrease in the Contract Price, and, if the parties are unable to agree as to the amount thereof, may make a claim therefore 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 Times (or Milestones), or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement and reconstruction; and, if the parties are unable to agree as to the amount or extent thereof, CONTRACTOR may make a claim therefore 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 surety or 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 Work that is not *defective*. CONTRACTOR shall pay all claims, costs, losses and damages caused by or resulting from such correction or removal (including but not limited to all costs of repair or replacement of work of others).

13.12. Correction Period:

13.12.1. 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: (i) correct such *defective* Work, or, if it has been rejected by OWNER, remove it from the site and replace it with Work that is not *defective*, and (ii) satisfactorily correct or remove and replace any damage to other Work or the work of others resulting therefrom. 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 claims, costs, losses and damages caused by or resulting from such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by CONTRACTOR.

13.12.2. 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 Amendment.

13.12.3. Where *defective* Work (and damage to other Work resulting therefrom) has been corrected, removed or replaced under this paragraph 13.12, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

Acceptance of Defective Work:

13.1. 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 pay all claims, costs, losses and damages attributable to OWNER's evaluation of and determination to accept such *defective* Work (such costs to be approved by ENGINEER as to reasonableness). 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 therefore 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 from ENGINEER 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. In connection with such corrective and remedial action, OWNER may exclude CONTRACTOR from all or part of the site, take possession of all or part of the Work, and suspend CONTRACTOR's services related thereto, take possession of CONTRACTOR's tools, appliances, construction equipment and machinery at the site and incorporate in the Work all materials and equipment stored at the site or for which OWNER has paid CONTRACTOR but which are stored elsewhere. CONTRACTOR shall allow OWNER, OWNER's representatives, agents and employees, OWNER's other contractors and ENGINEER and ENGINEER's Consultants access to the site to enable OWNER to

exercise the rights and remedies under this paragraph. All claims, costs, losses and damages incurred or sustained by OWNER in exercising such rights and remedies will be charged against CONTRACTOR and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and OWNER shall be entitled to an appropriate decrease in the Contract Price, and, if the parties are unable to agree as to the amount thereof, OWNER may make a claim therefore as provided in Article 11. Such claims, costs, losses and damages will include but not be limited to all costs of repair or replacement of work of others destroyed or damaged by correction, removal or replacement of CONTRACTOR's defective Work. CONTRACTOR shall not be allowed an extension of the Contract Times (or Milestones) because of any delay in the 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 the date established for each progress payment (but not more often than once a month), CONTRACTOR shall submit to ENGINEER for review an Application for Payment filled out and signed by CONTRACTOR covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice or other documentation warranting that OWNER has received the materials and equipment free and clear of all Liens and evidence that the materials and equipment are covered by appropriate property insurance 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:

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 executed Work as an experienced and qualified design professional and on ENGINEER's review of the Application for Payment and the accompanying data and schedules, that to the best of ENGINEER's knowledge, information and belief:

14.5.1. the Work has progressed to the point indicated.

14.5.2. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, 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

14.5.3. the conditions precedent to CONTRACTOR's being entitled to such payment appear to have been fulfilled in so far as it is ENGINEER's responsibility to observe the Work.

However, by recommending any such payment ENGINEER will not thereby be deemed to have represented that: (i) 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 (ii) that there may not be other matters or issues between the parties that might entitle CONTRACTOR to be paid additionally by OWNER or entitle OWNER to withhold payment to CONTRACTOR.

14.6. ENGINEER's recommendation of any payment, including final payment, shall not mean that ENGINEER is responsible for CONTRACTOR's means, methods, techniques, sequences or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of CONTRACTOR to comply with Laws and Regulations applicable to the furnishing or performance of Work, or for any failure of CONTRACTOR to perform or furnish Work in accordance with the Contract Documents.

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 the representations to OWNER referred to in paragraph 14.5. 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. ENGINEER has actual knowledge of the occurrence of any of the events enumerated in paragraphs 15.2.1 through 15.2.4 inclusive.

OWNER may refuse to make payment of the full amount recommended by ENGINEER because:

14.7.5. claims have been made against OWNER on account of CONTRACTOR's performance or furnishing of the Work,

14.7.6. Liens have been filed in connection with the Work, except where CONTRACTOR has delivered a specific Bond satisfactory to OWNER to secure the satisfaction and discharge of such Liens.

14.7.7. there are other items entitling OWNER to a set-off against the amount recommended, or

14.7.8. OWNER has actual knowledge of the occurrence of any of the events enumerated in paragraphs 14.7.1. through 14.7.3 or paragraphs 15.2.1 through 15.2.4 inclusive;

but OWNER must have CONTRACTOR immediate written notice (with a copy to ENGINEER) stating the reasons for such action and promptly pay CONTRACTOR the amount so withheld, or any adjustment thereto agreed to by OWNER and CONTRACTOR, when CONTRACTOR corrects to OWNER's satisfaction 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 therefore. 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 therefore. 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 and guarantees. Unless OWNER and CONTRACTOR agree otherwise in writing and so inform ENGINEER in writing prior to ENGINEER's issuing the definitive certificate of Substantial Completion, ENGINEER's aforesaid recommendation will be binding on OWNER and CONTRACTOR until final payment.

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 at OWNER's option of any substantially completed part of the Work which: (i) has specifically been identified in the Contract Documents, or (ii) OWNER, ENGINEER and CONTRACTOR agree constitutes a separately functioning and usable part of the Work that can be used by OWNER for its intended purpose without significant interference with CONTRACTOR's performance of the remainder of the Work, 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 that such part of the Work is substantially complete, CONTRACTOR will certify to OWNER and ENGINEER that such 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 therefore. 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. 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 such measures as are necessary to complete such Work or remedy such deficiencies.

Final Application for Payment:

14.12. After CONTRACTOR has completed all such corrections to the satisfaction of ENGINEER and delivered in accordance with the Contract Documents all maintenance and operating instructions, schedules, guarantees, Bonds, certificates or other evidence of insurance required by paragraph 5.4, certificates of inspection, marked-up record documents (as provided in paragraph 6.19) and other documents, CONTRACTOR may make application for final payment following the procedure for progress payments. The final Application for Payment shall be accompanied (except as previously delivered) by:

- (i) all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by subparagraph 5.4.13, (ii) consent of the surety, if any, to final payment, and (iii) 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 of such releases or waivers of Liens and as approved by OWNER, CONTRACTOR may furnish receipts or releases in full and an affidavit of CONTRACTOR that: (i) the releases and receipts include all labor, services, material and equipment for which a Lien could be filed, and (ii) all payrolls, material and equipment bills and other indebtedness connected with the Work for which OWNER or OWNER's property might in any way be responsible have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, CONTRACTOR may furnish a Bond or other collateral satisfactory to OWNER to indemnify OWNER against any Lien.

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 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. At the same time ENGINEER will also give written notice to OWNER and CONTRACTOR that the Work is acceptable subject to the provisions of paragraph 14.15. 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.

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.

Waiver of Claims:

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

14.15.1. 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, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from CONTRACTOR's continuing obligations under the Contract Documents; and

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

ARTICLE 15--SUSPENSION OF WORK AND TERMINATION

OWNER May Suspend Work:

15.1. At any time and without cause, OWNER may 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 adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension if CONTRACTOR makes an approved claim therefore 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 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 adjusted from time to time pursuant to paragraph 6.6);

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

15.2.3. if CONTRACTOR disregards the authority of ENGINEER; or

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

OWNER may, after giving CONTRACTOR (and the surety, if any,) 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 all claims, costs, losses and damages sustained by OWNER arising out of or resulting from completing the Work such excess will be paid to CONTRACTOR. If such claims, costs, losses and damages exceed such unpaid balance, CONTRACTOR shall pay the difference to OWNER. Such claims, costs, losses and damages incurred by

OWNER will be reviewed by ENGINEER as to their reasonableness and when so approved by ENGINEER incorporated in a Change Order, provided that 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 monies due CONTRACTOR by OWNER will not release CONTRACTOR from liability.

15.4. Upon seven day's written notice to CONTRACTOR and ENGINEER, OWNER may, without cause and without prejudice to any other right or remedy of OWNER, elect to terminate the Agreement. In such case, CONTRACTOR shall be paid (without duplication of any items);

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

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

15.4.3. for all claims, costs, losses and damages incurred in settlement of terminated contracts with Subcontractors, Suppliers and others; and

15.4.4. for reasonable expenses directly attributable to termination.

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

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 of 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, and provided OWNER and ENGINEER do not remedy such suspension or failure within that time, terminate the Agreement and recover from OWNER payment on the same terms as provided in paragraph 15.4. In lieu of terminating the Agreement and without prejudice to any other right or remedy, if ENGINEER has failed to act on an Application for Payment within thirty days after it is submitted, or OWNER has failed for thirty days to pay CONTRACTOR any sum finally determined to be due, CONTRACTOR may upon seven day's written notice to OWNER and ENGINEER stop the Work until payment of all such amount due CONTRACTOR, including interest thereon. The provisions of this paragraph 15.5 are not intended to preclude CONTRACTOR from making claim under Articles 11 and 12 for an increase in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to CONTRACTOR's stopping Work as permitted by this paragraph.

ARTICLE 16--DISPUTE RESOLUTION

If and to the extent that OWNER and CONTRACTOR have agreed on the method and procedure for resolving disputes between them that may arise under this Agreement, such dispute resolution method and procedure, if any, shall be as set forth in Exhibit CC-A, "Dispute Resolution Agreement," to be attached hereto and made a part hereof. If no such agreement on the method and procedure for resolving such disputes has been reached, and subject to the provisions of paragraphs 9.10, 9.11, and 9.12, OWNER and CONTRACTOR may exercise such rights or remedies as either may otherwise have under the Contract Documents or by Laws or Regulations in respect of any dispute.

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 or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

Computation of Times:

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 will constitute a day.

Notice of Claim:

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.

Cumulative Remedies:

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 6.12, 6.16, 6.30, 6.31, 6.32, 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.

Professional Fees and Court Costs Included:

17.5. Whenever reference is made to "claims, costs, losses and damages," it shall include in each case, but not be limited to, all fees and charges of engineers, architects, attorneys and other professionals and all court or arbitration or other dispute resolution costs.

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1. ENUMERATION OF PLANS, SPECIFICATIONS AND ADDENDA

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

DRAWINGS

General Construction:	Nos.	<u>G 0.00 - D 1.0</u>
Heating and Ventilating:	"	_____
Plumbing:	"	_____
Electrical:	"	_____
_____	"	_____
_____	"	_____

SPECIFICATIONS:

General Construction	Page	<u>114</u>	to	<u>279</u>	incl.
	Page	_____	to	_____	incl.
Heating and Ventilating:	Page	_____	to	_____	incl.
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Electrical:	Page	_____	to	_____	incl.
_____	Page	_____	to	_____	incl.
_____	Page	_____	to	_____	incl.

ADDENDA:

No.	_____	Date	_____	No.	_____	Date	_____
No.	_____	Date	_____	No.	_____	Date	_____

2. STATED 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)	\$
(e)	For	_____	(Page	_____	of Specifications)	\$
(f)	For	_____	(Page	_____	of Specifications)	\$ _____

3. 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 that the Contractor shall submit his estimate not later than the first day of the month: 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 to be charged with liquidated damages or any excess cost when the delay in completion of the work is due:

- (a) To any preference, priority or allocation order duly issued by the Government.
- (b) 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
- (c) To any delays of Subcontractors or suppliers occasioned by any of the causes specified in subsections (a) and (b) 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. The safety provisions of applicable laws and building and construction codes, in addition to specific safety and health regulations described by Chapter XIII, Bureau of Labor Standards, Department of Labor, Part 1518, Safety and Health Regulations for Construction, as outlined in the Federal Register, Volume 36, No. 75, Saturday, April 17, 1971. Title 29 - LABOR, shall be observed and the Contractor shall take or cause to be taken, such additional safety and health measures as the Contracting Authority may determine to be reasonably necessary."

E. Subcontracts

The contractor or subcontractor shall insert in any subcontracts the clauses contained in 29 CFR 5.5 (a)(1) through (10) and such other clauses as the (Department of Housing and Urban Development) may by appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.

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 extend to this contract if made with a corporation for its general benefit.

G. Other Prohibited Interests

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:

- (a) 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.
- (b) 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,
- (c) 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. FEDERAL LABOR STANDARDS PROVISIONS

Applicability

The Project or Program to which the construction work covered by this contract pertains is being assisted by the United States of America and the following Federal Labor Standards Provisions are included in this Contract pursuant to the provisions applicable to such Federal assistance.

A. 1. (i) Minimum Wages

All laborers and mechanics employed or working upon the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR Part 3), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics. Contributions made or costs reasonably anticipated for bona fide fringe benefits under Section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of 29 CFR 5.5(a)(1)(iv); also, regular contributions made or costs incurred for more than a weekly period (but not less than often than quarterly) under plans, funds, or programs, which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period.

Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR Part 5.5(a)(iv). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: provided, that the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under 29 FR Part 5.5(a)(1)(ii) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

- (ii)(a) 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. HUD shall approve an additional classification and wage rate and fringe benefits therefore 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.
- (b) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and HUD or its designee agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by HUD or its designee to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, D.C. 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise HUD or its designee or will notify HUD or its designee within the 30-day period that additional time is necessary. (Approved by the Office of Management and Budget under OMB Control Number 1215-0140.)
- (c) In the event the contractor, the laborers or mechanics to be employed in the classification or their representative, and HUD or its designee do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), HUD or its designee shall refer the questions, including the views of all interested parties and the recommendation of HUD or its designee, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise HUD or its designee or will notify HUD or its designee within the 30-day period that additional time is necessary. (Approved by the Office of Management and Budget under OMB Control Number 1215-0140.)
- (d) The wage rate (including the fringe benefits where appropriate) determined pursuant to subparagraphs (1)(b) or (c) of this paragraph, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.
- (iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

- (iv) If the contractor does not make payments to a trustee or other third persons, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, provided, that the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program. (Approved by the Office of Management and Budget under OMB Control Number 1215-0140.)

2. Withholding

HUD or its designee shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the contractor under this contract or any other Federal contract with the same prime contractor, or any other Federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices and trainees, employed by the contractor or any subcontractor the full amount of wages required by the contract.

In the event of failure to pay any laborer or mechanic, including any apprentice or trainee, employed or working on the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), all or part of the wages required by the contract, HUD or its designee may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased. HUD or its designee may, after written notice to the contractor, disburse such amounts withheld for and on account of the contractor or subcontractor to the respective employees to whom they are due. The Comptroller General shall make sure disbursements in the case of direct Davis-Bacon Act contracts.

3. (i) Payrolls and basic records.

Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work (or under the United States Housing Act of 1937, or under the Housing Act of 1949, in the construction or development of the project). Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in Section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5 (a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in Section 1 (b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs. (Approved by the Office of Management and Budget under OMB Control Numbers 1215-0140 and 1215-0017.)

- (ii)(a) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to HUD or its designee if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit the payrolls to the applicant, sponsor, or owner, as the case may be, for transmission to HUD or its designee. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR Part 5.5(a)(3)(i). This information may be submitted in any form desired. Optional Form WH-347 is available for this purpose and may be purchased from the Superintendent of Documents (Federal Stock Number 029-005-00014-1), U.S. Government Printing Office, Washington, D.C. 20402. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. (Approved by the Office of Management and Budget under OMB Control Number 1215-0149).
- (b) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:
 - (1) That the payroll for the payroll period contains the information required to be maintained under 29 CFR Part 5.5(a)(3)(i) and that such information is correct and complete;

- (2) That each laborer or mechanic (including each apprentice and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in 29 CFR Part 3;
- (3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.
- (c) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph A.3.(ii)(b) of this section.
- (d) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under Section 1001 of Title 18 and Section 231 of Title 31 of the United States Code.
- (iii) The contractor or subcontractor shall make the records required under paragraph A.3.(i) of this section available for inspection, copying, or transcription by authorized representative of HUD or its designee or the Department of Labor, and shall permit such representative to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, HUD or its designee may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR Part 5.12.

4. (i) Apprentices.

Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Bureau of Apprenticeship and Training, or with a State Apprenticeship Agency recognized by the Bureau, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Bureau of Apprenticeship and Training or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe

benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Bureau of Apprenticeship and Training, or a State Apprenticeship Agency recognized by the Bureau, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(ii) Trainees.

Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(iii) Equal employment opportunity.

The utilization of apprentices, trainees and journeyman under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR Part 30.

5. Compliance with Copeland Act requirements.

The contractor shall comply with the requirements of 29 CFR Part 3 which are incorporated by reference in this contract.

6. Subcontracts.

The contractor or subcontractor will insert in any subcontracts the clauses contained in 29 CFR 5.5(a)(1) through (10) and such other clauses as HUD or its designee may by appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR Part 5.5

7. Contract termination; debarment.

A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

8. Compliance with Davis-Bacon and Related Act Requirements.

All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR Parts 1, 3, and 5 are herein incorporated by reference in this contract.

9. Disputes concerning labor standards.

Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR Parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and HUD or its designee, the U.S. Department of Labor, or the employees or their representatives.

10. Certification of Eligibility.

- (i) By entering into this contract, the contractor certifies that neither it (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 by virtue of Section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1) or to be awarded HUD contracts or participate in HUD programs pursuant to 24 CFR Part 24.
- (ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of Section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1) or to be awarded HUD contracts or participate in HUD programs pursuant to 24 CFR Part 24.
- (iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001. Additionally, U.S. Criminal Code, Section 1010, Title 18, U.S.C., "Federal Housing Administration transactions", provides in part "Whoever, for the purpose of ...influencing in any way the action of such Administration ...makes, utters or publishes any statement, knowing the same to be false ...shall be fined not more than \$5,000 or imprisoned not more than two years, or both."

11. Complaints, Proceedings, or Testimony by Employees.

No laborer or mechanic to whom the wage, salary, or other labor standards provisions of this Contract are applicable shall be discharged or in any other manner discriminated against by the Contractor or any subcontractor because such employee has filed any complaint or instituted or caused to be instituted any proceeding or has testified or is about to testify in any proceeding under or relating to the labor standards applicable under this Contract to his employer.

B. Contract Work Hours and Safety Standards Act

As used in this paragraph, the terms "laborers" and "mechanics" include watchmen and guards.

1. Overtime requirements.

No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

2. Violation; liability for unpaid wages, liquidated damages.

In the event of any violation of the clause set forth in subparagraph (1) of this paragraph, the contractor and any subcontractor responsible therefore shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in subparagraph (1) of this paragraph, in the sum of \$10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in subparagraph (1) of this paragraph.

3. Withholding for unpaid wages and liquidated damages.

HUD or its designee shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contract, or any other Federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in subparagraph (2) of this paragraph.

4. Subcontracts.

The contractor or subcontractor shall insert in any subcontracts the clauses set forth in subparagraph (1) through (4) of this paragraph and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in subparagraphs (1) through (4) of this paragraph.

C. Health and Safety

1. No laborer or mechanic shall be required to work in surroundings or under working conditions which are unsanitary, hazardous, or dangerous to his health and safety as determined under construction safety and health standards promulgated by the Secretary of Labor by regulation.
2. The contractor shall comply with all regulations issued by the Secretary of Labor pursuant to Title 29 Part 1926 (formerly part 1518) and failure to comply may result in imposition of sanctions pursuant to the Contract Work Hours and Safety Standards Act (Public Law 91-54, 83 Stat. 96).
3. The Contractor shall include the provisions of this Article in every subcontract so that such provisions will be binding on each subcontractor. The Contractor shall take such action with respect to any subcontract as the Secretary of Housing and Urban Development or the Secretary of Labor shall direct as a means of enforcing such provisions.

5. SPECIAL HAZARDS

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

6. 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 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 on account of one accident, and Contractor's Property Damage Insurance in an amount not less than \$ 1,000,000.

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 Insurance of this type and in the same amounts as specified in the preceding paragraph, or (2) insure the activities of his subcontractors in his own policy.

7. PHOTOGRAPHS OF PROJECT

As provided in Paragraph 3.I of the Supplemental General Conditions, the Contractor will furnish photographs in the number, type, and stage as enumerated below:

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

Given on Pages 30 Thru 40

9. 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.

10. SPECIAL EQUAL OPPORTUNITY PROVISIONS

A. Activities and Contracts Not Subject to Executive Order 11246, as Amended

(Applicable to Federally assisted construction contracts and related subcontracts \$10,000 and under.)

During the performance of this contract, the Contractor agrees as follows:

1. The Contractor shall not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The Contractor shall take affirmative action to ensure that applicants for employment are employed, and that employees are treated during employment, without regard to their race, color, religion, sex, or national origin. Such action shall include, but not be limited to, the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship.
2. The Contractor shall post in conspicuous places, available to employees and applicants for employment, notices to be provided by Contracting Officer setting forth the provisions of this nondiscrimination clause. The Contractor shall state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, or national origin.
3. Contractors shall incorporate foregoing requirements in all subcontracts.

B. Executive Order 11246 (contracts/subcontracts above \$10,000)

1. Section 202 Equal Opportunity Clause

During the performance of this contract, the Contractor agrees as follows:

- a. The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex, or national origin. Such action shall include, but not be limited to, the following: employment, upgrading, demotion, or transfer; recruitment, or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.
- b. The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration without regard to race, color, religion, sex, or national origin.
- c. The Contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding a notice to be provided by the Contract Compliance Officer advising the said labor union or workers' representatives of the Contractor's commitment under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
- d. The Contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.
- e. The Contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the Department of the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and others.
- f. In the event of the Contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be cancelled, terminated, or suspended in whole or in part and the Contractor may be declared ineligible for further Government contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

- g. The Contractor will include the provisions of the sentence immediately preceding paragraph a. and the provisions of paragraphs a. through g. in every subcontract or purchase order unless exempted by rules, regulations, orders of the Secretary of Labor issued pursuant to Section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The Contractor will take such action with respect to any subcontract or purchase order as the Department may direct as a means of enforcing such provisions, including sanctions for non-compliance. Provided, however, that in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the Department, the Contractor may request the United States to enter into such litigation to protect the interest of the United States.
2. Notice of Requirement for Affirmative Action to ensure Equal Employment Opportunity (Executive Order 11246).
(Applicable to contracts/subcontracts exceeding \$10,000.)
- a. The Offeror's or Bidder's attention is called to the "Equal Opportunity Clause" and the "Standard Federal Equal Employment Opportunity Construction Contract Specifications" set forth herein.
- b. The goals and timetables for minority and female participation, expressed in percentage terms for the Contractor's aggregate workforce in each trade on all construction work in the covered area, are as follows:

Goals for minority participation	Goals for female participation
Insert Goals	Insert Goals
12%	6.9%

NOTE: THESE GOALS MUST BE PROVIDED. Also, list State Geographic Area to be covered on following page.

These goals are applicable to all the Contractor's construction work (whether or not it is Federal or Federally assisted) performed in the covered area. If the Contractor performs construction work in a geographic area located outside of the covered area, it shall apply the goals established for such geographic area where the work is actually performed. With regard to this second area, the Contractor also is subject to the goals for both its Federally involved and non-Federally involved construction.

The contractor's compliance with the Executive Order and the regulations in 41 CFR Part 60-4 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action obligations, required by the specifications set forth in 41 CFR 60-4.3(a), and its efforts to meet the goals established for the geographical area where the contract resulting from this solicitation is to be performed. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade, and the Contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor or from project to project for the sole purpose of meeting the Contractor's goals shall be a violation of the contract, the Executive Order, and the regulations in 41 CFR Part 60-4. Compliance with the goals will be measured against the total work hours performed.

- c. The Contractor shall provide written notification to the Director of the Office of Federal Contract Compliance Programs within 10 working days of award of any construction sub-contract in excess of \$10,000 at any tier for construction work under the contract resulting from this solicitation. The notification shall list the name, address, and telephone number of the subcontractor; employer identification number; estimated dollar amount of the subcontract; estimated starting and completion dates of the subcontract; and the geographical area in which the contract is to be performed.
 - d. As used in this Notice, and in the contract resulting from this solicitation, the "covered area" is Fentress County, TN.
3. Standard Federal Equal Employment Opportunity Construction Contract Specifications (Executive Order 11246)
- a. As used in these specifications:
 - (1) "Covered area" means the geographical area described in the solicitation from which this contract resulted;
 - (2) "Director" means Director, Office of Federal Contract Compliance Programs, United States Department of Labor, or any person to whom the Director delegates authority;
 - (3) "Employer identification number" means the federal social security number used on the Employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941;
 - (4) "Minority" includes:
 - (a) Black (all persons having origins in any of the Black African racial groups not of Hispanic origin);

- (b) Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South America or other Spanish Culture or origin, regardless of race);
 - (c) Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands);
 - (d) American Indian or Alaskan Native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).
- b. Whenever the Contractor, or any Subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of \$10,000 the provisions of these specifications and the Notice which contains the applicable goals for minority and female participation and which is set forth in the solicitations from which this contract resulted.
- c. If the Contractor is participating (pursuant to 41 CFR 60-4.5) in a Hometown Plan approved by the U.S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the Plan area (including goals and timetables) shall be in accordance with that Plan for those trades which have unions participating in the Plan. Contractors must be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each Contractor or Subcontractor participating in an approved Plan is individually required to comply with its obligations under the EEO clause, and to make a good faith effort to achieve each goal under the Plan in each trade in which it has employees. The overall good faith performance by other Contractors or Subcontractors toward a goal in an approved Plan does not excuse any covered Contractor's or Subcontractor's failure to take good faith efforts to achieve the Plan goals and timetables.

- d. The Contractor shall implement the specific affirmative action standards provided in paragraphs g.(1) through (16) of these specifications. The goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and female utilization the Contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. Covered construction contractors performing contracts in geographical areas where they do not have a Federal or Federally-assisted construction contract shall apply the minority and female goals established for the geographic area where the contract is being performed. Goals are published periodically in the Federal Register in notice form and such notices may be obtained from any Office of Federal Contract Compliance Programs office or from Federal procurement contracting officers. The Contractor is expected to make substantially uniform progress in meeting its goals in each craft during the period specified.
- e. Neither the provisions of any collective bargaining agreement, nor the failure by a union with whom the Contractor has a collective bargaining agreement, to refer either minorities or women shall excuse the Contractor's obligations under these specifications, Executive Order 11246, or the regulations promulgated pursuant thereto.
- f. In order for the nonworking training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees must be employed by the Contractor during the training period, and the Contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U.S. Department of Labor.
- g. 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 union have employment opportunities available, and maintain a record of the organization's 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 therefore, along with whatever additional actions the Contractor may have taken.
- (4) Provide immediate written notification to the Director when the union or unions with which the Contractor has a collective bargaining agreement has not referred to the Contractor a minority person or woman sent by the Contractor, or when the Contractor has other information that the union referral process has impeded the Contractor's efforts to meet its obligations.
- (5) 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 g.(2) above.

- (6) 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's EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.
- (7) 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.
- (8) 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.
- (9) 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.
- (10) 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.

- (11) Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR part 60-3.
 - (12) Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., such opportunities.
 - (13) Ensure that seniority practices, job classifications, work assignments and other personnel practices, do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the EEO policy and the Contractor's obligations under these specifications are being carried out.
 - (14) Ensure that all facilities and company activities are nonsegregated except that separate or single-user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.
 - (15) Document and maintain a record of all solicitations of offers for subcontracts from minority and female construction contractors and suppliers, including circulation of solicitations to minority and female contractor associations and other business associations.
 - (16) Conduct a review, at least annually, of all supervisors' adherence to and performance under the Contractor's EEO policies and affirmative action obligations.
- h. Contractors are encouraged to participate in voluntary associations which assist in fulfilling one or more of their affirmative action obligations g.(1) through (16). 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 g.(1) through (16) 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.

- i. A single goal for minorities and a separate single goal for women have been established. The Contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and non-minority. Consequently, the Contractor may be in violation of the Executive Order if a particular group is employed in a substantially disparate manner (for example, even though the Contractor has achieved its goals for women generally the Contractor may be in violation of the Executive Order if a specific minority group of women is underutilized).
- j. The Contractor shall not use the goals and timetables or affirmative action standards to discriminate against any person because of race, color, religion, sex, or national origin.
- k. The Contractor shall not enter into any Subcontract with any person or firm debarred from Government contracts pursuant to Executive Order 11246.
- l. The Contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, termination and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations, by the Office of Federal Contract Compliance Programs. Any contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.
- m. The Contractor, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps at least as extensive as those standards prescribed in paragraph g. of these specifications, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the Contractor fails to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the Director shall proceed in accordance with 41 CFR 60-4.8.

- n. The Contractor shall designate a responsible official to monitor all employment related activity to ensure that the company's 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.
- o. Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area residents (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).

C. Certification of Nonsegregated Facilities (Over \$10,000)

By the submission of this bid, the bidder, offeror, applicant or subcontractor certifies that he/she does not maintain or provide for his/her employees any segregated facility at any of his/her establishments, and that he/she does not permit employees to perform their services at any location, under his/her control, where segregated facilities are maintained. He/She certifies further that he/she will not maintain or provide for employees any segregated facilities at any of his/her establishments, and he/she 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. He/She further agrees that (except where he/she has obtained identical certifications from proposed subcontractors for specific time periods) he/she 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 he/she will retain such certifications in his/her files; and that he/she will forward the following notice to such proposed subcontractors (except where proposed subcontractors have submitted identical certifications for specific time periods).

D. 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.

E. Section 109 of the Housing and Community Development Act of 1974

No person in the United States shall on the grounds of race, color, national origin, or sex be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity funded in whole or in part with funds made available under this title.

F. "The Section 3 Clause"

1. The work to be performed under this contract is on a project assisted under a program providing direct Federal financial assistance from the Department of Housing and Urban Development and is subject to the requirements of section 3 of the Housing Urban Development Act of 1968, as amended, 12 U.S.C. 1701u. Section 3 requires that to the greatest extent feasible, opportunities for training and employment be given to lower income residents of the area of the Section 3 covered project, and contracts for work in connection with the project be awarded to business concerns which are located in, or owned in substantial part by persons residing in the area of the Section 3 covered project.
2. The parties to this contract will comply with the provisions of said Section 3 and the regulations issued pursuant thereto by the Secretary of Housing and Urban Development set forth in 24 Part CFR 135, and all applicable rules and orders of the Department issued thereunder prior to the execution of this contract. The parties to this contract certify and agree that they are under no contractual or other disability which would prevent them from complying with these requirements.
3. The contractor will send to each labor organization or representative of workers with which he has a collective bargaining agreement or other contract or understanding, if any, a notice advising the said labor organization or workers' representative of his commitments under this Section 3 clause and shall post copies of the notice in conspicuous places available to employees and applicants for employment or training.
4. The contractor will include this Section 3 clause in every subcontract for work in connection with the project and will, at the direction of the applicant for or recipient of Federal Financial assistance, take appropriate action pursuant to the subcontract upon a finding that the subcontractor is in violation of regulations issued by the Secretary of Housing and Urban Development, 24 CFR Part 135. The contractor will not subcontract with any subcontractor where it has notice or knowledge that the latter has been found in violation of regulations under 24 CFR part 135 and will not let any subcontract unless the subcontractor has first provided it with a preliminary statement of ability to comply with the requirements of these regulations.

5. Compliance with the provisions of Section 3, the regulations set forth in 24 CFR Part 135, and all applicable rules and orders of the Department issued thereunder prior to the execution of the contract, shall be a condition of the Federal financial assistance provided to the project, binding upon the applicant or recipient, its contractors and subcontractors, its successors, and assigns to those sanctions specified by the grant or loan agreement or contract through which Federal assistance is provided, and to such sanctions as are specified by 24 CFR Part 135.

G. 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.

H. Section 504 Handicapped

Non-Discrimination for Handicapped Workers

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.

11. **CERTIFICATION OF COMPLIANCE WITH AIR AND WATER ACTS**

(Applicable to Federally assisted construction contracts and related subcontracts exceeding \$100,000)

Compliance with Air and Water Acts

During the performance of this contract the contractor and all subcontractors shall comply with the requirements of the Clean Air Act, as amended, 42 USC 1857 et seq., the Federal Water Pollution Control Act, as amended, 33 USC 1251 et seq., and the regulations of the Environmental Protection Agency with respect thereto, at 40 CFR Part 15, as amended.

In addition to the foregoing requirements, all nonexempt contractors and subcontractors shall furnish to the Owner, the following:

1. A stipulation by the Contractor or subcontractors, that any facility to be utilized in the performance of any nonexempt contract or subcontract, is not listed on the List of Violating Facilities issued by the Environmental Protection Agency (EPA) pursuant to 40 CFR 15.20.

2. Agreement by the Contractor to comply with all the requirements of Section 114 of the Clean Air Act, as amended, (42 USC 1857c-8) and Section 308 of the Federal Water Pollution Control Act, as amended, (33 USC 1318) relating to inspection, monitoring, entry, reports and information, as well as all other requirements specified in said Section 114 and Section 308, and all regulations and guidelines issued thereunder.
3. A stipulation that as a condition for the award of the contract, prompt notice will be given of any notification received from the Director, Office of Federal Activities, EPA, indicating that a facility utilized, or to be utilized for the contract, is under consideration to be listed on the EPA List of Violating Facilities.
4. Agreement by the Contractor that he will include, or cause to be included, the criteria and requirements in paragraph (1) through (4) of this section in every nonexempt subcontract and requiring that the Contractor will take such action as the Government may direct as a means of enforcing such provisions.

12. SPECIAL CONDITIONS PERTAINING TO HAZARDS, SAFETY STANDARDS AND ACCIDENT PREVENTION

A. Lead-Based Paint Hazards

(Applicable to contracts for construction or rehabilitation of residential structures.) The construction or rehabilitation of residential structures is subject to the HUD Lead-Based Paint regulations, 24 CFR Part 35. The Contractor and Subcontractors shall comply with the provisions for the elimination of lead-base paint hazards under sub-part B of said regulations. The Owner will be responsible for the inspections and certifications required under Section 35.14(f) thereof.

B. 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 precaution 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.

C. 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.

13. 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 the 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.

14. 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.

15. 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.

16. 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.

17. PROJECT SIGN

If a project sign is erected, it must include the following:

Governor (Name)
Department of Economic and Community Development
Commissioner (Name)
CDBG Grant (Amount)

CITY OF JAMESTOWN

2024 ARC GRANT JAMESTOWN TANK REHABILITATION

TECHNICAL SPECIFICATIONS

TO BID, CONTRACTOR MUST OBTAIN DOCUMENTS FROM ISSUING OFFICE

2024 ARC GRANT JAMESTOWN TANK REHABILITATION TECHNICAL SPECIFICATIONS

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SECTION 01 00 00
GENERAL REQUIREMENTS

PART 1 GENERAL

1.01 GENERAL SCOPE AND SPECIAL PROVISIONS

- A. The Work consists of the rehabilitation of a 1,000,000 gallon Fluted Column Elevated Storage Tank (City Hall Tank) that involves repainting all interior and exterior surfaces, replacement of issues that currently exist on the tank, and replacement of tank lighting.
- B. The Contractor shall be responsible for all costs associated with the materials, equipment, and labor necessary to construct, and test all proposed items shown on the Drawings. Contractor shall also be responsible for the traffic control, worker protection, environmental pollution control, waste disposal and all other ancillary actions required to complete the work as shown on the Drawings.
- C. Submittals

All project submittals shall be submitted to the Engineer (Seth W. Rye, P.E., Rye Engineering PLC, 4210 West Main Street, Erin, Tennessee 37061).

- 1. Unless otherwise specified, the Contractor shall provide five sets of submittals and/or shop drawings for Engineer review.
- 2. Submittals shall be clear and legible, and of sufficient size for legibility and clarity of the presented data.
- 3. The submittal transmittal page shall include at a minimum the following information:
 - a. Contractor identification:
 - i. Contractor
 - ii. Supplier
 - iii. Manufacturer
 - iv. Supplier or Manufacturer Representative
 - b. Date of submission
 - c. Project number
 - d. Project name

- e. Description/identification of the product
 - f. Reference to Contract drawing(s), if applicable
 - g. Specification section number, page and paragraph(s), if applicable
 - h. Reference to applicable standards, such as ASTM or Federal Standards numbers
 - i. Contractor's approval and certification statement
 - j. Reference to previous submittal (for resubmittals)
- D. Contractor shall schedule all work in close coordination with Owner and Engineer. Due to the criticality of the pump station down time, timely work is crucial.
- E. Existing Utilities, Underground Pipelines and Electric Conduit

From investigations during the design surveys, at least the following existing utilities were found to be present in the area:

Water Lines..... City of Jamestown, TN
 Sewer Lines..... City of Jamestown, TN
 Power Lines Volunteer Energy Cooperative, Jamestown, TN
 Telephone Lines..... Twin Lakes Telephone Cooperative Corporation, Gainsboro, TN

Precautions shall be taken by the Contractor to avoid damage to existing overhead and underground utilities.

F. Project Sign

1. The General Contractor shall erect a sign at the Project site identifying the Project. The sign shall be erected within twenty-one (21) days after the Notice to Proceed and shall be in accordance with the Specifications and details included in this Section. The project sign and sign panel shall be installed by the Contractor at the location designated by the Owner's Representative. Wording and colors shall be as shown on the detail at the end of this Section.
2. The project sign shall be furnished, erected, and maintained by the Contractor in accordance with the following specifications:
 - a. Sign Panel: The sign panel shall be constructed of 3/4-inch minimum thickness marine plywood rabbited into a 2-inch x 4-inch wood frame. All fasteners used in the construction of the sign shall be of a rustproof nature.

- b. Painting: All supports, trim and back of the sign panel shall be painted with at least two (2) coats of the same paint used for the sign face. All paint used shall be exterior grade paint, suitable for use on wood signs.
- c. Sign Supports: The supports for the project sign shall be at least two 4" by 4" treated wood posts. The sign panel shall be securely fastened to the sign supports with at least six (6) 3/8" galvanized bolts, nuts and washers. The positioning and alignment of the sign shall be as determined by the Owner's Representative.
- d. Maintenance: The project sign shall be maintained by the Contractor, in good condition, at all times, for the duration of construction.
- e. Removal of Sign from Project Site: The removal of the project sign from the construction site by the Contractor shall be at the completion of construction, when ordered by the Owner's Representative.
- f. Payment: The cost of the fabrication, erection, maintenance, and removal of the project sign, including all labor and materials, shall be included in the General Contractor's Lump Sum Bid. No extra payment will be made for obliterating certain names and offices and replacement thereof of others because of administrative changes during the course of this Contract.
- g. Identification Plate – NOT USED

G. Progress Pictures

1. The Contractor shall furnish progress pictures to the Engineer at the end of each month at the time the estimate is submitted. The pictures shall be submitted in digital and print format, with descriptions. These pictures shall be approximately 3" x 5" and clearly show the work performed. The name of the project, Contractor's name, and the date shall be shown on the progress pictures. Twenty pictures minimum shall be required per month.

H. Documents at Site

2. Contractor shall maintain an approved original set of Drawings and Specifications on Site at all times. Said Drawings, Specifications and permits shall be available for inspection by Engineer, Owner and SFM officials at all times.

END OF SECTION

SECTION 01 29 00
MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.01 THE REQUIREMENT

- A. The Bid Form lists each item of the Project for which payment will be made. No payment will be made for any items other than those listed in the Bid Form.
- B. Required items of work and incidentals necessary for the satisfactory completion of the work which are not specifically listed in the Bid Form, and which are not specified in this Section, shall be considered incidental to the work. All costs thereof shall be considered as included in the lump sum or unit prices bid for the various Bid items. The Contractor shall prepare the Bid accordingly.
- C. Contractor shall include in the prices provided for the items listed herein adequate amounts considered by Contractor to cover all costs associated with furnishing all tools, equipment, supplies, manufactured articles and for all labor, operations, taxes, commissions, transportation and handling, bonds, permit fees, insurance, overhead and profit for each item.

1.02 BID ITEMS

- A. Unit prices bid by Contractor are deemed to be full compensation for all required labor, products, tools, equipment, plant, transportation, testing, inspection, services, incidentals, administrative, procedures, applicable taxes, permit fees, overhead, profit, and other miscellaneous expenses, unless specified otherwise.

B. Complete Tank Rehabilitation

1. MEASUREMENT

- a. Measurement for the Complete Tank Rehabilitation will be measured as a lump sum bid item. The lump sum shall include all work shown in the plans and specifications including, but not limited to, interior and exterior sandblasting, cleaning, and recoating; inlet/outlet piping coating; safety climb replacement; frost-proof vent installation; condensate drain replacement; pipe penetration sealing; dissimilar metal corrections; man door replacement; overflow modifications including duckbill check valve and screen; installation of tank roof corral and antenna relocation; site work including grading, erosion control, and restoration; and all other appurtenances and miscellaneous work required for a complete rehabilitation.

2. PAYMENT

- a. Payment will be made at the lump sum price listed on the bid form.

C. Electrical / Lighting Improvements

1. MEASUREMENT

- a. Measurement for the Electrical / Lighting Improvements will be measured as a lump sum bid item. The lump sum shall include all work shown in the plans and specifications for removal and replacement of existing tank lighting, including all materials, equipment, wiring, and incidentals required for a complete installation.

2. PAYMENT

- a. Payment will be made at the lump sum price listed on the bid form.

D. Containment System

1. MEASUREMENT

- a. Measurement for the Containment System will be measured as a lump sum bid item. The lump sum shall include all work shown in the plans and specifications for providing, maintaining, and removing containment systems required for blasting and coating operations, including all materials, labor, and incidentals necessary to protect surrounding areas.

2. PAYMENT

- a. Payment will be made at the lump sum price listed on the bid form.

E. Pit Filling

1. MEASUREMENT

- a. Measurement for the Pit Filling will be measured as a unit price bid item for every square inch (SI) of area repaired in the project. The unit price shall include all labor, materials, and equipment necessary to complete the work, per the construction drawings and specifications.

2. PAYMENT

- a. Payment will be made at the unit price listed on the bid form.

F. Pit Welding

1. MEASUREMENT

- a. Measurement for the Pit Welding will be measured as a unit price bid item for every square inch (SI) of area welded in the project. The unit price shall include all labor, materials, and equipment necessary to complete the work, per the construction drawings and specifications.

2. PAYMENT

- a. Payment will be made at the unit price listed on the bid form.

G. Seam Welding

1. MEASUREMENT

- a. Measurement for the Seam Welding will be measured as a unit price bid item for every linear foot (LF) of weld in the project. The unit price shall include all labor, materials, and equipment necessary to complete the work, per the construction drawings and specifications.

2. PAYMENT

- a. Payment will be made at the unit price listed on the bid form.

H. Plate Welding

1. MEASUREMENT

- a. Measurement for the Plate Welding will be measured as a unit price bid item for every square foot (SF) of weld in the project. The unit price shall include all labor, materials, and equipment necessary to complete the work, per the construction drawings and specifications.

2. PAYMENT

- a. Payment will be made at the unit price listed on the bid form.

END OF SECTION

SECTION 01 66 00

PRODUCT STORAGE AND HANDLING REQUIREMENTS

PART 1 GENERAL

1.01 DESCRIPTION

- A. This Section includes General Requirements for storing and protecting materials and equipment.
- B. The Contractor shall be responsible for storage and handling of Owner furnished equipment.

1.02 STORAGE

- A. Store and protect materials and equipment in accordance with manufacturer's recommendations and the Contract Documents.
- B. Contractor shall make all arrangements and provisions necessary for, and pay all costs for, storing materials and equipment. Excavated materials, construction equipment, and materials and equipment to be incorporated into the Work shall be placed to avoid damaging the Work and existing facilities and property, and so that free access is maintained at all times to all parts of the Work and to public utility installations in vicinity of the Work. Store materials and equipment neatly and compactly in locations that cause minimum inconvenience to Owner, other contractors, public travel, and owners, tenants, and occupants of adjoining property. Arrange storage in manner to provide easy access for inspection.
- C. Areas available at the Site for storing materials and equipment will be discussed with the Owner at the Pre-Bid Meeting and Kick-off Meeting of the project.
- D. Contractor shall be fully responsible for loss or damage (including theft) to stored materials and equipment.
- E. Do not open manufacturer's containers until time of installation, unless recommended by the manufacturer, required to verify all contents or otherwise specified in the Contract Documents.
- F. Do not store materials or equipment in structures being constructed unless approved by Engineer in writing.
- G. Do not use lawns or other private property for storage without written permission of the owner or other person in possession or control of such premises. Prior to use written permission must be submitted to Engineer for record purposes.

1.03 PROTECTION

- A. Equipment shall be boxed, crated, or otherwise completely enclosed and protected during shipping, handling, and storage, in accordance with Section 01 65 00, Product Delivery Requirements.

- B. Store all materials and equipment off the ground or floor on raised supports such as skids or pallets.
- C. Protect painted surfaces against impact, abrasion, discoloration, and other damage. Painted equipment surfaces that are damaged or marred shall be repainted in their entirety in accordance with equipment manufacturer and paint manufacturer requirements, to the satisfaction of Engineer.
- D. Protect electrical equipment, controls, and instrumentation against moisture, water damage, heat, cold, and dust. Space heaters provided in equipment shall be connected and operating at all times until equipment is placed in operation and permanently connected.

1.04 UNCOVERED STORAGE

- A. The following types of materials may be stored outdoors without cover on supports so there is no contact with the ground:
 - 1. Reinforcing steel.
 - 2. Structural steel.
 - 3. Piping.
 - 4. Precast concrete materials.
 - 5. Castings.
 - 6. Handrails and railings.
 - 7. Grating.
 - 8. Checker plate.
 - 9. Metal stairs.
 - 10. Metal access hatches.
 - 11. Fiberglass products.
 - 12. Rigid electrical conduit.
 - 13. Loose granular material.
 - 14. Others as directed by Owner.

1.05 COVERED STORAGE

- A. The following materials and equipment may be stored outdoors on supports and completely covered with covering impervious to water:
 - 1. Rough lumber.
 - 2. Filter media.
 - 3. Masonry units.
 - 4. Grout and mortar materials.
 - 5. Others as directed by Owner.
- B. Tie down covers with rope, and slope covering to prevent accumulation of water.

1.06 FULLY PROTECTED STORAGE

- A. Store all material and equipment not named in Articles 1.4 and 1.5 of this Section in on supports in buildings or trailers that have concrete or wooden flooring, roof, and fully closed walls on all

sides. Covering with Visqueen plastic sheeting or similar material in space without floor, roof and walls is not acceptable. Comply with the following:

1. Provide heated storage for materials and equipment that could be damaged by low temperatures or freezing.
2. Provide air-conditioned storage for materials and equipment that could be damaged by high temperatures.
3. Protect mechanical and electrical equipment from being contaminated by dust, dirt, and moisture.
4. Maintain humidity at levels recommended by manufacturers for electrical and electronic equipment.

1.07 HAZARDOUS PRODUCTS

- A. Prevent contamination of personnel, storage area, and the Site. Comply with Laws and Regulations and manufacturer's instructions.

1.08 MAINTENANCE OF STORAGE

- A. On scheduled basis, periodically inspect stored materials and equipment to ensure that:
 1. State of storage facilities is adequate to provide required conditions.
 2. Required environmental conditions are maintained on continuing basis.
 3. Materials and equipment exposed to elements are not adversely affected.
- B. Mechanical and electrical equipment requiring long-term storage shall have complete manufacturer's instructions for servicing each item, with notice of enclosed instructions shown on exterior of container or package.
 1. Comply with manufacturer's instructions on scheduled basis.
 2. Space heaters that are part of electrical equipment, shall be connected and operated continuously until equipment is placed in service and permanently connected.

1.09 MICROPROCESSORS, PANELS, AND INSTRUMENTATION STORAGE

- A. Microprocessor-based equipment, store panels, electronics, and other devices subject to damage or decreased useful life because of temperatures below 40 degrees F or above 100 degrees F, relative humidity above 90 percent, or exposure to rain or exposure to blowing dust in climate-controlled storage space.
- B. Requirements:
 1. Owner and Engineer have the right to inspect materials and equipment during normal working hours.

2. Placed inside each panel or device a desiccant, volatile corrosion inhibitor blocks (VCI), moisture indicator, and maximum-minimum indicating thermometer.
 3. Check panels and equipment at least once per month. Replace desiccant, VCI, and moisture indicator as often as required, or every six months, whichever occurs first.
 4. Certified record of daily maximum and minimum temperature and humidity in storage facility shall be available for inspection by Owner and Engineer. Certified record of monthly inspection, noting maximum and minimum temperature for month, condition of desiccant, VCI, and moisture indicator, shall be available for inspection by Owner and Engineer.
- C. Costs for storing climate-sensitive materials and equipment shall be paid by Contractor. Replace panels and devices damaged during storage, or for which storage temperatures or humidity range has been exceeded, at no additional cost to Owner. Delays resulting from such replacement are causes within Contractor's control.
- D. Do not ship panels and equipment to the Site until conditions at the Site are suitable for installation, including slabs and floors, walls, roofs, and environmental controls. Failure to have the Site ready for installation shall not relieve Contractor from complying with the Contract Documents.

1.10 RECORDS

- A. Keep up-to-date account of materials and equipment in storage to facilitate preparation of Applications for Payment, if the Contract Documents provide for payment for materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing.

END OF SECTION

SECTION 01 71 33

PROTECTION OF PROPERTY AND WORK

PART 1 GENERAL

1.01 THE REQUIREMENT

- A. Contractor shall be responsible for the preservation and protection of property adjacent to the work site against damage or injury as a result of his operations under this Contract. Any damage or injury occurring on account of any act, omission or neglect on the part of the Contractor shall be restored in a proper and satisfactory manner or replaced by and at the expense of the Contractor to an equal or superior condition than previously existed.
- B. Contractor shall comply promptly with such safety regulations as may be prescribed by the Owner or the local authorities having jurisdiction and shall, when so directed, properly correct any unsafe conditions created by, or unsafe practices on the part of, his employees. In the event of the Contractor's failure to comply, the Owner may take the necessary measures to correct the conditions or practices complained of, and all costs thereof will be deducted from any monies due the Contractor. Failure of the Engineer to direct the correction of unsafe conditions or practices shall not relieve the Contractor of his responsibility hereunder.
- C. In the event of any claims for damage or alleged damage to property as a result of work under this Contract, the Contractor shall be responsible for all costs in connection with the settlement of or defense against such claims. Prior to commencement of work in the vicinity of property adjacent to the work site, the Contractor, at his own expense, shall take such surveys as may be necessary to establish the existing condition of the property. Before final payment can be made, the Contractor shall furnish satisfactory evidence that all claims for damage have been legally settled or sufficient funds to cover such claims have been placed in escrow, or that an adequate bond to cover such claims has been obtained.

1.02 PROTECTION OF WORK AND MATERIAL

- A. During the progress of the work and up to the date of final payment, the Contractor shall be solely responsible for the care and protection of all work and materials covered by the Contract.
- B. All work and materials shall be protected against damage, injury or loss from any cause whatsoever, and the Contractor shall make good any such damage or loss at his own expense. Protection measures shall be subject to the approval of the Engineer.

1.03 BARRICADES, WARNING SIGNS AND LIGHTS

- A. The General Contractor shall provide, erect and maintain as necessary, strong and suitable barricades, danger signs and warning lights along all roads accessible to the public, as required by the authority having jurisdiction, to ensure safety to the public. All barricades and obstructions

along public roads shall be illuminated at night and all lights for this purpose shall be kept burning from sunset to sunrise.

- B. Each Contractor shall provide and maintain such other warning signs and barricades in areas of and around their respective work as may be required for the safety of all those employed in the work, the Owner's operating personnel, or those visiting the site.

1.04 EXISTING UTILITIES AND STRUCTURES

- A. The term existing utilities shall be deemed to refer to both publicly-owned and privately-owned utilities such as electric power and lighting, telephone, water, gas, storm drains, process lines, sanitary sewers and all appurtenant structures.
- B. Where existing utilities and structures are indicated on the Drawings, it shall be understood that all of the existing utilities and structures affecting the work may not be shown and that the locations of those shown are approximate only. It shall be the responsibility of the Contractor to ascertain the actual extent and exact location of existing utilities and structures. In every instance, the Contractor shall notify the proper authority having jurisdiction and obtain all necessary directions and approvals before performing any work in the vicinity of existing utilities.
- C. Prior to beginning any excavation work, the Contractor shall, through field investigations, determine any conflicts or interferences between existing utilities and new utilities to be constructed under this project. This determination shall be based on the actual locations, elevations, slopes, etc., of existing utilities as determined in the field investigations, and locations, elevation, slope, etc. of new utilities as shown on the Drawings. If an interference exists, the Contractor shall bring it to the attention of the Engineer as soon as possible. If the Engineer agrees that an interference exists, he shall modify the design as required. Additional costs to the Contractor for this change shall be processed through a Change Order as detailed elsewhere in these Contract Documents. In the event the Contractor fails to bring a potential conflict or interference to the attention of the Engineer prior to beginning excavation work, any actual conflict or interference which does arise during the Project shall be corrected by the Contractor, as directed by the Engineer, at no additional expense to the Owner.
- D. The work shall be carried out in a manner to prevent disruption of existing services and to avoid damage to the existing utilities. Temporary connections shall be provided, as required, to ensure the non-interruption of existing services. Any damage resulting from the work of this Contract shall be promptly repaired by the Contractor at his own expense in a manner approved by the Engineer and further subject to the requirements of any authority having jurisdiction. Where it is required by the authority having jurisdiction that they perform their own repairs or have them done by others, the Contractor shall be responsible for all costs thereof.
- E. Where excavations by the Contractor require any utility lines or appurtenant structures to be temporarily supported and otherwise protected during the construction work, such support and protection shall be provided by the Contractor. All such work shall be performed in a manner satisfactory to the Engineer and the respective authority having jurisdiction over such work. In the event the Contractor fails to provide proper support or protection to any existing utility, the Engineer may, at his discretion, have the respective authority to provide such support or

protection as may be necessary to ensure the safety of such utility, and the costs of such measures shall be paid by the Contractor.

END OF SECTION

TO BID, CONTRACTOR MUST OBTAIN DOCUMENTS FROM ISSUING OFFICE

SECTION 02 41 00

DEMOLITION

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. American National Standards Institute (ANSI): A10.6, Safety and Health Program Requirements for Demolition Operations.
 2. Occupational Safety and Health Administration (OSHA), U.S. Code of Federal Regulations (CFR) Title 29 Part 1926—Occupational Safety and Health Regulations for Construction.
 3. Environmental Protection Agency (EPA), U.S. Code of Federal Regulations (CFR), Title 40:
 - a. Part 61—National Emission Standards for Hazardous Air Pollutants.
 - b. Part 82—Protection of Stratospheric Ozone.
 - c. Part 273—Standards for Universal Waste Management.

1.02 DEFINITIONS

- A. ACM: Asbestos-containing material.
- B. Demolition: Dismantling, razing, destroying, or wrecking of any fixed building or structure or any part thereof.
- C. Modify: Provide all necessary material and labor to modify an existing item to the condition indicated or specified.
- D. Relocate: Remove, protect, clean and reinstall equipment, including electrical, instrumentation, and all ancillary components required to make the equipment fully functional, to the new location identified on the Drawings.
- E. Renovation: Altering a facility or one or more facility components in any way.
- F. Salvage/Salvageable: Remove and deliver, to the specified location(s), the equipment, building materials, or other items so identified to be saved from destruction, damage, or waste; such property to remain that of Owner. Unless otherwise specified, title to items identified for demolition shall revert to Contractor.
- G. Universal Waste Thermostat: A temperature control device that contains metallic mercury in an ampule attached to a bimetal sensing element, and mercury-containing ampules that have

been removed from these temperature control devices in compliance with the requirements of 40 CFR 273.

1.03 REGULATORY AND SAFETY REQUIREMENTS

- A. Comply with federal, state, and local hauling and disposal regulations. Contractor's safety requirements shall conform to ANSI A10.6.

1.04 USE OF EXPLOSIVES

- A. Use of explosives for demolition is not permitted.

1.05 ENVIRONMENTAL PROTECTION

- A. Prior to beginning demolition Contractor shall establish temporary erosion and sediment control, in accordance with Section 31 25 00, Erosion and Sediment Control.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 EXISTING FACILITIES TO BE DEMOLISHED OR RENOVATED

A. Facilities:

1. Buildings and adjacent designated areas scheduled for complete demolition are as shown on the Drawings.
2. Portions of buildings and other areas scheduled for selective demolition, partial demolition, and renovation work are as shown on the Drawings.

B. Utilities and Related Equipment:

1. Notify Owner or appropriate utilities to turn off affected services at least 48 hours before starting demolition or renovation activities.
2. Remove existing utilities as indicated and terminate in a manner conforming to the nationally recognized code covering the specific utility and approved by Owner.
3. When utility lines are encountered that are not indicated on the Drawings, notify Owner prior to further Work in that area.
4. Remove meters and related equipment and deliver to a location as determined by the Owner.
5. Excavate and remove utility lines serving buildings to be demolished to a distance of 10 feet beyond the outside perimeter of the demolition.

6. Provide a permanent leak-proof closure for water and gas lines.
 7. For lines less than 8 inches in diameter, plug sewer lines with concrete to a minimum plug length of 2 feet to prevent groundwater infiltration. For lines 8 inches and larger, or for all pipes abandoned under roadway, completely fill the abandoned line with controlled low strength material (CLSM) as specified in Section 31 23 00, Excavation and Fill.
- C. Paving and Slabs:
1. Provide neat saw cuts at limits of pavement removal as indicated.
- D. Masonry: Sawcut and remove masonry so as to prevent damage to surfaces to remain and to facilitate the installation of new work. Where new masonry adjoins existing, the new work shall abut or tie into the existing construction as indicated.
- E. Concrete: Saw concrete along straight lines to a depth of not less than 2 inches. Make each cut in walls perpendicular to the face and in alignment with the cut in the opposite face. Break out the remainder of the concrete, provided that the broken area is concealed in the finished work, and the remaining concrete is sound. At locations where the broken face cannot be concealed, grind smooth or saw cut entirely through the concrete. Where new concrete adjoins existing, the new work shall abut or tie into the existing construction as indicated.
- F. Patching:
1. Where removals leave holes and damaged surfaces exposed in the finished work, patch and repair to match adjacent finished surfaces as to texture and finish.
 2. Where new work is to be applied to existing surfaces, perform removals and patching in a manner to produce surfaces suitable for receiving new work.
 3. Patching shall be as specified and indicated, and shall include:
 - a. Fill holes and depressions left as a result of removals in existing surfaces with an approved patching material, applied in accordance with the manufacturer's printed instructions.
- G. Electrical:
1. Cut off concealed or embedded conduit, boxes, or other materials a minimum of 3/4 inch below final finished surface.
 2. When removing designated equipment, conduit and wiring may require rework to maintain service to other equipment.
 3. Rework existing circuits or provide temporary circuits as necessary during renovation to maintain service to existing lighting and equipment not scheduled to be renovated. Existing equipment and circuiting shown are based upon limited field surveys. Verify existing conditions, make all necessary adjustments, and record the Work on the Record Drawings. This shall include, but is not limited to, swapping and other adjustments to

branch circuits and relocation of branch circuit breakers within panelboards as required to accomplish the finished work.

4. Reuse of existing luminaires, devices, conduits, boxes, or equipment will be permitted only where specifically indicated.
5. Raceways and cabling not scheduled for reuse.
6. Inaccessibly Concealed: Cut off and abandon in place.
7. Exposed or Concealed Above Accessible Ceilings: Remove.
8. Raceways and Cabling Scheduled for Future Use: Cap/seal and tag.
9. Relocating Equipment: Extend existing wiring or run new wiring from the source.
10. Where the existing raceway is concealed, the outlet box shall be cleaned, and a blank cover plate installed.
11. Where the concealed raceway is uncovered remove raceway (or extend to new location if appropriate).
12. Provide new typewritten panelboard circuit directory cards.

3.02 PROTECTION

A. Dust and Debris Control:

1. Prevent the spread of dust and debris to occupied portions of the building and avoid the creation of a nuisance or hazard in the surrounding area. Do not use water if it results in hazardous or objectionable conditions such as, but not limited to, ice, flooding, or pollution.
2. Vacuum and dust interior work areas daily.
3. Sweep pavements as often as necessary to control the spread of debris that may result in foreign object damage potential to vehicular traffic.

B. Traffic Control Signs: Where pedestrian and driver safety is endangered in the area of removal work, use traffic barricades with flashing lights.

C. Existing Work:

1. Survey the site and examine the Drawings and Specifications to determine the extent of the Work before beginning any demolition or renovation.

2. Take necessary precautions to avoid damage to existing items scheduled to remain in place, to be reused, or to remain the property of Owner; any Contractor-damaged items shall be repaired or replaced as directed by Owner.
 3. Provide temporary weather protection during interval between removal of existing exterior surfaces and installation of new to ensure that no water leakage or damage occurs to structure or interior areas of existing building.
 4. Ensure that structural elements are not overloaded as a result of or during performance of the Work. Responsibility for additional structural elements or increasing the strength of existing structural elements as may be required as a result of any Work performed shall be that of the Contractor. Repairs, reinforcement, or structural replacement must have Owner approval.
 5. Do not overload pavements to remain.
- D. Weather Protection: For portions of the building scheduled to remain, protect building interior and materials and equipment from weather at all times. Where removal of existing roofing is necessary to accomplish the Work, have materials and workmen ready to provide adequate and temporary covering of exposed areas so as to ensure effectiveness and to prevent loss.
- E. Trees: Protect trees within the Site that might be damaged during demolition and are indicated to be left in place, by a 6-foot-high fence. The fence shall be securely erected a minimum of 5 feet from the trunk of individual trees or follow the outer perimeter of branches or clumps of trees. Any tree designated to remain that is damaged during the Work shall be replaced in kind, as approved by the Owner.
- F. Facilities:
1. Protect electrical and mechanical services and utilities. Where removal of existing utilities and pavement is specified or indicated, provide approved barricades, temporary covering of exposed areas, and temporary services or connections for electrical and mechanical utilities.
 2. Floors, roofs, walls, columns, pilasters, and other structural elements that are designed and constructed to stand without lateral support or shoring and are determined by Contractor to be in stable condition, shall remain standing without additional bracing, shoring, or lateral support until demolished, unless directed otherwise by the Owner.
 3. Protect all facility elements not scheduled for demolition.
 4. Provide interior shoring, bracing, or support to prevent movement, settlement, or collapse of structure or element to be demolished and adjacent facilities.
- G. Protection of Personnel:

1. During demolition, continuously evaluate the condition of the structure being demolished and take immediate action to protect all personnel working in and around the demolition site.
2. Provide temporary barricades and other forms of protection to protect Owner's personnel and the general public from injury due to demolition work.
3. Provide protective measures as required to provide free and safe passage of Owner's personnel and the general public to occupied portions of the structure.

3.03 BURNING

- A. The use of burning at the Site for the disposal of refuse and debris will not be permitted.

3.04 RELOCATIONS

- A. Perform the removal and reinstallation of relocated items as indicated with workmen skilled in the trades involved. Clean all items to be relocated prior to reinstallation, to the satisfaction of Owner. Repair items to be relocated which are damaged or replace damaged items with new undamaged items as approved by Owner.

3.05 BACKFILL

- A. Do not use demolition debris as backfill material.

3.06 TITLE TO MATERIALS

- A. All equipment will be discarded, or may be salvaged, by the Contractor, unless specifically identified to remain the property of Owner in the Contract Documents.

3.07 DISPOSITION OF MATERIAL

- A. Do not remove equipment and materials without approval of Owner.
- B. Remove materials and equipment that are indicated and specified to be removed by Contractor and deliver to The Town of Dover facility specified by Owner.
- C. Remove salvaged items in a manner to prevent damage, and pack or crate to protect the items from damage while in storage or during shipment. Properly identify containers as to contents.
- D. Repair or replace, at the discretion of Owner, items damaged during removal or storage.
- E. Owner will not be responsible for the condition or loss of, or damage to, property scheduled to become Contractor's property after Owner's authorization to begin demolition. Materials and equipment shall not be viewed by prospective purchasers or sold on the site.
- F. Owner will not be responsible for the condition or loss of, or damage to, such property after Owner's authorization to begin demolition.

- G. Store salvaged items as approved by Owner and remove them from Owner's property before completion of the Contract. Materials and equipment shall not be either viewed by prospective purchasers or sold on the Site.

3.08 REUSE OF MATERIALS AND EQUIPMENT

- A. Remove and store materials and equipment to be reused or relocated to prevent damage and reinstall as the Work progresses.
- B. Properly store and maintain equipment and materials in same condition as when removed.
- C. Store equipment and material designated to be reused in a location designated by Owner.
- D. Equipment and material designated to be reused shall be cleaned, serviced and checked for proper operability before being put back into service.
- E. Owner will determine condition of equipment and materials prior to removal.

3.09 UNSALVAGEABLE MATERIAL

- A. Concrete, masonry, and other noncombustible material, except concrete permitted to remain in place, shall be disposed of by the Contractor at a facility permitted to receive the waste by the appropriate state, federal, or local authority.
- B. Combustible material shall be disposed of off the Site.

3.10 CLEANUP

- A. Debris and rubbish shall be removed and transported in a manner that prevents spillage on streets or adjacent areas. Local regulations regarding hauling and disposal shall apply.

END OF SECTION

SECTION 05 50 00
METAL FABRICATIONS

PART 1 GENERAL

1.01 SUMMARY

A. This section includes the following metal fabrications:

1. Rough hardware
2. Ladders
3. Ladder safety cages
4. Loose bearing and leveling plates
5. Loose steel lintels
6. Miscellaneous framing, supports and trim
7. Shelf and ledger angles
8. Metal bar gratings
9. Floor plates
10. Tread plates
11. Steel pipe guardrails and handrails
12. Cast nosings and treads
13. Metal stairs
14. Pipe bollards

B. Related Sections: Refer to Section 05120: Structural Steel (for structural steel framing components).

1.02 REFERENCES

- A. Aluminum Association (AA)
- B. American National Standards Institute (ANSI)

1. A14.3 Safety Requirements for Fixed Ladders
- C. American Society of Testing and Materials (ASTM)
1. A27 Specification for Steel Castings, Carbon, for General Application
 2. A36 Specification for Structural Steel
 3. A47 Specification for Ferritic Malleable Iron Castings
 4. A48 Specification for Gray Iron Castings
 5. A53 Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
 6. A123 Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
 7. A153 Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
 8. A167 Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip
 9. A276 Specification for Stainless and Heat-Resisting Steel Bars and Shapes
 10. A307 Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength
 11. A366 Specification for Steel, Sheet, Carbon, Cold-Rolled, Commercial Quality
 12. A446 Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality
 13. A500 Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
 14. A510 Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel
 15. A526 Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Commercial Quality
 16. A569 Specification for Steel, Carbon (0.15 Maximum, Percent), Hot-Rolled Sheet and Strip, Commercial Quality
 17. A570 Specification for Steel, Sheet and Strip, Carbon, Hot-Rolled, Structural Quality
 18. A780 Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings

19. A786 Specification for Rolled Steel Floor Plates
20. B221 Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire Shapes, and Tubes
21. B632 Specification for Aluminum-Alloy Rolled Tread Plate
22. C1107 Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
23. E985 Specification for Permanent Metal Railing Systems and Rails for Building
- D. American Welding Society (AWS)
1. D1.1 Structural Welding Code – Steel
2. D1.3 Structural Welding Code - Sheet Steel
- E. Code of Federal Regulations (CFR)
1. Title 29 Part 1910 Labor-Occupational Safety and Health Standards
- F. Corps of Engineers (CE)
1. CRD C621 Specification for Nonshrink Grout
- G. Federal Specifications (FS)
1. FF-B-561 Bolts, Screw, Lag
2. FF-B-588 Bolt, Toggle, and Expansion Sleeve, Screw
3. FF-S-92 Screw, Machine, Slotted, Cross-Recessed or Hexagon Head
4. FF-S-111 Screw, Wood
5. FF-S-325 Shield, Expansion; Nail, Expansion; and Nail, Drive Screw (Devices, Anchoring, Masonry)
6. FF-W-84 Washers, Lock (Spring)
7. FF-W-92 Washer, Flat (Plain)
8. TT-P-664 Primer Coating, Alkyd, Corrosion-Inhibiting, Lead and Chromate Free, VOC-Compliant
9. TT-P-645 Primer, Paint, Zinc Chromate, Alkyd Type
- H. Military Standardization Documents (MIL)

1. P-21035 Paint, High Zinc Dust Content, Galvanizing Repair
- I. National Association of Architectural Metal Manufacturers (NAAMM)
1. AMP 500 Metal Finishes Manual
2. AMP 510 Metal Stair Manual
3. MBG 531 Metal Bar Grating Manual
4. MBG 532 Heavy Duty Metal Bar Grating Manual and Pipe Railing Manual
- J. National Fire Protection Association (NFPA)
1. 101 Life Safety Code
- K. Steel Structures Painting Council (SSPC)
1. SSPC-PA 1 Paint Application Specification No. 1
2. SSPC Paint 12 Paint Specification No. 12 Cold Applied Asphalt Mastic (Extra Thick Film)
3. SSPC Paint 20 Paint Specification No. 20 Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic")
4. SSPC-SP1 Surface Preparation Specification No. 1 "Solvent Cleaning"
5. SSPC-SP2 Surface Preparation Specification No. 2 "Hand-Tool Cleaning"
6. SSPC-SP3 Surface Preparation Specification No. 3 "Power Tool Cleaning"
7. SSPC-SP7 Surface Preparation Specification No. 7 "Brush-Off Blast Cleaning"
- L. International Building Code (IBC)
- M. Uniform Federal Accessibility Standards (UFAS)
1. Fed. Std. 795
- 1.03 DEFINITIONS
- A. Refer to ASTM E985 for railing-related terms that apply to this Section.

- B. Refer to the NAAMM publications listed in Article 1.02 "References" for definition of terms that apply to this Section.

1.04 SUBMITTALS

A. General: Submit the following :

1. Product Data: Submit product data for products used in metal fabrications, including paint products, grout and fasteners.
2. Shop Drawings: Submit detailed shop and erection drawings of each metal fabrication indicated. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
3. Welder certificates signed by Contractor certifying that welders comply with requirements specified in 1.05C.
4. Qualification data for firm specified in 1.05B to demonstrate their capabilities and experience.

1.05 QUALITY ASSURANCE

A. Codes and Standards: Comply with provisions of the following, except as otherwise indicated. Where conflicts occur, comply with the more stringent requirements.

1. ANSI 14.3
2. AWS D1.1 and D1.3
3. NFPA 101

B. Fabricator Qualifications: Firm experienced in successfully producing metal fabrications similar to that shown on the Drawings, with sufficient production capacity to produce required units without causing delay in the work.

C. Qualify welding processes and welding operators in accordance with AWS D1.1 and D1.3.

D. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

E. All materials used shall be free of lead, and asbestos fibers.

F. Use of damaged items is prohibited.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to the job site in good condition and properly protected against damage to finished surfaces.
- B. Storage on Site: Store materials in a location and in a manner to avoid damage. Stacking shall be done in a way which will prevent bending.
- C. Store metal components and materials in a clean, dry location.
- D. Cover with waterproof paper, tarpaulin or polyethylene sheeting in a manner that will permit circulation of air inside the cover.
- E. Keep handling on-site to a minimum. Exercise care to avoid damage to finishes of material.

1.07 PROJECT CONDITIONS

A. Field Measurements

1. Check actual locations of walls and other construction to which metal fabrications must fit, by accurate field measurements before fabrication; show recorded measurements on final shop drawings.
2. Coordinate fabrication schedule with construction progress to avoid delay of work. Where field measurements cannot be made without delaying the work, guarantee dimensions and proceed with fabrication of products without field measurements.
3. Coordinate construction to ensure that actual opening dimensions correspond to guaranteed dimensions. Allow for trimming and fitting.

1.07 SEQUENCING AND SCHEDULING

A. Sequence and coordinate installation of wall handrails as follows:

1. Mount handrails only on completed walls. Do not support handrails temporarily by any means not satisfying structural performance requirements.
2. Mount handrails only on gypsum board assemblies reinforced with proper blocking and backing to receive anchors, and where the location of concealed anchor plates has been clearly marked for benefit of installer.

PART 2 PRODUCTS

2.01 FERROUS METALS

- A. Metal Surfaces, General: Form metal fabrications exposed to view upon completion of the work, provide materials selected for their surface flatness, smoothness, and freedom from surface blemishes. Do not use materials whose exposed surfaces exhibit pitting, seam marks, roller marks, rolled trade names, roughness, and, for steel sheet, variations in flatness exceeding those permitted by referenced standards for stretcher-leveled sheet.
- B. Steel Plates, Shapes, and Bars: ASTM A36.
- C. Rolled Steel Floor Plates: ASTM A786.
- D. Steel Bars for Gratings: ASTM A569 or ASTM A36.
- E. Wire Rod for Grating Cross Bars: ASTM A510.
- F. Steel Tubing: Cold-formed, ASTM A500, Grade B, unless otherwise indicated.
- G. Uncoated Structural Steel Sheet: Hot-rolled, ASTM A570, Grade 30 unless otherwise indicated.
- H. Uncoated Steel Sheet (Commercial quality): Cold-rolled, ASTM A366.
- I. Galvanized Steel Sheet: Quality as follows:
1. Structural Quality: ASTM A446; Grade A, unless another grade required for design loading, and G90 coating designation unless otherwise indicated.
 2. Commercial Quality: ASTM A526, G90 coating designation unless otherwise indicated.
- J. Steel Pipe: ASTM A53, Type S, Grade B, standard weight (schedule 40), black finish, unless otherwise indicated.
- K. Gray Iron Castings: ASTM A48, Class 30.
- L. Malleable Iron Castings: ASTM A47, Grade 32510.
- M. Brackets, Flanges and Anchors: Cast or formed metal of the same type material and finish as supported rails, unless otherwise indicated.
- N. Concrete Inserts: Threaded or wedge type; galvanized ferrous castings, either malleable iron, ASTM A47, or cast steel, ASTM A27. Provide bolts, washers, and shims as required, hot-dip galvanized per ASTM A153.
- O. Welding Rods and Bare Electrodes: Select in accordance with AWS specifications for the metal alloy to be welded.

2.02 STAINLESS STEEL

- A. Bar Stock: ASTM A276, Type 302 or 304 (unless otherwise specified).
- B. Plate: ASTM A167, Type 302 or 304 (unless otherwise specified).

2.03 ALUMINUM

- A. Extruded Bars and Shapes: ASTM B221, alloy 6061-T6 or 6063-T6 for bearing bars of gratings and shapes and 6061-T6 for grating cross bars.
- B. Aluminum-Alloy Rolled Tread Plate: ASTM B632, alloy 6061-T4 for treads and 6061-T6 for platforms.

2.04 GROUT

- A. Nonshrink Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107 (formerly referenced as CE CRD C621).
- B. Provide grout specifically recommended by manufacturer for interior and exterior applications of type specified in this section.
- C. Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to the following
 - 1. Euco N-S Grout - Euclid Chemical Co.
 - 2. Kemset - Chem-Masters Corp.
 - 3. Crystex - L & M Construction Chemicals, Inc.
 - 4. SonogROUT - Sonneborn Building Products Div., Rexnord Chemical Products, Inc.
 - 5. Supreme Grout - Cormix, Inc.
 - 6. Sure-Grip High Performance Grout - Dayton Superior
 - 7. Vibraprof #11 - Lambert Corp.

2.05 FASTENERS

- A. General: Provide zinc-coated fasteners for exterior use or where built into exterior walls. Select fasteners for the type, grade, and class required. Suspect/counterfeit bolts will not be accepted and will be replaced at Contractor's expense.
- B. Bolts and Nuts: Regular hexagon head type, ASTM A307, Grade A.

- C. Lag Bolts: Square head type, FS FF-B-561.
- D. Machine Screws: FS FF-S-92.
- E. Wood Screws: Flat head carbon steel, FS FF-S-111.
- F. Plain Washers: Round, carbon steel, FS FF-W-92.
- G. Expansion Anchors: Expansion anchors complying with FS FF-S-325.
- H. Toggle Bolts: Tumble-wing type, FS FF-B-588, type, class, and style as required.
- I. Lock Washers: Helical spring type carbon steel, FS FF-W-84.
- J. Special Fasteners: Split nuts, indicator washers and others, as indicated.

2.06 PAINT

See Section 09960.

2.07 CONCRETE FILL

- A. Concrete Materials and Properties: Comply with requirements for Section 03300: Cast-in-Place Concrete, for normal weight, ready-mix concrete with minimum 28-day compressive strength of 3000 psi (21 MPa), unless higher strength indicated.
- B. Nonslip Aggregate Finish: Factory-graded, packaged material containing fused aluminum oxide grits or crushed emery as abrasive aggregate; rust-proof and nonglazing; unaffected by freezing, moisture, or cleaning materials.

2.08 FABRICATION, GENERAL

- A. Form metal fabrications from materials of size, thickness, and shapes indicated but not less than that needed to comply with performance requirements indicated. Work to dimensions indicated or accepted on shop drawings, using proven details of fabrication and support. Use type of materials indicated or specified for various components of each metal fabrication.
- B. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges.
- C. Allow for thermal movement resulting from the following maximum change (range) in ambient temperature in the design, fabrication, and installation of installed metal assemblies to prevent buckling, opening up of joints, and overstressing of welds and fasteners. Base design calculations on actual surface temperatures of metals due to both solar heat gain and nighttime sky heat loss.

- D. Temperature change (Range): 100 deg F (38 deg C).
- E. Shear and punch metals cleanly and accurately. Remove burrs.
- F. Ease exposed edges to a radius of approximately 1/32 inch (0.794 mm), unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- G. Remove sharp or rough areas on exposed traffic surfaces.
- H. Weld corners and seams continuously to comply with AWS recommendations and the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and contour of welded surface matched those adjacent.
- I. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts. Locate joints where least conspicuous.
- J. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space anchoring devices to provide adequate support for intended use.
- K. Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- L. Cut, reinforce, drill and tap miscellaneous metal work as indicated to receive finish hardware, screws, and similar items.
- M. Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weep holes where water may accumulate.

2.08 ROUGH HARDWARE

- A. Furnish bent or otherwise custom fabricated bolts, plates, anchors, hangers, dowels, and other miscellaneous steel and iron shapes as required.

- B. Fabricate items to sizes, shapes, and dimensions required.

2.09 STEEL LADDERS

- A. General: Fabricate ladders for the locations shown, with dimensions, spacing, details and anchorages as indicated. Comply with requirements of ANSI A14.3 and CFR 29 1910.27; where conflicts occur, comply with the more stringent requirements.
- B. Side Rails: Continuous steel flat bars, minimum size (cross section) 2-1/2" x 3/8" (63.5 mm x 9.5 mm), with eased edges, spaced 18 inches (0.46 m) apart. For ladders subject to unusually corrosive atmospheric exposures, steel flat bars 2-1/2" x 1/2" (63.5 mm x 12.7 mm).
- C. Bar Rungs: Round steel bars, minimum 3/4 inch (19.1 mm) diameter, spaced no greater than 12 inches (305 mm) o.c. and uniform throughout the length of the ladder. Individual metal rungs embedded in concrete which serve as access to pits and other areas under floors, should have a minimum diameter of 1 inch (25 mm) or shall otherwise be treated to resist corrosion and rusting.
- D. Fit rungs in centerline of side rails, plug weld and grind smooth on outer rail faces.
- E. Support each ladder at top and bottom and at intermediate points spaced not more than 5'-0" (1.5 m) o.c. by means of welded brackets, unless otherwise indicated.
 - 1. Size brackets to support design dead and live loads indicated and to hold centerline of ladder rungs clear of the wall surface by not less than 7 inches (178 mm).
 - 2. Extend side rails 42 inches (1.1 m) above top rung, and return rails to wall or structure unless other secure handholds are provided. If the adjacent structure does not extend above the top rung, goose-neck the extended rails back to the structure to provide secure ladder access.

2.10 LADDER SAFETY CAGES

- A. General: Fabricate ladder safety cages to comply with requirements of ANSI A14.3 and CFR 29 1910.27; where conflicts occur, comply with the more stringent requirements. Assemble safety cages by welding.
- B. Primary Hoops: Steel bars, 3" x 1/4" (76 mm x 6.4 mm), for top, bottom, and for cages longer than 20 feet (6.1 m), intermediate hoops spaced not more than 20'-0" (6.1 m) o.c.
- C. Secondary Intermediate Hoops: Steel bars, 2" x 1/4" (51 mm x 6.4 mm) hoops spaced not more than 4'-0" (1.2 m) o.c. between primary hoops.

D. Vertical Bars: Steel bars, 1-1/2" x 1/4" (38.1 mm x 6.4 m), secured to each hoop, spaced at intervals not more than 40° (0.7 rad) o.c. around the circumference of the cage, maximum spacing of approximately 9-1/2 inches (241 mm) o.c.

E. Fasten assembled safety cage to ladder rails and adjacent construction as indicated.

2.11 LOOSE BEARING AND LEVELING PLATES

A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction, made flat, free from warps or twists, and of required thickness and bearing area.

B. Drill plates to receive anchor bolts and for grouting as required.

2.12 LOOSE STEEL LINTELS

A. Fabricate loose structural steel lintels from steel angles and shapes of size indicated for opening and recesses in masonry walls and partitions at locations indicated.

B. Weld adjoining members together to form a single unit where indicated.

C. Size loose lintels for equal bearing of one inch per foot of clear span but not less than 8 inches (203 mm) bearing at each side of openings, unless otherwise indicated.

2.13 MISCELLANEOUS METAL ITEMS

A. Miscellaneous Framing and Supports: Provide steel framing and supports for applications indicated which are not a part of structural steel framework, as required to complete Work.

1. Fabricate units to sizes, shapes, and profiles indicated and required to receive adjacent other construction retained by framing and supports. Fabricate from structural steel shapes, plates, and steel bars of welded construction using mitered joints for field connection. Cut, drill, and tap units to receive hardware, hangers, and similar items.

2. Equip units with integrally welded anchors for casting into concrete or building into masonry. Furnish inserts if units must be installed after concrete is placed. Except as otherwise indicated, space anchors 24 inches (61 cm) o.c. and provide minimum anchor units in the form of steel straps 1-1/4" wide x 1/4" x 8" long (31.8 mm x 6.4 mm x 203 mm).

B. Miscellaneous Steel Trim: Provide shapes and sizes indicated for profiles shown. Unless otherwise indicated, fabricate units from structural steel shapes, plates, and steel bars, with continuously welded joints and smooth exposed edges. Use concealed field splices wherever possible. Provide cutouts, fittings, and anchorages as required for coordination for assembly and installation with other work.

2.14 SHELF AND LEDGER ANGLES

- A. Fabricate shelf and ledger angles from steel angles of sizes indicated and for attachment to concrete framing. Provide slotted holes to receive 3/4 inch (19.1 mm) bolts, spaced not more than 6 inches (152 mm) from ends and not more than 24 inches (0.61 m) o.c., unless otherwise indicated.
- B. For cavity walls, provide vertical channel brackets to support shelf/ledger angles from back-up masonry and concrete. Align expansion joints in angles with indicated expansion joints in cavity wall exterior wythe.
- C. Furnish wedge-type concrete inserts, complete with fasteners, for attachment of shelf angles to cast-in-place concrete.

2.15 METAL BAR GRATINGS

See Section 05510: Metal Bar Grating.

2.16 FLOOR PLATE

- A. Fabricate raised pattern floor plates from rolled steel floor plate of thickness and pattern indicated. If not indicated, pattern as selected from manufacturer's standard patterns. See ASTM A786 for pattern illustrations.
- B. Abrasive Surface Floor Plate: Manufacturer's standard abrasive granules, rolled into surface of steel plate, where indicated.
- C. Include steel angle stiffeners and fixed and removable sections as indicated. Provide 2 steel bar drop handles for lifting plates, one at each end of each removable section.

2.17 TREAD PLATE

- A. Fabricate raised pattern tread plates from aluminum-alloy rolled tread plate in pattern and thickness as indicated. See ASTM B632 for pattern illustrations.
- B. Abrasive Surface Floor Plate: Manufacturer's standard abrasive granules, rolled into surface of aluminum plate, where indicated.
- C. Include aluminum angle stiffeners and fixed and removable sections as indicated. Provide 2 aluminum bar drop handles for lifting plates, one at each end of each removable section.

2.18 STEEL PIPE GUARDRAILS AND HANDRAILS

- TO BID, CONTRACTOR MUST OBTAIN DOCUMENTS FROM ISSUING OFFICE
- A. General: Fabricate pipe guardrails and handrails to comply with requirements indicated for dimensions, details, finish, and member sizes, including wall thickness of pipe, post spacings, and anchorage.
 - B. Interconnect guardrails and handrail members by butt-welding or welding with internal connectors, at fabricator's option, unless otherwise indicated. At tee and cross intersections, cope ends of intersecting members to fit contour of pipe to which end is joined, weld all around and grind smooth.
 - C. Form changes in directions of railing members as follows:
 - 1. By use of welded prefabricated steel elbow fittings.
 - 2. By bending, of radius indicated.
 - 3. By mitering at elbow bends.
 - D. Form simple and compound curves by bending pipe in fits to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross-section of pipe throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of pipe.
 - E. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated.
 - F. Close exposed ends of pipe by welding 3/16 inch (4.8 mm) thick steel plate in place or by use of prefabricated fittings, except where clearance of end of pipe and adjoining wall surface is 1/4 inch (6.4 mm) or less.
 - G. Toe Boards: Where indicated, provide toe boards at railings around openings and at the edge of open-sided floors and platforms. Fabricate to dimensions and details indicated, or if not indicated, use 4 inches high x 1/4 inch (102 mm x 6.4 mm) steel bar welded to each railing post.
 - H. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, end closures, flanges, miscellaneous fittings, and anchors for interconnections of pipe and attachment of guardrails and handrails to other work. Furnish inserts and other anchorage devices for connecting guardrails and handrails to concrete or masonry work.
 - 1. For railing posts set in concrete, fabricate sleeves from steel pipe not less than 6 inches (152 mm) long and with an inside diameter not less than 1/2 inch (12.7 mm) greater than the outside diameter of post, with steel plate closure welded to bottom of sleeve.
 - 2. For removable railing posts, fabricate slip-fit sockets from steel pipe whose inside diameter is sized for a close fit with posts and to limit deflection of post without lateral load, measured at top, to not more than 1/12 of post height. Provide socket covers designed and fabricated to resist accidental dislodgement.

- I. Fillers: Provide steel sheet or plate fillers of thickness and size indicated or required to support structural loads of handrails where needed to transfer wall bracket loads through wall finishes to structural supports. Size fillers to suit wall finish thicknesses. Size fillers to produce adequate bearing to prevent bracket rotation and overstressing of substrate.

2.19 CAST NOSINGS AND TREADS

- A. Fabricate units of material, sizes, and configurations indicated. If not indicated, provide cast-iron units with integral abrasive finish. Furnish in lengths as required to accurately fit each opening or conditions. Cast units with an integral abrasive grit consisting of aluminum oxide, silicone carbide, or a combination of both.
- B. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:
1. AMSTEP Products, division of American Safety Technologies, Inc.
 2. American Safety Tread Co., Inc.
 3. IKG Industries
 4. Safe-T-Metal Co., Inc.
 5. Wooster Products Inc.
- C. Provide anchors for embedding units in concrete, either integral or applied to units, as standard with the manufacturer.
- D. Apply black asphaltic coating to concealed bottoms, sides, and edges of cast-iron units set into concrete.

2.20 STEEL FRAMED STAIRS

- A. General: Construct stairs to conform to sizes and arrangements indicated with welded connections, unless otherwise indicated. Provide complete stair assemblies, including metal framing, hangers, columns, railings, newels, balusters, struts, clips, brackets, bearing plates, and other components necessary for the support of stairs and platforms, and as required to anchor and contain the stairs on the supporting structure. Fabricate treads and platforms of exterior stairs to accommodate slopes to drain in finished traffic surfaces.
- B. Stair Framing: Fabricate stringers of structural steel channels, or plates, or a combination thereof, as indicated. Provide closures for exposed ends of stringers. Construct platforms of structural steel channel headers and miscellaneous framing members as indicated. Bolt or weld headers to stringers, newels, and framing members to stringers and headers; fabricate and join so that bolts, if used, do not appear on finish surfaces.

- C. Metal Pan Risers, Subtreads, and Subplatforms: Shape metal pans for risers and subtreads to conform to configuration shown. Provide thickness of structural steel sheet for metal pans as indicated.
1. Form metal pans of uncoated cold-rolled steel sheet, unless otherwise indicated.
 2. Form metal pans of galvanized steel sheet, where indicated on the Drawings.
 3. Attach Risers and Subtreads to Stringers by the following methods:
 - a. Directly weld risers and subtreads to stringers; locate welds on side of metal pans to be concealed by concrete fill.
 - b. Attach by means of brackets made of steel angles or bars. Weld brackets to stringers and attach metal pans to brackets by welding or bolting.
 4. Provide subplatforms of configuration and construction shown, with thickness of structural steel sheet as indicated. Attach subplatform to platform framing members with welds or as otherwise indicated. Construct subplatforms with smooth soffits.
- D. Steel Floor Plate Treads and Platforms: Provide raised pattern steel floor plate in pattern indicated or, if not indicated, as selected from manufacturer's standard patterns.
1. Form treads of 1/4 inch (6.4 mm) thick raised pattern steel floor plate with integral nosing and back edge stiffener. Weld steel supporting brackets to stringers and treads to brackets.
 2. Fabricate platforms of raised pattern steel floor plate of thickness indicated. Provide nosing matching that on treads at all landings. Secure to platform framing members with welds.
- E. Floor Grating Treads and Platforms: Provide patterns, spacing, and bar sizes indicated; fabricate to comply with NAAMM MBG 531.
1. Finish to be shop prime paint, unless otherwise indicated.
 2. Fabricate grating treads with steel plate nosing on one edge and with steel angle or steel plate carrier at each end for stringer connections. Secure treads to stringers with bolts or as otherwise indicated.
 3. Fabricate grating platforms, with nosing matching that on grating treads, at all landings. Provide toe plates at open-sided edges of grating platform. Secure grating to platform frame with welds or as otherwise indicated.
- F. Stair Guardrails and Handrails: Comply with applicable requirements specified elsewhere in this section for steel pipe guardrails and handrails, and as follows:
1. Fabricate newels of steel tubing and provide newel caps of gray-iron castings, as shown.

2. Railings may be bent at corners, rail returns, and wall returns, instead of using prefabricated fittings.
3. Connect railing posts to stair framing by direct welding, unless otherwise indicated.

2.21 PIPE BOLLARDS

Fabricate pipe bollards from 4-inch (102 mm) standard black steel pipe, Schedule 40, unless otherwise indicated. Cap bollards with 1/4 inch (6.4 mm) minimum thickness steel base plate, or as otherwise indicated.

2.22 FINISHES

- A. General: Comply with NAAMM AMP 500 "Metal Finishes Manual" for recommendations relative to application and designations of finishes.
- B. Finish metal fabrications after assembly.

2.23 STEEL AND IRON FINISHES

- A. General: Shop-paint uncoated surfaces of metal fabrications, except those to be embedded in concrete or masonry or to receive sprayed-on fireproofing, surfaces and edges to be welded, and galvanized surfaces, unless otherwise indicated. See Section 09960: Painting – Water / Wastewater Facilities.
- B. Galvanizing: For those items indicated for galvanizing, apply zinc-coating by the hot-dip process in compliance with the following requirements:
 1. ASTM A123 for galvanizing both fabricated and unfabricated iron and steel products made of uncoated rolled, pressed, and forced shapes, plates, bars, and strip 0.0299 inch (0.7595 mm) thick and heavier.
 2. ASTM A153 for galvanizing iron and steel hardware.
- C. Surface Preparation for Shop Priming: See Section 09960: Painting – Water / Wastewater Facilities.
- D. Painting: See Section 09960: Painting – Water / Wastewater Facilities.

2.24 ALUMINUM FINISH

- A. Mill (as fabricated) finish, unless otherwise indicated.

PART 3 EXECUTION

3.01 EXAMINATION

Installer shall examine the areas and conditions under which metal fabrication items are to be installed. Notify the Engineer in writing of conditions detrimental to the proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected in a manner acceptable to the installer and Engineer.

3.02 PREPARATION

- A. Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, including concrete inserts, sleeves, anchor bolts, and miscellaneous items having integral anchors that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to project site.
- B. Center nosings on tread widths with noses flush with riser faces and tread surfaces.
- C. Set sleeves in concrete with tops flush with finish surface elevations; protect sleeves from water and concrete entry.

3.03 INSTALLATION, GENERAL

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction; include threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws and other connectors as required.
 - B. Cutting, Fitting and Placement: Perform cutting, drilling, and fitting required for installation of miscellaneous metal fabrications. Set metal fabrication accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
 - C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete masonry or similar construction.
 - D. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints, but cannot be shop-welded because of shipping size limitations. Do not weld, cut, or abrade the surfaces of exterior units which have been hot-dip galvanized after fabrication, and are intended for bolted or screwed field connections.
- Field Welding: Comply with AWS Code for procedures of manual shielded metal-arc welding, appearance and quality of welds made, methods used in correcting welding work, and the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Obtain fusion without undercut or overlap.
 3. Remove welding flux immediately.
 4. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and contour of welded surfaces matches those adjacent.
- F. Grout: Follow manufacturer's recommendations for substrate preparation and application.
- G. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint or zinc chromate primer.

3.04 SETTING LOOSE PLATES

- A. Clean concrete and masonry bearing surfaces of any bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of bearing plates.
- B. Set loose leveling and bearing plates on wedges, or other adjustable devices. After the bearing members have been positioned and plumbed, tighten the anchor bolts. Do not remove wedges or shims, but if protruding, cut off flush with the edge of the bearing plate before packing with grout. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.05 INSTALLATION OF METAL BAR GRATINGS

- A. General: Install gratings to comply with requirements of NAAMM grating standard that apply to grating types and bar sizes indicated, including installation clearances and standard anchoring details.
- B. Secure removable units to supporting members with type and size of clips and fasteners indicated, or if not indicated, as recommended by grating manufacturer for type of installation conditions shown.
- C. Secure non-removable units to supporting members by welding where both materials are the same; otherwise, fasten by bolting as indicated above.
- D. Attach toe plates to gratings by welding, at locations indicated.

3.06 INSTALLATION OF STEEL PIPE GUARDRAILS AND HANDRAILS

- A. Adjust railings prior to anchoring to ensure matching alignment at abutting joints. Space posts at spacing indicated, or if not indicated, as required by design loadings. Plumb posts in each direction. Secure posts and railing ends to building construction as follows:
1. Anchor posts in concrete by means of pipe sleeves preset and anchored into concrete. After posts have been inserted into sleeves, fill annular space between post and sleeve solid with nonshrink, nonmetallic grout, mixed and placed to comply with anchoring material manufacturer's directions.
 2. Anchor posts and rail ends to steel with welded connections, unless otherwise indicated.
 3. Anchor posts and rail ends into concrete and masonry with steel round flanges welded to post and rail ends, and anchored into wall construction with expansion shields and bolts.
 4. Install removable railing sections where indicated in slip-fit metal sockets cast into concrete. Accurately locate sockets to match post spacing.
- B. Secure handrails to wall with wall brackets and end fittings. Provide bracket with not less than 1-1/2 inch (38.1 mm) clearance from inside face of handrail and finished wall surface. Locate brackets at spacing not less than 5'-0" (1.5 m) o.c., unless otherwise indicated. Secure wall brackets and wall return fittings to building construction as follows:
1. Use type of bracket with flange tapped for concealed anchorage to threaded hanger bolt.
 2. For concrete and solid masonry anchorage, use drilled-in expansion shield and either concealed hanger bolt or exposed lag bolt, as applicable.
 3. For hollow masonry anchorage, fasten brackets directly on masonry wall using toggle bolts.
 4. For steel framed gypsum board assemblies, fasten brackets to wood blocking using lag bolts or to metal blocking using self-tapping screws, of size and type required to support structural loads.
- C. Expansion Joints: Provide expansion joints at locations indicated, or if not indicated, at intervals not to exceed 40 feet (12.2 m). Provide slip joint with internal sleeve extending 2 inches (51 mm) beyond joint on either side; fasten internal sleeve securely to one side; locate joint within 6 inches (152 mm) of posts.

3.07 INSTALLATION OF CAST NOSINGS AND TREADS

- A. Install cast nosings and treads with anchorage system indicated to comply with manufacturer's recommendations.

3.08 INSTALLATION OF PIPE BOLLARDS

- A. General: Install bollards at locations shown on Drawings. After installation, fill pipe with concrete and provide a smooth convex curve at the top of the pipe.
- B. Backfill: The backfill in the annular space around bollards not embedded in poured footings shall be by the following methods:
 - 1. Clean excess soil from hole. Do not leave loose soil at bottom of hole.
 - 2. Backfill shall be of concrete with an ultimate strength of 3,000 pounds per square inch (210.92 kgs/sq cm) at 28 days. The hole shall not be less than four (4) inches (101.6 mm) larger than the diagonal dimension of a round, square or rectangular bollard.

3.09 ADJUSTING AND CLEANING

- A. Touch-Up Painting of Steel Items: Immediately after erection, clean field welds, bolted connections, abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 requirements for touch-up of field painted surfaces. Apply by brush or spray to provide a minimum dry film thickness of 3.0 mils (0.076 mm).
- B. For galvanized surfaces clean welds, bolted connections and abraded areas and apply galvanizing repair paint to comply with ASTM A780.

END OF SECTION

SECTION 07 90 00

JOINT SEALANTS

PART 1 GENERAL

1.01 SUMMARY

- A. General: This section includes furnishing and installing construction sealants, backers and related materials, as scheduled and/or as called for on Contract Documents. It does not include sealants for glazing, roof systems and firestop systems.
- B. Related Sections: Refer to the following sections for related work:
 - 1. Section 03300: Cast-In-Place Concrete
 - 2. Section 04220: Concrete Masonry Unit
 - 3. Section 08700: Stainless Steel Doors, Frames, and Windows

1.02 REFERENCES

- A. American Society of Testing and Materials (ASTM)
 - 1. C792 Test Method for Effects of Heat Aging on Weight Loss, Cracking, and Chalking of Elastomeric Sealants
 - 2. C834 Specification for Latex Sealing Compounds
 - 3. C919 Practice for Use of Sealants in Acoustical Applications
 - 4. C920 Specification for Elastomeric Joint Sealants
 - 5. C1193 Guide for Use of Joint Sealants
 - 6. D217 Test Method for Cone Penetration of Lubricating Grease
 - 7. D1056 Specification for Flexible Cellular Materials - Sponge or Expanded Rubber

1.03 DEFINITIONS

- A. Sealant Products: Any material with adhesive properties that is used to fill, seal, waterproof gaps or joints between two surfaces. Sealant products include sealant, primers and caulk
- B. Type: Defines whether products are premixed or require mixing at job site.
- C. Type S: Products furnished in prepackaged cartridges or other forms in which no job-site mixing is required.

- D. Grade: Defines the flow characteristics of the sealant.
- E. Grade P: Products having sufficient flow to fill joints in horizontal surfaces and remain level and smooth at temperatures as low as 40 degrees Fahrenheit (4.4 degrees Celsius).
- F. Grade NS: Nonsag or gunnable sealant that permits application in joints on vertical surfaces without sagging or slumping when applied at temperatures between 40 degrees F (4.4 degrees C) and 122 degrees F (50 degrees C).
- G. Class: Identifies sealants according to their tested capabilities.
- H. Use T: Classifies sealants designed for joints in surfaces subject to pedestrian and vehicular traffic.
- I. Use NT: Classifies sealants designed for nontraffic exposure.
- J. Use M, G, A: Refers to sealants which remain adhered, within given parameters, to various standard specimens.
- K. Use O: Refers to substrate materials other than M, G, and A.

1.04 SUBMITTALS

- A. Product Data Sheet: Submit manufacturer's catalog data and application instructions for each material proposed for use.
- B. Asbestos-Free and Lead-Free Paint Certification: Submit manufacturer's written certification that all materials are free of asbestos and lead paint.
- C. Manufacturer's Certifications: Submit manufacturer's representative certification that the proposed products are recommended and compatible with each other and substrates for the intended applications.
- D. Material Safety Data Sheets (MSDS): Submit MSDS for joint sealant products.
- E. Sealant Schedule: List type, grade, class, use classification and joint sealant backing for each proposed sealant system in Project.
- F. Leed Submittals: Credit EQ 4.1: Manufacturers' product data for interior sealants, including printed statement of VOC content.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer who has completed joint sealant applications similar in material, design and extent to that indicated for Project that have resulted in construction with a record of successful in-service performance.

- B. Single Source Responsibility for Joint Sealant Materials: Obtain joint sealant materials from a single manufacturer for each different product required.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in manufacturer's original unopened containers with seals unbroken and labels intact until time of use.
- B. Store materials off ground and under cover to prevent damage or contamination to materials by water, freezing, foreign matter or other causes.
- C. Promptly remove from site any materials which show evidence of damage and immediately make all replacements necessary.

1.07 PROJECT CONDITIONS

- A. Environmental Conditions: Do not proceed with installation of joint sealers under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside the limits permitted by joint sealer manufacturer or below 40 degrees F (4.4 degrees C).
 - 2. When joint substrates are wet due to rain, frost, condensation, or other causes.
 - 3. When cementitious substrates are not thoroughly cured and dry.
 - 4. When joint substrates contain contaminants or other material which may interfere with adhesion.
 - 5. When joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Products made by the following manufacturers, provided they comply with requirements of Contract Documents, will be among those considered acceptable, however, it is the Contractor's responsibility to provide only products compatible with adjacent materials in the assembly.
 - 1. Dow Corning Corporation
 - 2. General Electric Co., GE Silicones
 - 3. Pecora Corporation
 - 4. Sonneborn Building Products Division/Chemrex, Inc.

5. Tremco, Inc.

2.02 MATERIALS

- A. Compatibility: Provide joint sealers, joint fillers and other related materials that are compatible with one another and with joint substrates under conditions of service and application.
- B. Colors: If not otherwise indicated, or chosen at time of submittals, provide color of exposed joint sealers to closely match finish color of adjacent surfaces.
- C. Sealant Type: Provide type S sealants.
- D. Elastomeric Joint Sealants: Type S; Grade NS; Class 25; Uses V, NT, M, G, A, and as applicable to uses indicated, and O. Elastomeric joint sealers shall be used for interior surfaces where noted and at all non-protected exterior applications. Provide manufacturer's standard chemically curing, elastomeric silicone sealant, which complies with ASTM C920 requirements, including those for type, grade, class and uses, and as recommended by the manufacturer for the intended use.
- E. Latex Joint Sealants: Type S; Grade NS; Class 12 1/2; Uses per ASTM C834. Latex joint sealers may be used for interior and protected exterior applications only. Provide manufacturer's standard one-part, non-sag, mildew-resistant, paintable latex sealant that is recommended for exposed applications on interior and protected exterior locations and that accommodates indicated percentage change in joint width existing at time of installation without failing either adhesively or cohesively.
 - 1. Acrylic-Emulsion Sealant: Provide product complying with ASTM C834 that accommodates joint movement of not more than five (5%) percent in both extension and compression for a total of ten (10%) percent.
 - 2. Silicone Emulsion Sealant: Provide product complying with ASTM C834 and, except for weight loss measured per ASTM C792, with ASTM C920 that accommodates joint movement of not more than 25 percent in both extension and compression for a total of 50 percent.
- F. Acoustical Joint Sealant
 - 1. Acoustical Sealant: Type S; Grade NS. Provide manufacturer's standard non-sag, paintable, non-staining latex sealant complying with ASTM C834 that is effective in reducing airborne sound transmission through perimeter joints and openings in building construction.
 - 2. Acoustical Sealant for Concealed Joints: Type S; Grade NS. Provide manufacturer's standard, non-drying, non-hardening, non-skinning, non-staining, gunnable, synthetic rubber sealant complying with ASTM D217 (290-310) recommended for sealing interior concealed joints.

- G. Tape Sealants: Provide manufacturer's standard, solvent-free, butyl-based tape sealant with a solid content of 100 percent formulated to be non-staining, paintable and non-migrating in contact with nonporous surfaces with or without reinforcement thread to prevent stretch and packaged on rolls with a release paper on one side.
- H. Preformed Foam Sealants: Provide manufacturer's standard preformed, precompressed, impregnated open-cell foam sealant manufactured from high-density urethane foam impregnated with a non-drying, water repellent agent, factory-produced in precompressed sized and in roll or stick form to fit joint widths indicated and to develop a watertight and airtight seal when compressed to the degree specified by manufacturer and complying with the following requirements:
1. Sealant shall be permanently elastic, mildew-resistant, non-migratory, non-staining and compatible with joint substrates and other joint sealants.
- I. Joint Sealant Backing: Provide sealant backings of material and type that are non-staining, are compatible with joint substrates, sealants, primers and other joint fillers, and are approved for applications indicated by sealant manufacturer. Only elastomeric joint fillers may be used on exterior applications.
1. Plastic Foam Joint Fillers: Provide preformed, compressible, resilient, non-staining, non-waxing, non-extruding strips of open cell flexible plastic foam of size, shape and density to control sealant depth and otherwise contribute to optimum sealant performance. Provide products compatible with sealant and recommended by sealant manufacturer for the intended use.
 2. Elastomeric Tubing Joint Fillers: Neoprene, butyl or silicone tubing complying with ASTM D1056, non-absorbent to water and gas, capable of remaining resilient at temperatures down to 26 degrees F (-3 degrees C). Provide products compatible with sealant and recommended by sealant manufacturer for the intended use, with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and otherwise contribute to optimum sealant performance.
 3. Bond-Breaker Tape: Provide polyethylene tape or other plastic tape as recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.03 MISCELLANEOUS MATERIALS

- A. Primer: Provide material recommended by joint sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming in any way joint substrates and adjacent nonporous surfaces and formulated to promote optimum adhesion of sealants with joint substrates.

- C. Masking Tape: Non-staining, non-absorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 EXECUTION

3.01 PREPARATION

- A. General: Comply with manufacturer's recommendations and with the following:
 - 1. Remove all foreign materials from joint substrates which could interfere with adhesion of joint sealer, including oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 - 2. Clean concrete, masonry, and similar porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, acid washing or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealers.
 - 3. Remove laitance and form release agents from concrete prior to installation of sealants.
 - 4. Clean metal, glass, porcelain enamel, glazed surfaces of ceramic tile and other nonporous surfaces by chemical cleaners or other means which are not harmful to substrates or leave residues capable of interfering with adhesion of joint sealers.
 - 5. Prime or seal joint surfaces where recommended by the sealant manufacturer. Confine primer/sealer to areas of sealant bond; do not allow spillage or migration onto adjoining surfaces.

3.02 INSTALLATION OF JOINT SEALERS

- A. General: Comply with joint sealer manufacturer's printed installation instructions applicable to products and applications indicated, and with ASTM C1193 and ASTM C919.
- B. Backing: Provide backing material in the joint recess whenever necessary to control the depth of the sealant. One backer rod shall be a minimum of 33% oversized for closed cell and a minimum of 50% oversized for open cell backer rod.
- C. Set joint filler units at depth or position in joint as indicated to coordinate with other work, including installation of bond breakers, backer rods and sealants. Do not leave voids or gaps between ends of joint filler units.
- D. Install sealant backer rod for liquid-applied sealants, except where shown to be omitted by the sealant manufacturer for application indicated.
- E. Install bond breaker tape where indicated or where required by manufacturer's recommendations to ensure that liquid-applied sealants will perform as intended.
- F. Employ only proven installation techniques, which will ensure that sealants are deposited in uniform, continuous ribbons without gaps or air pockets, with complete "wetting" of joint

bond surfaces equally on opposite sides. Fill sealant rabbet to a slightly concave surface slightly below adjoining surfaces. Where horizontal joints are between a horizontal surface and vertical surfaces, fill joint to form a slight cove, so that joint will not trap moisture and dirt.

- G. Install liquid-applied sealant to depths shown or, if not shown, as recommended by the sealant manufacturer but within the following general limitations, measured at center (thin) section of beads (not applicable to sealants in lapped joints):
 - 1. For normal moving joints sealed with elastomeric sealants but not subject to traffic, fill joints to a depth equal to 50% of joint width, but neither more than 1/2 inch (12.7 mm) deep nor less than 1/4 inch (6.35 mm) deep.
 - 2. For joints sealed with non-elastomeric sealants and caulking compounds, fill joints to a depth in range of 75% to 125% of joint width.
- H. Spillage: Do not allow sealants to overflow from confines of joints, or to spill onto adjoining work. Clean adjoining surfaces by whatever means may be necessary to eliminate evidence of spillage.
- I. Do not overheat or reheat hot-applied sealants; discard and do not use this material.
- J. Recess exposed edges of gaskets and exposed joint fillers slightly behind adjoining surfaces, except as otherwise shown or specified so that compressed units will not protrude from joints.

3.03 CURING AND PROTECTION

- A. Cure sealants and caulking compounds in compliance with manufacturer's instructions and recommendations, to obtain high early bond strength, internal cohesive strength and surface durability. Cure and protect sealants in a manner which will minimize increases in modulus of elasticity and other accelerated aging effects. Replace or restore sealants which are damaged or deteriorated during the construction period.

END OF SECTION

SECTION 08 71 00

DOOR HARDWARE

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This section includes items known commercially as finish or door hardware that are required for swing, sliding, and folding doors, except special types of unique hardware specified in the same sections as the doors and door frames on which they are to be installed.

- B. This Section includes the following:

1. Hinges.
2. Key control systems.
3. Lock cylinders and keys.
4. Lock and latch sets.
5. Bolts.
6. Exit devices.
7. Push/pull units.
8. Closers.
9. Overhead holders.
10. Miscellaneous door control devices.
11. Protection plates.
12. Weatherstripping for exterior doors.
13. Astragals or meeting seals on pairs of doors.
14. Thresholds.

- C. Products furnished, but not installed, under this Section include:

1. Cylinders for locks on entrance doors. Hardware, except keyed cylinders, listed for entrance doors in this section is to indicate quality level and function required at each opening. Specific items listed may be modified as required to maintain windstorm product approvals for exterior openings, but in no case shall materials of lesser quality or different function be acceptable.

1.03 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification sections.
- B. Product data including manufacturer's technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
- C. Final hardware schedule coordinated with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
 1. Final Hardware Schedule Content: Based on hardware indicated, organize schedule into "hardware sets" indicating complete designations of every item required for each door or opening. Include the following information.
 - a. Type, style, function, size, and finish of each hardware item.
 - b. Name and manufacturer of each item.
 - c. Fastenings and other pertinent information.
 - d. Location of each hardware set cross referenced to indications on Drawings, both on floor plans and in door and frame schedule.
 - e. Explanation of all abbreviations, symbols, and codes contained in schedule.
 - f. Mounting locations for hardware.
 - g. Door and frame sizes and materials.
 - h. Keying information.
 2. Submittal Sequence: Submit final schedule at earliest possible date, particularly where acceptance of hardware schedule must precede fabrication of other work that is critical in the Project construction schedule. Include with schedule the product data, samples, shop drawings of other work affected by door hardware, and other information essential to the coordinated review of schedule.
 3. Keying Schedule: Submit separate detailed schedule indicating clearly how the Owner's final instructions on keying of locks has been fulfilled.

- D. Submit samples of each type of exposed hardware unit as required in finish indicated and tagged with full description for coordination with schedule. Submit samples prior to submission of final hardware schedule.
1. Samples will be returned to the supplier. Units that are acceptable and remain undamaged through submittal, review, and field comparison process may, after final check of operation, be incorporated in the Work, within limitations of keying coordination requirements.
- E. Templates for doors, frames, and other work specified to be factory prepared for the installation of door hardware. Check shop drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- F. For each electrified opening, provide complete wiring diagrams prepared by an authorized factory employee. Provide complete operational descriptions of electronic components listed by opening in the hardware submittals. Operational descriptions to detail how each electrical component functions within the opening incorporating all conditions of ingress and egress. Provide elevation drawings of electronic hardware and systems identifying locations of the system components with respect to their placement in the door opening. Provide a copy with each hardware schedule submitted for approval. Wiring diagrams may be submitted after approval of hardware schedule.

1.04 QUALITY ASSURANCE

- A. Single Source Responsibility: Obtain each type of hardware (latch and lock sets, hinges, closers, etc.) from a single manufacturer.
- B. Supplier Qualifications: A recognized architectural door hardware supplier, with warehousing facilities in the Project's vicinity, that has a record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this Project and that employs an experienced architectural hardware consultant (AHC) who is available to Owner, Engineer, and Contractor, at reasonable times during the course of the Work, for consultation.
1. Require Supplier to meet with Owner to finalize keying requirements and to obtain final instructions in writing.
- C. Fire Rated Openings: Provide door hardware for fire-rated openings that complies with NFPA Standard No. 80 and requirements of authorities having jurisdiction. Provide only items of door hardware that are listed and are identical to products tested by UL, Warnock Hersey, FM, or other testing and inspecting organization acceptable to authorities having jurisdiction for use on types and sizes of doors indicated in compliance with requirements of fire-rated door and door frame labels. All fire seals required for fire rated wood doors shall be furnished by the door manufacturer or supplier.
- D. Disabled Accessibility: Provide hardware that complies with all accessibility codes as they

pertain to this project, including the Americans with Disabilities Act Accessibility Guidelines and the Florida Accessibility Code for Building Construction.

- E. Exterior Openings: All doors, frames and hardware for exterior openings shall be tested and approved for use at the required wind loads for this project. Copies of current valid Florida State or Metro-Dade County product approvals shall be furnished as proof of compliance with this requirement.

1.05 PRODUCT HANDLING

- A. Tag each item or package separately with identification related to final hardware schedule, and include basic installation instructions with each item or package.
- B. Packaging of door hardware is responsibility of supplier. As material is received by hardware supplier from various manufacturers, sort and repackage in containers clearly marked with appropriate hardware set number to match set numbers of approved hardware schedule. Two or more identical sets may be packed in same container.
- C. Inventory door hardware jointly with representatives of hardware supplier and hardware installer until each is satisfied that count is correct.
- D. Deliver individually packaged door hardware items promptly to place of installation (shop or Project site).
- E. Provide secure lock-up for door hardware delivered to the Project, but not yet installed. Control handling and installation of hardware items that are not immediately replaceable so that completion of the Work will not be delayed by hardware losses both before and after installation.

1.06 MAINTENANCE

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Butts and Hinges:
 - a. Hager Hinge Co.
 - b. McKinney Products Co, an ASSA ABLOY Group Company.

- c. Stanley Hardware, Div. Stanley Works.
- 2. Key Control System
 - a. Telkee Inc.
 - b. Lund Equipment Company, Inc.
 - c. MMF Industries
- 3. Cylinders and Locks:
 - a. Corbin Russwin Architectural Hardware, an ASSA ABLOY Group Company. ML2000 series, PSA trim.
 - b. Schlage IR Security and Safety. L9000 series, 17A trim.
- 4. Bolts
 - a. Corbin Russwin Architectural Hardware, an ASSA ABLOY Group Company.
 - b. McKinney Products Co, an ASSA ABLOY Group Company.
 - c. Rockwood Manufacturing.
 - d. Triangle Brass Manufacturing Company (TRIMCO).
- 5. Exit/Panic Devices
 - a. Von Duprin, IR Security and Safety. 98 series, 17 lever trim.
 - b. Corbin Russwin Architectural Hardware, an ASSA ABLOY Group Company 5000 Series, PR lever trim.
- 6. Push/Pull Units:
 - a. McKinney Products Co, an ASSA ABLOY Group Company.
 - b. Rockwood Manufacturing.
 - c. Triangle Brass Manufacturing Company (Trimco).
- 7. Overhead Closers:
 - a. Corbin Russwin Architectural Hardware, an ASSA ABLOY Group Company. DC6000 series.
 - b. LCN, IR Security and Safety. 4041 series.

- c. Norton Door Controls, an ASSA ABLOY Group Company. 7500 series.
8. Door Control Devices:
- a. Glynn-Johnson, IR Security and Safety.
 - b. Rixson Specialty Door Controls, an ASSA ABLOY Group Company.
 - c. Rockwood Manufacturing.
 - d. Triangle Brass Manufacturing Company (Trimco).
9. Door Trim Units:
- a. Baldwin Hardware Corp. 2125/2581 x 2124
 - b. Hager 30S/33J.
 - c. Quality 40/163 x 40.
 - d. Rockwood Manufacturing. 70F/110 x 70C.
10. Kick, Mop, and Armor Plates:
- a. McKinney Products Co, an ASSA ABLOY Group Company.
 - b. Ives, IR Security and Safety.
 - c. Rockwood Manufacturing.
 - d. Triangle Brass Manufacturing Company (Trimco).
11. Door Stripping and Seals:
- a. National Guard Products, Inc.
 - b. Pernko Manufacturing Co., Inc.
 - c. Reese Enterprises, Inc.
 - d. McKinney Products Co, an ASSA ABLOY Group Company.
 - e. Zero International, Inc.
12. Thresholds:
- a. National Guard Products, Inc.

- b. Pemko Manufacturing Co., Inc.
- c. Reese Enterprises Inc.
- d. McKinney Products Co, an ASSA ABLOY Group Company.
- e. Zero International, Inc.

2.02 SCHEDULED HARDWARE

A. Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of finish hardware are indicated on Drawings. Products are identified by using hardware designation numbers of the following:

1. Manufacturer's Product Designations: The product designation and name of one manufacturer are listed for each hardware type required for the purpose of establishing minimum requirements. Provide either the product designated or, where more than one manufacturer is specified under the Article "Manufacturers" in Part 2 for each hardware type, the comparable product of one of the other manufacturers that complies with requirements.
2. ANSI/BHMA designations used elsewhere in this Section or in schedules to describe hardware items or to define quality or function are derived from the following standards. Provide products complying with these standards and requirements specified elsewhere in this Section.
 - a. Butts and Hinges: ANSI/BHMA A156.1-06.
 - b. Exit Devices: ANSI/BHMA A156.3-01.
 - c. Door Controls - Closers: ANSI/BHMA A156.4-00.
 - d. Architectural Door Trim: ANSI/BHMA A156.6-05.
 - e. Door Controls - Overhead Stops and Holders: ANSI/BHMA A156.8-05.
 - f. Mortise Locks and Latches Series 1000: ANSI/BHMA A156.13-05.
 - g. Auxiliary Hardware: ANSI/BHMA A156.16-02.
 - h. Recommended Practices for Materials and Finishes: ANSI/BHMA A156.18-06.
 - i. Thresholds: ANSI/BHMA A156.21-06.
 - j. Door Gasketing and Edge Seal Systems: ANSI/BHMA A156.22-05.
 - k. Continuous Hinges: ANSI/BHMA A156.27-06.

I. Recommended Practices for Keying Systems: ANSI/BHMA A156.28.07.

2.03 MATERIALS AND FABRICATION

- A. Manufacturer's Name Plate: Do not use manufacturers' products that have manufacturer's name or trade name displayed in a visible location (omit removable nameplates) except in conjunction with required fire-rated labels and as otherwise acceptable to Engineer.
 - 1. Manufacturer's identification will be permitted on rim of lock cylinders only.
- B. Base Metals: Produce hardware units of basic metal and forming method indicated using manufacturer's standard metal alloy, composition, temper, and hardness, but in no case of lesser (commercially recognized) quality than specified for applicable hardware units for finish designations indicated.
- C. Fasteners: Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation. Do not provide hardware that has been prepared for self-tapping sheet metal screws, except as specifically indicated.
- D. Furnish screws for installation with each hardware item. Provide Phillips flat-head screws except as otherwise indicated. Finish exposed (exposed under any condition) screws to match hardware finish or, if exposed in surfaces of other work, to match finish of this other work as closely as possible including "prepared for paint" surfaces to receive painted finish.
- E. Provide concealed fasteners for hardware units that are exposed when door is closed except to the extent no standard units of type specified are available with concealed fasteners. Do not use thru-bolts for installation where bolt head or nut on opposite face is exposed in other work unless their use is the only means of reinforcing the work adequately to fasten the hardware securely. Where thru-bolts are used as a means of reinforcing the work, provide sleeves for each thru-bolt or use sex screw fasteners.
- F. Electrified Hardware: For each item of electrified hardware specified, provide standardized Molex™ plug connectors to accommodate up to twelve (12) wires or as required. Molex™ plug connectors shall plug directly into through-door wiring harnesses, frame wiring harnesses, electric locking devices and power supplies. Provide an Operation Narrative for each electrified hardware opening.

2.04 HINGES, BUTTS, AND PIVOTS

- A. Templates: Except for hinges and pivots to be installed entirely (both leaves) into wood doors and frames, provide only template-produced units.
- B. Screws: Provide Phillips flat-head screws complying with the following requirements:
 - 1. For metal doors and frames install machine screws into drilled and tapped holes.
 - 2. For wood doors and frames install wood screws.

3. For fire-rated wood doors install #12 x 1-1/4-inch, threaded-to-the-head steel wood screws.
 4. Finish screw heads to match surface of hinges or pivots.
- C. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:
1. Out-Swing Exterior Doors: Non-removable pins.
 2. Out-Swing Corridor Doors with Locks: Non-removable pins.
 3. Interior Doors: Non-rising pins.
 4. Tips: Flat button and matching plug, finished to match leaves, except where hospital tip (HT) is indicated.
- D. Number of Hinges: Provide number of hinges indicated but not less than 3 hinges per door leaf for doors 90 inches or less in height and one additional hinge for each 30 inches of additional height.
1. Fire-Rated Doors: Not less than 3 hinges per door leaf for doors 86 inches or less in height with same rule for additional hinges.

2.05 LOCK CYLINDERS AND KEYING

- A. Multi-level System: Except as otherwise indicated, provide new masterkey system for Project. System to be factory based multi-level system comprised of utility patented controlled keys, security, and high security cylinders that can be operated by one key of the highest level.
1. Corbin Russwin Access 3
 2. Schlage Primus Everest D
- B. Equip locks with manufacturer's patented controlled ANSI/BHMA A 156.5 Grade One 6-pin tumbler cylinder with construction masterkey feature that permits voiding of construction keys without cylinder removal.
- C. Equip locks with cylinders for interchangeable-core pin tumbler inserts. Furnish only temporary inserts for the construction period, and remove these when directed. Furnish for all exit devices that would require dismantling of device in order to change keying of cylinder.
- D. Metals: Construct lock cylinder parts from brass or bronze, stainless steel, or nickel silver.
- E. Comply with Owner's instructions for masterkeying and, except as otherwise indicated, provide individual change key for each lock that is not designated to be keyed alike with a group of related locks.
1. Permanently inscribe each key with number of lock that identifies cylinder manufacturer's

key symbol, and notation, "DO NOT DUPLICATE".

- F. Key Material: Provide keys of nickel silver only.
- G. Key Quantity: Furnish 3 change keys for each lock, 6 master keys for each master system, and 6 grandmaster keys for each grandmaster system.
 - 1. Furnish three change keys per lock.
 - 2. Furnish ten construction Keys.
 - 3. Furnish three control keys for construction cores to remove / insert construction cores.
 - 4. Furnish two control keys for permanent cores to remove / insert permanent cores.
 - 5. Deliver all permanent keys to Owner.

2.06 KEY CONTROL SYSTEM

- A. Provide a key control system including envelopes, labels, tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet, all as recommended by system manufacturer, with capacity for 150 percent of the number of locks required for the Project.
 - 1. Provide hinged-panel type cabinet for wall mounting; install where directed by Owner.

2.07 LOCKS, LATCHES, AND BOLTS

- A. Strikes: Provide manufacturer's standard wrought box strike for each latch or lock bolt, with curved lip extended to protect frame, finished to match hardware set, unless otherwise indicated.
 - 1. Provide flat lip strikes for locks with 3-piece, anti-friction latchbolts as recommended by manufacturer.
 - 2. Provide extra long strike lips for locks used on frames with applied wood casing trim. Provide special strike lip for pairs of doors to allow astragal to be applied without modification or conflict with strike.
 - 3. Provide recess type top strikes for bolts locking into frame heads, unless otherwise indicated.
 - 4. Provide dust-proof strikes for foot bolts, except where special threshold construction provides non-recessed strike for bolt.
 - 5. Provide roller type strikes where recommended by manufacturer of the latch and lock units.

6. Provide standard (open) strike plates for interior doors of residential units where wood door frames are used.
- B. Lock Throw: Provide 3/4-inch minimum throw of latch on pairs of doors. Comply with UL requirements for throw of bolts and latch bolts on rated fire openings.
1. Provide 1/2-inch minimum throw of latch for other bored and pre-assembled types of locks and 3/4-inch minimum throw of latch for mortise locks. Provide 1-inch minimum throw for all dead bolts.
- C. Flush Bolt Heads: Minimum of 1/2-inch-diameter rods of brass, bronze, or stainless steel with minimum 12-inch-long rod for doors up to 7'-0" in height. Provide longer rods as necessary for doors exceeding 7'-0" in height.
- D. Exit Device Dogging: Except on fire-rated doors where closers are provided on doors equipped with exit devices, equip the units with keyed dogging device to keep the latch bolt retracted, when engaged.
- E. Rabbeted Doors: Where rabbeted door stiles are indicated, provide special rabbeted front on lock and latch units and bolts.
- 2.08 PUSH/PULL UNITS
- A. Concealed Fasteners: Provide manufacturer's special concealed fastener system for installation, thru-bolted for matched pairs but not for single units.
- 2.09 CLOSERS AND DOOR CONTROL DEVICES
- A. Size of Units: Except as otherwise specifically indicated, furnish units that are adjustable through a range of sizes (1 - 6).
1. Provide parallel arms for all overhead closers, except as otherwise indicated.
- B. Provide heavy duty forged arms as listed. Where closers are indicated to be closer/stop, provide units with a rigid arm assembly and a heavy duty bracket with builtin lug to provide a means of positive stop. For closers where indicated to have spring stop, furnish a heavy duty bracket with spring to allow a cushion prior to door stopping. For closer/holders, provide units with an additional built-in holder designed to hold open against normal wind and traffic conditions. Holder shall be activated manually. For closers listed with Unitrol arms, provide the closer arms with a five degree cushion stop with stop locate on the arm, not the bracket. As an alternate to Unitrol arms, the supplier may furnish solid heavy duty forged arms with appropriate bracket and a heavy duty overhead stop and holder.
- C. Access-Free Manual Closers: Where manual closers are indicated for doors required to be accessible to the physically handicapped, provide adjustable units complying with ANSI A117.1 provisions for door opening force and delayed action closing.
- D. Provide black resilient parts for exposed bumpers.

2.10 DOOR TRIM UNITS

- A. Fasteners: Provide manufacturer's standard exposed fasteners for door trim units consisting of either machine screws or self-tapping screws.
- B. Fabricate protection plates not more than 2 inches less than door width on hinge side and not more than 2 inch less than door width on pull side by height indicated.
 - 1. Metal Plates: Stainless steel, 0.050 inch (U.S. 18 gage).
 - 2. Metal Plates: Polished Aluminum with diamond pattern, 0.125 inch where indicated.

2.11 WEATHERSTRIPPING AND SEALS

- A. General: Provide continuous weatherstripping on exterior doors and smoke, light, or sound seals on interior doors where indicated or scheduled. Provide non-corrosive fasteners for exterior applications and elsewhere as indicated.
- B. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strip is easily replaceable and readily available from stocks maintained by manufacturer.

2.12 THRESHOLDS

- A. General: Except as otherwise indicated, provide standard metal threshold unit of type, size, and profile as shown or scheduled.

2.13 HARDWARE

- A. Match items to the manufacturer's standard color and texture finish for the latch and lock sets (or push-pull units if no latch or lock sets).
- B. Provide finishes that match those established by BHMA or, if none established, match the Engineer's sample.
- C. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware.
- D. Provide protective lacquer coating on all exposed hardware finishes of brass, bronze, and aluminum, except as otherwise indicated. The suffix A-NL@ is used with standard finish designations to indicate "no lacquer".
- E. The designations used in schedules and elsewhere to indicate hardware finishes are those listed in ANSI/BHMA A156.18, "Materials and Finishes", including coordination with the traditional U.S. finishes shown by certain manufacturers for their products.
- F. The designations used in schedules and elsewhere to indicate hardware finishes are the

industry-recognized standard commercial finishes, except as otherwise noted.

1. Rust-Resistant Finish: For iron and steel base metal required for exterior work and in areas shown as "High Humidity" areas (and also when designed with the suffix RR), provide 0.2-mil-thick copper coating on base metal before applying brass, bronze, nickel, or chromium plated finishes.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Mount hardware units at heights indicated in following applicable publications, except as specifically indicated or required to comply with governing regulations and except as otherwise directed by Engineer.
 1. "Recommended Locations for Builders Hardware for Standard Steel Doors and Frames" by the Door and Hardware Institute.
 2. WDMA Industry Standard I.S.1.7, "Hardware Locations for Wood Flush Doors".
- B. Install each hardware item in compliance with the manufacturer's instructions and recommendations. Where cutting and fitting is required to install hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation or application of surface protection with finishing work specified in the Division 9 Sections. Do not install surface-mounted items until finishes have been completed on the substrates involved.
- C. Set units level, plumb, and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.
- D. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.
- E. Set thresholds for exterior doors in full bed of butyl-rubber or polyisobutylene mastic sealant complying with requirements specified in Division 7 Section "Joint Sealants".
- F. Weatherstripping and Seals: Comply with manufacturer's instructions and recommendations to the extent installation requirements are not otherwise indicated.

3.02 ADJUSTING, CLEANING, AND DEMONSTRATING

- A. Adjust and check each operating item of hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate freely and smoothly or as intended for the application made.
 1. Where door hardware is installed more than one month prior to acceptance or occupancy of a space or area, return to the installation during the week prior to acceptance or occupancy and make final check and adjustment of all hardware items in such space or

area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.

- B. Clean adjacent surfaces soiled by hardware installation.
- C. Instruct Owner's personnel in the proper adjustment and maintenance of door hardware and hardware finishes.
- D. Six-Month Adjustment: Approximately six months after the date of Substantial Completion, the Installer, accompanied by representatives of the manufacturers of latches and locksets and of door control devices, and of other major hardware suppliers, shall return to the Project to perform the following work:
 - 1. Examine and re-adjust each item of door hardware as necessary to restore function of doors and hardware to comply with specified requirements.
 - 2. Consult with and instruct Owner's personnel in recommended additions to the maintenance procedures.
 - 3. Replace hardware items that have deteriorated or failed due to faulty design, materials, or installation of hardware units.
 - 4. Prepare a written report of current and predictable problems (of substantial nature) in the performance of the hardware.

3.03 HARDWARE SCHEDULE

- A. General: Provide hardware for each door to comply with requirements of Section "Door Hardware", hardware set numbers indicated in door schedule, and on the Drawings.

END OF SECTION

SECTION 09 97 13.24

COATING & PAINTING FOR STEEL WATER STORAGE TANKS

PART 1 - GENERAL

1.01 SCOPE

- A. The work of this section includes the work of repainting all interior and exterior surfaces of the Mountain Lake 500,000 Gallon Fluted Column Elevated Storage Tank.

1.02 RELATED WORK SPECIFIED ELSEWHERE (Not Applicable)

1.03 REFERENCE SPECIFICATIONS AND STANDARDS

- A. Without limiting the general aspects of other requirements of these specifications, all surface preparation, coating and painting of interior and exterior surfaces and inspection shall conform to the applicable requirements of the AMPP (Association for Materials Protection and Performance), ASTM (American Society for Testing and Materials), AWWA and the manufacturer's printed instructions.

1. ASTM (American Society for Testing and Materials)
 - ASTM D 520 Standard Specification for Zinc Dust Pigment
 - ASTM D 4417 Standard Test Methods for Field Measurement of Surface Profile of Blast Cleaned Steel
 - ASTM E 337 Standard Practice Test Method for Measuring Humidity with a Psychrometer
 - ASTM D2200 Standard Methods of Evaluating Degree of Rusting on Painted Surfaces
2. ANSI (American National Standards Institute)
 - ANSI/ASC 29.4 Exhaust Systems Abrasive Blasting Operations – Ventilation and Safe Practice
 - ANSI/NSF/CAN Standard 61 Drinking Water Components
 - ANSI/NSF/CAN Standard 600 Health Effects Solvent Criteria
3. AWWA (American Water Works Association)
 - AWWA D 102 Coating Steel Water Storage Tanks
 - AWWA C-652 Disinfection of Water-Storage Facilities
4. Consumer Product Safety Act, Part 1303
5. NACE International
 - NACE Publication TPC2 Coatings and Linings for Immersion Service: Chapter 1 Safety, Chapter Surface Preparation, Chapter 3 Curing, and Chapter 4 Inspection

- NACE Standard SP0178 Standard Recommended Practice – Fabrication Details, Surface Finish Requirements and Proper Design Considerations for Tanks and Vessels to be Lined for Immersion Service
- NACE Standard SP0188 Standard Recommended Practice – Discontinuity (Holiday) Testing of Protective Coatings
- NACE Standard RP0287 Field Measurement of Surface Profile of Abrasive Blast-Cleaned Steel Surfaces Using a Replica Tape
- NACE Standard RP0288 Standard Recommended Practice, Inspection of Linings on Steel and Concrete
6. OSHA (Occupational Safety & Health Administration) 1915.35 Standards – 29 CFR – Painting
7. SSPC (Society for Protective Coatings)
- SSPC-SP2 Hand Tool Cleaning
 - SSPC-SP3 Power Tool Cleaning
 - SSPC-SP11 Power Tool Cleaning to Bare Metal
 - SSPC-PA-1 Shop, Field and Maintenance Painting
 - SSPC-PA-2 Measurement of Dry Film Thickness with Magnetic Gages
 - SSPC-PA-3 Guide to Safety in Paint Application
 - SSPC-Guide 12 Guide for Illumination of Industrial Painting Project
 - SSPC-VIS 1-89 Pictorial Surface Preparation Standards for Painting Steel Surfaces
 - SSPC Paint Spec 36 Two Component Weatherable Aliphatic Polyurethane Topcoat, Performance-Based
8. SSPC/NACE Joint Standards
- SSPC-SP5/NACE 1 White Metal Blast Cleaning
 - SSPC-SP6/NACE 3 Commercial Blast Cleaning
 - SSPC-SP7/NACE 4 Brush-Off Blast Cleaning
 - SSPC-SP10/NACE 2 Near-White Metal Blast Cleaning
 - SSPC-SP16 Brush-Off Blast Cleaning of Coated and Uncoated Galvanized Steel, Stainless Steels, and Non-Ferrous Metals
9. NAPF 500-03 Surface Preparation Standard for Ductile Iron Pipe and Fittings In Exposed Locations Receiving Special External Coatings and/or Special Internal Linings.

B. The Engineer's decision shall be final as the interpretation and/or conflict between any of the referenced specifications and standards contained herein.

1.04 CONTRACTOR

- A. The Contractor shall have five years practical experience and successful history in the application of specified product to surfaces of steel water tanks. Upon request, he shall substantiate this requirement by furnishing a list of references and job completions.
- B. The personnel performing the work shall be knowledgeable and have the required experience and skill to adequately perform the work for this project, in accordance with SSPC-PA1, "Shop, Field and Maintenance Painting".

1.05 QUALITY ASSURANCE

- A. General: Quality assurance procedures and practices shall be utilized to monitor all phases of surface preparation, application and inspection throughout the duration of the project. Procedures or practices not specifically defined herein may be utilized provided they meet recognized and accepted professional standards and are approved by the Engineer.
- B. Surface Preparation: Surface preparation will be based upon comparison with: "Pictorial Surface Preparation Standards for Painting Steel Surfaces: SSPC-VIS 1-89", ASTM D2200-13, "Standard Methods of Evaluating Degree of Rusting on Painted Surfaces", ASTM D 4417, Method A and/or Method C or NACE Standard RP0287. In all cases the written standard shall take precedence over the visual standard. In addition, NACE Standard SP0178, along with the Visual Comparator, shall be used to verify the surface preparation of welds.
- C. Application: No coating or paint shall be applied when: 1) the surrounding air temperature or the temperature of the surface to be coated or painted is below the minimum surface temperature for the products specified herein, 2) rain, snow, fog or mist is present, 3) the surface temperature is less than 5°F above the dew point, 4) the air temperature is expected to drop below the minimum temperature for the products specified within six hours after application of coating. Dewpoint shall be measured by use of an instrument such as a Sling Psychrometer in conjunction with U.S. Department of Commerce Weather Bureau Psychrometric Tables. If any of the above conditions are prevalent, coating or painting shall be delayed or postponed until conditions are favorable. The day's coating or painting shall be completed in time to permit the film sufficient drying time prior to damage by atmospheric conditions.
- D. Coating Thickness: Thickness of coatings and paint shall be measured checked according to the procedures outlined in SSPC-PA 2 "Measurement of Dry Film Thickness with Magnetic Gages. Use of an instrument such as a Tooke Gauge, precision groove grinder, etc. is permitted if a destructive test is deemed necessary by the Engineer and the total DFT is less than 50 mils.
- E. Holiday (Pinhole) Testing: The integrity of interior coated surfaces shall be tested for holidays in accordance with NACE Standard SP0188. For dry films less than 20 mils, a non-destructive holiday detector shall not exceed 67.5 volts, nor shall destructive holiday detector exceed the voltage recommended by the manufacturer of the coating system.

A solution of 1-ounce non-sudsing type wetting agent, such as Kodak Photo-Flo, and 1 gallon of tap water shall be used to perform the holiday testing. For coating thickness at 20 mils and greater, a high voltage Tinker & Razor AP/W holiday tester shall be used. Contact coating manufacturer for voltage recommendations and curing parameters.

All pinholes and/or holidays shall be marked and repaired in accordance with the manufacturer's printed recommendations and retested. No pinholes or other irregularities will be permitted in the final coating.

- F. Inspection Devices: The contractor shall furnish, until final acceptance of coating and painting is accepted, inspection devices in good working condition for detection of holidays and measurement of dry film thickness of coating and paint. The Contractor shall also furnish U.S. Department of Commerce, National Bureau of Standards certified thickness calibration plates and/or plastic shims, depending upon the thickness gauge used, to test the accuracy of dry film thickness gauges and certified instrumentation to test the accuracy of holiday detectors. Dry film gauges and holiday detectors shall be made available for the Engineer's use at all times until final acceptance of application. Holiday detection devices shall be operated in the presence of the Engineer.
- G. Inspection: Inspection for this project shall consist of 'hold point' inspections. The Engineer or his representative shall inspect the surface prior to abrasive blasting, after abrasive blasting but prior to application of coating materials, and between subsequent coats of material. Final inspection shall take place after all coatings are applied, but prior to placing the tank in service. Contractor will insure that sufficient rigging is in place so that the Engineer or their representative shall be able to conduct the required inspections.
- H. Warranty Inspection: Warranty inspection shall be conducted during the eleventh month following acceptance of all coating and painting work. All defective work shall be repaired in accordance with this specification and to the satisfaction of the Engineer and/or Owner.

1.06 SAFETY AND HEALTH REQUIREMENTS

- A. General: In accordance with requirements set forth by regulatory agencies applicable to the construction industry and manufacturer's printed instructions and appropriate technical bulletins and manuals, the Contractor shall provide and require use of personal protective lifesaving equipment for persons working on or about the project site. The Contractor's work forces should comply with the provisions outlined in SSPC-PA-3 "A Guide to Safety in Paint Application".
- B. Head and Face Protection and Respiratory Devices: Equipment shall include protective helmets which shall be worn by all persons while in the vicinity of the work. In addition, workers engaged in or near the work during sandblasting shall wear eye and face protection devices and air purifying half-mask or mouthpiece respirators with appropriate filters. Barrier creams shall be used on any exposed areas of skin.

- C. Ventilation: Where ventilation is used to control hazardous exposure, all equipment shall be explosion-proof. Ventilation shall reduce the concentration of air contaminants to a degree a hazard does not exist. Air circulation and exhausting of solvent vapors shall be continued until coatings have fully cured.
- D. Sound Levels: Whenever the occupational noise exposure exceeds maximum allowable sound levels, the Contractor shall provide and require the use of approved ear protection devices.
- E. Illumination: Adequate illumination shall be provided while work is in progress, including explosion-proof lights and electrical equipment. Whenever required by the Engineer, the Contractor shall provide additional illumination and necessary supports to cover all areas to be inspected. The level of illumination for inspection purposes shall be determined by the Engineer.
- F. Temporary Ladders and Scaffolding: All temporary ladders and scaffolding shall conform to applicable safety requirements. They shall be erected where requested by the Engineer to facilitate inspection and be moved by the Contractor to locations requested by the Engineer.

1.07 PRODUCT DELIVERY, STORAGE & HANDLING

- A. All materials shall be brought to the jobsite in original sealed containers. They shall not be used until the Engineer has inspected the contents and obtained data from information on containers or label. Materials exceeding storage life recommended by the manufacturer shall be rejected.
- B. All coatings and paints shall be stored in enclosed structures to protect them from weather and excessive heat or cold. Flammable coatings and paints must be stored to conform with City, County, State and Federal safety codes for flammable coating or paint materials. At all times coatings and paints shall be protected from freezing.

PART 2 - MATERIALS

2.01 ACCEPTABLE MANUFACTURERS

- A. Materials specified are those that have been evaluated for the specific service. Products of the Tnemec Company, Inc. are listed to establish a standard of quality. The systems specified are intended to provide the longest service life, lowest service cost and most sustainable solution. Equivalent materials of other manufacturer's may be submitted on written approval of the Engineer.
- B. Performance equivalent products will be considered and must be approved by addendum. Requests for substitution shall include manufacturer's literature for each product giving name, product number, generic type, descriptive information, solids by volume recommended dry film thickness and certified lab test reports showing results to

equal the performance criteria of the products specified herein. As part of the proof of equality, the Engineer will require at the cost of the Contractor, certified test reports from a nationally known, reputable and independent testing laboratory conducting comparative tests as directed by the Engineer between the product specified and the requested substitution. In addition, a list of five projects shall be submitted in which each product has been used and rendered satisfactory service.

- C. All requests for product substitution shall be made at least 14 days prior to the bid date.
- D. Any material savings shall be passed to the owner in the form of a contract dollar reduction. Other approved coating manufacturer system, if provided, will be shown in the Bid Schedule as a separate bid item. The Owner will decide which coating system(s) to accept.
- E. Manufacturer's color charts shall be submitted to the Engineer at least 30 days prior to coating and/or paint application. General Contractor and Painting Contractor shall coordinate work so as to allow sufficient time (normally seven to ten days) for paint to be delivered to the job site.

2.02 GENERAL REQUIREMENTS

- A. All materials shall be lead-free as defined by the Consumer Product Safety Act, Part 1303.
- B. All zinc dust pigment contained in any zinc-rich material shall meet the requirements of ASTM D 520 Type III with regard to zinc content and purity.
- C. All materials for the interior wetted portion of the tank shall meet the requirements of ANSI/NSF/CAN Standard 61/600 for potable water contact.
- D. All catalyzed polyurethane products shall meet the minimum requirements of SSPC Paint Specification Number 36, Level 3 Performance Level.
- E. No products containing MOCHA shall be allowed.

2.03 MATERIAL PREPARATION

- A. Mix and thin materials according to manufacturer's latest printed instructions.
- B. Do not use materials beyond manufacturer's recommended shelf life.
- C. Do not use mixed materials beyond manufacturer's recommended pot life.
- D. Do not split kits of multi-component products.

2.04 TANK INTERIOR COATING SYSTEMS

A. Steel Substrates - Interior Wetted Areas, Underside of the Bowl (Interior Dry Areas), and Inlet/Outlet Piping (Interior Dry Areas)

1. Surface Preparation Prior to Abrasive Blast Cleaning: Weld flux and spatter shall be removed by power tool cleaning. Sharp projections shall be ground to a smooth contour. All welds shall be ground to a smooth contour as per NACE Standard SP0178, Designation D.
2. Surface Preparation: SSPC-SP10 Near-White Metal Blast Cleaning. An angular anchor profile of 1.5 mils as per ASTM D 4417, Method C or NACE Standard RP0287 is required. All surfaces must be clean, dry, and free of contaminants.

3. Coating System:

First Coat: Tnemec Series 93-H₂O or 94-H₂O Hydro-Zinc applied at 2.5 to 3.5 dry mils. Thin only with approved thinner: Tnemec 41-2, 41-3 or 41-49 Thinner.

Stripe Coat: Tnemec Series L140-1255 Pota-Pox Plus applied by brush or roller to all weld seams, edges, corners, bolts, nuts and other difficult to coat areas. Thin only with approved thinner, Tnemec 41-4 Thinner.

Second Coat: Tnemec Series 21 Epoxoline applied at 12.0 to 16.0 dry mils. Thin only with approved thinner, Tnemec 41-4 Thinner.

Total dry film thickness shall be a minimum of 14.5 mils.

For cold weather applications, Series 44-710 Urethane Accelerator may be added to Series 93 and 94-H₂O. Use Series L140F in lieu of L140 for cold weather applications.

B. Steel Substrates - Interior Dry

1. Surface Preparation Prior to Abrasive Blast Cleaning: Weld flux and spatter shall be removed by power tool cleaning. Sharp projections shall be ground to a smooth contour. All welds shall be ground to a smooth contour as per NACE Standard SP0178, Designation D.

2. Surface Preparation: SSPC-SP6 Commercial Blast Cleaning. An angular anchor profile of 1.5 mils as per ASTM D 4417, Method C or NACE Standard RP0287 is required.

3. Coating System:

First Coat: Tnemec Series 93-H₂O or 94-H₂O Hydro-Zinc applied at 2.5 to 3.5 dry mils. Thin only with approved thinner: Tnemec 41-2, 41-3 or 41-49 Thinner.

Stripe Coat: Tnemec Series N69-1255 or N69F Hi-Build Epoxoline II applied by brush or roller to all weld seams, edges, corners, bolts, nuts and other difficult to coat areas. Thin only with approved thinner, Tnemec 41-4 Thinner.

Second Coat: Tnemec Series N69-color or N69F Hi-Build Epoxoline II applied at 5.0 to 8.0 dry mils. Thin only with approved thinner, Tnemec 41-4 Thinner.

Total dry film thickness shall be a minimum of 7.5 mils.

For cold weather applications, Series 44-710 Urethane Accelerator may be added to Series 93 and 94-H₂O.

C. Galvanized Substrates – Interior Dry (Where applicable)

1. Surface Preparation: Visible deposits of oil, grease, or other contaminants shall be removed as required by SSPC-SP1. Sweep (Abrasive) Blasting per SSPC-SP16 to achieve a uniform anchor profile (1.0 to 2.0 mils). Galvanized surfaces must be clean, dry, and contaminant free prior to application of coatings.

3. Coating System:

1st Coat: Tnemec Series N69-color or N69F Hi-Build Epoxoline II applied at 2.0 to 3.0 dry mils. Thin only with approved thinner, Tnemec 41-4 Thinner.

2nd Coat: Tnemec Series N69-color or N69F Hi-Build Epoxoline II applied at 2.0 to 3.0 dry mils. Thin only with approved thinner, Tnemec 41-4 Thinner.

Total dry film thickness shall be a minimum of 4.0 mils.

2.05 TANK EXTERIOR COATING SYSTEMS

A. Steel Substrates

1. Surface Preparation: SSPC-SP6 Commercial Blast Cleaning. An angular anchor profile of 1.5 mils as per ASTM D 4417, Method C or NACE Standard RP0287 is required.

2. Coating System:

1st Coat: Tnemec Series 93-H₂O or 94-H₂O Hydro-Zinc applied at 2.5 to 3.5 dry mils. Thin only with approved thinner.

2nd Coat: Tnemec Series 1095 Endura-Shield applied at 2.0 to 3.0 dry mils. Thin only with approved thinner, Tnemec 41-10 Thinner.

3rd Coat: Tnemec Series 700 Hydroflon applied at 2.0 to 3.0 dry mils. Thin only with approved thinner, Tnemec 41-63 Thinner.

Logo(s): Tnemec Series 700 Hydroflon applied at 2.0 to 3.0 dry mils. Thin only with approved thinner, Tnemec 41-63 Thinner.

Total dry film thickness shall be a minimum of 6.5 mils.

For cold weather applications, Series 44-710 Urethane Accelerator may be added to Series 93 or 94 and Series 700 at the rate specified on the Series 44-710 product data sheet. Utilize Series 44-456 Urethane Accelerator for Series 1095 at the rate specified on the Series 44-456 product data sheet.

C. Exterior Exposed Ductile Iron Pipe

1. Surface Preparation: Clean all surfaces as per NAPF 500-03-01 Solvent Cleaning using stiff bristle brushes to remove all grease, oil, factory-applied tar or bitumastic coatings and any other contaminants. Abrasive blast as per NAPF 500-03-04 Brush-Off Blast Cleaning to remove existing paint and coatings and provide a minimum 1.5 mil surface profile. All surfaces must be clean, dry and free of contaminants.

2. Coating System:

1st Coat: Tnemec Series N69 Hi-Build Epoxoline II applied at 4.0 to 6.0 dry mils. Thin only with approved thinner, Tnemec 41-4 Thinner.

2nd Coat: Tnemec Series N69 Hi-Build Epoxoline II applied at 4.0 to 6.0 dry mils. Thin only with approved thinner, Tnemec 41-4 Thinner.

3rd Coat: Tnemec Series 1095 Endura-Shield applied at 2.0 to 3.0 dry mils. Thin only with approved thinner, Tnemec 41-10 Thinner.

4th Coat: Tnemec Series 700 Hydroflon applied at 2.0 to 3.0 dry mils. Thin only with approved thinner, Tnemec 41-63 Thinner.

Total dry film thickness shall be a minimum of 12.0 mils.

D. Galvanized Substrates – Interior Dry (Where applicable)

1. Surface Preparation: Visible deposits of oil, grease, or other contaminants shall be removed as required by SSPC-SP1. Sweep (Abrasive) Blasting per SSPC-SP16 to achieve a uniform anchor profile (1.0 to 2.0 mils). Galvanized surfaces must be clean, dry, and contaminant free prior to application of coatings.

2. Coating System:

- 1st Coat: Tnemec Series N69-color or N69F Hi-Build Epoxoline II applied at 2.0 to 3.0 dry mils. Thin only with approved thinner, Tnemec 41-4 Thinner.
- 2nd Coat: Tnemec Series 1095 Endura-Shield applied at 2.0 to 3.0 dry mils. Thin only with approved thinner, Tnemec 41-10 Thinner.
- 3rd Coat: Tnemec Series 700 Hydroflon applied at 2.0 to 3.0 dry mils. Thin only with approved thinner, Tnemec 41-63 Thinner.

Total dry film thickness shall be a minimum of 6.0 mils.

PART 3 - EXECUTION

3.01 GENERAL

- A. All surface preparation, coating and painting shall conform to applicable standards of the AMPP, NAPF, and the manufacturer's printed instructions. Materials applied to the surface prior to the approval of the Engineer shall be removed and re-applied to the satisfaction of the Engineer at the expense of the contractor.
- B. All work shall be performed by skilled craftsmen qualified to perform the required work in a manner comparable with the best standards of practice. Continuity of personnel shall be coordinated with the Engineer.
- C. The Contractor shall provide a supervisor at the work site during cleaning and application operations. The supervisor shall have the authority to sign change orders, coordinate work and make decisions pertaining to the fulfillment of the contract.
- D. Dust, dirt, oil, grease or any foreign matter that will affect the adhesion or durability of the coating or paint must be removed by washing with clean rags dipped in an approved cleaning solvent and wiped dry with clean rags.
- E. Coating and painting systems include surface preparation, prime coating and finish coatings. Unless otherwise approved in writing by the Engineer, prime coating shall be field applied. Where prime coatings are shop applied, the Contractor shall instruct suppliers to provide the prime coat compatible with the specified finish coat. Any off-site work which does not conform to this specification, is subjected to damage during transportation, construction or installation shall be thoroughly cleaned and touched-up in the field as directed by the Engineer. The Contractor shall use repair procedures which insure the complete protection of all adjacent primer. The specified repair method and equipment may include wire-brushing, hand or power tool cleaning, or dry air blast cleaning. In order to prevent injury to surrounding painted surfaces, blast cleaning may require use of lower air pressure, smaller nozzle and/or abrasive blast particles, or shorter blast nozzle distances from surface shielding and masking. If damage is too extensive or

uneconomical to touch-up, the entire item shall be blasted and then coated or painted as directed by the Engineer.

- F. The Contractor's coating and painting equipment shall be designed for application of materials specified and shall be maintained in first class working condition. Compressors shall have suitable traps and filters to remove water and oils from the air. Contractor's equipment shall be subject to approval of the Engineer.
- G. Application of the first coat shall follow immediately after surface preparation and cleaning before rust bloom occurs or the same day, whichever is less. Any cleaned areas not receiving first coat within this period shall be recleaned prior to application of first coat. Use of dehumidification equipment shall be first reviewed by the Engineer and coatings manufacturer prior to deviating from this provision.
- H. Prior to assembly, all surfaces made inaccessible after assembly shall be prepared as specified herein and shall receive the coating or paint system specified.

3.02 SURFACE PREPARATION

- A. The latest revision of the following surface preparation specifications of the Society for Protective Coatings (SSPC) shall form a part of this specification. The summaries listed below are for informational purposes; consult the actual SSPC specification for full detail.
 - 1. Solvent Cleaning (SSPC-SP1): Removal of oil, grease, soil and other contaminants by use of solvents, emulsions, cleaning compounds, steam cleaning or similar materials and methods which involve a solvent or cleaning action.
 - 2. Hand Tool Cleaning (SSPC-SP2): Removal of loose rust, loose mil scale and other detrimental foreign matter to a degree specified by hand chipping, scraping, sanding and wire brushing
 - 3. Power Tool Cleaning (SSPC-SP3): Removal of loose rust, loose mil scale and other detrimental foreign matter by power wire-brushing, power impact tools or power sanders.
 - 4. White Metal Blast Cleaning (SSPC-SP5/NACE No. 1): Air blast cleaning to a gray-white uniform metallic color until each element of surface area is free of all visible residues.
 - 5. Commercial Blast Cleaning (SSPC-SP6 NACE No. 3): Air blast cleaning until at least two-thirds of each element of surface area is free of all visible residues.
 - 6. Brush-Off Blast Cleaning (SSPC-SP7 NACE No. 4): Air blast cleaning to remove loose rust, loose mil scale and other detrimental foreign matter to a degree specified.

7. Near-White Metal Blast Cleaning (SSPC-SP10 NACE No. 2): Air blast cleaning until at least 95% of each element of surface area is free of all visible residues.
8. Power Tool Cleaning to Bare Metal (SSPC-SP11): Differs from SSPC-SP3 in that it requires more thorough cleaning and a surface profile not less than 1 mil.
- B. Slag, weld metal accumulation and spatters not removed by the Fabricator, Erector or Installer shall be removed by chipping and/or grinding. All sharp edges shall be peened, ground or otherwise blunted as required by the Engineer. All grinding and finishing of welds, edges, etc. shall be performed prior to solvent cleaning and abrasive blasting. Welds shall be prepared as per NACE Standard SP0178 for all interior and exterior surfaces:
1. Butt Welds: Shall be ground smooth and free of all defects, designation "D".
 2. Lap Welds: Shall be ground smooth and blended, designation "D".
 3. Fillet Welded Tee Joint: Shall be ground smooth and blended, designation "D".
- C. Field blast cleaning for all surfaces shall be by dry method unless otherwise directed. Blast nozzles shall be venturi-type nozzles with a minimum pressure at the nozzle of 90 psi.
- D. Particle size of abrasives used in blast cleaning shall be that which will produce the specified surface profile or in accordance with recommendations of the manufacturer of the specified coating or paint system to be applied.
- If the profile of the blasted steel exceeds the profile specified above, the Contractor shall be required to do one or both of the following:
1. Reblast the surface using a finer aggregate in order to produce the required profile.
 2. Apply a thicker prime coat, if possible given the limitations of the products being applied, in order to adequately cover the blast profile
- E. Abrasive used in blast cleaning operations shall be new, washed, graded and free of contaminants that would interfere with adhesion of coating or paint and shall not be reused unless specifically approved in writing by the Engineer.
- F. During blast cleaning operations, caution shall be exercised to insure that existing coatings or paint are not exposed to abrasion from blast cleaning.
- G. The Contractor shall keep the area of his work and the surrounding environment in a clean condition. He shall not permit blasting materials to accumulate as to constitute a nuisance or hazard to the accomplishment of the work, the operation of the existing facilities or to the surrounding environment.

- H. Blast cleaned surfaces shall be cleaned prior to application of specified coatings or paint. All surfaces shall be free of dust, dirt, and other residue resulting from the abrasive blasting operation. No coatings or paint shall be applied over damp or moist surfaces.
- I. Pitted areas on the tank interior shall be repaired by either filling with Tnemec Series 215 Surfacing Epoxy or by welding. Epoxy filler shall be feathered smooth. Filler shall be applied after primer and prior to the application of the finish coat. No protrusions or spatter will be allowed. Pits equal or greater in depth to one-half (1/2) of the steel thickness shall be filled by welding.
- K. NAPF-500 Surface preparation cast and ductile iron.
- J. Specific Surface Preparation: Surface preparation for the specific system shall be as noted in Sections 2.04 and 2.05.

3.03 APPLICATION, GENERAL

- A. Coating and paint application shall conform to the requirements of the Society for Protective Coatings Paint Application Specification SSPC-PA1, latest revision, for "Shop, Field and Maintenance Painting".
- B. Thinning shall be permitted only as recommended by the manufacturer and approved by the Engineer, and utilizing the thinners stated in Sections 2.04 and 2.05.
- C. Each application of coating or paint shall be applied evenly, free of brush marks, sags, runs, with no evidence of poor workmanship. Care shall be exercised to avoid lapping on glass or hardware. Coatings and paints shall be sharply cut to lines. Finished surfaces shall be free from defects or blemishes.
- D. Protective coverings or drop cloths shall be used to protect floors, fixtures and equipment. Care shall be exercised to prevent coatings or paints from being spattered onto surfaces which are not to be coated or painted. Report to the Engineer surfaces from which materials cannot be satisfactorily removed.
- E. When two coats of coating or paint are specified, where possible, the first coat shall contain sufficient approved color additive to act as an indicator of coverage or the two coats must be of contrasting color.
- F. Film thickness per coat as specified in Sections 2.04 and 2.05 are the minimum required. If roller application is deemed necessary, the Contractor shall apply additional coats as to achieve the specified thickness.
- G. All material shall be as specified.

3.04 COATING SYSTEMS APPLICATION

- A. After completion of surface preparation as specified for the specific system, materials shall be applied as noted in Sections 2.04 and 2.05.
- B. Care shall be taken so as to eliminate overspray and dry spray on the tank interior. Where such conditions are encountered, the surface shall be cleaned of all over spray and dry spray prior to the application of the succeeding coat.
- C. Areas rendered inaccessible after tank erection such as the spaces between roof plates and rafters shall receive the full coating system prior to erection and/or assembly.

3.05 DISINFECTION

- A. Disinfection of interior surfaces shall be performed in the presence of the Engineer in accordance with all the requirements of applicable AWWA Standards and regulatory agencies. Reference ANSI/AWWA C652 Disinfection of Water Storage Facilities.
- B. Disinfection shall be performed after protective coatings have been applied to the interior surfaces and allowed to thoroughly cure.
- C. Prior to disinfecting, the complete interior shall be washed down with clean water and thoroughly flushed out.

3.06 SOLVENT VAPOR REMOVAL

- A. All solvent vapors shall be completely removed by suction-type exhaust fans and blowers before placing tank in operating service.
- B. All solvent vapors will be exhausted both during and after coating application as per AWWA D 102 to allow the proper curing of the coating material.
- C. Ventilation shall be continued until such time as the coating has reached "full cure" as specified by the coating manufacturer.

3.07 CLEAN UP

- A. Upon completion of the work, all staging, scaffolding and containers shall be removed from the site or destroyed in a manner approved by the Engineer. Coating or paint spots or oil stains upon adjacent surfaces shall be removed and the jobsite cleaned. All damage to surfaces resulting from the work of this section shall be cleaned, repaired or refinished to the satisfaction of the Engineer at no cost to the Owner.

END OF SECTION

SECTION 26 05 00
COMMON WORK RESULTS FOR ELECTRICAL

PART 1 GENERAL

1.01 Work Included

- A. Provide all materials, labor and equipment required to furnish and install a complete electrical system as indicated on plans and as specified herein. Electrical work includes but is not limited to the following:
1. Complete distribution system for power and controls including necessary panelboard, mini power center, feeders and branch circuits.
 2. Excavation, trenching and backfilling for conduit and/or cable.
 3. Grounding.
 4. Surge protection device.
 5. Conduit rough-in and wiring for all equipment furnished under other Divisions.
 - a. **This includes, but is not limited to, packaged pump control panel, telemetry panel, chemical pumps and flow meter. Exact locations of outlets for equipment furnished under other Divisions shall conform with manufacturer's rough-in plans.**
 - b. Alternators, power interlocks and control wiring for equipment furnished under above mentioned Divisions unless otherwise noted on Plans.
 - c. Control components furnished under other Divisions for this equipment shall be installed under this Division. Wire and connect controls complete and in working order, in accordance with schematic diagrams on Plans and as recommended by control equipment manufacturer.
 - d. **It shall be the responsibility of the contractor to review all of the final installation instructions and shop drawings from the equipment suppliers and adjust all installations accordingly. Provide a complete and fully functional installation and system.**
 6. Supply and installation of temporary wiring for construction power and lighting for the project, in compliance with Article 590 of the National Electrical Code.

7. Removal of equipment as shown on plans. Cooperate with the general and subcontractors involved.

1.02 Related Work

- A. The following work shall be furnished under other Divisions of these Specifications.

1. Flashing of conduits into roofing and outside walls.
2. Concrete foundations, curbs and pads.
3. Painting.
4. Cutting and patching.

1.03 Definitions

- A. Provide: As used shall mean "furnish, install and connect, and put in good working order."
- B. Wiring: As used shall mean "wire and cable installed in raceway with all required boxes, fittings, connectors, etc. complete."
- C. Engineer: As used in various sections shall mean "Engineer of record whose seal is affixed to the Contract Specifications and/or Plans."

1.04 Requirements of Regulatory Agencies

- A. Equipment furnished shall be UL listed where such label is available. Installation shall conform to UL Standards where applicable.
- B. Electrical work shall be installed in accordance with Plans and Specifications, edition of NEC in effect at project location, recommendations of NFPA, state and local electrical and building codes and special codes having jurisdiction over specific portions within complete installation. This includes, but is not limited to the following:
 1. 2017 National Electrical Code.
 2. 2018 International Building Code.
- C. In event of conflict between Plans, Specifications and such codes, Engineer shall be notified in writing prior to bid. A ruling shall then be made by Engineer in writing.
- D. Obtain permits and certificates of approval from all authorities having jurisdiction over installation and pay all permit and inspection fees required.

- E. The Contractor shall make all necessary arrangements with the local Electric Utility Company concerning the electric service. The Contractor will be responsible for fees required for service modifications and extensions if and as required by the local Utility Company.

PART 2 PRODUCTS

(No products specified under this Section.)

PART 3 EXECUTION

3.01 Submittals

- A. Refer to general conditions for general requirements of shop drawing submittals. There shall be a separate submittal section or brochure for each product listed below with all sections or brochures submitted at the same time in one package. First sheet in each product section or brochure shall summarize and list all components, manufacturer's name and catalog number. Submittals shall include but not be limited to the following:
- B. Submittals must be complete with all materials to be used on the project included. Partial submittals will be rejected. Submittals shall be checked by the Contractor and evidence of such checking shall be indicated thereon. **SUBMITTALS NOT BEARING THE CONTRACTOR'S MARK OF ACCEPTANCE AND APPROVAL WILL NOT BE REVIEWED BY THE ENGINEER.** The Contractor shall be completely responsible for the accuracy, completeness, compliance with Plans and Detailed Specifications and compatibility of all submittals, the Engineer's approval notwithstanding. All submittals reviewed more than twice will be billed per the Engineer's hourly rate schedule.
- C. Submittals shall include but not be limited to the following:
1. Panelboard.
 2. Mini power center.
 3. Conduit and device mounting support channels, fittings, and fasteners.
 4. Conduit and fittings.
 5. Pull boxes and junction boxes.
 6. Wire and cable.
 7. Low voltage shielded cable.
 8. Wiring devices and plates.
 9. Surge protection device.

3.02 Site Visit

- A. Visit job site prior to bid date to determine actual conditions under which work shall be done to familiarize oneself with project and to verify total scope of work required. Failure to do so shall not constitute reason for extra change.

3.03 BASIC MATERIALS AND METHODS

A. General

1. Quality Assurance

- a. Qualifications of Manufacturer: Products used in work of this Section shall be produced by manufacturers regularly engaged in successful manufacture of similar items and with history acceptable to Engineer.
- b. Qualifications of Installers: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in necessary crafts and who are completely familiar with specified requirements and methods needed for proper performance of work of this Section.

B. Products

1. Substitutions

- a. Where "or equal" is included, Contractor may substitute equal products by another manufacturer subject to approval by the Engineer.
- b. Substitution shall be approved by Engineer before purchase and/or installation. If unapproved materials are installed, work required to remove and replace unapproved items shall be done at Contractor's expense.

C. Execution

1. Installation

- a. Electrical plans are diagrammatic and shall not be scaled for exact sizes or locations. They are not intended to disclose absolute or unconditional knowledge of actual field conditions. This Section covers installation or relocation of outlets and miscellaneous devices shown on the Plans. Any outlet or device may be installed or relocated a maximum of 10 feet in any direction from locations shown on the Plans without additional charge to the owner.

- b. All electrical equipment supports and conduit supports, anchors, bolts, locknuts, screws, washers, and mounting hardware including Unistrut, angle iron, and structural members shall be Type 304 stainless steel.
 - c. Equipment shall be installed in accordance with manufacturer's recommendations.
 - d. Protect work and materials from damage by weather, entrance of water and dirt. Cap conduit during installation. Avoid damage to materials and equipment in place. Satisfactorily repair or remove and replace damaged work with new materials. Deliver equipment and materials to job site in original, unopened, labeled containers. Store ferrous materials to prevent rusting and finished materials and equipment to prevent staining and discoloring.
 - e. Failure to route conduit through building without interfering with other equipment and construction shall not constitute a reason for an extra charge. Equipment, conduit and fixtures shall fit into available spaces in building and shall not be introduced into building at such times and manner as to cause damage to structure.
 - f. Equipment requiring service shall be readily accessible.
2. Testing and Equipment Servicing

- a. Entire installation shall be free from improper grounds and short and open circuits. Make test on conductors as required before energizing circuit.
- b. Make test to insure that entire system is in proper operating condition, and that adjustments and apparatus setting of circuit breakers, fuses, control equipment and apparatus have been made. Correct defects discovered during tests.
- c. Equipment shall be turned over to Owner in lubricated condition. Instruction on further lubrication shall be included in operating instructions.
- d. At termination of work under this Section, furnish Owner three complete bound sets of equipment catalog sheets, manufacturer's specifications and service and operating instructions on equipment furnished under this Section. Also instruct Owner on proper usage, care and maintenance of entire electrical system including all special systems or apparatus.

3. Removal of Debris

- a. Remove surplus materials and debris caused by, or incidental to, electrical work.
- b. Remove such debris at frequent intervals. Keep job clean during construction.

4. Salvageable Materials

- a. The electrical contractor shall be solely responsible for the disposition of waste material. The Owner shall have rights to all salvageable material.

5. Cutting and Patching

- a. The contractor shall so organize and execute his work so as to avoid all unnecessary cutting and patching of building surfaces. Preparatory work, including accurate installation of sleeves, wall and floor openings and construction of equipment foundations and supports shall be coordinated with the building progress. Cutting, patching and repairs to damaged building surfaces, as a result of the installation, shall be provided without additional cost to the Owner.
- b. Certain work of a general construction nature related to the work under this section of the specifications will be provided by the contractor and will include preparation of building surfaces at points of raceway and duct penetrations, necessary masonry and concrete work, etc. The contractor shall be completely responsible for the correct dimensions and general scope of all general construction requirements related to his work. All corrections to such related work, determined to be improperly executed due to the negligence of the contractor shall be made at the contractor's expense.

6. Identification of Wire and Cable

- a. **All proposed power, control, and signal wire and cable shall be properly terminated and consistently numbered in all junction and pull boxes, panels, devices, and all locations where wire and cable leave raceways.**

7. Identification of Equipment

- a. Identify the following electrical equipment with laminated plastic nameplates, engraved with 1/4" high letters.
- b. All nameplates shall be black and white letters except nameplates for emergency panelboards and transfer switches, which shall be red with white letters. Nameplates shall be attached to metal enclosure with two screws. Nameplates attached with adhesive are not acceptable.
 - i. Panelboards.
 - ii. Control panels furnished under other Divisions of these Specifications.

8. Record Drawings

- a. **THE CONTRACTOR SHALL MAINTAIN ONE SET OF ELECTRICAL PRINTS ON SITE MARKED TO SHOW ACTUAL AS CONSTRUCTED CONDITIONS AND INSTALLATIONS, PRINTS TO BE TURNED OVER TO ENGINEER AFTER JOB IS COMPLETE.** Installed location of all exterior buried conduit shall be accurately shown and referenced to above ground structures.

9. Temporary Lighting and Power

- a. Provide, maintain and remove after construction is completed, temporary lighting adequate for workman safety and temporary power for all trades including any 3 phase power required with a minimum as shown on the plans.
- b. Provide and maintain barricade lighting where required to adequately protect Owner against liability for damage to public or personnel. All lamps used in barricade shall be 70 watt red installed in weatherproof socket with wire guard. All wiring shall be approved for weatherproof installation.

10. Power Outages

- a. Coordinate all power outages with Owner and submit for approval proposed schedule of work indicating extent, number and length of outages required to perform work. All existing facilities must remain in operation during construction of new facilities. Include in bid cost of overtime labor required for power outage to occur after Contractor's normal working hours.

11. Other Materials

- a. Work of this section shall also include those items not specifically mentioned or described, but which are obviously necessary to conform to the design intent, applicable codes and to produce complete electrical system that functions properly. These materials shall be as selected by Contractor but subject to approval of Engineer.

12. Guarantee-Warranty

- a. Guarantee work to be free from defects of materials and workmanship for a period of one year from date of final acceptance of all work. Repair and replace defective work and other work damaged thereby which becomes defective during term of Guarantee-Warranty. Furnish Owner with three written copies of Guarantee-Warranty.

3.04 CONDUIT

A. General

1. Work Included

- a. Conduit
- b. Fittings

B. Products

1. Conduit

- a. Rigid Galvanized Steel Conduit: Allied, Wheatland, Republic or equal.
- b. Flexible Steel Conduit (Greenfield): Triangle, Anaconda, International Metal Hose or equal.
- c. Liquidtight flexible metallic conduit (Sealtite): Triangle, Anaconda, International Metal Hose or equal.
- d. Rigid Non-Metallic (PVC) Conduit: Carlon, Schedule 80, heavy wall or equal.

2. Conduit Fittings

- a. Galvanized Rigid Steel Couplings and Connectors: Raco, Thomas & Betts or equal.
- b. Bushings: Raco, Thomas & Betts or equal.
- c. Malleable Iron Straps and Hangers: Crouse Hinds, Appleton, Steel City or equal.
- d. Group Pipe Supports: Unistrut, Kindorf or equal. **Refer to paragraph 2.C.(1) for material type.**
- e. Expansion Fittings: O.Z. Type AX, Crouse-Hinds or equal.
- f. Exposed Conduit Fittings: Crouse-Hinds, Efcor, condulets or equal.
- g. Liquidtight flexible metallic conduit fittings: Raco, Thomas & Betts or equal.

C. Execution

1. Conduit

- a. In general, conduit installation shall follow layout shown on Plans. However, this layout is diagrammatic only and where changes are necessary due to structural conditions, other apparatus or other causes, such changes shall be made without cost to Owner. Offsets in conduits are not indicated and must be furnished as required.
- b. **Use rigid galvanized steel conduit throughout except as noted herein.**
- c. Use only rigid galvanized conduit for exposed turn-ups.
- d. Use PVC Schedule 80 when run underground. Use only rigid galvanized when exposed. Use rigid galvanized steel or PVC Schedule 80 when run under ground floor concrete slabs and rigid galvanized steel in concrete slabs.
- e. When PVC conduit is used, turn up with rigid galvanized elbows and provide equipment grounding conductor in accordance with NEC Article 250.
- f. Use rigid galvanized steel factory elbows for bends in plastic conduit runs longer than 100 feet, or in plastic conduit runs, which have more than two bends regardless of length.
- g. Coat metallic conduit placed in fill below concrete or underground with two heavy coats of asphaltum. Recoat any damage to asphaltum coating prior to backfilling. Support conduit and secure to forms when cast in concrete so that conduit will not be displaced during pouring of concrete. Stuff boxes and cork fittings to prevent entrance of water during concrete pouring and at other times during construction, prior to completion of conduit installation.
- h. Route exposed conduit at right angles or parallel to walls of building.
- i. Use proper sized tools for bending. Do not heat conduit. Dents and flat spots will be rejected. Cut and thread conduit so ends will butt in couplings. Make threads no longer than necessary and ream pipe free of burrs.
- j. Minimum conduit size 3/4" unless otherwise shown on the drawings or required by system.
- k. Leave one #10 or equivalent nylon pull wire in empty conduits.
- l. Use short pieces, approximately 2' of liquid-tight flexible conduit to connect motors and other devices subject to motion and vibration. Use liquidtight flexible conduit where subject to water spray and installed outdoors.

2. Conduit Fittings

- a. Support conduit vertically and horizontally by straps or hangers. Do not exceed these intervals as described in NEC Section 344.30 for rigid metal conduit and in NEC Section 352.30 for PVC.
- b. Use expansion fittings, properly bonded to assure ground continuity, across expansion joints in floors and ceilings. Use hubs at conduit entrance into all pull boxes, junction boxes, devices in exposed areas where knockout installations occur.
- c. When connections are made to motors or other equipment, not near walls or columns, provide vertical conduit, minimum 3/4", attached to floor with floor flange bring wiring out of conduit by means of conduit and flexible conduit extending to equipment junction box.

3.05 WIRE AND CABLE

A. General

1. Work Included
2. Wire and Cable

B. Products

1. Materials

- a. Wire and cable shall be 600 volt by Anaconda, General Cable, Habirshaw, Okonite, Rome, Triangle, Southwire or equal unless otherwise noted on Plans.
- b. For line voltage control wiring, use #14 type THHN/THWN copper by one of the manufacturers listed above. For low voltage control wiring, use type wiring recommended by equipment manufacturer.
- c. Use stranded copper type THHN/THWN for branch circuit wiring #10 and smaller. No conductor for branch circuit wiring shall be smaller than #12.
- d. Use stranded copper, type THHN/THWN for feeder and power circuits #8 and larger.
- e. Fixture wire shall be in accordance with Article 402 of the National Electrical Code.
- f. Provide color coded wire and with a different color for each phase and neutral and ground as follows: 120/208 volts circuits-phases A, B and C: black, red and blue respectively; neutral: white; ground: green; Approved color tape is acceptable for feeders. Also provide color coded wire for control circuits.

- g. Use Scotchlok, Ideal or equal wire connectors for #14 through #18 conductors. Use Burndy, T&B or equal, compression connectors with crimp cover, type CC, for #6 (600 MCM) conductors.
- h. Where branch circuits homeruns exceed 70' in length for 120 volt and 150' in length for 240 volt, No. 10 wire shall be used to first outlet.

C. Execution

1. Installation

- a. Complete conduit system before pulling any wire or cable. Only approved cable lubricants (such as soaptone) shall be used as necessary.
- b. Conductors shall be continuous from outlet to outlet or to branch circuit overcurrent devices. Make splices only in junction boxes. Splices shall not be made in panelboards. Sufficient slack shall be left at terminations to make proper connections.
- c. Connect No. 10 wire and smaller with Type R, 3M Scotchlock or Ideal 400 Series tapeless connectors or equal.
- d. Connect No. 8 wire and larger with Lock-Tite type silicon bronze type connectors, T&B Series 35000 or 54000, or equal. Insulate connections of No. 8 wire and larger with 3M #33, Scotch 33+ tape or equal.

3.06 OUTLET AND JUNCTION BOXES

A. General

1. Work Included

- a. Outlet Boxes
- b. Junction Boxes

B. Products

1. Outlet Boxes, Junction Boxes, and Wireways

- a. Outlet boxes for lighting, switches and receptacles in areas with exposed conduit shall be cast metal condulets and unilets with threaded hubs, Type FS or FD.
- b. All junction boxes, pull boxes, and wireways shall be NEMA 4X corrosion resistant stainless steel.

C. Execution

1. Outlet Boxes

- a. Use galvanized steel for concealed boxes. (All boxes shall be concealed wherever possible.) Use cast metal conduit fittings similar to "Condulets" and "Unilets" with threaded hubs for exposed boxes.
- b. Outlet boxes shall be securely anchored, set true and plumb and no part of box or cover shall extend beyond finished wall or ceiling.
- c. Select boxes according to intended use and type of outlet. Use minimum 4" diameter boxes for ceiling or wall mounted lighting fixtures. Use 4" square boxes to contain flush mounted outlets. Provide plaster or masonry rings for flush mounted outlets to conceal joint between box and wall finish material. Nongangable switch boxes may be used only for single gang switches.
- d. Mount outlet boxes worked to nearest block course.

2. Junction Boxes

- a. Junction boxes shall be sized according to number of conductors in box or type of service to be provided. Minimum junction box size 4-11/16" square and 2-1/8" deep. Provide screw covers for junction boxes.
- b. Use corrosion resistant NEMA 4X stainless steel with clamp covers for pull boxes. Size pull boxes according to the NEC.
- c. All junction boxes shall be corrosion resistant, NEMA 4X stainless steel.
- d. Provide pull box every 100' of conduit run or where excessive number of bends necessitates a box for ease of wire installation.

3. Wireways

- a. All wireways and wiring troughs shall be NEMA 4X corrosion resistant stainless steel.

3.07 WIRING DEVICES AND PLATES

A. General

1. Work Included

- a. Switches

b. Receptacles

c. Plates

B. Products

1. Materials

a. Wiring devices shall be Hubbell, Bryant or equal.

b. Switches: Single pole 20 amp, 120/277 volt AC:

- i. Single Pole Hubbell #1221 or equal
- ii. Two Pole Hubbell #1222 or equal
- iii. Three Way Hubbell #1223 or equal

Install switches on lock side and clear of door frame a minimum of 3". Prior to rough-in, coordinate with Building Details on Plans to determine lockside of door.

2. Time Switches: Paragon Electric Co., Inc. Electronic Time Control Series EC7000 or equal.

3. Receptacles

a. General Purpose, Duplex, 20 Amp, 125 Volt: Hubbell #5362 or equal.

b. Corrosion Resistant, Duplex, 20 Amp, 125 Volt: Hubbell #53CM62 or equal.

c. Ground fault interrupter receptacles, Duplex, 20 Amp, 125 Volt: Hubbell #GF5362 or equal.

d. Special Receptacles: As indicated.

4. Manual Motor Starting Switches

a. Square D Class 2510 or equal with thermal overload.

5. Device Plates

a. Stainless Steel: Hubbell, Bryant or equal.

b. Use cast weatherproof heavy duty "while-in-use" type covers for outside duplex receptacles: Pass & Seymour, Hubbell or equal.

- c. Provide properly designed plates and covers when devices are installed in exposed boxes or conduit fittings.

C. Execution

1. Installation

- a. Provide proper size outlet boxes for all wiring devices of types specified in outlet and junction box section of these specifications.
- b. All receptacles installed outdoors shall be corrosion resistant.

3.08 DISCONNECTS (MOTOR AND CIRCUIT)

A. General

1. Work Included

- a. Disconnects
- b. Fuses

B. Products

1. Disconnects (Motors and Circuits)

- a. Switches shall be Eaton or pre-approved equal.
- b. All switches shall have interlocking cover.
- c. Use heavy duty type, quick make, quick break.
- d. Provide NEMA 4X stainless steel, corrosion resistant enclosure for installations throughout except as noted herein and as shown on the Plans.
- e. Fusible switches if indicated on plans shall be equipped with Class 'R' fuse kits.
- f. Provide equipment ground lug in each switch.
- g. All disconnect switches used in motor circuits controlled by solid state reduced voltage (SSRV) motor starters or variable frequency drives (VFD) shall be equipped with auxiliary contacts wired back to the respective SSRV or VFD control circuit.

2. Fuses

- a. In fusible safety switches provide Bussman fusetrons or equal, dual element, time delay fuses for motor loads and one time fuses for non-motor loads.

C. Execution

1. Installation

- a. Provide safety switches, enclosures and sizes as indicated on Plans.

END OF SECTION

SECTION 26 05 26
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 Work Included

- A. Work included under this section shall consist of furnishing of all labor, materials, tools, equipment and supplies required to provide grounding as required by the National Electrical Code and as indicated by the plans and specifications.
- B. Types of grounding specified in this section include the following:
 - 1. System and enclosure grounding for electrical distribution systems.
 - 2. Grounding for separately derived electrical systems.
 - 3. Enclosures grounding.
 - 4. Equipment grounding.
- C. Requirements of this section apply to electrical grounding work specified elsewhere in these specifications.
- D. Comply with NEC requirements as applicable to materials and installation electrical grounding systems, associated equipment, and wiring. Provide grounding products which are UL listed and labeled.
- E. Comply with applicable requirements of UL Standards No. 467 and No. 869 pertaining to electrical grounding and bonding.
- F. Comply with applicable requirements of IEEE 837 for all grounding materials installed outside of the building in earth.
- G. Provide all grounding for the electrical system in accordance with requirements of all local codes and the 2017 edition of the National Electrical Code.

1.02 Grounding Electrode System

- A. Metal underground water pipe.
- B. Electrical service entrance.
- C. Metal frame of the building.

D. Building concrete reinforcing steel.

E. Rod electrodes.

1.03 Performance Requirements

A. Grounding System Resistance: 5 ohms.

PART 2 PRODUCTS

2.01 Grounding Systems

A. Work Included

1. Except as otherwise indicated, provide electrical grounding systems indicated with assembly of materials including, but not limited to: cables/wires, connectors, terminals, (compression type lugs), grounding rods, bonding jumper braid, and additional accessories needed for complete installation. Where materials or components are not indicated, provide products complying with NEC, UL, and IEEE Standard 827 for applications indicated.
2. Unless otherwise indicated, provide copper electrical grounding conductors for grounding connections matching power supply wiring materials and sized according to NEC.
3. Copper braided tape, constructed of 30-gauge bare copper wire and properly sized for indicated applications.
4. Ground Rods: Steel copper exterior, 5/8" dia. x 8' or 3/4" dia. X 10' as specified.
5. Exothermic connections: Cadweld or approved equal.

PART 3 EXECUTION

3.01 Installation

A. Work Included

1. Coordinate with other electrical work, as necessary, to interface installation of electrical grounding system with other work.
2. Install electrical grounding systems where shown, in accordance with applicable portions of NEC, with NECA "Standard of Installation", and in accordance with recognized industry practices to ensure that products comply with requirements and serve intended functions.

3. Furnish and install system, enclosure and equipment grounding for all electric wiring for the building in full compliance with the requirements of the NEC. All grounding conductors shall be copper
4. Ground conductors to underground rods and to building structural steel.
5. Each dry type transformer installation shall have system and enclosure grounding in accordance with the requirements of Article 250.26 of NEC. A bonding jumper, sized in accordance with Article 250.79 (c) of the NEC, shall be used to connect the neutral and enclosure of the secondary side of the transformer at the XO terminal. A separate grounding conductor shall then be provided from this connection to the building structural steel and bonded to the steel by means of thermit welding, or by an approved grounding clamp.
6. Where short lengths of flexible conduit are used to supply motors, the conduit and connectors shall be of a type approved by UL as a bonded grounding enclosure or, in lieu thereof, a separate bonding conductor and approved ground clamps shall be provided to assure a continuous ground return path around the flexible conduit and its associated connectors.
7. At all metal conduit terminations at panelboards, junction boxes, transformers, or other enclosures, the conduit shall be properly bonded to the enclosure or ground bus, as required by codes.
8. The service equipment, conduit system, supports, cabinets, other equipment and neutral conductor shall be grounded in accordance with Article 250 of the National Electrical Code, and Local Utility District requirements.
9. All ground connections shall have clean contact surfaces and shall be made with approved fittings. Where flexible metal conduit is used a separate conductor shall be provided, securely grounded on each side of the flexible section.
10. All feeder and branch circuits shall have insulated green grounding conductor sized per Article 250 of NEC.
11. Bond building water piping system per NEC if piping is metallic.
12. Field Welding: Comply with AWS Code for procedures, appearance, quality of welds, and methods used in correcting welding work. Provide welded connections where grounding conductors connect to underground grounding rods and to building steel; Cadweld or approved equal.
13. All metal, non-current carrying parts of the electrical system shall be grounded in accordance with the latest specifications of the National Electrical Code and further in accordance with the requirements as shown in the drawings.

14. The Electrical Contractor shall perform or have performed by a testing laboratory a test on the ground systems. Testing shall be done in accordance with the IEEE Green Book Test Procedures. Provide copies of test results to the Owner and Designer.

END OF SECTION

SECTION 26 56 19
LED EXTERIOR TANK LIGHTING

PART 1 GENERAL

1.01 DESCRIPTION

- A. This Section covers LED exterior floodlight luminaires of the type specified herein, including all integral components necessary for proper operation.

PART 2 PRODUCTS

2.01 MANUFACTURER

- A. Lithonia Lighting® LED floodlight or approved equal.
 - 1. Catalog Number: ESXF3 ALO SWW2 UVOLT YS DDB

2.02 LUMINAIRE CONSTRUCTION

- A. Housing: Die-cast aluminum housing with sealed construction.
- B. Rating: IP66 rated.
- C. Lens: 4 mm tempered glass.
- D. Finish: Manufacturer's standard dark bronze (DDB).

2.03 ELECTRICAL CHARACTERISTICS

- A. Input Voltage: 120–347 volts (UVOLT)
- B. Driver:
 - 1. 0–10V continuous dimming capable
 - 2. Power factor greater than 90 percent
 - 3. Total harmonic distortion (THD) less than 20 percent
- C. Surge Protection: Minimum 6kV surge protection tested in accordance with ANSI/IEEE C62.41.2, Category C.
- D. Ambient Operating Temperature: Rated for minimum -40°C.

2.04 LIGHT SOURCE AND PERFORMANCE

- A. Adjustable Lumen Output (ALO):
 - 1. 8,500 lumens
 - 2. 10,500 lumens
 - 3. 14,000 lumens
- B. Switchable Correlated Color Temperature (SWW2):
 - 1. 3000K
 - 2. 4000K
 - 3. 5000K
- C. Color Rendering Index: Minimum 80 CRI.
- D. Distribution: Wide flood (7 x 7).
- E. Efficacy: Up to approximately 163 lumens per watt at 4000K.
- F. Rated Life: L90 ≥ 36,000 hours at 25°C ambient.

2.05 CONTROLS AND FEATURES

- A. Adjustable Lumen Output (ALO).
- B. Switchable CCT (SWW2).
- C. Integral dusk-to-dawn photocell, selectable ON/OFF.

2.06 MOUNTING OPTIONS

- A. Yoke mount for surface mounting.
- B. Integral slipfitter compatible with standard 2-3/8 inch pole tenons.

2.07 FACTORY SETTINGS

- A. Lumen Output: High.
- B. Correlated Color Temperature: 4000K.
- C. Photocell: Enabled.

2.08 LISTINGS AND RATINGS

- A. IP66 rated.
- B. Wet location rated.
- C. DLC listed where applicable.

2.09 WARRANTY

- A. Manufacturer standard 5-year limited warranty.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Existing tank lighting shall be removed and replaced with LED floodlight luminaires as shown on the drawings.
- B. Install luminaires at locations indicated on the plans and in accordance with the detail shown on the drawings.
- C. Connect new luminaires to existing electrical service serving the tank lighting system.
- D. Aim and orient luminaires to illuminate the tank and associated site features as intended by the design.

END OF SECTION

SECTION 31 10 00

SITE CLEARING

PART 1 GENERAL

1.01 DEFINITIONS

- A. Interfering or Objectionable Material: Trash, rubbish, and junk; vegetation and other organic matter, whether alive, dead, or decaying; topsoil.
- B. Clearing: Removal of interfering or objectionable material lying on or protruding above ground surface.
- C. Grubbing: Removal of vegetation and other organic matter including stumps, buried logs, and roots greater than 2-inch caliper to a depth of 6 inches below subgrade.
- D. Scalping: Removal of sod without removing more than upper 3 inches of topsoil.
- E. Stripping: Removal of topsoil remaining after applicable scalping is completed.
- F. Project Limits: Areas, as shown or specified, within which Work is to be performed.

1.02 SCHEDULING AND SEQUENCING

- A. Prepare Site only after adequate erosion and sediment controls are in place.
- B. Contractor may clear and grub for linear pipe line projects 1,000 feet ahead of pipe laying, or a greater distance with written approval of the Owner. However, at Owner's discretion, areas cleared may require the application of soil stabilization seed mix. As the Work progresses, the initial portion of the alignment shall be restored, in accordance with Section 31 25 00, Erosion and Sediment Control, as additional alignment is cleared.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 GENERAL

- A. Clear, grub, and strip areas actually needed for waste disposal, borrow, or Site improvements within limits shown or specified.
- B. Do not injure or deface vegetation that is not designated for removal.

3.02 LIMITS

- A. As follows, but not to extend beyond Project limits.

1. Excavation Excluding Trenches: 5 feet beyond top of cut slopes.
2. Trench Excavation for Utilities: width of permanent easement as shown on the Drawings, or greater up to temporary easement, upon Owner approval.
3. Fill: Clearing and Grubbing: 5 feet beyond toe of permanent fill.
4. Structures: 15 feet outside of new structures.
5. Roadways: Clearing and grubbing: 10 feet from roadway shoulders, unless otherwise required for cut or fill sections.
6. Other Areas: As shown.

- B. Remove rubbish, trash, and junk from entire area within Project limits.

3.03 TEMPORARY REMOVAL OF INTERFERING PLANTINGS

- A. Remove and store plants, shrubs and trees that are not designated for removal but do interfere with construction or could be damaged by construction activities.
- B. Photograph and document location, orientation, and condition of each plant, shrub, or tree prior to its removal. Record sufficient information to uniquely identify each plant removed and to assure accurate replacement.

3.04 CLEARING

- A. Clear areas within limits shown or specified.
- B. Fell trees so that they fall away from facilities and vegetation not designated for removal.
- C. Cut off shrubs, brush, weeds, and grasses to within 2 inches of ground surface.

3.05 GRUBBING

- A. Grub areas within limits shown or specified.

3.06 SCALPING AND STRIPPING

- A. Where required on the plans, do not remove sod until after clearing and grubbing is completed and resulting debris is removed. Scalp areas within limits shown or specified.
- B. Do not remove topsoil until after scalping is completed. Strip areas within limits to minimum depths shown or specified. Do not remove subsoil with topsoil. Stockpile strippings, meeting requirements of Section 32 91 13, Soil Preparation, for topsoil, separately from other excavated material.

3.07 TREE REMOVAL OUTSIDE CLEARING LIMITS

A. Remove Within Project Limits:

1. Dead, dying, leaning, or otherwise unsound trees that may strike and damage Project facilities in falling.
2. Trees designated by Owner.

B. Cut stumps off flush with ground, grub, and remove debris, and if disturbed, restore surrounding area to its original condition.

3.08 PRUNING

A. Remove branches below the following heights:

1. 20 feet above roadways and shoulders.
2. 9 feet above sidewalks.
3. 6 feet above roofs.

3.09 SALVAGE

- A. With permission from Owner, saleable log timber may be sold to Contractor's benefit. Promptly remove from Project Site.
- B. Other limbs or woody debris shall be chipped and used for erosion control or mulch, if practical, or disposed of off-site.
- C. With permission from Owner, sod with commercial value may be sold to Contractor's benefit. Promptly remove from Project Site.

3.10 DISPOSAL

A. Clearing and Grubbing Debris:

1. Dispose of debris offsite. Burning is not permitted.
2. If practical, woody debris may be chipped and used for landscaping onsite as mulch or uniformly mixed with topsoil, provided that resulting mix will be fertile and not support combustion. Maximum dimensions of chipped material used onsite shall be 1/4 inch by 2 inches. Dispose of chips that are unsuitable for landscaping or other uses with unchipped debris.
3. Limit offsite disposal of clearing and grubbing debris to locations that are approved by federal, state, and local authorities, and that will not be visible from Project.

B. Scalpings: As specified for clearing and grubbing debris.

- C. Strippings: Stockpile topsoil in sufficient quantity to meet Project needs. Dispose of excess strippings as specified for clearing and grubbing.

END OF SECTION

SECTION 31 20 00

EARTHWORK

PART 1 GENERAL

1.01 SUMMARY

- A. The work under this section shall consist of providing all work, materials, labor, equipment, and supervision necessary to complete earthwork required in these specifications and on the drawings, to include the preparation of subgrades for slabs-on-grade, walks, pavements and lawns and grasses; excavating and backfilling for buildings and structures; drainage course for slabs-on-grade; aggregate base course for concrete walks and pavements; subsurface drainage backfill for walls and trenches; furnishing, placing and spreading of topsoil.
- B. Related Sections:
 - 1. Section 31 10 00 – Site Clearing
 - 2. Section 31 22 00 – Grading
 - 3. Section 32 23 00 – Excavation and Fill

1.02 REFERENCES

- A. American Society for Testing and Materials (ASTM)
 - 1. D 698- Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft)
 - 2. D 1556- Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method
 - 3. D 1557- Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³)
 - 4. D 2167- Standard Test Method for Density and Unit Weight of Soil In Place by the Rubber Balloon Method
 - 5. D 2216- Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
 - 6. D 2487- Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System)
 - 7. D 2922- Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
 - 8. D 2937- Standard Test Methods for Density of Soil in Place by the Drive-Cylinder Method
 - 9. D 4318- Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
- B. American Association of State Highway & Transportation Officials (AASHTO)
 - 1. M288- Standard Specification for Geotextile Specification for Highway Applications

1.03 DEFINITIONS

- A. Aggregate Base Course: Course placed between the subgrade and hot-mix asphalt pavement, or course placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.
- B. Backfill: Soil material or controlled low-strength material used to fill an excavation.
1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
 2. Final Backfill: Backfill placed over initial backfill to fill a trench.
- C. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.
- D. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.
- E. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.
1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Engineer.
 2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Engineer.
- F. Fill: Satisfactory soil materials used to raise existing grades.
- G. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material that cannot be removed by rock excavating equipment without systematic drilling, ram hammering, ripping, or blasting, when permitted. This definition of rock does not include materials such as hardpan, loose rock and concrete.
- H. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
- I. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below aggregate base, drainage fill, or topsoil materials.
- J. Topsoil: Friable clay loam, free of roots, stones and other deleterious materials that is capable of supporting a good growth of grass.
- K. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.04 SUBMITTALS

- A. Product Data: For the following:
1. Geotextiles fabrics and geogrids

2. Controlled Low Strength Material

- B. Material Test Reports shall be required from a qualified geotechnical testing agency indicating and interpreting test results for compliance of the following with requirements indicated. Contractor shall supply to Geotechnical Engineer a bulk soil sample (50 pounds +/-) for each on-site and borrow material pit to be used for fill. Geotechnical Engineer shall perform the following tests for each soil location:
1. Soil classification according to ASTM D 2487, to include grain-size distribution, natural moisture content.
 2. Atterburg limits according to ASTM D 4318
 3. Moisture-density relationships according to ASTM D 698.
- C. Pre-excavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by earthwork operations. Submit before earthwork begins.
- D. A Seismic survey report from seismic survey agency shall be submitted before any controlled blasting is approved.

1.05 QUALITY ASSURANCE

- A. Codes and Standards: Perform excavation work in compliance with applicable requirements of governing authorities having jurisdiction.
- B. Testing:
1. The Owner will retain and pay for the services of a qualified Geotechnical Engineer to observe, recommend and report on all aspects of grading and excavation. The Geotechnical Engineer shall observe all earthwork operation and make recommendations. The Contractor shall cooperate fully in providing proper notice to the Geotechnical Engineer for testing and observation of all earthwork operations. A representative of the Geotechnical Engineer shall be given twenty-four hours notice of all excavation and fill operations. All subgrades shall be tested per Section 3.17.

1.06 PROJECT CONDITIONS

- A. Existing Utilities: Notify the Tennessee One Call System, Inc. (TOCS) at 1-800-351-1111 and non-TOCS member utilities individually, at least 3 working days prior to any excavation and/or demolition.
1. Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Engineer and then only after arranging to provide temporary utility services according to requirements indicated.
 2. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, notify Engineer immediately and consult with utility owner for directions. Repair damaged utilities to satisfaction of utility owner as soon as possible.

3. Demolish and completely remove from site existing underground utilities to be removed. Coordinate with utility companies for shut-off of services if lines are active.
 4. Notify Engineer not less than seventy-two hours in advance of proposed utility interruptions.
 5. Do not proceed with utility interruptions without Engineer's written permission.
- B. Demolish and completely remove from site existing underground utilities indicated on the demolition plan to be removed. Note the location of capped utility lines on as-built drawings. Coordinate with utility companies to shut off services if lines are active.

PART 2 PRODUCTS

2.01 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient soil materials are not available from excavations.
- B. Insitu soils shall be classified by the Geotechnical Engineer. All soils and imported material used in this project shall be subject to approval by a Geotechnical Engineer.
- C. Excavation: Excavation of building areas, roadways and utilities, shall be Unclassified to design depths indicated on drawings and in specifications. No additional payment shall be made for removal of rock, debris, unsuitable soil, etc. to the required depth. Undercutting and fill beyond those depths shall be paid for by properly authorized Change Order.
- D. Backfill and Fill Materials: Structural Fill Materials shall consist of inorganic soils classified as CL, ML, SM, SC, SW, SP, GW, GP, GM and GC, or a combination of these groups, according to ASTM D 2487. Fine grained soils shall have a liquid limit less than 45 and a plasticity index less than 25 according to ASTM D 4318. Materials shall be free of organic matter, debris, waste, frozen materials, vegetation and should contain no particle size greater than 4 inches.
- E. Unsatisfactory materials: Topsoil and organic materials (OH, OL), elastic Silt (MH), and highly plastic clays (CH), according to ASTM D 2487.
- F. Aggregate Base Material: Class A, Grading D crushed stone pug mill mix in accordance with TDOT specifications, Section 303, Subsection 903.05.
- G. Drainage Fill: Washed, evenly graded mixture of crushed stone, or crushed or uncrushed gravel, with 100% passing a 1-1/2" sieve and not more than 5% passing a No. 8 sieve; Typically, TDOT #57 size aggregate.
- H. Shot Rock for Fill: Obtain approval of shot rock from the Engineer. Well graded stone with maximum particle size of 18" and not containing more than 20% fines by weight.
- I. Topsoil: Clean well-graded organic soil free from grass, weeds, and stones having a size greater than one inch.

- J. Ready-mix Controlled Low Strength Material (CLSM)- General use flowable fill in accordance with TDOT Standard Specifications, Subsection 204.06, having a compressive strength of 300 psi minimum at 28 days.
- K. Subsurface Drainage Geotextile: Non-woven polypropylene geotextile meeting the requirements for AASHTO M288 Class 2 survivability class. Hanes N06, Propex 600, US Fabrics 160NW, Tencate Mirafi 160N, or equivalent.
- L. Stabilization/ Separation Geotextile:
 - 1. Woven Geotextile: Woven polypropylene geotextile meeting the requirements for AASHTO M288 Class 2 survivability class for stabilization & separation when subgrade California Bearing Ration (CBR) values are less than or equal to 2. Hanes HD, Propex 315ST, US Fabrics 315ST, Tencate Mirafi 600X, or equivalent.

PART 3 EXECUTION

3.01 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
- B. Preparation of subgrade for earthwork operations including removal of vegetation, topsoil, debris, obstructions, and deleterious materials from ground surface is specified in Section 31 10 00 "Site Clearing."
- C. Install and maintain erosion and sedimentation controls indicated on drawings and described in Storm Water Pollution Prevention Plan (SWPPP) before any mass clearing or excavation begins.

3.02 DEWATERING

- A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.
- B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
 - 1. Reroute surface water runoff away from excavated areas. Install temporary swales and ditches to provide positive drainage, so that water does not accumulate in excavations or on fills. Do not use excavated trenches as temporary drainage ditches.
 - 2. Install a dewatering system to keep subgrades dry and convey ground water away from excavations. Maintain until dewatering is no longer required.

3.03 EXPLOSIVES

- A. Controlled blasting may only be used as an alternative to non-explosive methods of rock removal when approved by the Owner. Controlled blasting shall be performed by a qualified explosive specialist, employed by the Contractor. The contractor shall have a Registration Certificate and each employee engaged in the blasting activity shall carry a valid identification card issued by the Division of Fire Prevention.
- B. All blasting shall be performed in accordance with the Tennessee Blasting Standards Act of 1975. Conduct all blasting operations in accordance with prevailing municipal, state or other agency regulations, codes, ordinances, or laws.
- C. The Contractor assumes all liability for all personal injury, any damage to real or personal property, or interference with the use or enjoyment of any property by reason of blasting or the resulting vibration or concussion. The Contractor assumes full responsibility for operating all equipment and performing all blasting in accordance with Federal and State laws, and regulations prescribed by any other Governmental authority limiting the amount of vibration or concussion.
- D. The Contractor shall prepare or retain a consultant to prepare the blasting program and to supervise and assist in monitoring the blasting. The blasting program shall include, but not be limited to, data on the locations, hole size, depth, over-depth, pattern and inclination of the blast holes, the type, strength, amount, distribution and powder factor for the explosives used, per hole and per blast, the sequence and pattern of delays, maximum amount of explosives in any one period, depth of rock, and depth of overburden, if any, and the description and purpose of special methods to be used. This data shall be submitted to the City upon request.
- E. The Contractor or his consultant shall conduct a pre-blast survey of the surrounding structures within 300 feet of any blasting operation and document their condition prior to any blasting. Documentation shall include written descriptions, videos and/or photographs of the structures, and measures of obvious signs of structural distress such as cracks. Gauge marks shall be located over existing cracks at selected locations to be measured before and after blasting to determine if widening or displacement has taken place.
- F. All blasts shall be designed to prevent fly rock. The Contractor shall use adequate, good quality stemming material and cover the blasts with blasting mats or an adequate soil cover.
- G. If structures or pipelines are damaged, promptly replace or repair them at no expense to Owner.
- H. Seismographic monitoring shall be done by the Contractor or his consultant and a record made of the peak particle velocities caused by the blasting. This data shall be included in the blasting report.

- I. Air blast shall be monitored with an approved instrument having the required frequency response and capable of providing a permanent record of the air blast effects. These records, identified by time and recording location shall be included in the blasting report.
- J. The Contractor shall maintain a daily log on ready inspection by the Owner. A completed blasting report shall be submitted to the Owner at the conclusion of all blasting.

3.04 EXCAVATION, GENERAL

- A. Unclassified Excavation: Excavate to subgrade elevations indicated. Unclassified Excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.
- B. If excavated materials intended for fill and backfill include unsatisfactory soil materials or solid rock, replace with satisfactory soil materials.
 - 1. Remove rock to lines and grades indicated to permit installation of permanent construction without exceeding the following dimensions:
 - a. 24 inches outside of concrete forms other than at footings.
 - b. 12 inches outside of concrete forms at footings.
 - c. 6 inches outside of minimum required dimensions of concrete cast against grade.
 - d. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
 - e. 6 inches beneath bottom of concrete slabs on grade.
 - f. 6 inches beneath pipe in trenches, and the greater of 24 inches wider than pipe or 42 inches wide.
- C. Comply with all OSHA standards in determining where and in what manner sheeting, shoring, and bracing are to be done. The sheeting, shoring, and bracing system shall be designed by a professional engineer licensed in the State of Tennessee and shall be subject to approval by the Engineer. However, such approval does not relieve the Contractor of the sole responsibility for the safety of all employees, the effectiveness of the system, and any damages or injuries resulting from the lack of inadequacy of sheeting, shoring, and bracing.

3.05 EXCAVATION FOR STRUCTURES

- A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 0.1 feet. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
 - 1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.

3.06 EXCAVATION FOR WALKS AND PAVEMENTS

- A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

3.07 SUBGRADE INSPECTION

- A. Notify Engineer and Geotechnical Engineer when excavations have reached required subgrade.
- B. If Engineer and/or Geotechnical Engineer determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.
- C. Proof-roll entire subgrade below the building slabs and pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades. All proof rolling shall be done in the presence of the Geotechnical Engineer. The Geotechnical Engineer shall be given 24 hours of operations.
 - 1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph.
 - 2. Proof-roll with a fully loaded 10-wheel, tandem-axle dump truck weighing not less than 20 tons.
 - 3. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Engineer, and replace with compacted backfill or fill as directed.
- D. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Engineer, without additional compensation.
- E. Install Stabilization/Separation Geotextile when directed by Engineer.

3.08 UNAUTHORIZED EXCAVATION

- A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation.
- B. Fill unauthorized excavations under other construction or utility pipe as directed by Engineer.

3.09 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place grade, and shape stockpiles to drain surface water. Install a silt fence ring around the lower half of the stockpile. Stockpiles left dormant for a period greater than 14 days shall be stabilized with a temporary seed mixture specified in the SWPPP and covered with straw mulch or wood chips.
- B. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.10 BACKFILL

- A. Place and compact backfill in excavations promptly, but not before completing the following:

1. Construction below finish grade including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation.
2. Surveying locations of underground utilities for Record Documents.
3. Testing and inspecting underground utilities.
4. Removing concrete formwork.
5. Removing trash and debris.
6. Removing temporary shoring and bracing, and sheeting.
7. Installing permanent or temporary horizontal bracing on horizontally supported walls.

B. Place backfill on subgrades free of mud, frost, snow, or ice.

C. General: Place acceptable material in layers to required subgrade elevations, for each area classifications listed below.

1. In foundation excavations, use rock fill equal to No. 57 stone or dense graded aggregate or other borrow material only where approved by the Geotechnical Engineer.
2. Backfill of building walls, use drainage fill. Where area is to be planted extend drainage fill to 2' of finished grade and install filter fabric between stone and soils.

3.11 SOIL FILL

A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.

B. Place and compact fill material in layers to required elevations as follows:

1. Under grass and planted areas, use satisfactory soil material.
2. Under walks and pavements, use aggregate base material, drainage fill, approved soil materials or combinations of.
3. Under steps and ramps, use drainage fill or aggregate base material.
4. Under building slabs, use drainage fill or aggregate base material.
5. Under footings and foundations, use aggregate base material.

C. Place soil fills on subgrades free of mud, frost, snow, or ice.

3.12 SOIL MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 3 percent of optimum moisture content according to ASTM D 2216.

1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
2. Scarify and air dry otherwise satisfactory soil material that exceeds optimum moisture content by 3 percent and is too wet to compact to specified dry unit weight.

3. Scarify and uniformly apply and thoroughly mix water into soil material that does not meet optimum moisture minus 3 percent and is too dry to compact to specified dry unit weight.

3.13 COMPACTION OF SOIL BACKFILLS AND FILLS

- A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.
- C. The edges of compacted fills shall extend a minimum of ten feet beyond the limits of structures, building pads, and steps. The edges of compacted fills shall extend a minimum of five feet beyond, curbs, sidewalks, pavements and all other structural fills.
- D. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 698:
 1. Under structures, building slabs, steps, range berms and pavements, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill soil material at 95 percent.
 2. Under walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 90 percent.
 3. Under lawn or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 85 percent.

3.14 GRADING

- A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
 1. Provide a smooth transition between adjacent existing grades and new grades.
 2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
- B. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
 1. Lawn or Unpaved Areas: Plus or minus 0.10 feet.
 2. Walks: Plus or minus 0.10 feet.
 3. Pavements: Plus or minus 0.10 feet.
- C. Grading inside Building Lines: Finish subgrade to a tolerance of 0.05 feet when tested with a 10-foot straightedge.

3.15 AGGREGATE BASE COURSE

- A. Place aggregate base course on subgrades free of mud, frost, snow, or ice.
- B. On prepared subgrade, place aggregate base course under pavements and walks as follows:
 - 1. Install separation geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.
 - 2. Place base course material over aggregate base course under hot-mix asphalt pavement.
 - 3. Shape aggregate base course to required crown elevations and cross-slope grades.
 - 4. Place aggregate base course 6 inches or less in compacted thickness in a single layer.
 - 5. Place aggregate base course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
 - 6. Compact aggregate base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

3.16 DRAINAGE COURSE

- A. Place drainage course on subgrades free of mud, frost, snow, or ice.
- B. On prepared subgrade, place and compact drainage course under cast-in-place concrete slabs-on-grade as follows:
 - 1. Place drainage course 6 inches or less in compacted thickness in a single layer.
 - 2. Place drainage course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
 - 3. Compact each layer of drainage course to required cross sections and thicknesses to not less than 98 percent of maximum dry unit weight according to ASTM D 698.

3.17 FIELD QUALITY CONTROL

- A. Owner will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing.
- B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.
- C. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Engineer.
- D. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Contractor shall submit compaction tests reports with monthly applications for payment. Tests will be performed at the following locations and frequencies:

1. Building Slab Areas: At subgrade and at each compacted fill and backfill layer or lift, at least 1 test for every 2,500 sq. ft. or less of paved area or building slab, but in no case fewer than 3 tests per lift.
 2. Pavement Areas: At subgrade and at each compacted fill and backfill layer or lift, at least 1 test for every 10,000 sq. ft. or less of paved area or building slab, but in no case fewer than 3 tests per lift.
 3. Foundation Wall Backfill: At each compacted backfill layer, at least 1 test for each 100 feet or less of wall length, but no fewer than 2 tests per lift.
 4. Trench Backfill: At each compacted initial and final backfill layer, at least 1 test for each 200 feet or less of trench length, but no fewer than 2 tests per lift.
- E. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, the Contractor shall scarify and moisten or aerate, or remove and replace soil to depth required; recompact and retest until specified compaction is obtained.

3.18 PROTECTION

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

3.19 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.
- B. Transport surplus satisfactory soil to designated storage areas on Owner's property. Stockpile or spread soil as directed by Engineer.
1. Remove waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

END OF SECTION

SECTION 31 22 00

GRADING

PART 1 GENERAL

1.01 THE REQUIREMENT

- A. Furnish all labor, equipment, and materials necessary for final grading, topsoiling, seeding, and miscellaneous site work not included under other Sections, but required to complete the work as shown on the Drawings and specified herein.
- B. All areas of the project site disturbed by excavation, materials storage, temporary roads, etc., shall be restored as specified in Section 32 92 00.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 31 23 00 – Excavation and Fill
- B. Section 31 25 00 - Erosion and Sedimentation Control
- C. Section 32 92 00 – Turf and Grasses

1.03 SUBMITTALS

- A. Submit the following in accordance with Section 01 33 00, Submittals.
 - 1. Product Data
 - 2. Certification of all materials
 - 3. Composition and germination certification and test results for grass sod.

PART 2 PRODUCTS

2.01 CONTRACTOR'S RESPONSIBILITIES

- A. Furnish and submit certification for the materials used as specified in the General Conditions, Division 1 and Division 31.

2.02 TOPSOIL

- A. Topsoil shall be considered the surface layer of soil, suitable for use in seeding, sodding, and planting. It shall contain no mixture of refuse or any material toxic to plant growth.

2.03 WATER

- A. Water shall be furnished to the Contractor by the Owner from existing facilities.
- B. The Contractor shall furnish all hoses and connections necessary to complete the work.

2.04 FERTILIZER

- A. Refer to Section 32 92 00 Turf and Grasses

2.05 TURFGRASS SOD

- A. Refer to Section 32 92 00 Turf and Grasses

2.06 STRAW MULCH

- A. Refer to Section 32 92 00 Turf and Grasses

2.07 ROLLED EROSION CONTROL MATTING PRODUCTS

- A. The rolled erosion control matting products (RECMs) shall be as specified in Section 31 25 00, Erosion and Sedimentation Control.

2.08 RIPRAP AND HERBICIDES

- A. Furnish and install sufficient quantity of landscape gravel or riprap to cover over the ground to a minimum 4-inch depth for gravel and 24-inch depth for riprap, unless otherwise noted, or indicated on the Drawings. Also furnish and apply an approved herbicide to the subgrade surface just prior to installing the landscape gravel or riprap.
- B. During placing, the stone shall be graded so that the smaller stones are uniformly distributed through the mass. The Contractor may place the stone by mechanical methods, augmented by hand placing where necessary or as ordered by the Engineer. The placed riprap shall form a properly graded, dense, neat layer of stone.
- C. All topsoil and vegetative matter shall be removed from the subgrade surfaces prior to the application of the weed killer (herbicide) and to the placement of landscape gravel or riprap. Apply commercial-type herbicide as preemergence control of miscellaneous grasses and broadleaf weeds in granular or liquid form such as "Treflan", "Dymid", or equal. Methods and rates of application shall be in strict compliance with manufacturer's directions and acceptable to the Engineer.
- D. The herbicide selected shall be safe for use around ornamental plantings, have long-lasting weed control, and shall be resistant to leaching away under excessive rainfall.
- E. A second application of the herbicide shall be made on the surface of the landscape gravel or riprap sometime after the first six (6) months, but not later than 12-months. Same methods and rates apply as specified previously.

PART 3 EXECUTION

3.01 GRADING

- A. After approval of the rough grading, the Contractor shall commence his preparations of the subgrade for the various major conditions of the work as follows:
 - 1. Bare soil for riprap area at subgrade (24-inches below final grade, or as directed by the Engineer).
 - 2. Topsoil for lawn area - scarify 2-inch depth of subgrade (8-inches below final grade) prior to placing topsoil.
- B. Remove any foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in topsoil. Replace with new topsoil, as required.
- C. Suspend grading operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
- D. Uniformly moisten excessively dry soil that is not workable, and which is too dusty.
- E. Final surface grading of the topsoiled, landscape graveled, and riprapped areas shall be mechanically raked or hand raked to an even finished surface alignment.

3.02 TOPSOIL

- A. The Contractor shall place the topsoil over all areas disturbed during construction, except those areas which will be paved, graveled or rip rapped.
- B. Topsoil shall not be placed in a frozen or muddy condition and shall contain no toxic materials harmful to grass growth.
- C. Topsoil shall be spread in place at 8-inch minimum consolidated depth, and sufficient quantity for certain plant beds and backfill for shrubs and trees as specified.

3.03 SOD & TURF

- A. The Contractor's work shall include the preparation of the topsoil and bare soil bed, application of fertilizer, mulching, inoculant, temporary soil stabilizer, watering, and all other operations necessary to provide a satisfactory growth of sod at the end of the one-year maintenance period. Areas without satisfactory turf grass at the end of one (1) year shall be replanted until satisfactory growth is obtained and acceptable to the Engineer.
- B. Contractor shall sod areas disturbed during construction where topsoil is required.

1. Lay sod within 24 hours of harvesting. Do not lay sod if dormant or if ground is frozen or muddy.
 2. Lay sod to form a solid mass with tightly fitted joints; do not stretch or overlap. Stagger sod strips or pads to offset joints in adjacent courses. Avoid damage to subgrade or sod during installation. Tamp and roll lightly to ensure contact with subgrade, eliminate all pockets, and form a smooth surface. Work sifted soil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.
 3. Lay sod across angle of slopes steeper than 1:3. Anchor sod on slopes exceeding 1:6 with pegs or staples and at spacing as recommended by sod manufacturer.
 4. Saturate sod with fine water spray within two hours of planting. During first week after planting, water daily or as necessary to maintain moist soil.
- C. Contractor shall renovate existing turf damaged by Contractor's operations, where feasible, or replace with new sod, if required by the Engineer.
1. Remove waste and foreign materials, including weeds, soil cores, grass, vegetation, and turf, and legally dispose of them off Owner's property.
 2. Mow, dethatch, core aerate, and rake existing turf.
 3. Saturate existing turf with fine water spray. During first week after re-establishment, water daily or as necessary to maintain moist soil.
- D. Approved soil amendments including, but not limited to, lime and fertilizer may be utilized as necessary to promote growth of new turf and re-establish existing turf. Applications shall be evenly sprayed over the ground surface.

3.04 DITCH AND SWALE EROSION PROTECTION

- A. All ditches and swales indicated on the Drawings shall be lined with a rolled erosion control matting products (RECMs). The area to be covered shall be properly graded and hydroseeded before the RECM is installed. Installation shall be in accordance with Section 31 25 00, Erosion and Sedimentation Control.
- B. Slopes shall be protected from damage due to erosion, settlement, and other causes and shall be repaired promptly at the Contractor's expense.

3.05 MAINTENANCE

- A. The Contractor shall be responsible for maintaining all seeded and sodded areas through completion of the project. Maintenance shall include but not be limited to, annual fertilization, mowing, repair of seeded areas, irrigation, and weed control. The Contractor shall provide, at his own expense, protection for all landscaped areas against trespassing and damage at all times until

acceptance of the work. Slopes shall be protected from damage due to erosion, settlement, and other causes and shall be repaired promptly at the Contractor's expense.

- B. The Contractor shall water newly sodded and re-established areas of the lawn as required to maintain a healthy turf, or unless otherwise directed by the Engineer. The Contractor shall furnish all necessary hoses, sprinklers, and connections.
- C. Annual fertilization shall consist of an application of 500#/acre of 10-10-10 commercial grade fertilizer, or its equivalent and 60#/acre of nitrogen in early fall, or other analysis as may be determined by soil test. Annual fertilization shall be in addition to top dressing and shall be performed by the Contractor each fall season after planting until the work is substantially complete.
- D. Mowing shall be scheduled so as to maintain a minimum stand height of 4-inches or as directed by the Engineer. Stand height shall be allowed to reach 8-inches prior to mowing.
- E. All landscaped areas shall be inspected on a regular basis and any necessary repairs or replanting made within the planting season, if possible.
- F. Weed growth shall be maintained mechanically and/or with herbicides. When chemicals are used, the Contractor shall follow the current Tennessee Agricultural Experiment Stations' weed control recommendations and adhere strictly to the instructions on the label of the herbicide. No herbicide shall be used without prior approval of the Engineer.

3.06 CLEANUP

- A. The Contractor shall remove from the site all subsoil excavated from his work and all other debris including, but not limited to, branches, paper, and rubbish in all landscape areas, and remove temporary barricades as the work proceeds.
- B. All areas shall be kept in a neat, orderly condition at all times. Prior to final acceptance, the Contractor shall clean up the entire landscaped area to the satisfaction of the Engineer.

END OF SECTION

SECTION 31 23 00
EXCAVATION AND FILL

PART 1 GENERAL

1.01 THE REQUIREMENT

- A. Furnish all labor, equipment and materials required to complete all work associated with excavation, including off-site borrow excavation, dewatering, backfill, drainage layers beneath and around structures, foundation and backfill stone, filter fabric, embankments, stockpiling topsoil and any excess suitable material in designated areas, in place compaction of embankments, backfill and subgrades beneath foundations and roadways, excavation support, disposing from the site all unsuitable materials, providing erosion and sedimentation control grading, site grading and preparation of pavement and structure subgrade, and other related and incidental work as required to complete the work shown on the Drawings and specified herein.
- B. All excavations shall be in conformity with the lines, grades, and cross sections shown on the Drawings or established by the Engineer.
- C. It is the intent of this Specification that the Contractor conduct the construction activities in such a manner that erosion of disturbed areas and off-site sedimentation be minimized.
- D. All work under this Contract shall be done in conformance with and subject to the limitations of the latest editions of the Tennessee Department of Transportation (TDOT) Standard Specifications for Roads and Structures and the Tennessee Erosion and Sediment Control Planning and Design Manual.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 31 22 00 Grading
- B. Section 31 23 00 Excavation and Fill
- C. Section 31 25 00 Erosion and Sedimentation Control

1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

- A. Contractor shall comply with the applicable requirements of the following documents. All referenced codes and standards refer to the edition referenced in the code adopted by the Project.
 - 1. Tennessee Department of Transportation Standard Specifications for Roads and Structures, latest edition.

2. American Society for Testing and Materials (ASTM):
- | | |
|------------|--|
| ASTM C 127 | Test for Specific Gravity and Absorption of Coarse Aggregate. |
| ASTM C 136 | Test for Sieve Analysis of Fine and Coarse Aggregates. |
| ASTM D 422 | Particle Size Analysis of Soils. |
| ASTM D 423 | Test for Liquid Limit of Soils. |
| ASTM D 424 | Test for Plastic Limit and Plasticity Index of Soils. |
| ASTM C 535 | Test for Resistance to Degradation of Large Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine. |
| ASTM D 698 | Standard Method of Test for the Moisture - Density Relations of Soils Using a 5.5 lb. (2.5 kg) Rammer and a 12-inch (305 mm) Drop. |
| ASTM D1556 | Test for Density of Soil in Place by the Sand-Cone Method. |
| ASTM D1557 | Test for Moisture-Density Relations of Soils and Soil Aggregate Mixtures Using 10-lbs. (4.5 kg) Rammer and 18-inch (457 mm) Drop. |
| ASTM D2049 | Test Method for Relative Density of Cohesionless Soils. |
| ASTM D2167 | Test for Density of Soil in Place by the Rubber-Balloon Method. |
| ASTM D2216 | Test for Laboratory Determination of Water (Moisture) Content of Soil, Rock, and Soil Aggregate Mixtures. |
| ASTM D2487 | Test for Classification of Soils for Engineering Purposes. |
| ASTM D2922 | Test for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth). |

1.04 SUBSURFACE CONDITIONS

- A. Supplemental documents for existing conditions have been made available to the Contractor in the Appendices to these Specifications. This data is furnished for information only, and it is expressly understood that the Owner and Engineer will not be held responsible for any interpretations or conclusions drawn therefrom.
- B. It shall be noted that there may be water pipes, storm drains and other utilities located in the area of proposed excavation. Contractor shall take necessary means to identify below grade, in service utilities and avoid disruption of service. Contractor shall perform all repairs to same in the event that excavation activities disrupt service.

1.05 SUBMITTALS

- A. In accordance with the procedures and requirements set forth in Section 01 33 00, Submittals, the Contractor shall submit the following:
1. Name and location of all material suppliers.
 2. Certificate of compliance with the standards specified above for each source of each material.
 3. List of disposal sites for waste and unsuitable materials and all required permits for use of those sites.
 4. Plans and cross sections of open cut excavations showing side slopes and limits of the excavation at grade.
 5. Product data for such products as may be required by these specifications, including geotextile filter fabric, underdrain piping, geogrid, etc.
 6. Other submittals as required by Related Work Specified Elsewhere.

1.06 PRODUCT HANDLING

- A. Soil and rock material shall be excavated, transported, placed, and stored in a manner so as to prevent contamination, segregation and excessive wetting. Materials which have become contaminated or segregated will not be permitted in the performance of the work and shall be removed from the site.

1.07 USE OF EXPLOSIVES

- A. The use of blasting or explosives shall not be allowed under this project.

PART 2 PRODUCTS

2.01 GENERAL

- A. Where excavated material does not meet requirements for select fill, Contractor shall furnish off-site borrow material meeting the specified requirements herein. Determination of whether the borrow material will be paid for as an extra cost will be made based on Article 4 of the General Conditions, as amended by the Supplementary Conditions. When the excavated material from required excavations is suitable for use as backfill, bedding, or embankments, but is replaced with off-site borrow material for the Contractor's convenience, the costs associated with such work and material shall be borne by the Contractor.

2.02 SELECT FILL

- B. Soils from the excavations meeting requirements stipulated herein with the exceptions of topsoil and organic material may be used as select fill for general backfilling and constructing embankments, except as otherwise required.
- C. Select fill used as an embankment or soil cap shall be a silty or clayey soil material with a Maximum Liquid Limit (LL) of 50 and a Plasticity Index (PI) between 7 and 20.
- D. Select fill used for backfilling shall be as specified herein or approved by the Engineer.

2.03 STONE FILL

- A. Stone fill shall be a coarse aggregate material meeting the gradation requirements of #57 aggregates in accordance with ASTM C-33 or approved equal.
- B. Stone fill shall be used under all structural foundations and against all below grade walls, unless indicated otherwise.

2.04 TOPSOIL

- A. Topsoil shall be considered the surface layer of soil and sod, suitable for use in seeding, sodding, and planting. It shall contain no mixture of refuse or any material toxic to plant growth.

PART 3 EXECUTION

3.01 GENERAL

- A. Earthwork operations shall be performed in a safe and proper manner with appropriate precautions being taken against all hazards and to avoid slides that will cause disturbance of the subgrade or damage of adjacent areas. Comply with local regulations and with the provisions of the "Manual of Accident Prevention in Construction" of the Associated General Contractors of America, Inc., OSHA, and other applicable safety requirements.
- B. The Contractor shall control grading in a manner to prevent surface water from running into excavations. Obstruction of surface drainage shall be avoided and means shall be provided whereby storm water flow can be uninterrupted in existing gutters, other surface drains, or temporary drains.

3.02 STRIPPING OF TOPSOIL

- A. In all areas to be excavated, filled, paved, or graveled the topsoil shall be stripped to its full depth and shall be deposited in storage piles on the site, at locations designated by the Owner or Engineer, for subsequent reuse. Topsoil shall be kept separated from other excavated materials and shall be piled free of roots and other undesirable materials.

3.03 EXCAVATION

- A. All material excavated, regardless of its nature or composition, shall be considered UNCLASSIFIED EXCAVATION. Excavation shall include the removal of all soil, rock, weathered rock, rocks of all types, boulders, conduits, pipe, and all other obstacles encountered or shown to be removed within the limits of excavation shown on the Drawings or specified herein. The cost of excavation shall be included in the Lump Sum Bid Price and no additional payment will be made for the removal of obstacles encountered within the excavation limits shown on the Drawings and specified herein.
- B. All suitable material removed in the excavation shall be used as far as practicable in the formation of embankments, subgrades, and shoulders, and at such other places as may be indicated on the Drawings or indicated by the Engineer.
- C. The Engineer and/or Materials Testing Agency will designate materials that are unsuitable for use. The Contractor shall remove all unsuitable material, as directed by the Engineer, dispose of the material off-site, and replace it with thoroughly compacted select fill, and/or stone fill.
- D. All excavations shall be made in the dry and in such a manner and to such widths as will give ample room for properly constructing and inspecting the structures and/or piping they are to contain and for such excavation support, pumping and drainage as may be required. Excavation shall be made in accordance with the grades and details shown on the Drawings and as specified herein.
- E. No rock or boulders shall be left in place which protrude more than 1 foot within the typical section cut slope lines. All protruding roots and other objectionable vegetation shall be removed from slopes.
- F. Foundations for a structure shall bear on similar materials. Should excavation for a foundation bearing on earth be partially in rock, the Contractor shall undercut that portion of the rock and bring the excavation to bearing elevation with compacted stone fill. The thickness of the compacted stone fill shall be as indicated on the Drawings and uniform under the structure.
- G. All cuts shall be brought to the grade and cross section shown on the Drawings, prior to final inspection and acceptance by the Engineer.
- H. Slides and overbreaks which occur due to negligence, carelessness or improper construction techniques on the part of the Contractor shall be removed and disposed of by the Contractor as indicated by the Engineer at no additional cost to the Owner. If grading operations are suspended for any reason whatsoever, partially completed cut and fill slopes shall be brought to the required slope and the work of seeding and mulching or other required erosion and sedimentation control operations shall be performed.

3.04 EXCAVATION SUPPORT

- A. The Contractor shall furnish, place, and maintain such excavation support which may be required to support sides of excavation or to protect pipes and structures from possible damage and to provide safe working conditions. The Contractor shall be responsible for the adequacy of all

supports used and for all damage resulting from failure of support system or from failure to install and maintain it.

3.05 REMOVAL OF EXCESS AND UNSUITABLE MATERIALS

- A. The Contractor shall remove and dispose of all excess and unsuitable materials off-site.
- B. The Contractor shall be compensated for the removal of unsuitable materials, which are beyond the excavation limits required by the Contract Documents, as directed by the Engineer and in accordance with Section 01 29 00 Measurement and Payment.
 - 1. No payment will be made for excavation beyond the limits required by the Contract Documents without prior approval by the Engineer.
 - 2. Removal of unsuitable materials within the excavation limits required by the Contract Documents shall be considered Unclassified Excavation.
- C. All unsuitable materials shall be disposed of in locations and under conditions that comply with federal, state and local laws and regulations.
- D. The Contractor shall obtain an off-site disposal area prior to beginning demolition or excavation operations.
- E. All excess and unsuitable materials shall be hauled in trucks of sufficient capacity and tight construction to prevent spillage. Trucks shall be covered to prevent the propagation of dust.
- F. When all excess and unsuitable material disposal operations are completed, the Contractor shall leave the disposal sites in a condition acceptable to the Owner and Owner(s) of the disposal site(s).

3.06 PROTECTION OF SUBGRADE

- A. To minimize the disturbance of bearing materials and provide a firm foundation, the Contractor shall comply with the following requirements:
 - 1. Use of heavy rubber-tired construction equipment shall not be permitted on the final subgrade unless it can be demonstrated that drawdown of groundwater throughout the entire area of the structure is at least 3 feet below the bottom of the excavation (subgrade). Even then, the use of such equipment shall be prohibited should subgrade disturbance result from concentrated wheel loads.
 - 2. Subgrade soils disturbed through the operations of the Contractor shall be excavated and replaced with compacted select fill or stone fill at the Contractor's expense as indicated by the Engineer.

3. The Contractor shall provide protection against penetration of frost into materials below the bearing level. This protection may consist of a temporary blanket of straw or salt hay covered with a plastic membrane or other acceptable means.

3.07 DEWATERING

- C. The Contractor shall perform all dewatering as required for the completion of the work. Procedures for dewatering proposed by the Contractor shall be submitted to the engineer for review prior to any earthwork operations. All water removed by dewatering operations shall be disposed of in accordance with the Tennessee Department of Environment and Conservation and as required by the Owner.
- D. The dewatering system shall be of sufficient size and capacity as required to control groundwater or seepage to permit proper excavation operations, embankment construction, subgrade preparation, and to allow concrete to be placed in a dry condition.
 1. The system shall include a sump system or other equipment, appurtenances and other related earthwork necessary for the required control of water.
 2. The Contractor shall draw-down groundwater to at least 2-feet below the bottom of excavations (subgrade) at all times in order to maintain a dry and undisturbed condition.
- E. The Contractor shall be solely responsible for proper design, installation, proper operation, maintenance, and any failure of any component of the system.
- F. The Contractor shall be responsible for and shall repair without cost to the Owner, any damage to installed work and the excavation, including damage to the subgrade or fill materials. The Contractor shall be responsible for damages to any other area or structure caused by his failure to maintain and operate the dewatering system.
- G. The Contractor shall take all the steps that he considers necessary to familiarize himself with the surface and subsurface site conditions, and shall obtain the data that is required to analyze the water and soil environment at the site and to assure that the materials used for the dewatering systems will not erode, deteriorate, or clog to the extent that the dewatering systems will not perform properly during the period of dewatering.
- H. Copies of the geotechnical report are made available to the Contractor in the Appendices to these Specifications. This data is furnished for information only, and it is expressly understood that the Owner and Engineer will not be held responsible for any interpretations or conclusions drawn therefrom.
- I. Prior to the execution of the work, the condition of the existing structures shall be documented in accordance with Section 01 32 33 Photographic Documentation.

3.08 PROOFROLLING

- A. After stripping of topsoil, excavation to subgrade, and prior to placement of fills, the exposed subgrade shall be carefully inspected by the materials testing consultant by probing and testing

as needed. Any topsoil or other organic material still in place, frozen, wet, soft, or loose soil, and other undesirable materials shall be removed prior to probing and testing.

- B. The subgrade of all structures and all areas that will support pavements or fill shall be proof rolled.
- C. The exposed subgrade shall be proofrolled with at least six (6) passes by a heavily loaded tandem-wheeled dump truck or similar vehicle, in the presence of the Engineer, to check for soft or unsuitable bearing material.
- D. Any depressions due to soft soils which develop during proof rolling shall be filled with fill material and proof rolled smooth and level.
 - 1. If subgrade still contains depressions, the area of soft soils shall be undercut, backfilled, and proof rolled to achieve a suitable subgrade, unless otherwise directed by the Engineer.
- E. Any unsuitable materials, as identified by the Engineer, shall be removed and replaced with an approved compacted fill material, as specified herein.

3.09 BACKFILL

- A. It is the intent of these Specifications that all structures shall bear on stone fill placed to the thickness shown on the Drawings, as specified in these Specifications, or not less than 6-inches. Bedding for process piping shall be as specified in Section 40 05 00, Common Work Results for Process Interconnections, or as shown on the Drawings.
- B. The backfill shall be deposited in successive, uniform, approximately horizontal layers not exceeding compacted depth indicated for the full width.
- C. Stones or fragmentary rock larger than 4-inches in their greatest dimension will not be allowed within the top 12-inches of finished grade nor within 6 inches of pipes. No stone or fragmentary rock larger than 12-inches in their greatest dimension will be allowed for any portion of backfill.
- D. For backfill against below grade walls, a wedge of stone fill shall be provided the full height of the wall, except that the top 18-inches shall consist of a soil cap and topsoil, pavement, or concrete slab, as required by the Drawings. The top of the wedge of stone fill shall extend outward away from the wall at least half the height of the wall.

3.10 COMPACTION

- A. The Contractor shall compact embankments, backfill, crushed stone, aggregate base, and in place subgrade in accordance with the requirements.
- B. Soils shall be compacted at a moisture content not more than 1% below nor more than 4% above the optimum moisture content for the particular material tested in accordance with the ASTM D698.

- C. The densities specified herein refer to percentages of maximum dry density as determined by the noted test methods.

	Density Std. Proctor (D698)	Density Mod. Proctor (D1557)	Max. Lift Thickness as Compacted
Embankments Beneath Structures*	98%	95%	8"
Other Embankments	95%	92%	8"
Backfill Against walls of Structure	95%	92%	8"
Backfill in Pipe Trenches	95%	92%	8"
Stone Fill Beneath Structures	98%	95%	12"
Aggregate Base Course (ABC) Beneath Pavements	--	98%	8"
In place Subgrade Beneath Structures	98%	95%	Top 12-inches

* Embankments beneath structures shall include a zone 10 feet beyond the limits of the foundation of the structure and extend down to the natural grade on a 45° slope.

** The aggregate shall be compacted to a degree acceptable to the Engineer by use of a vibratory compactor and/or crawler tractor.

- D. Testing will be performed by a material testing consultant retained by the Owner.

- Field density tests will be performed in accordance with ASTM D 1556, ASTM D 2167, or ASTM D 2922, as determined by the Engineer and materials testing consultant, to determine if the specified densities have been achieved, and these tests shall be the basis for accepting or rejecting the compaction.
- The Contractor shall notify material testing consultant in advance when density testing will be required and coordinate access with the material testing consultant.
- One in-place density test shall be performed for each 400 cubic yards of backfill placed, with a minimum of one test performed each day that backfill is placed.
- Failure to achieve the specified densities shall require the Contractor to re-compact the material or remove and replace it, as deemed appropriate by the Engineer.
- Retesting for in-place density of fill, which was previously tested and failed to meet the requirements of these specifications, shall be paid for by the Contractor.

- E. The Contractor shall, if necessary, increase his compactive effort by increasing the number of passes, using heavier or more suitable compaction equipment, or by reducing the thickness of the

layers. The Contractor shall adjust the moisture contents of the soils to bring them within the optimum range by drying them or adding water as required.

END OF SECTION

TO BID, CONTRACTOR MUST OBTAIN DOCUMENTS FROM ISSUING OFFICE

SECTION 31 23 16.01
BORROW EXCAVATION

PART 1 GENERAL

1.01 SUBMITTALS

- A. Informational Submittal: Borrow Pit Plan, detailing development, operation, and reclamation of each pit. Submittal shall include all information on private borrow pits, including address and property owner approval.

1.02 WEATHER LIMITATIONS

- A. Except as approved by Engineer, do not operate borrow pits when ground is frozen or when borrow is too wet to achieve required compaction.

1.03 SEQUENCING AND SCHEDULING

- A. Clearing, Grubbing, and Stripping: Complete applicable Work specified in Section 31 10 00, Site Clearing, prior to borrow pit development.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 BORROW PIT OPERATION

- A. Both material storage and borrow pit areas, whether contiguous to the Site or not, shall be considered part of the Project's disturbed area and shall be subject to applicable NPDES "General Permit for Discharges of Storm Water Associated with Construction Activities" requirements.
- B. Review Borrow Pit Plan with Engineer prior to excavating from borrow pits. Obtain Engineer's acceptance of deviations from Borrow Pit Plan prior to their implementation.
- C. Always keep borrow pits neat and orderly, and work them in systematic manner. Continuously keep borrow pits graded to drain, and take necessary precautions to control erosion and prevent offsite sediment releases. Dewater as necessary to develop, operate, and reclaim each borrow pit.
- D. Do not excavate more borrow material than required for work. Leave surplus material in place.
- E. Limit excavation at borrow pits to depth which will permit completed area to drain to surrounding area after completion of work.

- F. If required by the Owner and indicated on the Drawings, Contractor shall fill and grade borrow pits to match existing grades that surround the borrow pit.

3.02 OBSTRUCTIONS

- A. Remove or protect as specified in Drawings.

3.03 RECLAMATION

- A. Grade borrow pits and replace topsoil, as specified in the Borrow Pit Plan, to drain without ponding surface water and to blend graded surfaces neatly with surrounding terrain at completion of borrow operations.
- B. Final Slopes:
 - 1. Maximum: Three horizontal to one vertical.
 - 2. Minimum: 2 percent.
- C. Do not use borrow pits for disposal, unless otherwise specified or shown.
- D. Prepare topsoil as specified in Section 32 91 13, Soil Preparation, and reestablish vegetation as specified Section 32 92 00, Turf and Grasses.

END OF SECTION

SECTION 32 91 13
SOIL PREPARATION

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this section.
1. ASTM International (ASTM):
 - a. C33/C33M, Standard Specification for Concrete Aggregates.
 - b. C602, Standard Specification for Agricultural Liming Materials.
 - c. D2974, Standard Test Methods for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils.
 - d. D5268, Standard Specification for Topsoil Used for Landscaping Purposes.

1.02 SUBMITTALS

- A. Action Submittals:
1. Samples:
 - a. Representative of stockpiled or imported topsoil.
- B. Informational Submittals:
1. Certified Topsoil Analysis Reports: if requested by Owner.
 - a. Indicate quantities of materials necessary to bring onsite or imported topsoil into compliance with textural/gradation requirements.
 - b. Indicate quantity of lime, quantity and analysis of fertilizer, and quantity and type of soil additive.

1.03 SEQUENCING AND SCHEDULING

- A. Rough grade areas to be planted or seeded, prior to performing work specified under this section.

PART 2 PRODUCTS

2.01 TOPSOIL

- A. General: Natural, friable, sandy loam, obtained from well-drained areas, free from objects larger than 1-1/2 inches maximum dimension, and free of subsoil, roots, grass, other foreign matter, hazardous or toxic substances, and deleterious material that may be harmful to plant growth or may hinder grading, planting, or maintenance.
- B. Use onsite topsoil wherever possible. If imported topsoil is specifically called for on the project Drawings, it shall meet the requirements in the paragraphs below.
- C. Composition: In general accordance with ASTM D5268:3
1. Gravel-Sized Fraction: Maximum 5 percent by weight retained on a No. 10 sieve.
 2. Sand-Sized Fraction: Minimum 20 to 60 percent passing No. 20 sieve.
 3. Silt and Clay-Sized Fraction: Minimum 35 to 70 percent.
- D. Organic Matter: Greater than 2 percent by dry weight as determined in accordance with ASTM D2974.
- E. pH: Range 5.5 to 7.0.
- F. Textural Amendments: Amend as necessary to conform to required composition by incorporating sand, peat, manure, or sawdust.
- G. Source: Stockpile material onsite, in accordance with specifications. Import topsoil if onsite material is insufficient in quantity, and as approved by the Owner.

2.02 LIME

- A. Composition: Ground limestone with not less than 85 percent total carbonates, ASTM C602.
- B. Gradation:
1. Minimum 50 percent passing No. 100 sieve.
 2. Minimum 90 percent passing No. 20 sieve.
 3. Coarser material acceptable provided rates of application are increased proportionately on basis of quantities passing No. 100 sieve.

2.03 SOIL ADDITIVES

- A. Sawdust or Ground Bark:
1. Nontoxic, of uniform texture, and subject to slow decomposition when mixed with soil.
 2. Nitrogen-treated, or if untreated mix with minimum 0.15 pound of ammonium nitrate or 0.25 pound of ammonium sulfate per cubic foot of loose material.

B. Peat:

1. Composition: Natural residue formed by decomposition of reeds, sedges, or mosses in a freshwater environment, free from lumps, roots, and stones.
 - a. Organic Matter: Not less than 90 percent on a dry weight basis as determined by ASTM D2974.
 - b. Moisture Content: Maximum 65 percent by weight at time of delivery.

C. Fertilizer:

1. Natural:

a. Manure:

- i. Well-rotted, stable or cattle manure, free from weed seed and refuse.
- ii. Maximum 50 percent sawdust or shavings by volume.
- iii. Age: Minimum 4 months; maximum 2 years.

2. Commercial:

- a. Commercial, uniform in composition, free-flowing, suitable for application with equipment designed for that purpose.
- b. Contain the following minimum percentage of plant food by weight:
 - i. Nitrogen: 10 percent.
 - ii. Phosphoric Acid: 10 percent.
 - iii. Potash: 10 percent.

D. Sand: Fine Aggregate: Clean, coarse, well-graded, ASTM C33/C33M.

2.04 SOURCE QUALITY CONTROL

- A. If requested by Owner, provide Topsoil Analysis/Testing: Performed by county or state soil testing service or approved certified independent testing laboratory.

PART 3 EXECUTION

3.01 SUBGRADE PREPARATION

- A. Apply lime at the rate of 50 pounds per 1,000 square feet to subgrade before tilling.
- B. Scarify subgrade to minimum depth of 4 inches where topsoil is to be placed.
- C. Remove stones over 2-1/2 inches in any dimension, sticks, roots, rubbish, and other extraneous material.
- D. Limit preparation to areas which will receive topsoil within 2 days after preparation.

3.02 TOPSOIL PLACEMENT

- A. Do not place topsoil when subsoil or topsoil is frozen, excessively wet, or otherwise detrimental to the Work.
- B. Mix soil amendments, lime, and other soil additives identified in analysis reports with topsoil before placement or spread on topsoil surface and mix thoroughly into entire depth of topsoil before planting or seeding. Delay mixing of fertilizer if planting or seeding will not occur within 3 days.
- C. Place topsoil to depth of 5 inches and lightly compact where seeding and planting are scheduled.
- D. Uniformly distribute to within 1/2 inch of final grades. Fine grade topsoil eliminating rough or low areas and maintaining levels, profiles, and contours of subgrade.
- E. Remove stones exceeding 1-1/2-inch diameter, roots, sticks, debris, and foreign matter during and after topsoil placement.
- F. Remove surplus subsoil and topsoil from Site. Grade stockpile area as necessary and place in condition acceptable for planting or seeding.

END OF SECTION

SECTION 32 92 00
TURF AND GRASSES

PART 1 – GENERAL

1.01 DEFINITIONS

- A. Maintenance Period: Begin maintenance immediately after each area is planted (seed, sod) and continue until all planting under this section is completed and a satisfactory stand has been established.
- B. Satisfactory Stand: Grass that has:
 - 1. No bare spots larger than 3 square feet.
 - 2. Not more than 10 percent of total area with bare spots larger than 1 square foot.
 - 3. Not more than 15 percent of total area with bare spots larger than 6 square inches.

1.02 SUBMITTALS

- A. Action Submittals: Product labels/data sheets.
- B. Informational Submittals:
 - 1. Seed: Certification of seed analysis, germination rate, and inoculation:
 - a. Mixtures: Proportion of each kind of seed.
 - 2. Certification of sod; include source and harvest date of sod, and sod seed mix.
 - 3. Description of required maintenance activities and activity frequency.

1.03 DELIVERY, STORAGE, AND PROTECTION

- A. Seed:
 - 1. Furnish in standard containers with seed name, lot number, net weight, percentages of purity, germination, and hard seed and maximum weed seed content, clearly marked for each container of seed.
 - 2. Keep dry during storage.
- B. Sod:

1. Do not harvest if sod is excessively dry or wet to the extent survival may be adversely effected.
2. Harvest and deliver sod only after laying bed is prepared for sodding.
3. Roll or stack to prevent yellowing.
4. Deliver and lay within 24 hours of harvesting.
5. Keep moist and covered to protect from drying from time of harvesting until laid.

1.04 WEATHER RESTRICTIONS

- A. Perform Work under favorable weather and soil moisture conditions as determined by accepted local practice.

1.05 SEQUENCING AND SCHEDULING

- A. Prepare topsoil as specified in Section 32 91 13, Soil Preparation, before starting Work of this section.
- B. Complete Work under this section within 3 days following completion of soil preparation.
- C. Planting Season: Those times of year that are normal for such work as determined by accepted local practice.

1.06 MAINTENANCE SERVICE

- A. Contractor: Perform maintenance operations during maintenance period to include:
 1. Watering: Keep surface moist.
 2. Washouts: Repair by filling with topsoil, liming, fertilizing, seeding, and mulching.
 3. Mulch: Replace wherever and whenever washed or blown away.
 4. Mowing: Mow to 2 inches after grass height reaches 3 inches, and mow to maintain grass height from exceeding 3-1/2 inches.
 5. Reseed unsatisfactory areas or portions thereof immediately at the end of the maintenance period if a satisfactory stand has not been produced.
 6. Reseed/replant during next planting season if scheduled end of maintenance period falls after September 15.
 7. Reseed/replant entire area if satisfactory stand does not develop by July 1 of the following year.

PART 2 – PRODUCTS

2.01 FERTILIZER

- A. Commercial, uniform in composition, free-flowing, suitable for application with equipment designed for that purpose. Minimum percentage of plant food by weight.
- B. Application Rates: 20 pounds per 1,000 square feet.
- C. Mix:
 - 1. Nitrogen: 10.
 - 2. Phosphoric Acid: 10.
 - 3. Potash: 10.

2.02 SEED

- A. Fresh, clean new-crop seed that complies with the tolerance for purity and germination established by Official Seed Analysts of North America.
- B. Seeds of Legumes: Inoculated with pure culture of nitrogen-fixing bacteria prepared specifically for legume species in accordance with inoculants manufacturer's instructions.
- C. Seed Mix:

<u>Seeding Dates</u>	<u>Species</u>	<u>Proportion By Weight</u>
February 1 to July 1	Kentucky 31 Fescue	80%
	Korean Lespedeza	15%
	English Rye	5%
June 1 to August 15	Kentucky 31 Fescue	55%
	Korean Lespedeza	20%
	English Rye	15%
	German Millet	10%
April 15 to August 15	Kentucky 31 Fescue	60%
	Korean Lespedeza	15%
	Kobe Lespedeza	15%
August 1 to December 1	Kentucky 31 Fescue	70%
	English Rye	20%
	White Clover	10%
February 1 to December 1	Kentucky 31 Fescue	70%
	Crown Vetch	25%
	English Rye	5%

2.03 SOD

- A. Certified, containing grass mix specified.
- B. Strongly rooted pads, capable of supporting own weight and retaining size and shape when suspended vertically from a firm grasp on upper 10 percent of pad.
 - 1. Grass Height: Normal.
 - 2. Strip Size: Supplier's standard.
 - 3. Soil Thickness: Uniform; 1 inch plus or minus 1/4 inch at time of cutting.
 - 4. Age: Not less than 10 months or more than 30 months.
 - 5. Condition: Healthy, green, moist; free of diseases, nematodes and insects, and of undesirable grassy and broadleaf weeds. Yellow sod, or broken pads, or torn or uneven ends will not be accepted.

2.04 STRAW MULCH

- A. Threshed straw of oats, wheat, barley, or rye, free from (i) seed of noxious weeds or (ii) clean salt hay.

2.05 NETTING

- A. Jute:
 - 1. Heavy-duty, twisted, weighing 1 pound(s) per square yard.
 - 2. Openings Between Strands: Approximately 1 inch square.
- B. Plastic:
 - 1. Extruded Polypropylene: 20 mils.
 - 2. Opening Between Strands: 1 inch by 2 inch.
- C. Matting:
 - 1. Excelsior mat or straw blanket; staples as recommended by matting manufacturer.
 - 2. Manufacturers and Products:
 - a. North American Green, Evansville, IN; S150 blanket.
 - b. Approved equal.

2.06 TACKIFIER

- A. Derived from natural organic plant sources containing no growth or germination-inhibiting materials.
 - 1. Capable of hydrating in water, and to readily blend with other slurry materials.
 - 2. Wood Cellulose Fiber: Add as tracer, at rate of 150 pounds per acre.
 - 3. Manufacturers and Products:
 - a. Reinco, Inc.; Terra Tack SC.
 - b. Reclamare; J-Tac.
 - c. Approved equal.

2.07 WEED BARRIER

- A. 6 mils (0.006 inch) black polyethylene sheet.

2.08 DIVIDER

- A. Cedar, Standard or Better Grade.

2.09 EDGING

- A. Steel: 1/8 inch by 4 inches wide in 15-foot minimum lengths, manufacturer's standard black, with 18-inch-long steel stakes and fastenings on curb.
- B. Plastic: Polyethylene edging 1/8 inch by 4 inches wide, black, with integral design to provide a firm hold without staking.

PART 3 – EXECUTION

3.01 PREPARATION

- A. Grade areas to smooth, even surface with loose, uniformly fine texture.
 - 1. Roll and rake, remove ridges, fill depressions to meet finish grades.
 - 2. Limit such work to areas to be planted within immediate future.
 - 3. Remove debris using a mechanical device such as a Harley Rake or similar mechanical implement to remove all debris.

- B. Moisten prepared areas before planting if soil is dry. Water thoroughly and allow surface to dry off before seeding. Do not create muddy soil.
- C. Restore prepared areas to specified condition if eroded or otherwise disturbed after preparation and before planting.

3.02 FERTILIZER

- A. Apply evenly over area in accordance with manufacturer's instructions. Mix into top 2 inches of topsoil, when applied by broad cast method.
- B. Application Rate: 20 pounds per 1,000 square feet.

3.03 SEEDING

- A. Start within 2 days of preparation completion.
- B. Mechanical: Broadcast seed in two different directions, compact seeded area with cultipactor or roller.
 - 1. Sow seed at uniform rate of 15 pounds per 1,000 square feet.
 - 2. Use Brillion type seeder.
 - 3. Broadcasting will be allowed only in areas too small to use Brillion type seeder. Where seed is broadcast, increase seeding rate 20 percent.
 - 4. Roll with ring roller to cover seed, and water with fine spray.
- C. Cover Crop Seeding: Apply seed at rate of 120 pounds per acre to areas that are bare or incomplete after September 15.
- D. Mulching: Apply uniform cover of straw mulch at a rate of 2 tons per acre.
- E. Netting: Immediately after mulching, place over mulched areas with slopes steeper than 3:1, in accordance with manufacturer's instructions. Locate strips parallel to slope and completely cover seeded areas.
- F. Tackifier: Apply over mulched areas with slopes steeper than 4:1 at rate of 5 gallons per 1,000 square feet in accordance with the manufacturers recommended requirements.
- G. Water: Apply with fine spray after mulching to saturate top 4 inches of soil.

3.04 SODDING

- A. Do not plant dormant sod, or when ground is frozen.
- B. Lay sod to form solid mass with tightly fitted joints; butt ends and sides, do not overlap.

1. Stagger strips to offset joints in adjacent courses.
 2. Work from boards to avoid damage to subgrade or sod.
 3. Tamp or roll lightly to ensure contact with subgrade; work sifted soil into minor cracks between pieces of sod, remove excess to avoid smothering adjacent grass.
 4. Complete sod surface true to finished grade, even, and firm.
- C. Fasten sod on slopes to prevent slippage with wooden pins 6 inches long driven through sod into subgrade, until flush with top of sod. Install at sufficiently close intervals to securely hold sod.
- D. Water sod with fine spray immediately after planting. During first week, water daily or more frequently to maintain moist soil to depth of 4 inches.
- E. Apply top dress fertilizer at recommended rate.

3.05 FIELD QUALITY CONTROL

- A. 8 weeks after seeding is complete and on written notice from Contractor that a satisfactory stand has been established, Owner will, within 15 days of receipt, determine if a satisfactory stand has been established.
- B. If a satisfactory stand has not been established, Owner will make another determination after written notice from Contractor following the next growing season.

END OF SECTION

SECTION 33 01 13

DISINFECTION & TESTING OF WATER UTILITIES

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this section.
1. American Water Works Association (AWWA):
 - a. B300, Hypochlorites.
 - b. B301, Liquid Chlorine.
 - e. C651, Disinfecting Water Mains.
 - f. C652, Disinfection of Water Storage Facilities.
 2. NSF International (NSF):
 - a. NSF/ANSI 61, Drinking Water System Components – Health Effects.
 3. Standard Methods for the Examination of Water and Wastewater, as published by American Public Health Association, American Water Works Association, and the Water Environment Federation.

1.02 SUBMITTALS

- A. Informational Submittals.
1. Plan describing and illustrating conformance to appropriate AWWA standards and this Specification.
 2. Procedure and plan for cleaning system.
 3. Procedures and plans for disinfection and testing.
 4. Proposed locations within system where Samples will be taken.
 5. Type of disinfecting solution and method of preparation.
 6. Certification that employees working with concentrated chlorine solutions or gas have received appropriate safety training.
 7. Method of disposal for highly chlorinated disinfecting water.

PART 2 PRODUCTS

2.01 GENERAL

- A. Components and Materials in Contact with Water for Human Consumption: Comply with the requirements of the Safe Drinking Water Act and other applicable federal, state, and local requirements. Provide certification by manufacturer or an accredited certification organization recognized by the AHJ that components and materials comply with the maximum lead content standard in accordance with NSF/ANSI 61 and NSF/ANSI 372.

- 1. Use or reuse of components and materials without a traceable certification is prohibited.

2.02 WATER FOR DISINFECTION AND TESTING

- A. Clean, uncontaminated, and potable.
- B. Owner will supply potable quality water. Contractor shall convey in disinfected pipelines or containers.

2.03 CONTRACTOR'S EQUIPMENT

- A. Furnish chemicals and equipment, such as pumps and hoses, to accomplish disinfection.
- B. Water used to fill pipeline may be supplied using a temporary connection to existing distribution system. Provide protection against cross-connections as required by AWWA C651.

PART 3 EXECUTION

3.01 WATER LINE PRESSURE TESTS

- A. All newly laid pipe or any valved section thereof shall be subjected to hydrostatic pressure testing. Conduct hydrostatic testing in accordance with AWWA C600 for ductile iron pipe or AWWA C605 for PVC pipe.
- B. Where practicable, pipelines shall be tested in lengths between line valves or plugs of no more than 3,000 feet.
- C. Hydrostatic testing shall be conducted only with potable water. Due to the inherent safety hazard potential associated with testing components and systems with compressed air or other compressed gases, pressure testing shall never be accomplished using compressed air.
- D. The Contractor shall furnish all gauges, recording devices, meters, pumps, pipe, connections and other equipment required to conduct the test and shall maintain said

equipment in condition for accurate testing as determined by the Owner. Gauges used for pressure tests shall be oil-filled gauges.

- E. Hydrostatic test results shall be recorded on an appropriate chart recorder. The Contractor shall furnish a recording gauge and water meter for recording pressure charts and for measuring makeup water used during the hydrostatic testing. Recording pressure charts shall be submitted to the Owner at the conclusion of testing. The pressure recording device shall be suitable for outside service, with a range from 0–300 psig, 24-hour spring wound clock, designed for 9-inch charts, and shall be approved by the Engineer. For Contractor's information only, such pressure recording devices may be available from Foxboro Company, Foxboro, Massachusetts; Bristol Division of ACCO, Waterbury, Connecticut; or Weksler Instruments Corporation, Freeport, New York.
- F. Prior to testing, the Contractor shall place sufficient backfill to prevent pipe movement. When local conditions require that the trenches be backfilled immediately after the pipe has been laid, the testing may be carried out after backfilling has been completed but before placement of permanent surfacing. The Contractor shall ensure that thrust blocking or other types of restraining systems will provide adequate restraint prior to pressurizing the pipeline.
- G. Cross Connection Control: When existing water mains are used to supply test water, they should be protected from backflow contamination by temporarily installing a double check valve assembly between the test and supply main or by other means approved by the Engineer. Prior to pressure and leakage testing, the temporary backflow protection should be removed and the main under test isolated from the supply main.
- H. Test Pressure Requirements:
 - 1. The test pressure shall not be less than 1.25 times the stated working pressure of the pipeline measured at the highest elevation along the test section and not less than 1.5 times the stated working pressure at the lowest elevation of the test section, but not greater than 200 psi.
 - 2. The test pressure shall not exceed the thrust restraint design pressure or 1.5 times the pressure rating of the pipe or joint, whichever is less (as specified by the manufacturer).
 - 3. The test pressure shall not exceed the rated working pressure of the valves when the pressure boundary of the test section includes closed, resilient seated gate valves or butterfly valves.
 - 4. Valves shall not be operated in either direction at a differential pressure exceeding the rated valve working pressure. A test pressure greater than the rated valve working pressure can result in trapped test pressure between the gates of a doubledisc gate

valve. For tests exceeding the rated valve working pressure, the test setup should include a provision, independent of the valve, to reduce the line pressure to the rated valve working pressure on completion of the test. The valve can then be opened enough to equalize the trapped pressure with the line pressure, or the valve can be fully opened if desired.

I. Test Procedure:

1. Each valved section of pipeline shall be slowly filled with potable water using a backflow prevention and test apparatus assembly. When venting air from pipelines, it is important to limit the pipeline fill rate to avoid excessive surge pressures when the water reaches the air venting opening(s).
2. Before applying the specified test pressure, air shall be expelled completely from the pipeline section under test. If permanent air vents are not located at all high points, corporation cocks shall be installed at such points to expel air as the line is filled with water. After all the air has been expelled, close the corporation cocks and apply the test pressure. At the conclusion of the pressure test, remove the corporation cocks and plug or leave in place at the discretion of the Engineer.
3. The specified test pressure shall be applied using a suitable pump connected to the pipeline in a manner satisfactory to the Engineer. The specified test pressure shall be based on the elevation of the lowest point of the pipeline or section under test and corrected to the elevation of the test gauge, in accordance with test pressure requirements specified herein.
4. The pipeline shall be allowed to stabilize at the test pressure before conducting the hydrostatic test. This may require several cycles of pressurizing and bleeding trapped air prior to beginning the test. It is recommended that the line remain pressurized for a minimum of 24 hours before testing in order for joints to tighten and pockets of air to dissolve in the water.
5. The hydrostatic test shall be at least 2 hours in duration after reaching the specified test pressure where joints are exposed and at least 8 hours where joints are covered.
6. The test pressure shall not vary by more than ± 5 psi for the duration of the test. Test pressure shall be maintained within this tolerance by adding makeup water through the pressure test pump into the pipeline. The amount of makeup water added shall be accurately measured (in gallons per hour) by suitable methods and shall not exceed the applicable testing allowance as specified herein.

J. Visual Inspection:

Any exposed pipe, fittings, valves, hydrants and joints shall be examined carefully during the hydrostatic pressure test. Any damaged or defective materials that are discovered during or following the pressure test shall be repaired or replaced at the Contractor's expense, and the test shall be repeated until satisfactory results are obtained. Water main repair and replacement shall be in accordance with Paragraph 3.01.K.4.

K. Testing Allowance:

1. Testing allowance shall be defined as the maximum quantity of makeup water that is added into a pipeline undergoing hydrostatic pressure testing, or any valved section thereof, in order to maintain pressure within +/- 5 psi of the specified test pressure (after the pipeline has been filled with water and the air has been expelled).
2. No pipe installation will be accepted if the quantity of makeup water is greater than that determined by the following formula:

$$L = \frac{S * D * (P)^{1/2}}{143,000}$$

Where:

L = testing allowance (makeup water), in gallons per hour

S = length of pipe tested, in feet

D = nominal diameter of the pipe, in inches

P = average test pressure during the hydrostatic test, in pounds per square inch (gauge pressure)

This formula is based on a testing allowance of 10.5 gpd/mile/inch of nominal diameter at a pressure of 150 psi. Values of testing allowance at various pressures are shown in the following table. When testing against closed metal-seated valves, an additional testing allowance per closed valve of 0.0078 gal/hr/inch of nominal valve size shall be allowed. When hydrants are in the test section, the test shall be made against the main valve of the hydrant.

Hydrostatic Testing Allowance per 1,000 feet of pipeline (gallons per hour) *											
Average Test Pressure (psi)	Nominal Pipe Diameter (inches)										
	4	6	8	10	12	14	16	18	20	24	30
250	0.43	0.64	0.85	1.07	1.28	1.50	1.71	1.92	2.14	2.56	3.21
225	0.41	0.61	0.81	1.01	1.22	1.42	1.62	1.82	2.03	2.43	3.04
200	0.38	0.57	0.76	0.96	1.15	1.34	1.53	1.72	1.91	2.29	2.87
175	0.36	0.54	0.72	0.89	1.07	1.25	1.43	1.61	1.79	2.15	2.68
150	0.33	0.50	0.66	0.83	0.99	1.16	1.32	1.49	1.66	1.99	2.48
125	0.30	0.45	0.60	0.76	0.91	1.06	1.21	1.36	1.51	1.81	2.27
100	0.27	0.41	0.54	0.68	0.81	0.95	1.08	1.22	1.35	1.62	2.03
75	0.23	0.35	0.47	0.59	0.70	0.82	0.94	1.05	1.17	1.40	1.76
50	0.19	0.29	0.38	0.48	0.57	0.67	0.76	0.86	0.96	1.15	1.43

*If the pipeline under test contains sections of various diameters, the allowable leakage will be the sum of the computed leakage for each size.

3. Acceptance of the installation shall be determined on the basis of testing allowance only. Should any test of pipe laid disclose leakage greater than that specified, the Contractor shall, at his own expense, locate and repair the defective joints until the leakage is within the specified allowance. All visible leaks are to be repaired regardless of the allowance used for testing. Hydrostatic test results shall be recorded on an appropriate chart recorder as specified herein. A copy of the test chart shall be provided to the Engineer.
4. To repair or replace damaged or defective water main pipe, the Contractor shall maintain positive pressure on the main (valves left partially open) while he excavates around and under (2' clearance) the pipe so that water can be pumped out of the excavation pit before it enters the newly constructed main during the repair process. Contractor shall have adequate pumping capacity to prevent any trench water or debris from entering the main during this process. The interior of all pipe and fittings shall be sprayed with a 1% hypochlorite solution before they are installed in the repair process. To produce this one percent hypochlorite solution, one gallon of 5% hypochlorite bleach can be diluted with four (4) gallons of water. Flooding or contamination of the main during this process shall invoke the Paragraph below.

3.02 FAILURE TO FOLLOW SPECIFICATIONS

- A. Failure to take such preventative measures mentioned in these specifications, or flooding or contamination of the main for any reason, shall require the Contractor to clean the line with a hydraulically propelled foam pig (or other suitable pigging device acceptable to the Engineer)

and slug chlorinate the line as specified in Paragraph 3.03 of this Section. The Contractor shall also be required to take whatever other measures required by the Engineer in accordance with these specifications or AWWA C-651 to remove the contamination. All such procedures shall be fully documented and submitted for approval by the Engineer.

3.03 CLEANING AND DISINFECTING OF WATER LINES

- A. Disinfection Tests: Conduct disinfection tests in accordance with AWWA C-651.
- B. During construction, take precautions to protect pipe interiors, fittings, and valves against contamination. Follow all Material Storage and Handling Requirements in Section 02713 Part 2.
- C. All chlorine products shall be NSF approved chlorine. Pool chlorine products shall not be used.
- D. The Granular Method shall be used as the standard disinfection method on all newly installed pipelines unless prior approval for the continuous feed or slug method is obtained from the Engineer.
- E. Granular Method (Standard Method):
 - 1. Obtain chlorine product from reputable source. This chlorine product shall be OxyChem ACL 60 Disinfecting Granules (sodium dichloroisocyanurate) with approximately 62% available chlorine or equal.
 - 2. Place granular chlorine in the pipe at the beginning of the line, beginning of each branch line, and at 500-foot intervals (every 25 pipe joints).
 - 3. Place enough granular chlorine in the pipe to achieve a 25 ppm dosage in the pipeline. See Table 1 for dosage amounts for the particular size pipe being disinfected.
 - 4. Slowly fill the pipeline with water and eliminate all air pockets. Hold the disinfection solution in the pipeline for 24 hours.
 - 5. Flush thoroughly to clear the strong chlorine solution from the pipelines before bacteriological sampling.

TABLE I - GRANULAR METHOD	
Granular Chlorine Dose Size for 500 FT of pipe at 25 PPM (MG/L)	
Pipe Diameter (in)	Dose Size (oz)
2	0.5
4	2
6	4
8	7
10	11
12	16
16	28
24	63
30	99
36	142

F. Continuous Feed Method (Special Approval Required):

1. Granular chlorine may be placed (optional) in the pipeline during construction (see Granular Method).
2. Thoroughly flush the pipeline to remove all sediments and air pockets.
3. Add a continuous dose of chlorine while flowing water slowly into the new main until a 25 ppm chlorine concentration is reached throughout the new pipelines. Contractor shall use Sodium Hypochlorite to obtain the 25 ppm dosage (see Table II for total amount of Sodium Hypochlorite to be fed to establish 25 ppm dosage for 500 feet of pipe). In the alternative, granular chlorine can be mixed to obtain the 25 ppm concentration (see Table I for total amount of granular chlorine to be fed to establish 25 ppm concentration for 500 feet of pipe). Measure the chlorine residual at various locations to confirm proper residual has been achieved.
4. Hold the disinfection solution in the lines for 24 hours and confirm that the chlorine residual is at least 10 ppm after 24 hours.
5. Flush thoroughly to clear the strong solution from the pipelines before bacteriological sampling.

TABLE II – CONTINUOUS FEED METHOD			
Sodium Hypochlorite Dose Size for 500 ft of Pipe at 25 ppm (mg/l)			
Pipe Diameter (in)	Sodium Hypochlorite Volume (gal)		
	5.0%	6.15%	10.0%
2	0.04	0.03	0.02
4	0.16	0.13	0.08
6	0.37	0.30	0.18
8	0.65	0.53	0.33
10	1.0	0.83	0.51
12	1.5	1.2	0.73
16	2.6	2.1	1.3
24	5.9	4.8	2.9
30	9.2	7.5	4.6
36	13.2	10.7	6.6

G. Slug Method (Special Approval Required):

1. Granular chlorine may be placed (optional) in the pipeline during construction (see Granular Method).
2. Thoroughly flush the line to remove all sediments and air pockets.
3. Admit water to the new main very slowly and dose with enough chlorine to produce a residual of at least 100 ppm. Contractor shall use Sodium Hypochlorite or granular chlorine according to Table III to obtain the 100 ppm concentration. The objective is to produce a column of 100 ppm chlorine solution which will move slowly as a slug through the new pipeline. The column or slug of highly chlorinated water must be long enough to contact all surfaces of the pipe interior for at least 3 hours. Measure chlorine residuals in the slug as it moves down the pipeline. The residual must be maintained over 50 ppm.
4. For emergency line repair situations only, to be performed only by, or in the presence of, authorized Owner personnel, and where no service connections exist, the standard 100 ppm concentration can be substituted for a 300 ppm solution and the contact time can be reduced from the standard 3 hours to 15 minutes. Table IV indicates the Sodium Hypochlorite and granular chlorine dose sizes to be used for this method. Refer to Paragraph 3.03.B for appropriate situations and procedures.
5. Flush thoroughly to clear the strong chlorine solution from the pipelines before bacteriological sampling.

TABLE III – SLUG METHOD				
Chlorine Dose Size for 500 ft of Pipe at 100 ppm (mg/l)				
Pipe Diameter (in)	Sodium Hypochlorite Volume (gal)			Granular Chlorine (oz. of weight)
	5.0%	6.15%	10.0%	62%
2	0.2	0.1	0.1	2.1
4	0.7	0.5	0.3	7.1
6	1.5	1.2	0.7	16
8	2.6	2.1	1.3	28
10	4.1	3.3	2.0	44
12	5.9	4.8	2.9	63
16	10	8.5	5.2	112
24	23	19	12	253
30	37	30	18	395
36	53	43	26	569

TABLE IV – SLUG METHOD				
Chlorine Dose Size for 500 ft of Pipe at 300 ppm (mg/l)				
Pipe Diameter (in)	Sodium Hypochlorite Volume (gal)			Granular Chlorine (oz. of weight)
	5.0%	6.15%	10.0%	62%
2	0.5	0.4	0.2	6.3
4	2.0	1.6	1.0	21
6	4.4	3.6	2.2	48
8	7.8	6.4	3.9	84
10	12	10	6.1	132
12	18	14	8.8	190
16	31	25	16	336
24	70	57	35	758
30	110	90	55	1185
36	159	129	79	1706

- H. While chlorine is being applied, manipulate valves so that the treatment dosage will not flow back into the line that is supplying the water. Continue application of chlorine until the entire line being treated is filled with the chlorine solution.

I. Final Flushing: Conduct final flushing in accordance with AWWA C651.

1. After applicable retention period, flush heavily chlorinated water from the line until chlorine concentration in water leaving the main is no higher than that generally prevailing in the system, or less than 2 mg/l. Unless special approval is obtained from Engineer, all water shall be flushed through de-chlorinating diffusers rated to remove the appropriate chlorine concentration (Arden Industries' Bazooka with Liquid Calcium Thiosulfate Feed or equal). The Owner may, at its option, provide such devices to the Contractor while the line is flushed. The Contractor must contact the Inspector prior to flushing any water from the newly constructed line. The Inspector shall provide de-chlorinating diffuser(s) to the Contractor before flushing. If no diffusers are available through the city, the Contractor shall be required to provide diffusers. The Inspector shall approve the flushing location. The Inspector shall also check the chlorine level in the main before final flushing. If the residual chlorine level is out of the effective range of the de-chlorinating diffuser, the Inspector shall require the Contractor to wait until the residual level has dropped to within the range of the de-chlorinating diffuser before flushing.
2. In the alternative, but only with special approval from the Engineer, neutralizing chemicals may be applied externally as the water reaches the ground. Perform such flushing only at sites where Engineer has approved. If no approved point of discharge is available, neutralizing chemicals must be applied to the water in order to neutralize the chlorine residual. The amount of chemicals required to neutralize various residual chlorine concentrations in 100,000 gallons of water are shown in Table V.
3. Flushing Velocity: The velocity of water used to flush the line shall be at least 2 fps. The flow rates required to produce this velocity varies depending on pipe diameter. To approximate this velocity, refer to Table VI to select the proper number of taps or 2-½" Fire Hydrant Nozzles to open at the end of the line.
4. Minimum Flushing Time: At minimum, the line shall be flushed to remove two complete volumes of water through the newly constructed pipeline, approximately 7 minutes per 500 ft. The Disinfection, Flushing, and Pressure Testing Worksheet presents the minimum flushing time for various lengths of pipe.
5. Additional Flushing: After flushing pipe for minimum time specified in Item 4 above, check for trapped air at Air Release Valves, Blow-offs and services at high points. Verify that all mud, air cloudiness, or other discoloration is absent from flushing stream. If such problems exist, continue to flush line until the stream is clear.
6. Once a line has been flushed, test to make certain that the residual chlorine in the water is within acceptable limits.
7. It must be noted that flushing is no substitute for taking preventative measures before and during the laying of water lines. Certain contaminants – especially those in caked

deposits – are difficult or even impossible to remove by flushing, no matter how high the velocity. Furthermore, in pipe with diameters of 16" or more, it can be difficult to achieve even the minimum recommended flushing velocity of 2.5 fps.

TABLE V - Required Chemicals to Neutralize Chlorine Concentration (per 100,000 gallons of water)				
Residual Chlorine Concentration (mg/L)	Sulfur Dioxide (SO₂) lb	Sodium Bisulfite (NaHSO₃) lb	Sodium Sulfite (Na₂SO₃) lb	Sodium Thiosulfate (Na₂S₂O₃- 5H₂O) lb
1	0.08	1.2	1.4	1.2
2	1.7	2.5	2.9	2.4
3	8.3	12.5	14.6	12.0
4	41.7	62.6	73.0	60.0

TABLE VI - Minimum number of openings to produce 2.5 fps. (at 40 psi Residual)			
Pipe Diameter (in)	Number of 1" Taps	Number of 2" Taps	Number of 2- 1/2" FH Nozzles
2	1	---	---
4	1	1	1
6	---	1	1
8	---	1	1
10	---	2	1
12	---	2	2
16	---	4	2
24	---	-	4
30	---	---	6
36	---	---	8

J. Bacteriological Testing:

1. After a water line has undergone final flushing but before it is placed into service, collect a sample for bacteriological testing from the end of that line. In the case of extremely long lines, take additional samples if the Owner so directs. Bacteriological samples shall be collected at approximately 2,500-foot intervals with samples near the beginning point and at the end point of each section of line. Where sanitary conditions were not maintained before, during or after construction, an additional bacteriological sample shall be collected from a location representing the water from the contaminated area.

Unsanitary conditions include failure to document sanitary handling of materials, to conduct construction inspections and to maintain records, and to document sanitary practices during construction and other hazards such as trench flooding during construction.

2. Collect these samples in sterile bottles treated with sodium thiosulfate. Fire hydrants shall be used to take samples. Other locations may be utilized if no fire hydrant is available.
3. Samples will be collected by water plant personnel to be tested for bacteriological quality in order to determine if they contain any coliform organisms. The sample is required to be taken 48 hours after flushing all new pipelines. If the initial disinfection fails to produce satisfactory samples, repeat disinfection until satisfactory samples are obtained.
4. When the samples tested are found to be satisfactory, the water line may be placed in service.
5. The Contractor shall fill out and sign a Disinfection, Flushing, and Pressure Testing Worksheet documenting adherence to the Specifications. Contractor shall obtain a blank worksheet from the Owner upon issuance of a construction permit. The Contractor shall complete the worksheet during the construction process and present a signed copy to the Inspector prior to bacteriological testing. If improper or inadequate documentation is presented, the Contractor shall be deemed to have failed to follow the specifications and shall be required to follow the cleaning and chlorination procedures specified in Paragraph 3.03.
6. Only smooth brass or copper testing ports shall be used to collect bacteriological samples. Air valves may serve as suitable sampling locations. Sampling ports shall be spaced no farther than 2500' apart and shall be present at the beginning and end of each water line. If directed, the Contractor shall install a $\frac{3}{4}$ " or 1" corporation with copper service line at appropriate sampling locations, at the discretion of the Engineer.

Section K and L below are for Authorized Owner Personnel or Contractors working under direct supervision of Authorized Owner Personnel.

K. Positive Pressure Method:

1. Contact Tennessee One Call to have all other utilities located; notify Service Department and Water Treatment Plant of areas affected.
2. All attempts will be made to repair line under "wet" conditions to avoid or eliminate possible contaminants from entering the system.

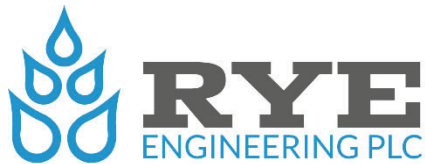
3. Close nearest isolation valves on the downstream side of the leak. Reduce the flow from the upstream side of the leak by throttling back the remaining valve, leaving **positive pressure** on the line. DO NOT OPEN ANY FIRE HYDRANTS TO REDUCE LINE PRESSURE PRIOR TO OPENING THE TRENCH TO A DEPTH OF AT LEAST 18-INCHES BELOW THE LINE. This will prevent contaminants from entering the system. Complete the repair trench excavation.
4. After excavation of the repair trench is complete (to a depth of at least 18-inches below the line) close the remaining valve after removing the standing water to fully expose the pipe 360 degrees. Treat any standing water now remaining in the repair trench with ½ oz. of Granular Chlorine (62% purity) for every one hundred gallons of trench water to achieve a 25-ppm solution.
5. To ensure a clean repair, inspect around the pipe in and near the damaged area and remove any debris, soil, or other material from the damaged area. Swab or spray the damaged area of the pipe and interior of all repair clamps or other appropriate devices with a 1% hypochlorite solution (5.2 fluid oz. of 6.15% bleach/quart of water) before installation. Complete the repair.
6. Open the appropriate valve(s) and flush the water main toward the repair location from both directions if valve and hydrant locations permit. Continue flushing until all discolored water is eliminated and a satisfactory chlorine residual is reached.
7. Before the water main is returned to full service, collect a single water sample at a point nearest the repaired section. If direction of flow can be determined, the sample should be collected from downstream of the break repair. If direction of flow cannot be determined, samples should be collected from above and below the break repair. These samples should be coded "D". This sample is to be delivered as soon as possible to the Water Treatment Plant for bacteriological testing.
8. Check all valves to insure they have been returned to the open position.
9. If the test results are negative, the test results will serve as a record of compliance and no future work is required.
10. Fill out all appropriate forms indicating disinfection procedures.
11. If the test results are positive, then additional sampling should be undertaken immediately. A total of three (3) additional samples should be taken. The first additional sample should be taken from the original sampling location and the other two additional samples should be taken above and below the original sampling location. These three samples should be coded "R". If all three samples are negative, then no further work is required. If any of the additional samples is positive, then follow the normal repeat monitoring procedure.

L. Dewatered Method: If it is not possible to maintain positive pressure as stated above and the pipe must be dewatered prior to opening and preparing the repair trench, then the entire section of pipe must be disinfected in accordance with Paragraph 3.03.G. (Slug Method), which is derived from Section 4.7.4 of AWWA C651-99.

1. Contact Tennessee One Call to have all other utilities located; notify the Service Department and Water Treatment Plant of areas affected.
2. Close the nearest isolation valves on all sides of main break.
3. If there are customers in the isolated area, turn off all services at the lock wing on the meter yokes. Remove the meters. This will prevent the disinfectant from entering the customer's premises.
4. In order to lessen the possibility of additional contaminants from entering the exposed line, after excavation of the repair trench is complete, pump the water down below the main line. Treat the standing water in the repair trench with $\frac{1}{2}$ oz. of granular chlorine for every one hundred gallons of trench water to achieve a 25-ppm solution.
5. Clean the area around the pipe. Swab or spray the interior of all repair pipe and fittings with a 1 percent hypochlorite solution (5.2 fluid oz. of 6.15% bleach/quart of water) before installation.
6. The line should be properly disinfected by the slug method using a chlorine dosage of 100 mg/L and a contact time of at least 3 hours for areas where service connections are present.
7. In areas where no service connections exist the line can be properly disinfected by the slug method using a chlorine dosage of 300 mg/L and a contact time of at least 15 minutes.
8. After the disinfectant has been added to the line by using a sodium hypochlorite solution or calcium hypochlorite granules, an upstream valve should be opened slightly, along with an opened downstream hydrant, to allow air and highly discolored contaminated water to be removed. The slow flowing concentrated slug will gradually move through the pipe allowing all parts to be exposed to the disinfectant.
9. Once the highly discolored contaminated water has been flushed, the valve and flushing hydrant should be closed to allow for the prescribed disinfectant contact time.
10. After the prescribed contact time has been reached, prepare to treat (de-chlorinate) the highly chlorinated water to be flushed from the isolated line if there is a possibility that the discharge will cause any damage to the environment.
11. Open the upstream valve and the downstream hydrant and flush until all discolored water is eliminated, de-chlorinating the discharge if necessary. Test for highly

chlorinated water remaining in the line and continue flushing if necessary until elimination is successful and the concentration is no higher than that in the prevailing water in the surrounding area.

12. Before the water main is returned to full service, collect a single water sample at a point nearest the repaired section. If direction of flow can be determined, the sample should be collected from downstream of the break repair. If direction of flow cannot be determined, samples should be collected from above and below the break repair. These samples should be coded "D". This sample is to be delivered as soon as possible to the Water Treatment Plant for bacteriological testing.
13. Open the customer's services at the lock wings and flush the service lines. Reinstall meters.
14. Open the remaining valves in the isolated area.
15. Flush the area again at the highest hydrant in the area to insure the elimination of any discolored water.
16. If the test results are negative, the test results will serve as a record of compliance and no future work is required.
17. Fill out all appropriate forms indicating disinfection procedures.
18. If the test results are positive, then additional sampling should be undertaken immediately. A total of three (3) additional samples should be taken. The first additional sample should be taken from the original sampling location and the other two additional samples should be taken above and below the original sampling location. These three samples should be coded "R". If all three samples are negative, then no further work is required. If any of the additional samples is positive, then follow the normal repeat monitoring procedure.



DISINFECTION, FLUSHING AND PRESSURE TESTING WORKSHEET

(MANDATORY BEFORE BACTERIOLOGICAL TESTING)

PRESENT TO INSPECTOR

Date: _____

Project Name: _____

Material: ☐ PVC ☐ D.I. Size: _____

Length of Section: _____

Contractor: _____

Instructions:

1. This worksheet references the Granular Method.
2. This worksheet must be properly filled out and presented to inspector before bacteriological testing.
3. Use one worksheet per test section. If test pit is moved, use a new sheet. If pipe diameter changes, use a new sheet.

A. DISINFECTION

1. Select Granular Chlorine
Dose Size

Pipe Dia (in)	Dose Size (oz)
2	05
4	2
6	4
8	7
10	11
12	16
16	28
24	63
30	99
36	142

2. Select Number of
Doses Needed

Pipe Length (ft)	No. of Doses
500	1
1000	2
1500	3
2000	4
2500	5
3000	6
3500	7
4000	8
4500	9
5000	10

3. Calculate Total Granular Chlorine

$$\text{Dose Size (Table 1)} \times \text{No. of Doses (Table 2)} = \text{oz.}$$

1. Check granular chlorine container for approval (62% purity, NSF stamp) ☐
2. Place 1 dose at the beginning of the line ☐
3. Place 1 dose every 500 feet during construction ☐
4. After construction, install test pit (back flow/meter assembly by sleeving into the line) ☐
5. Partially open valve at test pit ☐
6. Adjust valve to slowly fill line ☐
7. Open blow-offs, services, and air release valves at high points to remove air ☐
8. Allow water to sit for at least 24 hours ☐

B. FLUSHING

1. Select Number of Flushing Ports
(circle below)

Pipe Dia (in)	No. of 1" Taps	No. of 2" Taps	No. of FH Nozzles
2	1	-	-
4	1	1	1
6	-	1	1
8	-	1	1
10	-	2	1
12	-	2	2
16	-	4	2
24	-	-	4
30	-	-	6
36	-	-	8

2. Select Minimum Flushing Time
(circle below)

Pipe Length (ft)	Min. Flush Time (min)
500	7
1000	14
1500	20
2000	27
2500	34
3000	40
3500	47
4000	54
4500	60
5000	67

3. Select Flushing Location
(list below)

4. Contact Inspector and attach dechlorinating diffuser (provided by Inspector)
to each flushing port and open. ☐
5. Fully open valve at test pit. ☐
6. Flush for time selected in Step 2. ☐
7. Check for trapped air at ARV's, blow-offs and services at high points. ☐
8. Check for mud, air, and cloudiness (flush until clear). ☐

C. PRESSURE TESTING

1. Apply 200 psi maximum test pressure (measured at pit or lowest point) through test pit. ☒
2. Fix all defective parts of water line according to Standard Specifications ☐
3. Call Inspector to witness pressure test. ☐
4. The pressure held at _____ psi for _____ hrs.

Inspector's Initials

D. SAMPLING PORTS

1. Provide smooth copper brass sampling taps and spacing described in project Plans/Specifications or required by Distribution Operator. ☐

No. of Taps

E. SKETCH

Attach a simple sketch identifying this section of test pit location, line, sampling location, flushing locations, and chlorine dosing locations.

F. BACTERIOLOGICAL TESTING

1. Sign statement below.
2. Call inspector for bacteriological testing.

G. STATEMENT

I certify that the above information is correct, and this water is ready to be tested by the Distribution Operator for bacteriological contamination.

Contractor's Authorized Signature

DISINFECTION, FLUSHING AND PRESSURE TESTING SKETCH



INCLUDES THE FOLLOWING FEATURES:

- | | | | |
|--------------------------------------|---------------------------------------|--|--------------------------------------|
| ☐ Test Pit | ☐ Sample Ports | ☐ Chlorine Dosing Locations | ☐ North Arrow |
| ☐ Flush Ports | ☐ Water Line | ☐ Street Names | ☐ Other Info |

END OF SECTION

SECTION 33 12 01

FROST PROOF VENT FOR WATER TANKS

PART 1 – GENERAL

- 1.01 Provide a roof vent located near the center of the roof that shall have sufficient capacity to pass air, so that at the maximum design flow rate of water entering or leaving the tank, excessive pressure/vacuum will not develop. The vent shall have a minimum 12" diameter flanged opening into the tank. Contractor shall be responsible for cutting roof and installing flange, vent, and any reinforcements required under AWWA D100-05.
- 1.02 The overflow pipe shall not be considered a tank vent.
- 1.03 The maximum flow rate into the tank is 4,000 gpm. The maximum flow rate leaving the tank is 7,000 gpm.
- 1.04 The vent shall be constructed to prevent the entrance of birds, insects or contaminating materials. The vent can be easily dismantled for cleaning.
- 1.05 The vent shall be screened with stainless steel 24 mesh screen.
- 1.06 In the event that the screen frosts over or becomes clogged with foreign material, a fail-safe system is to be provided to relieve excess pressure or vacuum. The relief mechanism shall not be damaged by the occurrence and shall return automatically to the original operating position after the clogging is cleared.
- 1.07 The vent shall have a locking mechanism to prevent access to the tank.
- 1.08 The vent shall be aluminum construction.
- 1.09 The vent shall be AST-Vent manufactured by Advance Tank and Construction Company or pre-approved equal.

END OF SECTION