PROJECT MANUAL
DOCUMENTS AND SPECIFICATIONS

TOWN OF BEAN STATION
PHASE I SEWER COLLECTION SYSTEM
TDEC-ARPA GRAINGER COUNTY 2022-8568
WW-PDC-2

NOT FOR BID

Hatfield & Allen, Associates
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DIVISION 1 – SITEWORK

001 TOWN OF BEAN STATION SEWER CONSTRUCTION SPECIFICATIONS

Bid Number:	TDEC-ARPA GRAINGER COUNTY 2022-8568 WW-PDC-2
Bid Title:	Town of Bean Station Phase I Sewer Collection System Construction Bids
Category:	Public Works
Status:	

DESCRIPTION

Advertisement for Bids

Town of Bean Station Phase I Sewer Collection System Construction Bids

The Town of Bean Station will be soliciting bids for a new sewer collection system. The sewer system collection system consists of approximately 14,512 linear feet of 6-inch force main, 16,667 linear feet of 2 thru 4 inch low pressure sewer force mains, a duplex sewer pump station, bridge crossing and all other associated appurtenances, valves, fittings and connections. This project is being supported with American Rescue Plan Act, Coronavirus State and Local Recovery Fund grant funding. Therefore, certain restrictions and other federal requirements attach to this opportunity.

Separate sealed bids for the Phase I Sewer Collection System Construction will be received by Town of Bean Station at the Bean Station Town Hall located at 785 Main St., Bean Station, TN 37708 until November 15, 2024 at 2:00 PM Local Time and then at said office publicly opened and read aloud. Any person with disability requiring special accommodations must contact the Town no later than 7 days prior to the bid opening.

A Pre-bid Meeting will not be held. All bid documents may be examined at the following: 1) Knoxville Blueprint & Supply, 2) Town of Bean Station, and 3)Knoxville Builders Exchange.

Town of Bean Station hereby notifies all bidders that it will affirmatively insure that in any contract entered into pursuant to this advertisement will be afforded full opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, sex, or national origin in consideration for an award. Bean Station is an Equal Opportunity Employer. Any contract that uses federal funds to pay for construction work is a "federally assisted construction contract" and must include the equal opportunity clause found in 2 C.F.R. Part 200, unless otherwise stated in 41 C.F.R. Part 60. We encourage all small and minority owned firms and women's business enterprises to participate. No bidder may withdraw his bid within (60) days after the actual date of the opening thereof.

PLEASE NOTE: Official plans and specifications may only be obtained at Knoxville Blueprint & Supply for a non-refundable cost of $200/set. It is the sole responsibility of all plan holders, whether they have received digital downloads or paper copies of the plans and specifications, to periodically to check for Addenda which will posted at Knoxville Blueprint & Supply

The Copeland "Anti-Kickback" Act is also applicable, which prohibits workers on construction contracts from giving up wages that they are owed. Contractor's must not appear on Sam.gov disbarment list.

A detailed listing of all subcontractors shall be provided by the Bidder. In accordance with the Contract Documents, documentation that the prospective General Contractor and its subcontractors meet minimum qualifications shall be provided and submitted. Subcontractors must also not appear on Sam.gov disbarment list. Mark-ups on subcontractor work or Cost Plus Overhead will be disallowed for reimbursement.

A bid bond or certified check for five percent (5%) of the total bid amount must accompany each bid. The successful bidder will be required to furnish a performance bond in the amount of his bid and shall, before entering on the work of said contract, be licensed as a contractor of Jefferson County The owner reserves the right to waive any Informalities or to reject any or all bids.

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.

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

Contact Person
Matt Hatfield, 865-388-5031, matthatfield2@gmail.com To obtain plans and specifications please contact Knoxville Blueprint & Supply at (865) 525-0463. Plans and specifications are a non-refundable $200/set and digital copies are not available.

INFORMATION FOR BIDDERS

1. Receipt and Opening of Bids:
The Town of Bean Station (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 Mayor until 2:00 PM local time and then at said office publicly opened and read aloud. The envelopes containing the bids must be sealed, Addressed to Town of Bean Station located at 785 Main Street, Bean Station, TN 37708 and designated as bid for Phase I Sewer Collection System . The Owner may consider informal any bid not prepared and submitted in accordance with the provisions hereof and may waive any informalities or reject any and all bids. Any bid may be withdrawn prior to the above scheduled time for the opening of bids or authorized postponement thereof. Any bid received after the time and date specified shall not be considered. No bidder may withdraw a bid within 60 days after the actual date of the opening thereof.

2. Preparation of Bid: Each bid must be submitted on the prescribed form. All blank spaces for bid prices must be filled in, in ink or typewritten, in both words and figures.
Each bid must be submitted in a sealed envelope bearing on the outside the name of the bidder, his/her address, the name of the project for which the bid is submitted and all other information required by State law. If forwarded by mail, the sealed envelope containing the bid must be enclosed in another envelope addressed as specified in the bid form.

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

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

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

   Unit Price Contract

6. Qualification of Bidder: The Owner may make such investigations as s/he deems necessary to determine the ability of the bidder to perform the work, and the bidder shall furnish to the Owner all such information and data for this purpose as the Owner may request. The Owner reserves the right to reject any bid if the evidence submitted by, or investigation of, such bidder fails to satisfy the owner that such bidder is properly qualified to carry out the obligations of the contract and to complete the work contemplated therein. Conditional bids will not be accepted.

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

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

9. Time of Completion and Liquidated Damages: Bidder must agree to commence work on or before a date to be specified in a written “Notice to Proceed” of the Owner and to fully complete the project within 365 consecutive calendar days thereafter. Bidder must agree also to pay as liquidated damages, the sum of $500 for each consecutive calendar day thereafter.

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

Matthew Hatfield at matthatfield2@gmail.com and to be given consideration must be received at least five days prior to the date fixed for the opening of bids. Any and all such interpretations and any supplemental instructions will be in the form of written addenda to the specifications which, if issued, will be mailed by certified mail with return receipt requested to all prospective bidders (at the respective addresses furnished for such purposes), not later than three days prior to the date fixed for the opening of bids. Failure of any bidder to receive any such addendum or interpretation shall not relieve such bidder from any obligation under his/her bid as submitted. All addenda so issued shall become part of the contract documents.

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

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

14. Notice of Special Conditions: Attention is particularly called to those parts of the contract documents and specifications which deal with the following:

a. Inspection and testing of materials.

b. Insurance requirements.

c. Wage rates, if applicable.

d. States allowances.

15. Laws and Regulations: The bidder's attention is directed to the fact that all applicable State laws, municipal ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the project shall apply to the contract throughout, and they will be deemed to be included in the contract the same as though herein written out in full.

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

17. Obligation of Bidder: At the time of the opening of bids each bidder will be presumed to have inspected the site and to have read and to be thoroughly familiar with the plans and contract documents (including all addenda). The failure or omission of any bidder to examine any form, instrument or document shall in no way relieve any bidder from any obligation in respect of his/her bid.

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

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

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

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

19. Drug-Free Workplace

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

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

BID BOND

KNOW ALL MEN BY THSE 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 wereas the Principal has submitted to _____ a certain Bid, attached hereto and hereby made a part hereof to enter into a contract in writing for the

_____

_____

_____

NOW, THEREFORE,

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

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

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

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

_____(L.S.)
(Principal)

_____
(Surety)

SEAL By: _____

NOT FOR BID

PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS, that

_____
(Name of Contractor)

_____
(Address of Contractor)

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

and

_____
(Name of Surety)

_____
(Address of Surety)

hereinafter called Surety, are held and firmly bound unto

_____
(Name of Owner)

_____
(Address of Owner)

hereinafter called OWNER, in the penal sum of _____

_____ Dollars, $(_____) in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, successors, and assigns, jointly and severally, firmly by these presents, this sum being in the amount of one hundred percent (100%) of the contract amount.

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

NOW, THEREFORE, if the Contractor shall promptly make payment to all persons, firms, SUBCONTRACTORS, and corporations furnishing materials for or performing labor in the prosecution of the WORK provided for in such contract, and any authorized extension or modification thereof, including all amounts due to materials, lubricants, oil, gasoline, coal and coke, repairs on machinery, equipment and tools, consumed or used in connection with the construction of such WORK, and all insurance premiums on said WORK, and for all labor, performed in such WORK whether by SUBCONTRACTOR or otherwise, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, FURTHER, that the said Surety for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to the WORK to be performed thereunder or the SPECIFICATIONS accompanying the same shall in any wise affect its obligation on this BOND, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the WORK or to the SPECIFICATIONS.

PROVIDED, FURTHER, that no final settlement between the OWNER and the CONTRACTOR shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

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

each one of which shall be deemed an original,

this the _____ day of _____, 20_____.

ATTEST:

_____ _____
(Contractor) Corporate Official Contractor

(SEAL) By: _____

Title: _____

Address: _____

_____

_____
Witness to Contractor

_____
Address

_____

ATTEST:

_____ _____

Witness to Surety Surety

_____ By: _____

Address Attorney-in-Fact

_____

Address

_____

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

BOND is not valid unless accompanied by Power of Attorney.

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

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS, that

_____
(Name of Contractor)

_____
(Address of Contractor)

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

and _____
(Name of Surety)

_____
(Address of Surety)

hereinafter called Surety, are held and firmly bound unto

_____
(Name of Owner)

_____
(Address of Owner)

hereinafter called OWNER, in the penal sum of _____

_____Dollars, $(_____) in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, successors, and assigns, jointly and severally, firmed by these presents, this sum being in the amount of one hundred percent (100%) of the contract amount.

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

_____

_____

_____

_____

_____

_____

NOW, THEREFORE, if the Contractor shall well, truly and faithfully perform its duties, all the undertakings, covenants, terms conditions, and agreements of said contract during the original term thereof, and any extensions thereof which may be granted by the OWNER, with or without notice to the Surety and during the one year guaranty period, and if he shall satisfy all claims and demands incurred under such contract, and shall full indemnify and save harmless the OWNER from all costs and damages which it may suffer by reason of failure to do so, and shall reimburse and repay the OWNER all outlay and expense which the OWNER may incur in making good any default, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, FURTHER, that the said Surety for value received hereby stipulates and agrees that no change, extension of time, alternation or addition to the terms of the contract or to the WORK to be performed thereunder or the SPECIFICATIONS accompanying the same shall in any wise affect its obligation on this BOND, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the WORK or to the SPECIFICATIONS.

PROVIDED, FURTHER, that no final settlement between the OWNER and the CONTRACTOR shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

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

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

ATTEST:

_____
(Contractor) Corporate Official

_____
Contractor

(SEAL)

By: _____

Title: _____

Address: _____

_____

_____
Witness to Contractor

_____
Address

_____

ATTEST:

_____ _____

Witness to Surety Surety

_____ By: _____

Address Attorney-in-Fact

_____

Address

_____

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

BOND is not valid unless accompanied by Power of Attorney.

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

NOT FOR BID

BID FOR UNIT PRICE CONTRACTS

Place _____

Date _____

Project No. _____

Proposal of _____ (hereinafter called "Bidder") a
(a corporation) (a partnership) (an individual doing business as _____)

STRIKE OUT INAPPLICABLE TERMS

To the _____

(hereinafter called "OWNER")

Dear Sir or Madam:

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.

Town of Bean Station Phase I Sewer Collection System

BID FORM

Bidder acknowledges receipt of the following addendum: _____
Bidder agrees to perform all the sewer line construction work described in the specifications and shown on the plans, for the following unit prices.

Area 1: Pump Station and US 25E Southbound to MUS Connection

Item #	Description	Qty.	Unit	Unit Price	Total
1	Project Sign	1	LS		
2	Provide and install 6" PE 4710 DR 13.5 HDPE DIPS pipe including all fittings and bends, restraining joints, #10 gauge copper tracing wire, unclassified excavation, backfill, erosion conttrol, traffic control, final grading, revegetation, and pressure testing as shown on the plans, notes and specifications.	11,073	LF		
3	Provide and install 2" PE 4710 DR 11 HDPE DIPS pipe in same trench as 6" pipe including all fittings and bends, restraining joints, #10 gauge copper tracing wire, unclassified excavation, backfill, erosion conttrol, traffic control, final grading, revegetation, and pressure testing as shown on the plans, notes and specifications.	2,067	LF		
4	Provide and install a duplex submersible sewage grinder pump station capable of pumping 200-gpm at 125 feet of TDH. Pump station is to include pumps, motors, valve vault, 12ft. deep-8ft. diameter interior and exterior lined waterproofed wetwell, piping, valve vault, ultrasonic flow meter, bypass pump connection, valves, controls, vfd drives, electrical service and wiring, electrical hook-up, training, landscaping, fencing and all other associated appurtenances as shown on the plans and specifications for a complete operational system.	1	LS		
5	Provide and install chemical feed odor control system including all pumps, tank and pad, valves, piping, connections, controls, electrical connections, and all other associated fittings and appurtenances as shown in the plans and specifications for complete operational system.	1	LS		
6	Provide and install all bridge pipe mounting brackets, yokes, threaded rod hangars, clamps, insulation, insulation protection trays, roller assemblys, anti-sway assemblys, pipe rollers, mounting straps, mounting clips, wall boring and all other fittings and associated appurtenances required as shown on the plans, details and specifications to provide a complete bridge pipe crossing.	1	LS		
7	Provide and install a heating element controller ETI TRACON Model GPT230 dual lead heat trace controller with protherm 2700 series self regulating heating cable or engineer approved equal including all required electrical connections, heat tracing tape for 1,800 feet of 6-inch HDPE pipe and all required electrical wire connections and mounting brackets as shown in the plans, details and specifications to provide a complete operational system.	2	LS		
8	Provide and install a 6-inch mechanical expansion-contraction joint at beginning of pipe bridge crossing as shown on plans, details and specifications.	2	EA		
9	Provide and install a 6-inch gate valve and box.	3	EA		
10	Provide and install a 4-inch gate valve and box.	1	EA		
11	Provide and install a 3-inch gate valve and box.	1	EA		
12	Provide and install a 2-inch gate valve and box.	1	EA		
13	Provide and install combination 6-inch air release valve/vacuum break and valve box.	3	EA		
14	Provide and instal 4" x 4" x 3 "x 2" M.J. Cross.	1	LS		
15	Open cut and repair asphalt surfaces matching existing asphalt thickness including 100% crushed stone backfill.	665	LF		
16	Open cut gravel driveway repair including 4-inch stone backfill.	35	LF		
17	6-inch directional bore asphalt driveways not including carrier pipe and with no casing pipe. The amount paid will be the actual width of the asphalt crossed and will not include setbacks for bore pits.	30	LF		
18	6-inch directional bore asphalt roads not including carrier pipe and with no casing pipe. The amount paid will be the actual width of the asphalt crossed and will not include setbacks for bore pits.	210	LF		
19	Core existing concrete manhole and make watertight 6-inch connection.	1	LS		

Subtotal Area 1:

Area 2: US 25E Northbound to Turtle Creek RV Center

20	Provide and install 6" PE 4710 DR 13.5 HDPE DIPS pipe including all fittings and bends, restraining joints, #10 gauge copper tracing wire, unclassified excavation, backfill, erosion conttrol, traffic control, final grading, revegetation, and pressure testing as shown on the plans, notes and specifications.	3,439	LF		
21	Provide and install 4" PE 4710 DR 11 HDPE DIPS pipe in same trench as 6" pipe including all fittings and bends, restraining joints, #10 gauge copper tracing wire, unclassified excavation, backfill, erosion conttrol, traffic control, final grading, revegetation, and pressure testing as shown on the plans, notes and specifications.	3,129	LF		
22	Provide and install a 6-inch gate valve and box.	1	EA		
23	Provide and install a 3-inch gate valve and box.	1	EA		
24	Provide and instal 4" x 4" x 3" M.J. Tee	1	LS		
25	Provide and install combination 6-inch air release valve/vacuum break and valve box.	2	EA		
26	Provide and install combination 4-inch air release valve/vacuum break and valve box.	2	EA		
27	Open cut and repair asphalt surfaces matching existing asphalt thickness including 100% crushed stone backfill.	70	LF		
28	Directional bore S.R. 32 with 10-inch steel casing pipe and casing spacers.The amount paid will be the actual width of the asphalt crossed and will not include the setbacks for bore pits.	135	LF		
29	Core existing concrete wetwell and make watertight 4-inch connection.	1	LS		

Subtotal Area 2:

Area #3: Baker Lane and Bluff Village Road

30	Provide and install 2" PE 4710 DR 11 HDPE DIPS pipe including all fittings and bends, restraining joints, #10 gauge copper tracing wire, unclassified excavation, backfill, erosion conttrol, traffic control, final grading, revegetation, and pressure testing as shown on the plans, notes and specifications.	1,384	LF		
31	Provide and install combination 2-inch air release valve/vacuum break and valve box.	2	EA		
32	Provide and instal 2" x 2" x 2" M.J. Tee	1	LS		
33	Provide and install a 2-inch gate valve and box.	2	EA		
34	Open cut and repair asphalt surfaces matching existing asphalt thickness including 100% crushed stone backfill.	70	LF		
35	Provide and install a 2-inch terminal flushing station per plans, details and specifications	2	LS		

Subtotal Area 3:

Area #4: Livingston, Fred Davis and McCall Roads

36	Provide and install 3" PE 4710 DR 11 HDPE DIPS pipe including all fittings and bends, restraining joints, #10 gauge copper tracing wire, unclassified excavation, backfill, erosion conttrol, traffic control, final grading, revegetation, and pressure testing as shown on the plans, notes and specifications.	2,830	LF		
37	Provide and install 2" PE 4710 DR 11 HDPE DIPS pipe including all fittings and bends, restraining joints, #10 gauge copper tracing wire, unclassified excavation, backfill, erosion conttrol, traffic control, final grading, revegetation, and pressure testing as shown on the plans, notes and specifications.	1,430	LF		
38	Provide and install a 2-inch gate valve and box.	2	EA		
39	Provide and install combination 3-inch air release valve/vacuum break and valve box.	2	EA		
40	Provide and install combination 2-inch air release valve/vacuum break and valve box.	1	EA		
41	Provide and instal 3" x 3" x 2" M.J. Tee	1	LS		
42	Provide and instal 3" x 2" x 2" M.J. Tee	1	LS		
43	Provide and install a 2-inch terminal flushing station per plans, details and specifications	3	LS		
44	Open cut and repair asphalt surfaces matching existing asphalt thickness including 100% crushed stone backfill.	90	LF		
45	Open cut gravel driveway repair including 4-inch stone backfill.	220	LF		
46	Open cut concrete driveway repair to first construction joint matching existing concrete thickness and type including 100% stone backfill.	18	LF		

Subtotal Area 4:

Area 5: Crosby Rd, Park Drive and Lake Drive

47	Provide and install 3" PE 4710 DR 11 HDPE DIPS pipe including all fittings and bends, restraining joints, #10 gauge copper tracing wire, unclassified excavation, backfill, erosion conttrol, traffic control, final grading, revegetation, and pressure testing as shown on the plans, notes and specifications.	3,371	LF		
48	Provide and install 2" PE 4710 DR 11 HDPE DIPS pipe including all fittings and bends, restraining joints, #10 gauge copper tracing wire, unclassified excavation, backfill, erosion conttrol, traffic control, final grading, revegetation, and pressure testing as shown on the plans, notes and specifications.	2,456	LF		
49	Provide and instal 3" x 3" x 3" M.J. Tee	1	LS		
50	Provide and instal 3" x 3" x 2" M.J. Tee	1	LS		
51	Provide and instal 3" x 2" x 2" M.J. Tee	1	LS		
52	Provide and install 3" x 2" M.J. Reducer	1	LS		
53	Provide and install combination 3-inch air release valve/vacuum break and valve box.	2	EA		
54	Provide and install combination 2-inch air release valve/vacuum break and valve box.	2	EA		
55	Provide and install a 3-inch gate valve and box.	1	EA		
56	Provide and install a 2-inch gate valve and box.	2	EA		
57	Provide and install a 2-inch terminal flushing station per plans, details and specifications	4	LS		
58	Open cut and repair asphalt surfaces matching existing asphalt thickness including 100% crushed stone backfill.	247	LF		
59	Open cut gravel driveway repair including 4-inch stone backfill.	155	LF		
60	Open cut concrete driveway repair to first construction joint matching existing concrete thickness and type including 100% stone backfill.	351	LF		

Subtotal Area 5:

Total Base Bid (Subtotal Areas 1 thru 5): $_____

Total Base Bid in Words:_____

Deductive Alternates

If the total sum of the Base Bid exceeds the owner's construction budget, the owner will use the following deductive alternates (deductions) in whichever order that will ensure that the total bid is within budget: The deductive alternates are the Subtotal for Area 3, Subtotal for Area 4, and the Subtotal for Area 5. Each bid submitted, regardless of who submitted the low bid, will be considered in the same equal manner.

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

Contractors procured directly by grantees, sub-grantees, and/or sub-recipients of American Rescue Plan Act (ARPA) funds, 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 certifies that it has an active registration is SAM that is not set to expire within the next 90 days.

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: _____

STATE OF TENNESSEE

CERTIFICATION OF BIDDER REGARDING

USE OF WOMEN/MINORITY SUBCONTRACTORS

Construction Projects Only

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 women/minority owned firms.

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

☐ I certify that every attempt was made to utilize female/minority contractors on this project.
☐ I am unable to certify to the above statements. Explanation is attached.

Signature of Authorized Representative	**Date**
Printed Name	**Phone Number**
Email Address	**Address**

STATE OF TENNESSEE

CERTIFICATION REGARDING DEBARMENT, SUSPENSION AND OTHER RESPONSBILITY MATTERS

The prospective participant certifies to the best of its knowledge and belief that it and its principals:

☐ Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;

☐ Have not within a three-year period preceding this proposal been convicted of or had a civil judgement rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statues or
commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

☐ Are not presently indicted for or otherwise criminally or civilly charged by a government entity (Federal, State, or local) with commission of any of the offenses enumerated in paragraph (b) of this certification; and

☐ Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State, or local) terminated for cause or default.

I understand that a false statement on this certification may be grounds for rejection of this proposal or termination of the award. In addition, under 18 USC Sec. 1001, a false statement may result in a fine of up to $10,000 or imprisonment for up to 5 years, or both.

Signature of Authorized Representative	**Date**
Printed Name	**Phone Number / Email Address**

☐ I am unable to certify to the above statements. Explanation is attached.

CERTIFICATION OF SUBCONTRACTOR REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND EXCLUSION

Subcontractors for projects that are funded in whole or in part by Coronavirus State and Local Fiscal Recovery Fund (SLFRF) and American Rescue Plan Act (ARPA) 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 erroneously 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 BY PROPOSED SUBCONTRACTOR REGARDING EQUAL EMPLOYMENT OPPORTUNITY

NAME OF PRIME CONTRACTOR: _____

PROJECT NUMBER: _____

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: _____

STATE OF TENNESSEE

NON-BOYCOTT OF ISRAEL CERTIFICATION

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.

Signature of Authorized Representative	**Date**
Printed Name	**Phone Number / Email Address**

STATEMENT OF COMPLIANCE CERTIFICATE
ILLEGAL IMMIGRANTS

EACH CONTRACTOR BIDDING SHALL FILL IN AND SIGN THE FOLLOWING

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

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

Signed: _____

State of _____)
) ss
County of _____)

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

Witness my hand, at office, this _____ day of _____, 200__.

_____
Notary Public

My commission expires _____

STATE OF TENNESSEE

IRAN DIVESTMENT ACT CERTIFICATION

SUBJECT CONTRACT NUMBER(S):	
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

CERTIFICATE OF OWNER'S ATTORNEY

I, the undersigned, _____, the duly authorized and

acting legal representative of _____

do hereby certify as follows:

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

Date: _____ _____

NOT FOR BID

STATE OF TENNESSEE

BYRD ANTI-LOBBYING AMENDMENT CERTIFICATION

Contractors who apply or bid for an award of $100,000 or more shall file the required certification. Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, officer or employee of Congress, or an employee of a Member of Congress in connection with obtaining any Federal contract, grant, or any other award covered by 31 U.S.C. § 1352.

Each tier shall also disclose any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award. Such disclosures are forwarded from tier to tier up to the recipient who in turn will forward the certification(s) to the awarding agency.

APPENDIX A, 44 C.F.R. PART 18 – CERTIFICATION REGARDING LOBBYING – REQUIRED FOR CONTRACTS OVER $100,000 *Certification for Contracts, Grants, Loans, and Cooperative Agreements*

The undersigned certifies, to the best of his or her knowledge and belief, that:

☐ No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

☐ If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, “Disclosure Form to Report Lobbying,” in accordance with its instructions.

☐ The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

The Contractor certifies or affirms the truthfulness and accuracy of each statement of its certification and disclosure, if any. In addition, the Contractor understands and agrees that the provisions of 31 U.S.C. Chap. 38, Administrative Remedies for False Claims and Statements, apply to this certification and disclosure, if any.

Signature of Authorized Representative	**Date**
Printed Name and Title	**Phone Number / Email Address**

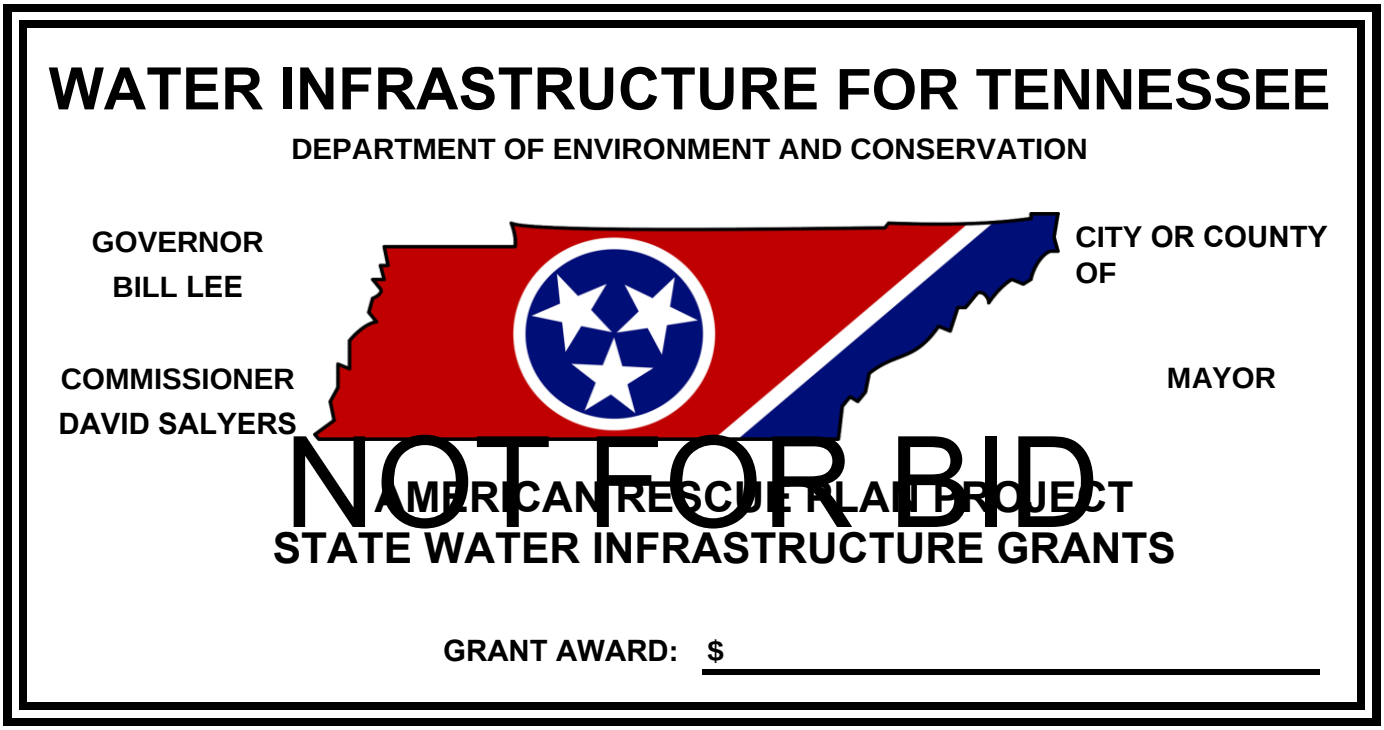
NOT FOR BID

STATE WATER INFRASTRUCTURE GRANTS

IDENTIFICATION SIGN

All plans and specifications for each project approved shall contain provisions for requiring the general contractor to provide identification signs. The signs shall conform to the following basic features:

1. The following diagram shall be used as a design:



2. The sign shall be a 4'0" X 8'0" sheet of exterior grade plywood and shall be built so as to remain erected during the entire construction phase of the project.

3. The background of both sides shall be white. The lettering shall be black and shall be large enough to take advantage of the full size of the plywood. The stars shall be white set on a blue field and surrounded by a white ring placed inside a state map in red with a stripe of white and blue on the right side. The sign shall be bordered by a one-inch blue stripe.

AGREEMENT (Contract)

THIS AGREEMENT, made this _____ day of _____, 20____, by and

between _____, herein called “Owner”, acting herein

through its _____,

and _____
(a corporation) (a partnership) (an individual doing business as _____)

STRIKE OUT INAPPLICABLE 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:

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hereinafter called the project, for the sum of _____

_____ Dollars ($_____)

and all extra work in connection therewith, under the terms as stated in the General Conditions of the Contract; and at this (it’s 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, 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.

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 _____ consecutive calendar days thereafter.

The OWNER agrees to pay the CONTRACTOR in current funds for the performance of the contract, subject to additions and deductions, as provided in the General Conditions of the Contract.

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:

_____

(Secretary) (Owner)

_____ By: _____
(Witness)

_____
(Title)

(Seal)

NOT FOR BID

_____

(Secretary) (Owner)

_____ By: _____
(Witness)

_____
(Title)

_____
(Address and Zip Code)

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

DRUG-FREE WORKPLACE AFFIDAVIT

STATE OF _____

COUNTY OF _____

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

1. The undersigned is a principal officer of _____ (hereinafter referred to as the "Company"), and is duly authorized to execute this Affidavit on behalf of the Company.
2. The Company submits this Affidavit pursuant to T.C.A. § 50-9-113, which requires each employer with no less than five (5) employees receiving pay who contracts with the state or any local government to provide construction services to submit an affidavit stating that such employer has a drug-free workplace program that complies with Title 50, Chapter 9, of the *Tennessee Code Annotated*.
3. The Company is in compliance with T.C.A. § 50-9-113.

Further affiant saith not.

_____
Principal Officer

STATE OF _____
COUNTY OF _____

Before me personally appeared _____, with whom I am personally acquainted (or proved to me on the basis of satisfactory evidence), and who acknowledged that such person executed the foregoing affidavit for the purposes therein contained.
Witness my hand and seal at office this _____ day of _____, 20__.

_____
Notary Public

My commission expires: _____

GENERAL CONDITIONS

CONTRACT AND CONTRACT DOCUMENTS

The project to be constructed and pursuant to this contract will be financed with assistance from Coronavirus State and Local Fiscal Recovery Fund (SLFRF) and American Rescue Plan Act (ARPA) and is subject to all applicable Federal laws and regulations.

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

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GENERAL CONDITIONS

ARTICLE 1--DEFINITIONS

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

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

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

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

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

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

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

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

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

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

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

Defective – An adjective which when modifying the word Work refers to Work that is unsatisfactory, faulty or deficient, or does not conform to the Contract Documents, or does not meet the requirements of any inspection, reference standard, test or approval referred to in the Contract Documents, or has been damaged prior to ENGINEER's recommendation of final payment (unless responsibility for the protection thereof has been assumed by OWNER at Substantial Completion in accordance with paragraph 14.8 or 14.10).

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

Effective Date of the Agreement – The date indicated in the Agreement on which it becomes effective, but if no such date is indicated it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.

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

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

General Requirements – Sections of Division 1 of the Specifications.

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

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

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

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

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

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

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

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

Specifications – Those portions of the Contract Documents consisting of written technical descriptions of materials, equipment, construction systems, standards and workmanship as applied to the Work and certain administrative details applicable thereto.

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

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

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

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

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

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

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

Work Directive Change – A written directive to CONTRACTOR, issued on or after the Effective Date of the Agreement and signed by OWNER and recommended by ENGINEER, ordering an addition, deletion or revision in the Work, or responding to differing or unforeseen physical conditions under which the Work is to be performed as provided in paragraph 4.2 or 4.3 or to emergencies under paragraph 6.22. A Work Directive Change may not change the Contract Price or the Contract Time, but is evidence that the parties expect that the change directed or documented by a Work Directive Change will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Time as provided in paragraph 10.2.

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

ARTICLE 2 – PRELIMINARY MATTERS

Delivery of Bonds:

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

***Copies of Documents*:**

2.2. OWNER shall furnish to CONTRACTOR up to ten copies (unless otherwise specified in the Supplementary Conditions) of the Contract Documents as are reasonably necessary for the execution of the Work. Additional copies will be furnished, upon request, at the cost of reproduction.

Commencement of Contract Time; Notice to Proceed:

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

Starting the Project:

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

Before Starting Construction:

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

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

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

2.6.2. a preliminary schedule of Shop Drawing submissions; and

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

2.7 Before any Work at the site is started, CONTRACTOR shall deliver to OWNER, with a copy to ENGINEER, certificates (and other evidence of insurance requested by OWNER) which

CONTRACTOR is required to purchase and maintain in accordance with paragraphs 5.3 and 5.4, and OWNER shall deliver to CONTRACTOR certificates (and other evidence of insurance requested by CONTRACTOR) which OWNER is required to purchase and maintain in accordance with paragraphs 5.6 and 5.7.

Preconstruction Conference:

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

Finalizing Schedules:

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

ARTICLE 3—CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

Intent:

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

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

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

Amending and Supplementing Contract Documents:

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

3.4.1. a formal Written Amendment,

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

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

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

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

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

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

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

Reuse of Documents:

3.6. Neither CONTRACTOR nor any Subcontractor or Supplier or other person or organization performing or furnishing any of the Work under a direct or indirect contract with OWNER shall have or acquire any title to or ownership rights in any of the Drawings, Specifications or other documents (or copies of any thereof) prepared by or bearing the seal of ENGINEER; and they shall not reuse any of them on extensions of the Project or any other project without written consent of OWNER and ENGINEER and specific written verification or adaptation by ENGINEER.

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

Availability of Lands:

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

Physical Conditions:

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

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

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

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

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

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

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

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

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

Physical Conditions – Underground Facilities:

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

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

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

4.3.2. *Not Shown or Indicated*. If an Underground Facility is uncovered or revealed at or contiguous to the site which was not shown or indicated in the Contract Documents and which CONTRACTOR could not reasonably have been expected to be aware of, CONTRACTOR shall, promptly after becoming aware thereof and before performing any Work affected thereby (except in an emergency as permitted by paragraph 6.22), identify the owner of such Underground Facility and give written notice thereof to that owner and to OWNER and ENGINEER. ENGINEER will promptly review the Underground Facility to determine the extent to which the Contract Documents should be modified to reflect and document the consequences of the existence of the Underground Facility, and the Contract Documents will be amended or supplemented to the extent necessary. During such time, CONTRACTOR shall be responsible for the safety and protection of such Underground Facility as provided in paragraph 6.20. CONTRACTOR shall be allowed an increase in the Contract Price or an extension of the Contract Time, or both, to the extent that they are attributable to the existence of any Underground Facility that was not shown or indicated in the Contract Documents and which CONTRACTOR could not reasonably have been expected to be aware of. If the parties are unable to agree as to the amount or length thereof, CONTRACTOR may make a claim therefor as provided in Articles 11 and 12.

Reference Points:

4.4. OWNER shall provide engineering surveys to establish reference points for construction which in ENGINEER's judgment are necessary to enable CONTRACTOR to proceed with the Work. CONTRACTOR shall be responsible for laying out the Work (unless otherwise specified in the General Requirements),

shall protect and preserve the established reference points and shall make no changes or relocations without the prior written approval of OWNER. CONTRACTOR shall report to ENGINEER whenever any reference point is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points by professionally qualified personnel.

ARTICLE 5—BONDS AND INSURANCE

Performance and Other Bonds:

5.1. CONTRACTOR shall furnish performance and payment Bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all CONTRACTOR's obligations under the Contract Documents. These Bonds shall remain in effect at least until one year after the date when final payment becomes due, except as otherwise provided by Law or Regulation or by the Contract Documents. CONTRACTOR shall also furnish such other Bonds as are required by the Supplementary Conditions. All Bonds shall be in the forms prescribed by Law or Regulation or by the Contract Documents and be executed by such sureties as are named in the current list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Audit Staff Bureau of Accounts, U.S. Treasury Department. All Bonds signed by an agent must be accompanied by a certified copy of the authority to act.

5.2. If the surety on any Bond furnished by CONTRACTOR is declared a bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of paragraph 5.1, CONTRACTOR shall within five days thereafter substitute another Bond and Surety, both of which must be acceptable to OWNER.

Contractor's Liability Insurance:

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

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

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

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

5.3.4. Claims for damages insured by personal injury liability coverage which are substained (a) by any person as a result of an offense directly or indirectly related to the employment of such person by CONTRACTOR, or (b) by any other person for any other reason;

5.3.5. Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom;

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

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

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

Contractual Liability Insurance:

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

Owner's Liability Insurance:

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

Property Insurance:

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

professionals). If not covered under the "all risk" insurance or otherwise provided in the Supplementary Conditions, CONTRACTOR shall purchase and maintain similar property insurance on portions of the Work stored on and off the site or in transit when such portions of the Work are to be included in an Application for Payment.

5.7. OWNER shall purchase and maintain such boiler and machinery insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of OWNER, CONTRACTOR, Subcontractors, ENGINEER and ENGINEER's consultants in the Work, all of whom shall be listed as insured or additional insured parties.

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

5.9. OWNER shall not be responsible for purchasing and maintaining any property insurance to protect the interests of CONTRACTOR, Subcontractors or others in the Work to the extent of any deductible amounts that are provided in the Supplementary Conditions. The risk of loss within the deductible amount, will be borne by CONTRACTOR, Subcontractor or others suffering any such loss and if any of them wishes property insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser's own expense.

5.10. If CONTRACTOR requests in writing that other special insurance be included in the property insurance policy, OWNER shall, if possible, include such insurance, and the cost thereof will be charged to CONTRACTOR by appropriate Change Order or Written Amendment. Prior to commencement of the Work at the site, OWNER shall in writing advise CONTRACTOR whether or not such other insurance has been procured by OWNER.

Waiver of Rights:

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

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

Receipt and Application of Proceeds:

5.12. Any insured loss under the policies of insurance required by paragraphs 5.6 and 5.7 will be adjusted with OWNER and made payable to OWNER as trustee for the insureds, as their interests may appear, subject to the requirements of any applicable mortgage clause and of paragraph 5.13. OWNER shall deposit in a separate account any money so received, and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached the damaged Work shall be repaired or replaced, the moneys so received applied on account thereof and the Work and the cost thereof covered by an appropriate Change Order or Written Amendment.

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

Acceptance of Insurance:

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

Partial Utilization – Property Insurance:

5.15. If OWNER finds it necessary to occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work, such use or occupancy may be accomplished in accordance with paragraph 14.10; provided that no such use or occupancy shall commence before the insurers providing the property insurance have acknowledged notice thereof and in writing effected the changes in coverage necessitated thereby. The insurers providing the property insurance shall consent by endorsement on the policy or policies, but the property insurance shall not be cancelled or lapse on account of any such partial use or occupancy.

ARTICLE 6 – CONTRACTOR'S RESPONSIBILITIES

Supervision and Superintendence:

6.1. CONTRACTOR shall supervise and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. CONTRACTOR shall be solely responsible for the means, methods, techniques, sequences and procedures of construction, but CONTRACTOR shall not be responsible for the negligence of others in the design or selection of a specific means, method, technique, sequence or procedure of construction which is indicated in and required by the Contract Documents. CONTRACTOR shall be responsible to see that the finished Work complies accurately with the Contract Documents.

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

Labor, Materials and Equipment:

6.3. CONTRACTOR shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. CONTRACTOR shall at all times maintain good discipline and order at the site. Except in connection with the safety or protection of persons or the Work or property at the site or adjacent thereto, and except as otherwise indicated in the Contract Documents, all work at the site shall be performed during regular working hours, and CONTRACTOR will not permit overtime work or the performance of Work on Saturday, Sunday or any legal holiday without OWNER's written consent given after prior written notice to ENGINEER.

6.4. Unless otherwise specified in the General Requirements, CONTRACTOR shall furnish and assume full responsibility for all materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities and all other facilities and incidentals necessary for the furnishing, performance, testing, start-up and completion of the Work.

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

Adjusting Progress Schedule:

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

Substitutes or "Or-Equal" Items:

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

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

6.7.3. ENGINEER will be allowed a reasonable time within which to evaluate each proposed substitute. ENGINEER will be the sole judge of acceptability, and no substitute will be ordered, installed or utilized without ENGINEER's prior written acceptance which will be evidenced by either a Change Order or an approved Shop

Drawing. OWNER may require CONTRACTOR to furnish at CONTRACTOR's expense a special performance guarantee or other surety with respect to any substitute. ENGINEER will record time required by ENGINEER and ENGINEER's consultants in evaluating substitutions proposed by CONTRACTOR and in making changes in the Contract Documents occasioned thereby. Whether or not ENGINEER accepts a proposed substitute, CONTRACTOR shall reimburse OWNER for the charges of ENGINEER and ENGINEER's consultants for evaluating each proposed substitute.

Concerning Subcontractors, Suppliers and Others:

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

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

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

6.10. The divisions and sections of the Specifications and the identifications of any Drawings shall not control CONTRACTOR in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.

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

Patent Fees and Royalties:

6.12. CONTRACTOR shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process product or device is specified in the Contract Documents for use in the performance of the Work and if to the actual knowledge of OWNER or ENGINEER its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by OWNER in the Contract Documents. CONTRACTOR shall indemnify and hold harmless OWNER and ENGINEER and anyone directly or indirectly employed by either of them from and against all claims, damages, losses and expenses (including attorney's fees and court and arbitration costs) arising out of any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any inventions, design, process, product or device not specified in the Contract Documents, and shall defend all such claims in connection with any alleged infringement of such rights.

Permits:

6.13. Unless otherwise provided in the Supplementary Conditions, CONTRACTOR shall obtain and pay for all construction permits and licenses. OWNER shall assist CONTRACTOR, when necessary, in obtaining such permits and licenses. CONTRACTOR shall pay all governmental charges and inspection fees necessary for the prosecution of the Work, which are applicable at the time of opening of Bids, or if there are no Bids on the Effective Date of the Agreement, CONTRACTOR shall pay all charges of utility owners for connections to the Work, and OWNER shall pay all charges of such utility owners for capital costs related thereto such as plant investment fees.

Laws and Regulations:

6.14.1. CONTRACTOR shall give all notices and comply with all Laws and Regulations applicable to furnishing and performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither OWNER nor ENGINEER shall be responsible for monitoring CONTRACTOR's compliance with any Laws or Regulations.

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

Taxes:

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

Use of Premises:

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

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

6.18. CONTRACTOR shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall CONTRACTOR subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

Record Documents:

6.19. CONTRACTOR shall maintain in a safe place at the site one record copy of all Drawings, Specifications, Addenda, Written Amendments, Change Orders, Work Directive Changes, Field Orders and written interpretations and clarifications (issued pursuant to paragraph 9.4) in good order and annotated to show all changes made during construction. These record documents together with all approved samples and a counterpart of all approved Shop Drawings will be available to ENGINEER for reference. Upon completion of the Work, these record documents, samples and Shop Drawings will be delivered to ENGINEER for OWNER.

Safety and Protection:

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

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

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

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

CONTRACTOR shall comply with all applicable Laws and Regulations of any public body having jurisdiction for the safety of persons or property or to protect them from damage, injury or loss; and shall erect and maintain all necessary safeguards for such safety and protection. CONTRACTOR shall notify owners of adjacent property and of Underground Facilities and utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation and replacement of their property. All damage, injury or loss to any property referred to in paragraph 6.20.2 or 6.20.3 caused, directly or indirectly, in whole or in part, by CONTRACTOR, any Subcontractor, Supplier or any other person or organization directly or indirectly employed by any of them to perform or furnish any of the Work or anyone for whose acts any of them may be liable, shall be remedied by CONTRACTOR (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of OWNER or ENGINEER or anyone employed by either of them or anyone for whose acts either of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of CONTRACTOR). CONTRACTOR's duties and responsibilities for the safety and protection of the Work shall continue until such time as all the Work is completed and ENGINEER has issued a notice to OWNER and CONTRACTOR in accordance with paragraph 14.13 that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

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

Emergencies:

6.22. In emergencies affecting the safety or protection of persons or the Work or property at the site or adjacent thereto, CONTRACTOR, without special instruction or authorization from ENGINEER or OWNER, is obligated to act to prevent threatened damage, injury or loss. CONTRACTOR shall give ENGINEER prompt written notice if CONTRACTOR believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby. If ENGINEER determines that a change in the Contract Documents is required because of the action taken in response to an emergency, a Work Directive Change or Change Order will be issued to document the consequences of the changes or variations.

Shop Drawings and Samples:

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

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

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

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

6.26. ENGINEER will review and approve with reasonable promptness Shop Drawings and samples, but ENGINEER's review and approval will be only for conformance with the design concept of the Project and for compliance with the information given in the Contract Documents and shall not extend to means, methods, techniques, sequences or procedures of construction (except where a specific means, method, technique, sequence or procedure of construction is indicated in or required by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions. CONTRACTOR shall make corrections required by ENGINEER, and shall return the required number of corrected copies of Shop Drawings and submit as required new samples for review and approval. CONTRACTOR shall direct specific attention in writing to revisions other than the corrections called for by ENGINEER on previous submittals.

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

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

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

Continuing the Work:

6.29. CONTRACTOR shall carry on the Work and adhere to the progress schedule during all disputes or disagreements with OWNER. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as permitted by paragraph 15.5 or as CONTRACTOR and OWNER may otherwise agree in writing.

Indemnification:

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

6.31. In any and all claims against OWNER or ENGINEER or any of their consultants, agents or employees by any employee of CONTRACTOR, any Subcontractor, any person or organization directly or indirectly employed by any of them to perform or furnish any of the Work or anyone for whose acts any of them may be liable, the indemnification obligation under paragraph 6.30 shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for CONTRACTOR or any such Subcontractor or other person or organization under workers' or workmen's compensation acts, disability benefit acts or other employee benefit acts.

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

ARTICLE 7 – OTHER WORK

Related Work at Site:

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

7.2. CONTRACTOR shall afford each utility owner and other contractor who is a party to such a direct contract (or OWNER, if OWNER is performing the additional work with OWNER's employees) proper and safe access to the site and a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such work, and shall properly connect and coordinate the Work with theirs, CONTRACTOR shall do all cutting, fitting and patching of the Work that may be required to make its several parts come together properly and integrate with such other work. CONTRACTOR shall not endanger any work of others by cutting, excavating or otherwise altering their work and will only cut or alter their work with the written consent of ENGINEER and the others whose work will be affected. The duties and responsibilities of CONTRACTOR under this paragraph are for the benefit of such utility owners and other contractors to the extent that there are comparable provisions for the benefit of CONTRACTOR in said direct contracts between OWNER and such utility owners and other contractors.

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

Coordination:

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

ARTICLE 8 – OWNER'S RESPONSIBILITIES

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

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

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

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

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

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

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

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

ARTICLE 9 – ENGINEER'S STATUS DURING CONSTRUCTION

Owner's Representative:

9.1. ENGINEER will be OWNER's representative during the construction period. The duties and responsibilities and the limitations of authority of ENGINEER as OWNER's representative during construction are set forth in the Contract Documents and shall not be extended without written consent of OWNER and ENGINEER.

Visits to Site:

9.2. ENGINEER will make visits to the site at intervals appropriate to the various stages of construction to observe the progress and quality of the executed Work and to determine, in general, if the Work is proceeding in accordance with the Contract Documents. ENGINEER will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. ENGINEER's efforts will be directed toward providing for OWNER a greater degree of confidence that the completed Work will conform to the Contract Documents. On the basis of such visits and on-site observations as an experienced and qualified design professional, ENGINEER will keep OWNER informed of the progress of the Work and will endeavor to guard OWNER against defects and deficiencies in the Work.

Project Representative:

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

Clarifications and Interpretations:

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

Authorized Variations in Work:

9.5. ENGINEER may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Time and are consistent with the overall intent of the Contract Documents. These may be accomplished by a Field Order and will be binding an OWNER, and also on CONTRACTOR who shall perform the Work involved promptly. If CONTRACTOR believes that a Field Order justifies an increase in the Contract Price or an extension of the Contract Time and the parties are unable to agree as to the amount or extent thereof, CONTRACTOR may make a claim therefor as provided in Article 11 or 12.

Rejecting Defective Work:

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

Shop Drawings, Change Orders and Payments:

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

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

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

Determination for Unit Price:

9.10. ENGINEER will determine the actual quantities and classifications of Unit Price Work performed by CONTRACTOR. ENGINEER will review with CONTRACTOR ENGINEER's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). ENGINEER's written decisions thereon will be final and binding upon OWNER and CONTRACTOR, unless, within ten days after the date of any such decision, either OWNER or CONTRACTOR delivers to the other party to the Agreement and to ENGINEER written notice of intention to appeal from such a decision.

Decisions on Disputes:

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

9.12. When functioning as interpreter and judge under paragraphs 9.10 and 9.11, ENGINEER will not show partiality to OWNER or CONTRACTOR and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity. The rendering of a decision by ENGINEER pursuant to paragraphs 9.10 and 9.11 with respect to any such claim, dispute or other matter (except any which have been waived by the making or acceptance of final payment as provided in paragraph 14.16) will be a condition precedent to any exercise by OWNER or CONTRACTOR of such rights or remedies as either may otherwise have under the Contract Documents or by Laws or Regulations in respect of any such claim, dispute or other matter.

Limitations on ENGINEER's Responsibilities:

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

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

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

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

ARTICLE 10 – CHANGES IN THE WORK

10.1. Without invalidating the Agreement and without notice to any surety, OWNER may, at any time or from time to time, order additions, deletions or revisions in the Work; these will be authorized by a Written Amendment, a Change Order, or a Work Directive Change. Upon receipt of any such document, CONTRACTOR shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).

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

10.3. CONTRACTOR shall not be entitled to an increase in the Contract Price or an extension of the Contract Time with respect to any Work performed that is not required by the Contract Documents as amended, modified and supplemented as provided in paragraphs 3.04 and 3.05, except in the case of an emergency as provided in paragraph 6.22 and except in the case of uncovering Work as provided in paragraph 13.9.

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

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

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

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

provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal. CONTRACTOR shall carry on the Work and adhere to the progress schedule as provided in paragraph 6.29.

10.5. If notice of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Time) is required by the provisions of any Bond to be given to a surety, the giving of any such notice will be CONTRACTOR's responsibility, and the amount of each applicable Bond will be adjusted accordingly.

ARTICLE 11 – CHANGE OF CONTRACT PRICE

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

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

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

11.3.1. Where the Work involved is covered by unit prices contained in the Contract Documents, by application of unit prices to the quantities of the items involved (subject to the provisions of paragraphs 11.9.1 through 11.11.3, inclusive).

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

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

Cost of the Work:

11.4. The term Cost of the Work means the sum of all costs necessarily incurred and paid by CONTRACTOR in the proper performance of the Work. Except as otherwise may be agreed to in writing by OWNER, such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall include only the following items and shall not include any of the costs itemized in paragraph 11.5:

11.4.1. Payroll costs for employees in the direct employ of CONTRACTOR in the performance of the Work under schedules of job classifications agreed upon by OWNER and CONTRACTOR. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits which shall include social security contributions, unemployment, excise and payroll taxes, workers' or workmen's compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. Such employees shall include superintendents and foremen at the site. The expenses of performing Work after regular working hours, on Saturday, Sunday or legal holidays, shall be included in the above to the extent authorized by OWNER.

11.4.2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to CONTRACTOR unless OWNER deposits funds with CONTRACTOR with which to make payments, in which case the cash discounts shall accrue to OWNER. All trade discounts, rebates and refunds and all returns from sale of surplus materials and equipment shall accrue to OWNER, and CONTRACTOR shall make provisions so that they may be obtained.

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

11.4.4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys and accountants) employed for services specifically related to the Work.

11.4.5. Supplemental costs including the following:

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

11.4.5.2. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office and temporary facilities at the site and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost less market value of such items used but not consumed which remain the property of CONTRACTOR.

11.4.5.3. Rentals of all construction equipment and machinery and the parts thereof whether rented from CONTRACTOR or others in accordance with rental agreements approved by OWNER with the advice of ENGINEER, and the costs of transportation, loading, unloading, installation, dismantling and removal thereof-all in accordance with terms of said rental agreements. The rental of any such equipment, machinery or parts shall cease when the use thereof is no longer necessary for the Work.

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

11.4.5.5. Deposits lost for causes other than negligence of CONTRACTOR, any Subcontractor or anyone directly or indirectly employed by any of them or

for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.

11.4.5.6. Losses and damages (and related expenses), not compensated by insurance or otherwise, to the Work or otherwise sustained by CONTRACTOR in connection with the performance and furnishing of the Work (except losses and damages within the deductible amounts of property insurance established by OWNER in accordance with paragraph 5.9), provided they have resulted from causes other than the negligence of CONTRACTOR, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of OWNER. No such losses, damages and expenses shall be included in the Cost of the Work for the purpose of determining CONTRACTOR's Fee. If, however, any such loss or damage requires reconstruction and CONTRACTOR is placed in charge thereof, CONTRACTOR shall be paid for services a fee proportionate to that stated in paragraph 11.6.2.

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

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

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

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

11.5.1. Payroll costs and other compensation of CONTRACTOR's officers, executives, principals (of partnership and sole proprietorships), general managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks and other personnel employed by CONTRACTOR whether at the site or in CONTRACTOR's principal or a branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in paragraph 11.4.1 or specifically covered by paragraph 11.4.4-all of which are to be considered administrative costs covered by the CONTRACTOR's Fee.

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

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

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

11.5.5. Costs due to the negligence of CONTRACTOR, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of *defective* Work, disposal of materials or equipment wrongly supplied and making good any damage to property.

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

Contractor's Fee:

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

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

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11.7. Whenever the cost of any Work is to be determined pursuant to paragraph 11.3 or 11.5, CONTRACTOR will submit in form acceptable to ENGINEER an itemized cost breakdown together with supporting data.

Cash Allowances:

11.8. It is understood that CONTRACTOR has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be done by such Subcontractors or Suppliers and for such sums within the limit of the allowances as may be acceptable to ENGINEER, CONTRACTOR agrees that:

11.8.1. The allowances include the cost to CONTRACTOR (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the site, and all applicable taxes; and

11.8.2. CONTRACTOR's costs for unloading and handling on the site, labor, installation costs, overhead, profit and other expenses contemplated for the allowances have been included in the Contract Price and not in the allowances. No demand for additional payment on account of any thereof will be valid.

Prior to final payment, an appropriate Change Order will be issued as recommended by ENGINEER to reflect actual amounts due CONTRACTOR on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

Unit Price Work:

11.9.1. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the established unit prices for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by CONTRACTOR will be made by ENGINEER in accordance with Paragraph 9.10.

11.9.2. Each unit price will be deemed to include an amount considered by CONTRACTOR to be adequate to cover CONTRACTOR's overhead and profit for each separately identified item.

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

ARTICLE 12 – CHANGE OF CONTRACT TIME

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

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

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

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

Warranty and Guarantee:

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

Access to Work:

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

Tests and Inspections:

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

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

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

13.6. If any Work (including the work of others) that is to be inspected, tested or approved is covered without written concurrence of ENGINEER, it must, if requested by ENGINEER, be uncovered for observation. Such uncovering shall be at CONTRACTOR's expense unless CONTRACTOR has given ENGINEER timely notice of CONTRACTOR's intention to cover the same and ENGINEER has not acted with reasonable promptness in response to such notice.

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

Uncovering Work:

13.8. If any Work is covered contrary to the written request of ENGINEER, it must, if requested by ENGINEER, be uncovered for ENGINEER's observation and replaced at CONTRACTOR's expense.

13.9. If ENGINEER considers it necessary or advisable that covered Work be observed by ENGINEER or inspected or tested by others, CONTRACTOR, at ENGINEER's request, shall uncover, expose or otherwise make available for observation, inspection or testing as ENGINEER may require, that portion of the Work in question, furnishing all necessary labor, material and equipment. If it is found that such Work is *defective*, CONTRACTOR shall bear all direct, indirect and consequential costs of such uncovering, exposure, observation, inspection and testing and of satisfactory reconstruction, (including but not limited to fees and charges of engineers, architects, attorneys and other professionals), and OWNER shall be entitled to an appropriate decrease in the Contract Price, and, if the parties are unable to agree as to the amount thereof, may make a claim therefor as provided in Article 11. If, however, such Work is not found to be *defective*, CONTRACTOR shall be allowed an increase in the Contract Price or an extension of the Contract Time, or both, directly attributable to such uncovering, exposure, observation, inspection, testing and reconstruction; and, if the parties are unable to agree as to the amount or extent thereof, CONTRACTOR may make a claim therefor as provided in Articles 11 and 12.

Owner May Stop the Work:

13.10. If the Work is *defective*, or CONTRACTOR fails to supply sufficient skilled workers or suitable materials or equipment, or fails to furnish or perform the Work in such a way that the completed Work will conform to the Contract Documents, OWNER may order CONTRACTOR to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of OWNER to stop the Work shall not give rise to any duty on the part of OWNER to exercise this right for the benefit of CONTRACTOR or any other party.

Correction or Removal of Defective Work:

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

One Year Correction Period:

13.12. If within one year after the date of Substantial Completion or such longer period of time as may be prescribed by Laws or Regulations or by the terms of any applicable special guarantee required by the Contract Documents or by any specific provision of the Contract Documents, any Work is found to be *defective*, CONTRACTOR shall promptly, without cost to OWNER and in accordance with OWNER's written instructions, either correct such *defective* Work, or, if it has been rejected by OWNER, remove it from the site and replace it with *nondefective* Work. If CONTRACTOR does not promptly comply with the terms of such instructions, or in an emergency where delay would cause serious risk of loss or damage, OWNER may have the *defective* Work corrected or the rejected Work removed and replaced, and all direct, indirect and consequential costs of such removal and replacement (including but not limited to fees and charges of engineer, architects, attorneys and other professionals) will be paid by CONTRACTOR. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications or by Written Amendments.

Acceptance of Defective Work:

13.13. If, instead of requiring correction or removal and replacement of *defective* Work, OWNER (and, prior to ENGINEER's recommendation of final payment, also ENGINEER) prefers to accept it, OWNER may do so, CONTRACTOR shall bear all direct, indirect and consequential costs attributable to OWNER's evaluation of and determination to accept such *defective* Work (such costs to be approved by ENGINEER as to reasonableness and to include but not be limited to fees and charges of engineers, architects, attorneys and other professionals). If any such acceptance occurs prior to ENGINEER's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and OWNER shall be entitled to an appropriate decrease in the Contract Price, and, if the parties are unable to agree as to the amount thereof, OWNER may make a claim therefor as provided in Article 11. If the acceptance occurs after such recommendation, an appropriate amount will be paid by CONTRACTOR to OWNER.

OWNER May Correct Defective Work:

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

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ARTICLE 14 – PAYMENTS TO CONTRACTOR AND COMPLETION

Schedule of Values:

14.1. The schedule of values established as provided in paragraph 2.9 will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to ENGINEER. Progress payments on account of Unit Price Work will be based on the number of units completed.

Application for Progress Payment:

14.2. At least twenty days before each progress payment is scheduled (but not often than once a month), CONTRACTOR shall submit to ENGINEER for review an Application for Payment filled out and signed by CONTRACTOR covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice or other documentation warranting that OWNER has received the materials and equipment free and clear of all liens, charges, security interests and encumbrances (which are hereinafter in these General Conditions referred to as "Liens") and evidence that the materials and equipment are covered by appropriate property insurance and other arrangements to protect OWNER's interest therein, all of which will be satisfactory to OWNER. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

CONTRACTOR's Warranty of Title:

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

Review of Applications for Progress Payment:

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

check the quality or the quantity of the Work beyond the responsibilities specifically assigned to ENGINEER in the Contract Documents or that there may not be other matters or issues between the parties that might entitle CONTRACTOR to be paid additionally by OWNER or OWNER to withhold payment to CONTRACTOR.

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

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

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

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

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

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

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

Substantial Completion:

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

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

Partial Utilization:

14.10. Use by OWNER of any finished part of the Work, which has specifically been identified in the Contract Documents, or which OWNER, ENGINEER and CONTRACTOR agree constitutes a separately functioning and useable part of the Work that can be used by OWNER without significant interference with CONTRACTOR's performance of the remainder of the Work, may be accomplished prior to Substantial Completion of all the Work subject to the following:

14.10.1. OWNER at any time may request CONTRACTOR in writing to permit OWNER to use any such part of the Work which OWNER believes to be ready for its intended use and substantially complete. If CONTRACTOR agrees, CONTRACTOR will certify to OWNER and ENGINEER that said part of the Work is substantially complete and request ENGINEER to issue a certificate of Substantial Completion for that part of the Work. CONTRACTOR at any time may notify OWNER and ENGINEER in writing that CONTRACTOR considers any such part of the Work ready for its intended use and substantially complete and request ENGINEER to issue a certificate of Substantial Completion for that part of the Work. Within a reasonable time after either such request, OWNER, CONTRACTOR and ENGINEER shall make an inspection of that part of the Work to determine its status of completion. If ENGINEER does not consider that part of the Work to be substantially complete, ENGINEER will notify OWNER and CONTRACTOR in writing giving the reasons therefor. If ENGINEER considers that part of the Work to be substantially complete, the provisions of paragraphs 14.8 and 14.9 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.

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

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

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

Final Inspection:

14.11. Upon written notice from CONTRACTOR that the entire Work or an agreed portion thereof is complete, ENGINEER will make a final inspection with OWNER and CONTRACTOR and will notify CONTRACTOR in writing of all particulars in which this inspection reveals that the Work is incomplete or *defective*. CONTRACTOR shall immediately take sure measures as are necessary to remedy such deficiencies.

Final Application for Payment:

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

Final Payment and Acceptance:

14.13. If, on the basis of ENGINEER's observation of the Work during construction and final inspection, and ENGINEER's review of the final Application for Payment and accompanying documentation – all as required by the Contract Documents, ENGINEER is satisfied that the Work has been completed and CONTRACTOR's other obligations under the Contract Documents have been fulfilled, ENGINEER will, within ten days after receipt of the final Application for Payment, indicate in writing ENGINEER's recommendation of payment and present the Application to OWNER for payment. Thereupon ENGINEER will give written notice to OWNER and CONTRACTOR that the Work is acceptable subject to the provisions of paragraph 14.16. Otherwise, ENGINEER will return the Application to CONTRACTOR, indicating in writing the reasons for refusing to recommend final payment, in which case CONTRACTOR shall make the necessary corrections and resubmit the Application. Thirty days after presentation to OWNER of the Application and accompanying documentation, in appropriate form and substance, and with ENGINEER's recommendation and notice of acceptability, the amount recommended by ENGINEER will become due and will be paid by OWNER to CONTRACTOR.

14.14. If, through no fault of CONTRACTOR, final completion of the Work is significantly delayed and if ENGINEER so confirms, OWNER shall, upon receipt of CONTRACTOR's final Application for Payment and recommendation of ENGINEER, and without terminating the Agreement, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by OWNER for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if Bonds have been furnished as required in paragraph 5.1, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by CONTRACTOR to ENGINEER with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of claims.

Contractor's Continuing Obligation:

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

Waiver of Claims:

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

14.16.1. a waiver of all claims by OWNER against CONTRACTOR, except claims arising from unsettled Liens, from *defective* Work appearing after final inspection pursuant to paragraph 14.11 or from failure to comply with the Contract Documents or the terms of any special guarantees specified therein; however, it will not constitute a waiver by OWNER of any rights in respect of CONTRACTOR's continuing obligations under the Contract Documents; and

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

ARTICLE 15 – SUSPENSION OF WORK AND TERMINATION

Owner May Suspend Work:

15.1. OWNER may, at any time and without cause, suspend the Work or any portion thereof for a period of not more than ninety days by notice in writing to CONTRACTOR and ENGINEER which will fix the date on which Work will be resumed. CONTRACTOR shall resume the Work on the date so fixed. CONTRACTOR shall be allowed an increase in the Contract Price or an extension of the Contract Time, or both, directly attributable to any suspension if CONTRACTOR makes an approved claim therefor as provided in Articles 11 and 12.

Owner May Terminate:

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

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

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

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

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

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

15.2.6. if CONTRACTOR persistently fails to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the progress schedule established under paragraph 2.9 as revised from time to time);

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

15.2.8. if CONTRACTOR disregards the authority of ENGINEER; or

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

OWNER may, after giving CONTRACTOR (and the surety, if there be one) seven days' written notice and to the extent permitted by Laws and Regulations, terminate the services of CONTRACTOR, exclude CONTRACTOR from the site and take possession of the Work and of all CONTRACTOR's tools, appliances, construction equipment and machinery at the site and use the same to the full extent they could be used by CONTRACTOR (without liability to CONTRACTOR for trespass or conversion), incorporate in the Work all materials and equipment stored at the site or for which OWNER has paid CONTRACTOR but which are stored elsewhere, and finish the Work as OWNER may deem expedient. In such case CONTRACTOR shall not be entitled to receive any further payment until the Work is finished. If the unpaid balance of the Contract Price exceeds the direct, indirect and consequential costs of completing the Work (including but not limited to fees and charges of engineers, architects, attorneys and other professionals and court and arbitration costs) such excess will be paid to CONTRACTOR. If such costs exceed such unpaid balance, CONTRACTOR shall pay the difference to OWNER. Such costs incurred by OWNER will be approved as to reasonableness by ENGINEER and incorporated in a Change Order, but when exercising any rights or remedies under this paragraph OWNER shall not be required to obtain the lowest price for the Work performed.

15.3. Where CONTRACTOR's services have been so terminated by OWNER, the termination will not affect any rights or remedies of OWNER against CONTRACTOR then existing or which may thereafter accrue. Any retention or payment of moneys due CONTRACTOR by OWNER will not release CONTRACTOR from liability.

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

Contractor May Stop Work or Terminate:

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

ARTICLE 16 – ARBITRATION

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

arbitrate and any other agreement or consent to arbitrate entered into in accordance herewith as provided in this Article 16 will be specifically enforceable under the prevailing law of any court having jurisdiction.

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

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

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

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

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

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

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

ARTICLE 17 – MISCELLANEOUS

Giving Notice:

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

Computation of Time:

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

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

General:

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

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

ENGINEER thereunder, are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee or by other provisions of the Contract Documents, and the provisions of this paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right and remedy to which they apply. All representatives, warranties and guarantees made in the Contract Documents will survive final payment and termination or completion of the Agreement.

State and Local Fiscal Recovery Funds (SLFRF) Supplemental conditions for Contracts

Termination for cause or convenience

All contracts in excess of $10,000 must address termination for cause and for convenience by the non-Federal entity, including the manner by which it will be affected and the basis for settlement.

Equal Employment Opportunity

Any contract that uses federal funds to pay for construction work is a "federally assisted construction contract" and must include the equal opportunity clause found in 2 C.F.R. Part 200, unless otherwise stated in 41 C.F.R. Part 60. This contract provision is required for all procurements that meet the definition of a "federally assisted construction contract."

Required Language. The regulation at 41 C.F.R. Part 60-1.4(b) requires the insertion of the following contract clause.

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

(1) The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, sexual orientation, gender identity, 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, sexual orientation, gender identity, 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.

(2) 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 for employment without regard to race, color, religion, sex, sexual orientation, gender identity, or national origin.

(3) The contractor will not discharge or in any other manner discriminate against any employee or applicant for employment because such employee or applicant has inquired about, discussed, or disclosed the compensation of the employee or applicant or another employee or applicant. This provision shall not apply to instances in which an employee who has access to the compensation information of other employees or applicants as a part of such employee's essential job functions discloses the compensation of such other employees or applicants to individuals who do not otherwise have access to such information, unless such disclosure is in response to a formal complaint or charge, in furtherance of an investigation, proceeding, hearing, or action, including an investigation conducted by the employer, or is consistent with the contractor's legal duty to furnish information.

(4) 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 advising the said labor union or workers' representatives of the contractor's commitments under this section and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

(5) 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.

(6) 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 administering agency

and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

(7) 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 canceled, terminated, or suspended in whole or in part and the contractor may be declared ineligible for further Government contracts or federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided 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. (8) The contractor will include the portion of the sentence immediately preceding paragraph (1) and the provisions of paragraphs (1) through

(8) in every subcontract or purchase order unless exempted by rules, regulations, or 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 administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance:

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 administering agency, the contractor may request the United States to enter into such litigation to protect the interests of the United States.

The applicant further agrees that it will be bound by the above equal opportunity clause with respect to its own employment practices when it participates in federally assisted construction work: Provided, That if the applicant so participating is a State or local government, the above equal opportunity clause is not applicable to any agency, instrumentality or subdivision of such government which does not participate in work on or under the contract.

The applicant agrees that it will assist and cooperate actively with the administering agency and the Secretary of Labor in obtaining the compliance of contractors and subcontractors with the equal opportunity clause and the rules, regulations, and relevant orders of the Secretary of Labor, that it will furnish the administering agency and the Secretary of Labor such information as they may require for the supervision of such compliance, and that it will otherwise assist the administering agency in the discharge of the agency's primary responsibility for securing compliance.

The applicant further agrees that it will refrain from entering into any contract or contract modification subject to Executive Order 11246 of September 24, 1965, with a contractor debarred from, or who has not demonstrated eligibility for, Government contracts and federally assisted construction contracts pursuant to the Executive Order and will carry out such sanctions and penalties for violation of the equal opportunity clause as may be imposed upon contractors and subcontractors by the administering agency or the Secretary of Labor pursuant to Part II, Subpart D of the Executive Order. In addition, the applicant agrees that if it fails or refuses to comply with these undertakings, the administering agency may take any or all of the following actions: Cancel, terminate, or suspend in whole or in part this grant (contract, loan, insurance, guarantee); refrain from extending any further assistance to the applicant under the program with respect to which the failure or refund occurred until satisfactory assurance of future compliance has been received from such applicant; and refer the case to the Department of Justice for appropriate legal proceedings.

Davis-Bacon Act

U.S. Treasury exercised its federal authority outlining the requirements for water infrastructure projects executed using ARP funds. Therefore, the requirements for prevailing wages and rates slightly differs from the standards of Davis-Bacon. Individual projects less than $10 million dollars are not required to provide certification that prevailing wages and rates were followed. Individual projects of $10 million dollars or more require certification similar to Davis-Bacon and are outlined below. Please note that any project using other funding sources, like Community Development Block Grants or SRF loans, are subject to requirements for those

programs. When combining funding sources on a single and complete project or phase, other funding program requirements may trump the requirements for the use of ARP funds. We recommend Grantees and Project Owners discuss project requirements with TDEC when leveraging ARP funds with other funding programs to ensure all applicable rules and regulations are followed.

Individual Water Infrastructure Projects of $10 million dollars or more

(1) A recipient may provide a certification that, for the relevant project, all laborers and mechanics employed by contractors and subcontractors in the performance of such project are paid wages at rates not less than those prevailing, as determined by the U.S. Secretary of Labor in accordance with subchapter IV of chapter 31 of title 40, United States Code (commonly known as the "Davis-Bacon Act"), for the corresponding classes of laborers and mechanics employed on projects of a character similar to the contract work in the civil subdivision of the State (or the District of Columbia) in which the work is to be performed, or by the appropriate State entity pursuant to a corollary State prevailing-wage-in-construction law (commonly known as "baby Davis-Bacon Acts"). If such certification is not provided, a recipient must provide a project employment and local impact report detailing:
   a. The number of employees of contractors and sub-contractors working on the project;
   b. The number of employees on the project hired directly and hired through a third party;
   c. The wages and benefits of workers on the project by classification; and
   d. Whether those wages are at rates less than those prevailing. 19 Recipients must maintain sufficient records to substantiate this information upon request.

(2) A recipient may provide a certification that a project includes a project labor agreement, meaning a pre-hire collective bargaining agreement consistent with section 8(f) of the National Labor Relations Act (29 U.S.C. 158(f)). If the recipient does not provide such certification, the recipient must provide a project workforce continuity plan, detailing:
   a. How the recipient will ensure the project has ready access to a sufficient supply of appropriately skilled and unskilled labor to ensure high-quality construction throughout the life of the project, including a description of any required professional certifications and/or in-house training;
   b. How the recipient will minimize risks of labor disputes and disruptions that would jeopardize timeliness and cost-effectiveness of the project;
   c. How the recipient will provide a safe and healthy workplace that avoids delays and costs associated with workplace illnesses, injuries, and fatalities, including descriptions of safety training, certification, and/or licensure requirements for all relevant workers (e.g., OSHA 10, OSHA 30);
   d. Whether workers on the project will receive wages and benefits that will secure an appropriately skilled workforce in the context of the local or regional labor market; and
   e. Whether the project has completed a project labor agreement.

(3) Whether the project prioritizes local hires.

(4) Whether the project has a Community Benefit Agreement, with a description of any such agreement.

Suggested Language, if applicable. The following provides a sample contract clause:

   a. All transactions regarding this contract shall be done in compliance with the Davis-Bacon Act (40 U.S.C. 3141- 3144, and 3146-3148) and the requirements of 29C.F.R. pt. 5 as may be applicable. The contractor shall comply with 40 U.S.C. 3141-3144, and 3146-3148 and the requirements of 29 C.F.R. pt. 5 as applicable.
   b. b. Contractors are required to pay wages to laborers and mechanics at a rate not less than the prevailing wages specified in a wage determination made by the Secretary of Labor.
   c. c. Additionally, contractors are required to pay wages not less than once a week.

Copeland Anti-Kickback Act

The Copeland "Anti-Kickback" Act prohibits workers on construction contracts from giving up wages that they are owed. This requirement applies to all contracts for construction or repair work above $2,000 in situations where the Davis-Bacon Act also applies.

Suggested Language, if applicable. The following provides a sample contract clause:

a. a. Contractor. The contractor shall comply with 18 U.S.C. § 874, 40 U.S.C. § 3145, and the requirements of 29 C.F.R. pt. 3 as may be applicable, which are incorporated by reference into this contract.

b. b. Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clause above and 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 of these contract clauses.

c. c. Breach. A breach of the contract clauses above may be grounds for termination of the contract, and for debarment as a contractor and subcontractor as provided in 29 C.F.R. § 5.12."

Contract Work Hours and Safety Standards Act

Where applicable, all contracts awarded by the non-Federal entity in excess of $100,000 that involve the employment of mechanics or laborers must include a provision for compliance with 40 U.S.C. §§ 3702 and 3704, as supplemented by Department of Labor regulations at 29 C.F.R. Part 5. See 2 C.F.R. Part 200, Appendix II(E). Each contractor must be required to compute the wages of every mechanic and laborer on the basis of a standard work week of 40 hours.

Required Language. The following provides a sample contract clause:

Compliance with the Contract Work Hours and Safety Standards Act.

(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 paragraph (b)(1) of this section the contractor and any subcontractor responsible therefor 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 paragraph (b)(1) of this section, in the t $27 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 paragraph (b)(1) of this section.

(3) Withholding for unpaid wages and liquidated damages. The (write in the name of the Federal agency or the loan or grant recipient) 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 contractor, 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 paragraph (b)(2) of this section.

(4) Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth

in paragraph (b)(1) through (4) of this section 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 paragraphs (b)(1) through (4) of this section.

Clean Air Act and Federal Water Pollution Control Act

For contracts over $150,000, contracts must contain a provision requiring contractors to comply with the Clean Air Act and the Federal Water Pollution Control Act. If applicable, contracts must contain a provision that requires the contractor to agree to comply with all applicable standards, orders, or regulations issued pursuant to the Clean Air Act (42 U.S.C. §§ 7401-7671q.) and the Federal Water Pollution Control Act as amended (33 U.S.C. §§ 1251-1387).

Suggested Language. The following provides a sample contract clause.

Clean Air Act

(1) The contractor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act, as amended, 42 U.S.C. § 7401 et seq

(2) The contractor agrees to report each violation to the (name of subrecipient entering into the contract) and understands and agrees that the (name of the subrecipient entering into the contract) will, in turn, report each violation as required to assure notification to Treasury, and the appropriate Environmental Protection Agency Regional Office.

(3) The contractor agrees to include these requirements in each subcontract exceeding $150,000

Federal Water Pollution Control Act

(1) The contractor agrees to comply with all applicable standards, orders, or regulations issued pursuant to the Federal Water Pollution Control Act, as amended, 33 U.S.C. 1251 ets eq.

(2) The contractor agrees to report each violation to the (name of the subrecipient entering into the contract) and understands and agrees that the (name of the subrecipient entering into the contract) will, in turn, report each violation as required to assure notification to the Treasury, and the appropriate Environmental Protection Agency Regional Office.

(3) The contractor agrees to include these requirements in each subcontract exceeding $150,000

Debarment and Suspension

Non-federal entities, contractors and subcontractors are subject to debarment and suspension regulations. These regulations restrict awards, subawards, and contracts with certain parties that are debarred, suspended, or otherwise excluded from or ineligible for participation in Federal assistance programs and activities. In general, an "excluded" party cannot receive a Federal grant award or a contract within the meaning of a "covered transaction," to include subawards and subcontracts. The debarment and suspension clause is required for all contracts and subcontracts for $25,000 or more, all contracts that require the consent of an official of a federal agency, and all contracts for federally required audit services.

Suggested Language. The following provides a debarment and suspension clause. It incorporates an optional method of verifying that contractors are not excluded or disqualified.

Suspension and Debarment

(1) This contract is a covered transaction for purposes of 2 C.F.R. pt. 180 and 2 C.F.R. pt. 3000. As such, the contractor is required to verify that none of the contractor's principals (defined at 2 C.F.R. § 180.995) or its affiliates (defined at 2 C.F.R. § 180.905) are excluded (defined at 2 C.F.R. §

180.940) or disqualified (defined at 2 C.F.R. § 180.935).

(2) The contractor must comply with 2 C.F.R. pt. 180, subpart C and2 C.F.R. pt. 3000, subpart C, and must include a requirement to comply with these regulations in any lower tier covered transaction it enters into.

(3) This certification is a material representation of fact relied upon by (insert name of recipient/subrecipient/applicant). If it is later determined that the contractor did not comply with 2 C.F.R. pt. 180, subpart C and 2 C.F.R. pt. 3000, subpart C, in addition to remedies available to (insert name of recipient/subrecipient/applicant), the Federal Government may pursue available remedies, including but not limited to suspension and/or debarment.

(4) The bidder or proposer agrees to comply with the requirements of2 C.F.R. pt. 180, subpart C and 2 C.F.R. pt. 3000, subpart C while this offer is valid and throughout the period of any contract that may arise from this offer. The bidder or proposer further agrees to include a provision requiring such compliance in its lower tier covered transactions.

Byrd Anti-Lobbying Amendment

Contractors that apply or bid for a contract of $100,000 or more under a federal grant must file the required certification. This is also applicable to subcontractors of more than $100,000, must include a contract provision prohibiting the use of federal appropriated funds to influence officers or employees of the federal government. Contractors that apply or bid for a contract for more than $100,000 must also file the required certification regarding lobbying.

Suggested Language. The following provides a sample contract clause:

Byrd Anti-Lobbying Amendment, 31 U.S.C. § 1352

Contractors who apply or bid for an award of $100,000 or more shall file the required certification. Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, officer or employee of Congress, or an employee of a Member of Congress in connection with obtaining any Federal contract, grant, or any other award covered by 31 U.S.C. § 1352. Each tier shall also disclose any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award. Such disclosures are forwarded from tier to tier up to the recipient who in turn will forward the certification(s) to the awarding agency.

Procurement of Recovered Materials

A non-Federal entity that is a state agency or agency of a political subdivision of a state and its contractors must comply with section 6002 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act. The requirements of Section 6002 include procuring only items designated in guidelines of the Environmental Protection Agency (EPA) at 40 CFR part 247 that contain the highest percentage of recovered materials practicable, consistent with maintaining a satisfactory level of competition, where the purchase price of the item exceeds $10,000 or the value of the quantity acquired during the preceding fiscal year exceeded $10,000; procuring solid waste management services in a manner that maximizes energy and resource recovery; and establishing an affirmative procurement program for procurement of recovered materials identified in the EPA guidelines.

Suggested Language. The following provides a sample contract clause:

"In the performance of this contract, the Contractor shall make maximum use of products containing recovered materials that are EPA-designated items unless the product cannot be acquired competitively within a timeframe providing for compliance with the contract performance schedule; meeting contract performance requirements; or at a reasonable price.

Information about this requirement, along with the list of EPA-designated items, is available at EPA's Comprehensive Procurement Guidelines webpage.

The Contractor also agrees to comply with all other applicable requirements of Section 6002 of the Solid Waste Disposal Act."

Domestic Preference for Procurement

As appropriate, and to the extent consistent with law, NFEs should, to the greatest extent practicable under a federal award, provide a preference for the purchase, acquisition, or use of goods, products or materials produced in the United States. This includes, but is not limited to, iron, aluminum, steel, cement, and other manufactured products.

Suggested Language. The following provides a sample contract clause:

"Domestic Preference for Procurements

As appropriate, and to the extent consistent with law, the contractor should, to the greatest extent practicable, provide a preference for the purchase, acquisition, or use of goods, products, or materials produced in the United States. This includes, but is not limited to iron, aluminum, steel, cement, and other manufactured products.

For purposes of this clause:

Produced in the United States means, for iron and steel products, that all manufacturing processes, from the initial melting stage through the application of coatings, occurred in the United States. Manufactured products mean items and construction materials composed in whole or in part of non-ferrous metals such as aluminum; plastics and polymer-based products such as polyvinyl chloride pipe; aggregates such as concrete; glass, including optical fiber; and lumber."

Recommended Clauses

Access to Records

NFEs and their contractors and subcontractors must give the Department of Treasury and other authorized representatives access to records associated with their awards during the federally required record retention period and as long as the records are retained.

Suggested Language. The following provides a sample contract clause:

The following access to records requirements apply to this contract:

(1) The Contractor agrees to provide (insert name of state agency or local or Indian tribal government), (insert name of recipient), Treasury, the Comptroller General of the United States, or any of their authorized representatives access to any books, documents, papers, and records of the Contractor which are directly pertinent to this contract for the purposes of making audits, examinations, excerpts, and transcriptions.

(2) The Contractor agrees to permit any of the foregoing parties to reproduce by any means whatsoever or to copy excerpts and transcriptions as reasonably needed.

(3) The Contractor agrees to provide the Treasury or authorized representatives access to construction or other work sites pertaining to the work being completed under the contract.

Contract Changes or Modifications

To be eligible for ARP SLFRF assistance under the non-Federal entity's Treasury grant or cooperative agreement, the cost of the change, modification, change order, or constructive change must be allowable, allocable, within the scope of its grant or cooperative agreement, and reasonable for the completion of project scope.

Compliance with Federal Law, Regulations and Executive Orders

The recipient and its contractors are required to comply with all Federal laws, regulations, and executive orders.

Suggested Language. The following provides a sample contract clause:

"This is an acknowledgement that Treasury ARP SLFRF financial assistance will be used to fund all or a portion of the contract. The contractor will comply with all applicable Federal law, regulations, executive orders, Treasury policies, procedures, and directives."

Program Fraud and False or Fraudulent Statements or Related Acts

Recipients must comply with the requirements of The False Claims Act (31 U.S.C. §§ 3729-3733) which prohibits the submission of false or fraudulent claims for payment to the federal government. It is that the non-Federal entity include a provision in its contract that the contractor acknowledges that 31 U.S.C. Chap. 38 (Administrative Remedies for False Claims and Statements) applies to its actions pertaining to the contract.

Suggested Language. The following provides a sample contract clause:

"The Contractor acknowledges that 31 U.S.C. Chap. 38 (Administrative Remedies for False Claims and Statements) applies to the Contractor's actions pertaining to this contract."

Special Construction Conditions

Amendments to Construction Specifications and General Conditions

1. The contractor shall be responsible for furnishing all labor, materials, equipment, signing (including road signs and barricades), flagging operation personnel and traffic control devices as required by U.S. Department of Transportation " Standards and Guides for Traffic Controls for Street and Highway Construction, Maintenance, Utility an Incident Management Operations".

2. The contractor shall control the stockpiling of materials and or spoil piles so as not to prohibit access to residences or businesses. Lighted, reflectorized plastic drums shall be provided around any and all materials and/or hazardous locations within the project limits and within the county and state rights of way.

3. A minimum of one 11-foot travel lane must be maintained at all times on public roads. All travel lanes must be open at the end of the workday. No road or lane shall be left closed at the end of the workday without the express written permission of the Owner and the Road Superintendent.

4. The locations of the existing utilities on the plans are approximate only. The contractor is responsible for determining the exact location by contacting the local utility company. The contractor is to verify the actual location of existing underground utilities prior to commencing excavation operations. The contractor shall be responsible for repairing or replacing any damaged utilities without any cost to the owner or engineer.

5. The contractor shall perform all of the work specified herein under the general direction and to the entire satisfaction, approval, and acceptance of the engineer. The engineer shall decide all questions relating to measurements of quantities, the character of the work performed and as to whether the rate of the progress will insure completion within the contract time. The engineer will solely decide all questions as to the meaning or intent of the specifications and he shall have the authority to stop the work if necessary to insure its proper execution.

6. The contractor shall be responsible for the storage and disposal of all materials cleaned from the project. Storage and disposal of such material shall be incidental to manhole rehabilitation and shall be in accordance with State and Federal regulations.

7. All surfaces and fences removed or damaged or disturbed by the contractor in the work areas shall be restored to the condition in which they existed prior to commencement of the work at no additional cost to the owner.

8. All Roadway cuts must be backfilled and repaved in the same day as the open cut is made. Road crossings, and paved or concrete driveway crossings will be required to be backfilled entirely with crushed stone backfill. The contractor will not be paid for the additional backfill stone as a separate item. The contractor shall include the cost for the stone in his or her road or driveway crossing unit price.

9. The contractor shall be responsible for resetting any property corner pins that are damaged or removed during construction with a registered land surveyor.

10. The contractor shall be responsible for removing any and all structures necessary for construction. The contractor will maintain ownership of these structures unless the owner indicates they will maintain ownership. The cost for removal of these structures will not be measured and paid for separately, but should be included in the mobilization/demobilization line item.

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Contractor's Application for Payment No. _____

	Application Period:	Application Date:
To (Owner):	From (Contractor):	Via (Engineer):
Project:	Contract:	
Owner's Contract No.:	Contractor's Project No.:	Engineer's Project No.:

Application For Payment

Change Order Summary

Approved Change Orders		
Number	Additions	Deductions
TOTALS		
NET CHANGE BY CHANGE ORDERS		

1.	ORIGINAL CONTRACT PRICE	$ _____
2.	Net change by Change Orders	$ _____
3.	Current Contract Price (Line 1 ± 2)	$ _____
4.	TOTAL COMPLETED AND STORED TO DATE (Column F total on Progress Estimates)	$ _____
5.	RETAINAGE:	
	a. _____ Work Completed	$ _____
	b. _____ Stored Material	$ _____
	c. Total Retainage (Line 5.a + Line 5.b)	$ _____
6.	AMOUNT ELIGIBLE TO DATE (Line 4 - Line 5.c)	$ _____
7.	LESS PREVIOUS PAYMENTS (Line 6 from prior Application)	$ _____
8.	AMOUNT DUE THIS APPLICATION	$ _____
9.	BALANCE TO FINISH, PLUS RETAINAGE (Column G total on Progress Estimates + Line 5.c above)	$ _____

Contractor's Certification

The undersigned Contractor certifies, to the best of its knowledge, the following:
(1) All previous progress payments received from Owner on account of Work done under the Contract have been applied on account to discharge Contractor's legitimate obligations incurred in connection with the Work covered by prior Applications for Payment;
(2) Title to all Work, materials and equipment incorporated in said Work, or otherwise listed in or covered by this Application for Payment, will pass to Owner at time of payment free and clear of all Liens, security interests, and encumbrances (except such as are covered by a bond acceptable to Owner indemnifying Owner against any such Liens, security interest, or encumbrances); and
(3) All the Work covered by this Application for Payment is in accordance with the Contract Documents and is not defective.

Contractor Signature

By:	Date:

Payment of: $ _____
(Line 8 or other - attach explanation of the other amount)

is recommended by: _____ _____
(Engineer) (Date)

Payment of: $ _____
(Line 8 or other - attach explanation of the other amount)

is approved by: _____ _____
(Owner) (Date)

Approved by: _____ _____
Funding or Financing Entity (if applicable) (Date)

Progress Estimate - Unit Price Work | **Contractor's Application**

For (Contract):	Application Number:
Application Period:	Application Date:

A					B	C	D	E	F		
Item		Contract Information									
Bid Item No.	Description	Item Quantity	Units	Unit Price	Total Value of Item ($)	Estimated Quantity Installed	Value of Work Installed to Date	Materials Presently Stored (not in C)	Total Completed and Stored to Date (D + E)	% (F / B)	Balance to Finish (B - F)
	Totals										

Stored Material Summary

Contractor's Application

For (Contract):								Application Number:			
Application Period:								Application Date:			
A		B	C		D		E		F		G
Bid Item No.	Supplier Invoice No.	Submittal No. (with Specification Section No.)	Storage Location	Description of Materials or Equipment Stored	Stored Previously: Date Placed in Storage (Month/Year)	Stored Previously: Amount ($)	Amount Stored this Month ($)	Subtotal Amount Completed and Stored to Date (D + E)	Incorporated in Work: Date (Month/Year)	Incorporated in Work: Amount ($)	Materials Remaining in Storage ($) (D + E - F)
				Totals							

NOT FOR BID

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Change Order No. _____

Date of Issuance:	Effective Date:
Owner:	Owner's Contract No.:
Contractor:	Contractor's Project No.:
Engineer:	Engineer's Project No.:
Project:	Contract Name:

The Contract is modified as follows upon execution of this Change Order:

Description:

Attachments: *[List documents supporting change]*

CHANGE IN CONTRACT PRICE	CHANGE IN CONTRACT TIMES *[note changes in Milestones if applicable]*
Original Contract Price: $_____	Original Contract Times: Substantial Completion: _____ Ready for Final Payment: _____ days or dates
[Increase] [Decrease] from previously approved Change Orders No. __ to No. __: $_____	[Increase] [Decrease] from previously approved Change Orders No. __ to No. __: Substantial Completion: _____ Ready for Final Payment: _____ days
Contract Price prior to this Change Order: $_____	Contract Times prior to this Change Order: Substantial Completion: _____ Ready for Final Payment: _____ days or dates
[Increase] [Decrease] of this Change Order: $_____	[Increase] [Decrease] of this Change Order: Substantial Completion: _____ Ready for Final Payment: _____ days or dates
Contract Price incorporating this Change Order: $_____	Contract Times with all approved Change Orders: Substantial Completion: _____ Ready for Final Payment: _____ days or dates

RECOMMENDED:	ACCEPTED:	ACCEPTED:
By: _____	By: _____	By: _____
Engineer (if required)	Owner (Authorized Signature)	Contractor (Authorized Signature)
Title: _____	Title _____	Title _____
Date: _____	Date _____	Date _____

Approved by Funding Agency (if applicable)

By: _____ Date:

Title: _____

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NOTICE OF AWARD

Date of Issuance:

Owner: Owner's Contract No.:

Engineer: Engineer's Project No.:

Contract Name:

Project:

Bidder:

Bidder's Address:

TO BIDDER:

You are notified that Owner has accepted your Bid dated _____, for the above Contract, and that you are the Successful Bidder and are awarded a Contract for

_____.

The Contract Price of the awarded Contract is: $_____

Unexecuted counterparts of the Agreement accompany this Notice of Award, and one copy of the Contract Documents accompanies this Notice of Award or has been transmitted or made available to Bidder electronically.

One set of the Drawings will be delivered separately from the other Contract Documents.

You must comply with the following conditions precedent within 15 days of the date of receipt of this Notice of Award:

1. Deliver performance and payment bonds and insurance documentation as specified in the Instructions to Bidders and General Conditions, Articles 2 and 6.
2. Other conditions precedent: None

Failure to comply with these conditions within the time specified will entitle Owner to consider you in default, annul this Notice of Award, and declare your Bid security forfeited.

Within ten days after you comply with the above conditions, the Owner will return to you one fully executed counterpart of the Agreement, together with any additional copies of the Contract Documents as indicated in Paragraph 2.02 of the General Conditions.

Owner:

By:

Title:

Copy: Engineer

Notice to Proceed

Dated:

Project::	Owner:	Owner's Contract No.:
Contract:		Engineer's Project No.:
Contractor:		
Contractor's Address:		

You are notified that the Contract Times under the above contract will commence to run on _____. On or before that date, you are to start performing your obligations under the Contract Documents. In accordance with Article 4 of the Agreement, the date of Substantial Completion is _____, and the date of readiness for final payment is _____ or the number of days to achieve Substantial Completion is _____, and the number of days to achieve readiness for final payment is _____.

Before you may start any Work at the Site, Paragraph 2.01.B of the General Conditions provides that you and Owner must each deliver to the other (with copies to Engineer and other identified additional insureds) certificates of insurance which each is required to purchase and maintain in accordance with the Contract Documents.

Also, before you may start any Work at the Site, you must:

_____

_____

_____

_____

Owner

Given by:

_____

Authorized Signature

_____

Title

_____

Date

Copy to Engineer

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CERTIFICATE OF SUBSTANTIAL COMPLETION

Owner:	Owner's Contract No.:
Contractor:	Contractor's Project No.:
Engineer:	Engineer's Project No.:
Project:	Contract Name:

This [preliminary] [final] Certificate of Substantial Completion applies to:

☐ All Work ☐ The following specified portions of the Work:

Date of Substantial Completion

The Work to which this Certificate applies has been inspected by authorized representatives of Owner, Contractor, and Engineer, and found to be substantially complete. The Date of Substantial Completion of the Work or portion thereof designated above is hereby established, subject to the provisions of the Contract pertaining to Substantial Completion. The date of Substantial Completion in the final Certificate of Substantial Completion marks the commencement of the contractual correction period and applicable warranties required by the Contract.

A punch list of items to be completed or corrected is attached to this Certificate. This list may not be all-inclusive, and the failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract.

The responsibilities between Owner and Contractor for security, operation, safety, maintenance, heat, utilities, insurance, and warranties upon Owner's use or occupancy of the Work shall be as provided in the Contract, except as amended as follows: *[Note: Amendments of contractual responsibilities recorded in this Certificate should be the product of mutual agreement of Owner and Contractor; see Paragraph 15.03.D of the General Conditions.]*

Amendments to Owner's responsibilities: ☐ None ☐ As follows

Amendments to Contractor's responsibilities: ☐ None ☐ As follows:

The following documents are attached to and made a part of this Certificate: *[punch list; others]*

This Certificate does not constitute an acceptance of Work not in accordance with the Contract Documents, nor is it a release of Contractor's obligation to complete the Work in accordance with the Contract.

EXECUTED BY ENGINEER:	RECEIVED:	RECEIVED:
By: _____ (Authorized signature)	By: _____ Owner (Authorized Signature)	By: _____ Contractor (Authorized Signature)
Title: _____	Title: _____	Title: _____
Date: _____	Date: _____	Date: _____

USDA
Form RD 1924-10
(Rev. 1-98)

Form Approved
OMB No. 0575-0042

RELEASE BY CLAIMANTS

The undersigned, having received payment in full for all labor, materials, supplies, or equipment supplied to _____, Contractor, or to any subcontractor, in the construction or repair of the improvements upon the property located at:

_____

_____

_____ , and furnished in the execution and fulfillment of contract between said Contractor and _____ Owner, dated _____, do (does) hereby release and waive any and all claims, liens, and lien rights, of any kind, nature, or description whatsoever, against said property and the Owner thereof, and against said Contractor.

Lien or Claimant	*Work or Materials*	*Amount*	*Date*

WEATHER DELAYS

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. Standards set for weather delays.

B. Procedures for claim submittals.

1.02 RELATED REQUIREMENTS

A. Document 00700 – General Conditions, Article 12.

1.03 EXTENSION OF CONTRACT TIME

A. If the basis exists for an extension of time in accordance with Article 12 of the General Conditions, then an extension of time on the basis of weather may be granted only for the number of weather delay days in excess of the number of weather days listed as the Standard Baseline for that month.

1.04.1 STANDARD BASELINE FOR AVERAGE CLIMATIC RANGE

A. The Engineer has reviewed weather data available from the National Oceanic and Atmospheric Administration and determined a Standard Baseline of average climatic range for the Knoxville area of Tennessee.

B. The Standard Baseline shall be regarded as the normal and anticipated number of calendar days for each month during which construction activity shall be expected to be prevented and suspended by cause of adverse weather. Suspension of construction activity for the number of days each month as listed in the Standard Baseline is to be included in the work and not eligible for an extension of the contract time.

C. The Standard Baseline is as follows:

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
12	11	13	11	11	10	10	9	8	8	10	11

1.05 ADVERSE WEATHER AND WEATHER DELAY DAYS

A. Adverse weather is defined as the occurrence of one or more of the following conditions which prevents only exterior construction activity or access to the site within a 24-hour period:

1. Precipitation (rain, snow, or ice) in excess of one-tenth inch (0.10") liquid measure.
2. Temperatures which do not rise above 32 degrees F by 10:00 AM.
3. Standing snow in excess of one inch (1.00").

B. Adverse weather may include, if appropriate, "dry-out" or "mud" days when all of the following conditions are met:

1. For rain above the Standard Baseline.
2. Only if there is a hindrance to site access or site work, such as excavation, backfill, and footings.
3. At a rate no greater than 1 make-up day for each day or consecutive days of rain beyond the Standard Baseline that total 1.0 inch or more, liquid measure, unless specifically recommended otherwise by the A/E.

C. A weather delay day may be counted only if adverse weather prevents work on the project for 50 percent or more of the Contractor's scheduled work day, including a weekend day or holiday if the Contractor has scheduled construction activity that day.

1.06 DOCUMENTATION AND SUBMITTALS

A. Maintain Daily Jobsite Work Log showing which and to what extent construction activities have been affected by weather on a monthly basis.

B. Maintain a rain gauge, thermometer, and clock at the jobsite. Keep daily records of precipitation, temperature, and the time of each occurrence throughout the project.

C. Use the Standard Baseline data provided in this section when documenting actual delays due to weather in excess of the average.

D. Organize claim and documentation to facilitate evaluation on a basis of calendar month periods, and submit in accordance with the procedures for claims established in Article 12 of the General Conditions.

E. If an extension of the contract time is appropriate, it shall be effected in accordance with the provisions of Article 12 of the General Conditions.

F. No extra cost will be incurred by the Owner for any extra time increase to the Contract.

PART 2 PRODUCTS

A. Not Applicable

PART 3 EXECUTION

A. Not Applicable

END OF SECTION

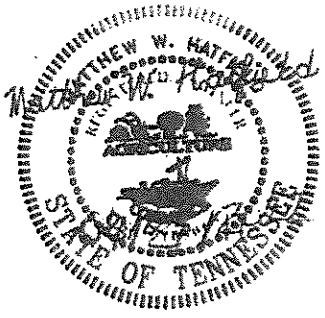
TOWN OF BEAN STATION

785 Main Street, Bean Station, TN 37708
Tel: (865) 993-3177

SANITARY SEWER CONSTRUCTION SPECIFICATIONS

NOT FOR BID

Approved: Ben Waller, Mayor Updated: 4/7/23



PREFACE

These Standard Specifications have been prepared to complement the Standard Detail Drawings and to provide the qualitative requirements for products, materials and workmanship for construction of additions and replacements to the wastewater system which are owned and operated by the Town of Bean Station. These Standard Specifications are only to be used for projects with Drawings which have been approved by the Tennessee Department of Environment and Conservation as prepared by the Town of Bean Station, its design consultant, or by a developer's engineer, whose Drawings must first be approved by the Town of Bean Station and reviewed and approved by Hatfield & Allen Associates. All references in these Standard Specifications to "Engineer" and "Owner" shall mean Hatfield & Allen, Associates and the Town of Bean Station. These Standard Specifications are subject to revision for a specific project, with such revisions identified in the Bidding Requirements and Special Conditions document prepared by Town of Bean Station or its design consultant, or with such revisions noted on the Drawings approved by the Town of Bean Station.

All work requirements described in the Standard Specifications is the responsibility of the Contractor, unless specifically designated.

STANDARD SPECIFICATIONS

Division 1 – General Construction Requirements

Section	Title
01001	General Utility Construction Requirements
01002	Certificate of Completion and Warranty
01003	State of Tennessee Construction Start Notifications

Division 2 - Sitework

Section	Title
02001	Clearing and Grubbing
02002	Soil Erosion and Sediment Control
02003	Trench Excavation and Backfill
02004	Bore and Jack Casings
02005	Removing and Replacing Pavement
02006	Sanitary Sewers and Appurtenances
02007	Valves and Appurtenances
02008	Packaged Submersible Sewage Pump Stations
02009	Grinder Pump Stations

STANDARD DETAIL DRAWINGS

Sheet 1	Silt Fence Detail
Sheet 2	Concrete Encasement Detail
Sheet 3	Trench Terminology Detail
Sheet 4	Concrete Replacement Detail
Sheet 5	Asphalt Replacement Detail
Sheet 6	Pipe Bedding and Haunching Details
Sheet 7	Creek Crossing Detail
Sheet 8	River Rock Backfill Detail
Sheet 9	Thrust Block Detail
Sheet 10	Concrete Blocking for Valves Details
Sheet 11	Gate Valve Detail
Sheet 12	Standard Manhole Plan View Detail
Sheet 13	Standard Manhole Profile View Detail
Sheet 14	Manhole Lid Detail
Sheet 15	Manhole Steps Detail
Sheet 16	Sewer Cleanout Detail
Sheet 17	Sewer Service Connection
Sheet 18	Sewer Water Stop

Town of Bean Station

Owner/Contractor Utility Construction Requirements

1. The Owner/Developer/Contractor shall adhere strictly to the construction specifications and details here within unless given prior written approval from the Town of Bean Station to deviate from the construction specifications and details.

2. The utility construction plans shall be prepared by a State of Tennessee registered professional engineer and reviewed and approved by town engineer and the Town of Bean Station.

3. The utility construction plans shall be submitted, reviewed and approved by the State of Tennessee Department of Environment & Conservation prior to installation. The Owner/Developer shall provide a copy of the State of Tennessee approval letter and stamped plans to the Town of Bean Station before construction shall begin.

4. The Owner/Developer/Contractor shall notify the Town of Bean Station in writing a minimum of 7-calendar days prior to beginning construction and attend a preconstruction meeting.

5. The Owner/Developer/Contractor shall complete and mail/fax the State of Tennessee "Construction Start Notification" to the Tennessee Department of Environment & Conservation a minimum of 7-calendar days prior to beginning construction.

6. The Owner/Developer/Contractor shall provide the owner with three paper copies of the construction plans and one electronic copy (CADD) of the construction plans on an external hard drive or other acceptable media device.

7. The Town of Bean Station will provide a construction inspector during all trenching, pipe and valve installation, and pressure testing. The cost of the inspection services will be based on the current hourly rate for construction inspection services and shall be paid by the Owner and/or Developer. An estimate of the construction inspection cost will be provided to the Owner/Developer/Contractor.

8. The utility installation contractor shall be a State of Tennessee licensed general contractor with a MU (municipal utility) classification. The contractor shall provide the Town of Bean Station with a copy of the contractor's license prior to beginning construction. Additionally, the Superintendent of the Town of Bean Station may require job experience references if unfamiliar with the construction contractor.

9. The utility installation contractor shall have a minimum of $1,000,000 of general liability insurance. The contractor shall provide the Town of Bean Station with a copy of the contractor's insurance certificate prior to beginning construction.

10. Upon completion of construction the Owner/Developer/Contractor shall sign and submit the "Construction Approval Form" and the "1 Year Construction Warranty Form" to the Town of Bean Station for Town review and approval.

11. The Owner/Developer/Contractor shall be required to pay the monthly electricity bill and all required maintenance during the first-year warranty period for any pump station installations.

12. New pump stations will be required to provide SCADA control interfaces and alarms that will interface with the existing Town of Bean Station SCADA system. The Owner/Developer/Contractor will be responsible for ensuring this interface compatibility with the Town of Bean Station before purchasing the new pump station.

13. The current standard plan review fee made payable to Town of Bean Station must be submitted with the associated construction plans. Any revised plans/submittals shall be billed at fee from engineer.

NOT FOR BID

CERTIFICATE OF COMPLETION & WARRANTY

PROJECT #:	DATE:
PROJECT NAME:	
CONTRACTOR:	

This Certificate of Completion applies to:

All work under the Contract Documents and Plans and the following specified specified portions:

*The work to which this certificate applies has been inspected by Town of Bean Station representatives and found to be complete. The Date of Completion of the project or portion designated above is the date of commencement of applicable warranties required by the Contract Documents, except as stated below.

A list of items to be completed or corrected is attached. This list may not be all-inclusive, and the failure to include any items on such list does not alter the responsibility of the Contractor to complete all work in accordance with the Contract Documents.

The responsibilities between OWNER and CONTRACTOR or DEVELOPER for security, operations, safety, maintenance, utilities, insurance and warranties shall be as provided in the Contract Documents except as amended as follows:

? Amended Responsibilities ? Not Amended

Owner's Amended Responsibilities:

Contractor/Developer's Amended Responsibilities:

*Project construction cost (attach invoices/statement):

The following documents are attached to and made part of this Certificate:

This Certificate constitutes an acceptance of work in accordance with the Contract Documents and Plans. The Contractor/Developer 1-year warranty shall begin from the date of acceptance by the Town of Bean Station. Finally, the Developer will repair, replace or re-compensate the the Town of Bean Station for 100 % of any and all expenses related to the repair or replacement of any materials or workmanship deemed defective by the Town of Bean Station pertaining to or affected by this project. Additionally it will be at the sole discretion of the Town of Bean Station to decide the extent of any repairs or material replacements required under the one year warranty as well as which entity will perform the said repairs and/or material.

Owner's Authorized Signature:	Date:
Contractor/Developer's Authorized Signature:	Date:

CONSTRUCTION START NOTIFICATION

INSTRUCTIONS: **WHEN THE CONSTRUCTION START DATE FOR A PROJECT IS KNOWN, COMPLETE THIS FORM AND EMAIL, MAIL OR FAX TO:**

Robert Ramsey
Knoxville Field Office
Division of Water Resources
3711 Middlebrook Pike
Knoxville TN 37921
Fax: (865) 594-6105
Email Address: robert.ramsey@tn.gov

Water System - _____

County - _____

Project Name - _____

DW Project Number - _____

Start Construction Date - _____

Estimated Completion - _____

Will this project require interruption of water service? _____ **Yes**
_____ **No**

Number of Customers Affected _____

Part 1 General

1.01 Scope

A. The Work under this Section includes furnishing all labor, equipment and materials, and performing all operations in connection with Clearing and Grubbing. Clearing and grubbing includes, but is not limited to, removing from the Project site, trees, stumps, roots, brush, structures, abandoned utilities, trash, debris and all other materials found on or near the surface of the ground in the construction area and understood by generally accepted engineering practice not to be suitable for construction of the type contemplated. Precautionary measures that prevent damage to existing features to remain are part of the Work.

B. Clearing and grubbing operations shall be coordinated with temporary and permanent erosion and sedimentation control procedures.

1.02 Quality Assurance

A. The Contractor shall comply with applicable codes, ordinances, rules, regulations and laws of local, municipal, state or federal authorities having jurisdiction over the Project. All required permits of a temporary nature shall be obtained for construction operations by the Contractor.

B. Open burning, if allowed, shall first be permitted by the local authority having jurisdiction. The Contractor shall notify the local fire department and abide by fire department restrictions.

1.03 Job Conditions

Location of the Work: The area to be cleared and grubbed is shown schematically on the Drawings or specified below. It includes all areas designated for construction.

Part 2 Products

2.01 Equipment

The Contractor shall furnish equipment of the type normally used in clearing and grubbing operations including, but not limited to, tractors, trucks and loaders.

Part 3 Execution

3.01 Scheduling of Clearing

A. The Contractor shall clear at each construction site only that length of the right-of-way, permanent or construction easement which would be the equivalent of

one month's pipe laying. This length shall be determined from the Contractor's Progress Schedule.

B. The Town may permit clearing for additional lengths of the pipeline provided that temporary erosion and sedimentation controls are in place and a satisfactory stand of temporary grass is established. Should a satisfactory stand of grass not be possible, no additional clearing shall be permitted beyond that specified above.

C. A satisfactory stand of grass shall have no bare spots larger than one square yard. Bare spots shall be scattered and the bare area shall not comprise more than one percent of any given area.

3.02 Clearing and Grubbing

A. Clear and grub as required on each side of the pipeline before excavating. Remove all trees, growth, debris, stumps and other objectionable matter. Clear the construction easement or road right-of-way only if necessary.

B. Grubbing shall consist of completely removing roots, stumps, trash and other debris from all graded areas so that topsoil is free of roots and debris. Topsoil is to be left sufficiently clean so that further picking and raking will not be required.

C. All stumps, roots, foundations and planking embedded in the ground shall be removed and disposed of. Piling and butts of utility poles shall be removed to a minimum depth of two feet below the limits of excavation for structures, trenches and roadways or two feet below finish grade, whichever is lower.

D. Landscaping features shall include, but are not necessarily limited to, fences, cultivated trees, cultivated shrubbery, property corners, man-made improvements, subdivision and other signs within the right-of-way and easement. The Contractor shall take extreme care in moving landscape features and promptly re-establishing these features.

E. Surface rocks and boulders shall be grubbed from the soil and removed from the site if not suitable as rip-rap.

F. Where the tree limbs interfere with utility wires, or where the trees to be felled are in close proximity to utility wires, the tree shall be taken down in sections to eliminate the possibility of damage to the utility.

G. Any work pertaining to utility poles shall comply with the requirements of the appropriate utility.

H. All fences adjoining any excavation or embankment that, in the Contractor's opinion, may be damaged or buried, shall be carefully removed, stored and replaced. Any fencing that, in the Town's opinion, is significantly damaged shall be replaced with new fence material.

I. The Contractor shall exercise special precautions for the protection and preservation of trees, cultivated shrubs, sod, fences, etc. situated within the limits of the construction area but not directly within excavation and/or fill limits. The Contractor shall be held liable for any damage the Contractor's operations have inflicted on such property.

J. The Contractor shall be responsible for all damages to existing improvements resulting from Contractor's operations.

3.03 Disposal of Debris

A. The debris resulting from the clearing and grubbing operation shall be hauled to a disposal site secured by the Contractor and shall be disposed of in accordance with all requirements of federal, state, county and municipal regulations. No debris of any kind shall be deposited in any stream or body of water, or in any street or alley. No debris shall be deposited upon any private property except with written consent of the property owner. A copy of written consent shall be provided to the Owner for permanent records. In no case shall any material or debris be left on the Project, shoved onto abutting private properties or buried on the Project.

B. When approved in writing by the Owner and when authorized by the proper authorities, the Contractor may dispose of such debris by burning on the Project site provided all requirements set forth by the governing authorities are met. The authorization to burn shall not relieve the Contractor in any way from damages, which may result from Contractor's operations. On easements through private property, the Contractor shall not burn on the site unless written permission is also secured from the property owner, in addition to authorization from the proper authorities.

END OF SECTION

Part 1 General

1.01 Scope

A. The work specified in this Section consists of providing, maintaining and removing temporary erosion and sedimentation controls.

B. Temporary erosion controls, include, but are not limited to, grassing, mulching, watering and reseeding on-site surfaces and spoil and borrow area surfaces, and providing interceptor ditches at ends of berms and at those locations which will ensure that erosion during construction will be either eliminated or maintained within acceptable limits as established by the Federal Clean Water Act of 1987, as amended. The Contractor should follow the Tennessee Erosion and Sedimentation Control Handbook.

C. Temporary sedimentation controls include, but are not limited to, silt dams, traps, barriers, filter stone and appurtenances at the foot of sloped surfaces which will ensure that sedimentation pollution will be either eliminated or maintained within acceptable limits as established by the Federal Clean Water Act of 1987, as amended.

D. Basic Principles

1. Conduct the earthwork and excavation activities in such a manner to fit the topography, soil type and condition.

2. Minimize the disturbed area and the duration of exposure to erosion elements.

3. Stabilize disturbed areas immediately.

4. Safely convey run-off from the site to an outlet such that erosion will not be increased off site.

5. Retain sediment on site that was generated on site.

6. Minimize encroachment upon watercourses.

E. Temporary Erosion and Sedimentation Control: In general, temporary erosion and sedimentation control procedures shall be directed toward:

1. Preventing soil erosion at the source.

2. Preventing silt and sediment from entering any waterway if soil erosion cannot be prevented.

3. Preventing silt and sediment from migrating downstream in the event it cannot be prevented from entering the waterway.

F. Permanent Erosion Control: Permanent erosion control measures shall be implemented to prevent sedimentation of the waterways and to prevent erosion of the Project site.

1.02 Quality Assurance

A. General: Perform all work under this Section in accordance with all pertinent rules and regulations including, but not necessarily limited to, those stated above and these Specifications.

B. Conflicts: Where provisions of pertinent rules and regulations conflict with these Specifications, the more stringent provisions shall govern.

1.03 Permits

A. When area of disturbance for the entire project is greater than 1 acre, a NPDES Storm Water Construction Permit must be obtained from TDEC.

Part 2 Products

2.01 Temporary Erosion and Sedimentation Control

A. Silt Fence

1. Silt fence shall be polymer type netting with a built-in cord running throughout the top edge of the fabric. Posts shall be either steel or pressure treated fir, southern pine or hemlock and shall be spaced not more than six feet on center. Silt fence shall be provided with netting to provide reinforcing when necessary. Silt fence shall have an Equivalent Opening Size (EOS) of 40 to 100. Silt fence fabric shall have a maximum permeability of 40 gallons per square foot.

2. Silt fence fabric shall be Mirafi 100X, Amoco 1380 or Exxon GTF-100 Series.

B. Hay bales shall be clean, seed free cereal hay type.

C. Netting shall be 1/2-inch, galvanized steel, chicken wire mesh.

2.02 Stone Rip-Rap

Use sound, tough, durable stones resistant to the action of air and water. Slabby or shaley pieces will not be acceptable. Specific gravity shall be 2.0 or greater. Rip-rap shall have less than 66 percent wear when tested in accordance with AASHTO T-96. Rip-rap shall be in accordance with Section 709 of the Tennessee Department of Transportation Standard Specifications.

2.03 Filter Fabric

A. The filter fabric for use under rip-rap shall be a monofilament, polypropylene woven fabric meeting the specifications as established by Task Force 25 for the Federal Highway Administration. The filter fabric shall have an equivalent opening size (EOS) of 70.

B. Filter fabric under rip-rap shall be Mirafi, Amoco or Exxon.

Part 3 Execution

3.01 General

A. Standards: Provide all materials and promptly take all actions necessary to achieve effective erosion and sedimentation control in accordance with the Federal Clean Water Act of 1987, as amended, local enforcing agency guidelines and these Specifications.

B. Implementation: The Contractor shall have the responsibility to actively take all steps necessary to control soil erosion and sedimentation.

3.02 Temporary Erosion and Sedimentation Control

A. Temporary erosion and sedimentation control procedures should be initially directed toward preventing silt and sediment from entering the waterways. The preferred method is to provide an undisturbed natural buffer, extending a minimal five feet from the water, to filter the run-off. Should this buffer prove infeasible due to construction activities being too close to the water, or if the amount of sediment overwhelms the buffer, the Contractor shall place silt fences to filter the run-off and, if necessary, place permanent rip-rap to stabilize the bank.

B. Silt dams, silt fences, traps, barriers, check dams, appurtenances and other temporary measures and devices shall be installed as indicated on the approved plans and working drawings, shall be maintained until no longer needed, and shall then be removed. Deteriorated hay bales and dislodged filter stone shall be replaced with new materials.

C. Where permanent grassing is not appropriate, and where the Contractor's temporary erosion and sedimentation control practices is inadequate, the Town may direct the Contractor to provide temporary vegetative cover with fast growing seedings.

D. All erosion and sedimentation control devices, including check dams, shall be inspected by the Contractor at least weekly and after each rainfall occurrence and cleaned out and repaired by the Contractor as necessary.

E. Temporary erosion and sedimentation control devices shall be installed and maintained from the initial land disturbance activity until the satisfactory completion

and establishment of permanent erosion control measures. At that time, temporary devices shall be removed.

3.03 Permanent Erosion Control

A. Permanent erosion control shall include:

1. Restoring the work site to its original contours, unless shown otherwise on the Drawings or directed by the Town.

2. Permanent vegetative cover shall be performed in accordance with "Grassing" of this Section.

B. Permanent erosion control measures shall be implemented as soon as practical after the completion of pipe installation or land disturbance for each segment of the Project. In no event shall implementation be postponed when no further activities related to pipe installation will impact that portion or segment of the Project. Partial payment requests may be withheld for those portions of the Project not complying with this requirement.

3.04 Grassing

A. General

1. All references to grassing, unless noted otherwise, shall relate to establishing permanent vegetative cover as specified herein for seeding, fertilizing, mulching, etc.

2. When final grade has been established, all bare soil, unless otherwise required by the Contract Documents, shall be seeded, fertilized and mulched in an effort to restore to a protected condition. Critical areas shall be sodded as approved or directed by the Town.

3. Specified permanent grassing shall be performed at the first appropriate season listed below following establishment of final grading in each section of the site.

Times of Sowing and Seed Mixtures Required	
February 1 - September 1	Group A Only
September 1 - December 1	Group B Only
December 1 - February 1	Do Not Sow Any Seeds

B. Materials

1. Topsoil: Natural, fertile, agricultural soil typical of the locality, capable of

sustaining vigorous plant growth, from a well drained site free of flooding, not in frozen or muddy condition, not less than six percent organic matter, and pH value of 5.9 to 7.0. Free from subsoil, slag, clay, stones, lumps, live plants, roots, sticks, crabgrass, couch grass, noxious weeds, and foreign matter.

2. Peatmoss: Horticultural grade Class A decomposed plant material, elastic and homogeneous. Free of decomposed colloidal residue, wood, sulphur, and iron. Peatmoss shall have a pH value of 5.9 to 7.0, 60 percent organic matter by weight, moisture content not exceeding 15 percent and water absorption capacity of not less than 300 percent by weight on oven dry basis.

3. Sand: Hard, granular, natural, beach sand, washed, free of impurities, chemical, or organic matter.

4. Fertilizer: 6-12-12 grade Commercial type with six percent nitrogen, 12 percent P_2O_5, and 12 percent K_2O.

5. Lime: Standard agricultural type containing at least 85 percent total carbonates applied at a rate of 4,000 pounds per acre (92 pounds per 1,000 square feet), or as required by the test results and recommendations as specified above. Before seeding, apply lime and fertilizer and incorporate them into the soil at least 3-inches deep by discing and harrowing, at the rates recommended above or required by the above test results. "N-Viro" soil available at the First Utility District Wastewater Plant is an acceptable substitute.

6. Seed: Seed shall be uniform mixtures of the following kinds and properties:

	Group A		Group B	
Kind	% by Weight	Pounds/Acre	% by Weight	Pounds/Acre
Kentucky Bluegrass	25	50	25	50
Hulled Bermuda	-	-	20	40
Kentucky 31 Fescue	75	150	35	70
English Rye	-	-	20	40
Total	100	200	100	200

C. Replant grass removed or damaged in residential areas using the same variety of grass and at the first appropriate season. Where sod is removed or damaged, replant such areas using sod of the same species of grass at the first appropriate season. Outside of residential or landscaped areas, grass the entire area disturbed by the work on completion of work in any area. In all areas, promptly establish successful stands of grass.

3.05 Rip-Rap

A. Unless shown otherwise on the Drawings, rip-rap shall be placed where ordered by the Town. Carefully compact backfill and place rip-rap to prevent subsequent settlement and erosion.

B. Preparation of Foundations: The ground surface upon which the rip-rap is to be placed shall be brought in reasonably close conformity to the correct lines and grades before placement is commenced. Where filling of depressions is required, the new material shall be compacted with hand or mechanical tampers.

C. Placement of Rip-rap: The rip-rap shall be placed on a 6-inch layer of soil, crushed stone or sand overlaying the filter fabric. This 6-inch layer shall be placed to maximize the contact between the soil beneath the filter fabric and the filter fabric. Rip-rap shall be placed with its top elevation conforming to the natural slope of the stream bank and stream bottom. Stone rip-rap shall be dumped into place to form a uniform surface and to the thickness specified on the Drawings. The thickness tolerance for the course shall be -6-inches and +12-inches. If the Drawings or Bid do not specify a thickness, the course shall be placed to a thickness of not less than 18-inches.

D. Repair of Existing Rip-rap Ditches: The Drawings show locations where existing rip-rap ditches will be disturbed in order to construct the new water main. The Contractor shall limit the amount of ditch disturbed to that which is necessary to construct the water main. Immediately after placement of the water main, the rip-rap ditch shall be repaired. The Contractor, at it's option may reuse the existing rip-rap providing it is free of all mud or any other deleterious matter and has not been made unusable by the action of the Contractor. The Town will determine as to the suitability of the material for reuse. Any shortage of materials to replace the ditch shall be replaced with new material by the Contractor. If the Contractor chooses not to use the existing stone, the unused material shall be removed from the site. All new rip-rap used to repair/replace the existing ditches shall meet the requirements as specified in Article 2.02 Rip-Rap of this Section of the Specifications. Placement of the rip-rap will be in accordance with the requirements of Article 3.05, Paragraph D of this Section of the Specifications.

END OF SECTION

Part 1 General

1.01 Scope

A. The work under this Section consists of furnishing all labor, equipment and materials and performing all operations in connection with the trench excavation and backfill required to install the pipelines shown on the Drawings and as specified.

B. Excavation shall include the removal of any trees, stumps, brush, debris or other obstacles which remain after the clearing and grubbing operations, which may obstruct the work, and the excavation and removal of all earth, rock or other materials to the extent necessary to install the pipe and appurtenances in conformance with the lines and grades shown on the Drawings and as specified.

C. Backfill shall include the refilling and compaction of the fill in the trenches and excavations up to the surrounding ground surface or road grade at crossing.

D. The trench is divided into five specific areas:

1. Foundation: The area beneath the bedding, sometimes also referenced to as trench stabilization.

2. Bedding: The area above the trench bottom (or foundation) and below the bottom of the barrel of the pipe.

3. Haunching: The area above the bottom of the barrel of the pipe up to a specified height above the bottom of the barrel of the pipe.

4. Initial Backfill: The area above the haunching material and below a plane 18 inches above the top of the barrel of the pipe or the top of duct bank.

5. Final Backfill: The area above a plane 18 inches above the top of the barrel of the pipe.

E. The choice of method, means, techniques and equipment rests with the Contractor. The Contractor shall select the method and equipment for trench excavation and backfill depending upon the type of material to be excavated and backfilled, the depth of excavation, the amount of space available for operation of equipment, storage of excavated material proximity of man-made improvements to be protected, available easement or right-of-way and prevailing practice in the area.

1.02 Quality Assurance

A. Density: All references to "maximum dry density" shall mean the maximum dry density defined by the "Maximum Density-Optimum Moisture Test", ASTM D 698, except that for non-cohesive materials "maximum dry density" shall mean the maximum index density as determined by the "Maximum Index Density of Soils Using

a Vibratory Table", ASTM D 4253. Determination of the density of foundation, bedding, haunching, or backfill materials in place shall meet with the requirements of ASTM D 1556, "Density of Soil In Place by the Sand Cone Method", ASTM D 2937, "Density of Soil In Place by the Drive-Cylinder Method" or ASTM D 2922, "Density of Soil and Soil-Aggregate In Place by clear Methods (Shallow Depth)".

B. Sources and Evaluation Testing: Testing of materials to certify conformance with the specifications shall be performed by an independent testing laboratory. All imported fill materials shall meet the requirements of on-site fill materials.

1.03 Safety

Perform all trench excavation and backfilling activities in accordance with the Occupational Safety and Health Act of 1970 (PL 91-596), as amended. The Contractor shall pay particular attention to the Safety and Health Regulations Part 1926, Subpart P "Excavation, Trenching & Shoring" as described in OSHA publication 2226.

Part 2 Products

2.01 Trench Foundation Materials

A. Crushed stone or surge stone shall be utilized for trench foundation (trench stabilization).

B. Crushed stone shall be crushed limestone and shall meet the requirements of the Tennessee Department of Transportation Specification 903.11. Stone size shall be between No. 57 and No. 4, inclusive, as determined by the Tennessee Department of Transportation Specification 903.22.

C. Surge stone shall be crushed limestone and shall meet the requirements of the Tennessee Department of Transportation Specification 903.11. Stone size shall be No. 1, inclusive, as determined by the Tennessee Department of Transportation Specification 903.22.

2.02 Bedding and Haunching Materials

A. Unless shown on the Drawings or specified otherwise, bedding and haunching material shall be suitable earth materials.

B. Bedding and haunching materials under all pavement areas or where the trench is within three feet of the pavement edge of a Town of Bean Station road shall be crushed stone.

C. Earth materials utilized for bedding and haunching shall be suitable materials selected from materials excavated from the trench. Suitable materials shall be clean and free of rock larger than 2 inches at its largest dimension, organics, cinders, stumps, limbs,

frozen earth or mud, man-made wastes and other unsuitable materials. Should the material excavated from the trench be saturated, the saturated material may be used as earth material, provided it is allowed to dry properly and it is capable of meeting the specified compaction requirements. When necessary, earth bedding and haunching materials shall be moistened to facilitate compaction by tamping. If materials excavated from the trench are not suitable for use as bedding or haunching material, provide select material conforming to the requirements of this Section.

2.03 Initial Backfill

A. Unless shown on the Drawings or specified otherwise, initial backfill material shall be crushed stone or earth materials as specified for bedding and haunching materials.

B. Initial backfill material under all pavement areas or where the trench is within three feet of the pavement edge of a Town of Bean Station road shall be crushed stone.

C. Earth materials utilized for initial backfill shall be suitable materials selected from materials excavated from the trench. Suitable materials shall be clean and free of rock larger than 2 inches at its largest dimension, organics, cinders, stumps, limbs, frozen earth or mud, man-made wastes and other unsuitable materials. Should the material excavated from the trench be saturated, the saturated material may be used as earth material, provided it is allowed to dry properly and it is capable of meeting the specified compaction requirements. When necessary, initial backfill materials shall be moistened to facilitate compaction by tamping. If materials excavated from the trench are not suitable for use as initial backfill material, provide select material conforming to the requirements of this Section.

2.04 Final Backfill

A. Unless shown on the Drawings or specified otherwise, final backfill material shall be general excavated earth materials, shall not contain more than one/third broken rock, of which no stone or boulder shall weigh more than 50 pounds, cinders, stumps, limbs, man-made wastes and other unsuitable materials. If materials excavated from the trench are not suitable for use as final backfill material, Contractor/Developer shall provide select material conforming to the requirements of this Section.

B. Final backfill material, up to 6-inches of grade, under all pavement areas or where the trench is within three feet of the pavement edge shall be crushed stone.

2.05 Select Backfill

Select backfill shall be materials, which meet the requirements as specified for bedding, haunching, initial backfill, or final backfill materials, including compaction requirements.

2.06 Concrete

Concrete for bedding, haunching, initial backfill or encasement shall have a compressive strength of not less than 3,000 psi, with not less than 5.5 bags of cement per cubic yard and a slump between 3 and 5 inches. Ready-mixed concrete shall be mixed and transported in accordance with ASTM C 94. Reinforcing steel shall conform to the requirements of ASTM A 615, Grade 60.

Part 3 Execution

3.01 Trench Excavation

A. Topsoil and grass shall be stripped a minimum of 6 inches over the trench excavation site and stockpiled separately for replacement over the non-paved, finished grading areas.

B. Trenches shall be excavated to the lines and grades shown on the Drawings with the centerlines of the trenches on the centerlines of the pipes and to the dimensions, which provide the proper support, and protection of the pipe and other structures and accessories.

C. Trench Width for Pipelines

1. The sides of all trenches shall be as vertical as practical to a minimum of one foot above the top of the pipe. Unless otherwise indicated on the Drawings, the maximum trench width shall be equal to the sum of the outside diameter of the pipe plus two feet. The minimum trench width shall be that which allows the proper consolidation of the haunching and initial backfill material.

2. Excavate the top portion of the trench to any width within the construction easement or right-of-way, which will not cause unnecessary damage to adjoining structures, roadways, pavement, utilities, trees or private property. Where necessary to accomplish this, provide sheeting and shoring.

3. Where rock is encountered in trenches, excavate to remove boulders and stones to provide a minimum of 6 inches clearance between the rock and any part of the pipe or appurtenance.

4. Wherever the prescribed maximum trench width is exceeded, the Contractor shall use the next higher Class or Type of bedding and haunching as shown on the Drawings for the full trench width as actually cut. The excessive trench width may be due to unstable trench walls, inadequate or improperly placed bracing and sheeting which caused sloughing, accidental over-excavation, intentional over-excavation necessitated by the size of the Contractor's tamping and compaction equipment, intentional over-excavation due to the size of the Contractor's excavation equipment, or other reasons beyond the control of the Engineer or Owner.

D. Depth

1. The trenches shall be excavated to the required depth or elevation, which allow for the placement of the pipe and bedding to the dimensions shown on the Drawings or specified.

2. Excavate trenches to provide a minimum cover of 30 inches. Within the right-of-way of highways, streets or roadways, also excavate to place the top of the pipe a minimum of 30 inches below the nearest pavement edge or drainage ditch.

3. Increase the depth of cover where specifically shown on the Drawings and where necessary to avoid interference with underground utilities and obstructions.

4. Where rock is encountered in trenches for pipelines, excavate to the minimum depth which will provide clearance below the pipe barrel of 8 inches for pipe 21 inches in diameter and smaller and 12 inches for larger pipe, valves and manholes. Remove boulders and stones to provide a minimum of 6-inches clearance between the rock and any part of the pipe, manhole or accessory.

E. Excavated Materials

1. Excavated materials shall be placed adjacent to the work to be used for backfilling as required. Topsoil shall be carefully separated and lastly placed in its original location.

2. Excavated material shall be placed sufficiently back from the edge of the excavation to prevent caving of the trench wall, to permit safe access along the trench and not cause any drainage problems. Excavated material shall be placed so as not to damage existing landscape features or man-made improvements.

3.02 Sheeting, Bracing and Shoring

A. Sheeting, bracing and shoring shall be performed in the following instances:

1. Where sloping of the trench walls do not adequately protect persons within the trench from slides or cave-ins.

2. In caving ground.

3. In wet, saturated, flowing or otherwise unstable materials. The sides of all trenches and excavations shall be adequately sheeted, braced and shored.

4. Where necessary to prevent damage to adjoining buildings, structures, roadways, pavement, utilities, trees or private properties which are required to

remain.

5. Where necessary to maintain the top of the trench within the available construction easement or right-of-way.

B. In all cases, excavation protection shall strictly conform to the requirements of the Occupational Safety and Health Act of 1970, as amended.

C. Timber: Timber for shoring, sheeting, or bracing shall be sound and free of large or loose knots and in good, serviceable condition. Size and spacing shall be in accordance with OSHA regulations.

D. Steel Sheeting and Sheet Piling: Steel sheet piling shall be the continuous interlock type. The weight, depth and section modulus of the sheet piling shall be sufficient to restrain the loads of earth pressure and surcharge from existing foundations and live loads. Procedure for installation and bracing shall be so scheduled and coordinated with the removal of the earth that the ground under existing structures shall be protected against lateral movement at all times. The Contractor shall provide closure and sealing between sheet piling and existing facilities.

E. Trench Shield: A trench shield or box may be used to support the trench walls. The use of a trench shield does not necessarily preclude the additional use of bracing and sheeting. When trench shields are used, care must be taken to avoid disturbing the alignment and grade of the pipe or disrupting the haunching of the pipe as the shield is moved. When the bottom of the trench shield extends below the top of the pipe, the trench shield will be raised in 6-inch increments with specified backfilling occurring simultaneously. At no time shall the trench shield be "dragged" with the bottom of the shield extending below the top of the pipe or utility.

F. Remove bracing and sheeting in units when backfill reaches the point necessary to protect the pipe and adjacent property. Leave sheeting in place when in the opinion of the Town it cannot be safely removed or is within three feet of an existing structure, utility, or pipeline. Cut off any sheeting left in place at least two feet below the surface.

G. Sheet piling within three feet of an existing structure or pipeline shall remain in place, unless otherwise directed by the Town.

3.03 Rock Excavation

A. Definition of Rock: Any material which cannot be excavated with conventional excavating equipment, and is removed by drilling and blasting, or mechanically fracturing by means other than a trench excavator, and occupies an original volume of at least one-half cubic yard.

B. Blasting: Provide licensed, experienced workmen to perform blasting. Conduct blasting operations in accordance with all existing ordinances and regulations. Protect all buildings and structures from the effects of the blast. Repair any resulting damage. If the Contractor repeatedly uses excessive blasting charges or blasts in an unsafe or

improper manner, the Town may direct the Contractor to employ an independent blasting consultant to supervise the preparation for each blast and approve the quantity of each charge.

C. Removal of Rock: Dispose of rock off site that is surplus or not suitable for use as rip-rap or backfill.

D. The Contractor shall notify the Town prior to any blasting. Additionally, the Contractor shall notify the Town and local fire department before any charge is set.

E. The Contractor shall conduct pre-blast and post-blast inspections of structures, including photographs or videos, and maintain a detailed written log.

3.04 Dewatering Excavations

A. Dewater excavation continuously to maintain a water level two feet below the bottom of the trench.

B. Control drainage in the vicinity of excavation so the ground surface is properly pitched to prevent water running into the excavation.

C. There shall be sufficient pumping equipment in good working order available at all times, to remove any water that accumulates in excavations. Where the utility crosses natural drainage channels, the work shall be conducted in such a manner that unnecessary damage or delays in the prosecution of the work will be prevented. Provision shall be made for the satisfactory disposal of surface water to prevent damage to public or private property.

D. In all cases, accumulated water in the trench shall be removed before placing bedding or haunching, laying pipe, placing concrete or backfilling.

E. Where dewatering is performed by pumping the water from a sump, crushed stone shall be used as the medium for conducting the water to the sump. Sump depth shall be at least two feet below the bottom of the trench. Pumping equipment shall be of sufficient quantity and/or capacity to maintain the water level in the sump two feet below the bottom of the trench. Pumps shall be a type such that intermittent flows can be discharged. A standby pump shall be required in the event the operating pump or pumps clog or otherwise stop operation.

F. Dewater by use of a well point system when pumping from sumps does not lower the water level two feet below the trench bottom. Where soil conditions dictate, the Contractor shall construct well points cased in sand wicks. The casing, 6 to 10-inches in diameter, shall be jetted into the ground, followed by the installation of the well point, filling casing with sand and withdrawing the casing.

3.05 Trench Foundation and Stabilization

A. The bottom of the trench shall provide a foundation to support the pipe and its specified bedding. The trench bottom shall be graded to support the pipe and bedding uniformly throughout its length and width.

B. If, after dewatering as specified above, the trench bottom is spongy, or if the trench bottom does not provide firm, stable footing and the material at the bottom of the trench will still not adequately support the pipe, the trench will be determined to be unsuitable and the Town shall then authorize payment for trench stabilization.

C. Should the undisturbed material encountered at the trench bottom constitute, in the opinion of the Town, an unstable foundation for the pipe, the Contractor shall be required to remove such unstable material and fill the trench to the proper subgrade with crushed stone or surge stone as directed by the Town.

D. Where trench stabilization is provided, the trench stabilization material shall be compacted to at least 90 percent of the maximum dry density, unless shown or specified otherwise.

3.06 Bedding and Haunching

A. Prior to placement of bedding material, the trench bottom shall be free of any water, loose rocks, boulders or large dirt clods.

B. Bedding material shall be placed to provide uniform support along the bottom of the pipe and to place and maintain the pipe at the proper elevation. The initial layer of bedding placed to receive the pipe shall be brought to the grade and dimensions indicated on the Drawings. All bedding shall extend the full width of the trench bottom. The pipe shall be placed and brought to grade by tamping the bedding material or by removal of the excess amount of the bedding material under the pipe. Adjustment to grade line shall be made by scraping away or filling with bedding material. Wedging or blocking up of pipe shall not be permitted. Applying pressure to the top of the pipe, such as with a backhoe bucket, to lower the pipe to the proper elevation or grade shall not be permitted. Each pipe section shall have a uniform bearing on the bedding for the length of the pipe, except immediately at the joint.

C. At each joint, excavate bell holes of ample depth and width to permit the joint to be assembled properly and to relieve the pipe bell of any load.

D. After the pipe section is properly placed, add the haunching material to the specified depth. The haunching material shall be shovel sliced, tamped, vigorously chinked or otherwise consolidated to provide uniform support for the pipe barrel and to fill completely the voids under the pipe, including the bell hole. Prior to placement of the haunching material, the bedding shall be clean and free of any water, loose rocks, boulders or dirt clods.

E. Ductile Iron Pipe

1. Unless otherwise shown on the Drawings or specified, utilize earth materials for bedding and haunching. Type 2, 3, 4 and 5 bedding shall be as detailed on the Drawings.

2. Unless specified or shown otherwise, bedding shall meet the requirements for Type 2 Pipe Bedding. Unless specified or shown otherwise for restrained joint pipe and fittings, bedding shall meet the requirements for Type 3 Pipe Bedding.

3. Where the depth of cover over the piping exceeds 15 feet, the pipe bedding shall meet the requirements of Type 4 Pipe Bedding. Where the depth of cover over the piping exceeds 28 feet, the pipe bedding shall meet the requirements of Type 5 Pipe Bedding.

4. Type 4 or Type 5 Pipe Bedding called for on the Drawings, specified or ordered by the Town, shall meet requirements for Type 4 or Type 5 Pipe Bedding, utilizing crushed stone bedding and haunching material.

F. Polyvinyl Chloride Pipe

1. Unless shown otherwise on the Drawings, utilize earth materials for bedding and haunching.

2. Unless shown otherwise on the Drawings, bedding and haunching shall meet the requirements for Type 2 Pipe Bedding, as detailed on the Drawings.

G. Excessive Width and Depth

1. Water Mains: If the trench is excavated to excess width, provide the next higher type or class of pipe bedding, but a minimum of Type 4, as detailed on the Drawings.

2. If the trench is excavated to excessive depth, provide crushed stone to place the bedding at the proper elevation or grade.

H. Compaction: Bedding and haunching materials under pipe, manholes and accessories shall be compacted to a minimum of 90 percent of the maximum dry density, unless shown or specified otherwise.

3.07 Initial Backfill

A. Initial backfill shall be placed to anchor the pipe, protect the pipe from damage by subsequent backfill and ensure the uniform distribution of the loads over the top of the pipe.

B. Place initial backfill material carefully around the pipe in uniform layers to a depth of at least 18 inches above the pipe barrel. Layer depths shall be a maximum of 6 inches.

C. Backfill on both sides of the pipe simultaneously to prevent side pressures.

D. Compact each layer thoroughly with suitable hand tools or tamping equipment.

E. Initial backfill shall be compacted to a minimum 90 percent of the maximum dry density, unless shown or specified otherwise.

F. If materials excavated from the trench are not suitable for use as backfill materials, provide select backfill material conforming to the requirements of this Section.

3.08 Concrete Encasement for Pipelines

Where concrete encasement is shown on the Drawings for pipelines, excavate the trench to provide a minimum of 6-inches clearance from the bell of the pipe. Lay the pipe to line and grade on concrete blocks. In lieu of bedding, haunching and initial backfill, place concrete to the full width of the trench and to a height of not less than 6 inches above the pipe bell. Do not backfill the trench for a period of at least 24 hours after concrete is placed.

3.09 Final Backfill

A. Backfill carefully to restore the ground surface to its original condition.

B. The top 6 inches shall be topsoil obtained as specified in "Trench Excavation" of this Section.

C. Excavated material, which is unsuitable for backfilling, and excess material, shall be disposed of, at no additional cost to the Owner, in a manner approved by the Engineer. Surplus soil may be neatly distributed and spread over the site, if approved by the Town. If such spreading is allowed, the site shall be left in a clean and sightly condition and shall not affect pre-construction drainage patterns. Surplus rock from the trenching operations shall be removed from the site.

D. If materials excavated from the trench are not suitable for use as backfill materials, provide select backfill material conforming to the requirements of this Section.

E. After initial backfill material has been placed and compacted, backfill with final backfill material. Place backfill material in uniform layers, compacting each layer thoroughly as follows:

1. In 6 inch layers, if using light power tamping equipment, such as a "jumping jack"

2. In 12 inch layers, if using heavy tamping equipment, such as hammer with tamping feet

3. In 24 inch layers, if using a hydra-hammer

F. Settlement: If trench settles, re-fill and grade the surface to conform to the adjacent surfaces.

G. Final backfill shall be compacted to a minimum 90 percent of the maximum dry density, unless specified otherwise.

3.10 Additional Material

Where final grades above the pre-construction grades are required to maintain minimum cover, additional fill material will be as shown on the Drawings. Utilize excess material excavated from the trench, if the material is suitable. If excess excavated materials are not suitable, or if the quantity available is not sufficient, provide additional suitable fill material.

3.11 Backfill Under Roads

A. Compact backfill underlying pavement and sidewalks shall be crushed stone unless other suitable material is pre-approved by the Town of Bean Station Department of Public Works.

B. Town of Bean Station Roads

1. All bedding, haunching and backfill beneath the pavement, as well as within three feet from the edge of pavement, of all Town of Bean Station roadways shall be crushed stone meeting the requirements of the Town of Bean Station Department of Public Works.

2. If a pipeline is constructed beneath the shoulder of the road but is beyond three feet from the edge of pavement, final backfill shall be earth materials placed to a minimum of 95 percent of the maximum dry density. The top 6 inches shall be size No. 57 crushed stone compacted to a minimum 95 percent of the maximum dry density.

3.12 Backfill Along Restrained Joint Pipe

Backfill along restrained joint pipe shall be compacted to a minimum 90 percent of the maximum dry density.

3.13 Testing and Inspection

A. The soils testing laboratory is responsible for the following:

1. Compaction tests in accordance with Article 1.02 of this Section.

2. Field density tests as ordered by the Town.

3. Inspecting and testing stripped site, subgrades and proposed fill materials.

B. The Contractor's duties relative to testing include:

1. Notifying laboratory of conditions requiring testing.

2. Coordinating with laboratory for field testing.

3. Paying costs for additional testing performed beyond the scope of that required and for re-testing where initial tests reveal non-conformance with specified requirements.

4. Providing excavation as necessary for laboratory personnel to conduct tests.

C. Inspection

1. Earthwork operations, acceptability of excavated materials for bedding or backfill, and placing and compaction of bedding and backfill is subject to inspection by the Town.

2. Foundations and shallow spread footing foundations are required to be inspected by a geotechnical engineer who shall verify suitable bearing and construction.

D. Comply with applicable codes, ordinances, rules, regulations and laws of local, municipal, state or federal authorities having jurisdiction.

END OF SECTION

Part 1 General

1.01 Scope

A. The work covered by this Section includes furnishing all labor, materials and equipment required to bore and jack casings and to properly complete pipeline construction as described herein and/or shown on the Drawings.

B. General: Supply all materials and perform all work in accordance with applicable American Society for Testing and Materials (ASTM), American Water Works Association (AWWA), American National Standards Institute (ANSI) or other recognized standards. Latest revisions of all standards are applicable. If requested by the Town, submit evidence that manufacturer has consistently produced products of satisfactory quality and performance over a period of at least two years.

1.02 Submittals

A. Submit shop drawings, product data and experience.

B. Material Submittals: The Contractor shall provide shop drawings and other pertinent specifications and product data as follows:

1. Shop drawings for casing pipe showing sizes and connection details.
2. Casing Spacers.

C. Experience Submittals: Boring and jacking casings is deemed to be specialty contractor work. If the Contractor elects to perform the work, the Contractor shall provide evidence as required by the General Conditions. A minimum of five continuous years of experience in steel casing construction is required of the casing installer. Evidence of this experience must be provided with the shop drawings for review by the Town.

1.03 Storage and Protection

All materials shall be stored and protected in accordance with the manufacturer's recommendations and as approved by the Town.

Part 2 Products

2.01 Materials and Construction

A. Casing

1. The casing shall be new and unused pipe. The casing shall be made from steel plate having a minimum yield strength of 35,000 psi. The steel plate shall also meet the chemical requirements of ASTM A 36.

2. The thicknesses of casing shown in paragraph B. below are minimum thicknesses. Actual thicknesses shall be determined by the casing installer, based on an evaluation of the required forces to be exerted on the casing when jacking. Any buckling of the casing due to jacking forces shall be repaired at no additional cost to the Owner.

3. The diameters of casing shown in paragraph B. below and shown on the Drawings are minimum. Larger casings, with the Town's approval, may be provided at no additional cost to the Owner, for whatever reasons the Contractor may decide, whether casing size availability, line and grade tolerances, soil conditions, etc.

B. Casing Sizes

UNDER RAILROADS			
Pipe Diameter, inches	Casing Diameter, inches	Wall Thickness, inches	
		Coated	Uncoated
6	14	0.250	0.282
8	18	0.250	0.313
10	20	0.281	0.344
12	22	0.312	0.375

UNDER HIGHWAYS		
Pipe Diameter, inches	Casing Diameter, inches	Wall Thickness, inches
6	12	0.250
8	16	0.250
10	16	0.250
12	18	0.250

C. Casing Spacers: Casing spacers shall meet one of the following requirements:

1. Casing spacers shall be flanged, bolt-on style with a two-section stainless steel shell lined with a PVC liner, minimum 0.09-inch thick also having a hardness of 85-90 durometer. Runners shall be attached to stainless steel risers, which

shall be properly welded to the shell. The height of the runners and risers shall be manufactured such that the pipe does not float within the casing. Casing spacers shall be equal to Cascade Waterworks Manufacturing Company or Advanced Products & Systems, Inc or owner approved equal.

2. Casing spacers shall be a two-section, flanged, bolt on style constructed of heat fused PVC coated steel, minimum 14 gauge band and 10 gauge risers, with 2-inch wide glass reinforced polyester insulating skids, heavy duty PVC inner liner, minimum 0.09-inch thick having a hardness of 85-90 durometer, and all stainless steel or cadmium plated hardware. Casing spacers shall be equal to Pipeline Seal and Insulator, Inc.

D. Carrier Pipe: Carrier pipes shall meet requirements as specified in these Specifications.

2.02 Equipment

A cutting head shall be attached to a continuous auger mounted inside the casing pipe.

Part 3 Execution

3.01 General

A. Interpretation of soil investigation reports and data, investigating the site and determination of the site soil conditions prior to bidding is the sole responsibility of the Contractor. Any subsurface investigation by the Bidder or Contractor must be approved by the appropriate authority having jurisdiction over the site.

B. Casing construction shall be performed so as not to interfere with, interrupt or endanger roadway surface and activity thereon, and minimize subsidence of the surface, structures, and utilities above and in the vicinity of the casing. Support the ground continuously in a manner that will prevent loss of ground and keep the perimeters and face of the casing, passages and shafts stable. The Contractor shall be responsible for all settlement resulting from casing operations and shall repair and restore damaged property to its original or better condition at no cost to the Owner.

C. Face Protection: The face of the excavation shall be protected from the collapse of the soil into the casing.

D. Casing Design: Design of the bore pit and required bearing to resist jacking forces are the responsibility of the Contractor. The excavation method selected shall be compatible with expected ground conditions. The lengths of the casing shown on the Drawings are the minimum lengths required. The length of the casing may be extended for the convenience of the Contractor, at no additional cost to the Owner. Due to restrictive right-of-way and construction easements, boring and jacking casing lengths less than the nominal 20 foot length may be necessary.

E. Highway Crossings

1. The Contractor shall be held responsible and accountable for the coordinating and scheduling of all construction work within the highway right-of-way.

2. Work along or across the Department of Public Works rights-of-way shall be subject to inspection by such Department of Public Works.

3. All installations shall be performed to leave free flows in drainage ditches, pipes, culverts or other surface drainage facilities of the highway, street or its connections.

4. No excavated material or equipment shall be placed on the pavement or shoulders of the roadway without the express approval of the Department of Public Works.

5. In no instance will the Contractor be permitted to leave equipment (trucks, backhoes, etc.) on the pavement or shoulder overnight. Construction materials to be installed, which are placed on the right-of-way in advance of construction, shall be placed in such a manner as not to interfere with the safe operation of the roadway.

6. The Contractor shall be responsible for providing the Owner sufficient information to obtain a blasting permit in a timely manner.

F. Railroad Crossings

1. The Contractor shall secure permission from the Railroad to schedule work so as not to interfere with the operation of the Railroad.

2. Additional insurance is required for each railroad crossing. The Contractor shall furnish the Railroad with such additional insurance as may be needed; cost of the same shall be borne by the Contractor.

3. All work on the Railroad right-of-way, including necessary support of tracks, safety of operations and other standard and incidental operation procedures may be under the supervision of the appropriate authorized representative of the Railroad affected and any decisions of this representative pertaining to construction and/or operations shall be final and construction must be governed by such decisions.

4. If, in the opinion of the Railroad, it becomes necessary to provide flagging protection, watchmen or the performance of any other work in order to keep the tracks safe for traffic, the Contractor shall coordinate such work and shall reimburse the Railroad, in cash, for such services, in accordance with accounting procedures agreed on by the Contractor and affected Railroad before construction is started.

5. No blasting shall be permitted within the Railroad right-of-way.

3.02 Groundwater Control

A. The Contractor shall control the groundwater throughout the construction of the casing.

B. Methods of dewatering shall be at the option and responsibility of the Contractor. Maintain close observation to detect settlement or displacement of surface facilities due to dewatering. Should settlement or displacement be detected, notify the Town immediately and take such action as necessary to maintain safe conditions and prevent damage.

C. When water is encountered, provide and maintain a dewatering system of sufficient capacity to remove water on a 24-hour basis keeping excavations free of water until the backfill operation is in progress. Dewatering shall be performed in such a manner that removal of soil particles is held to a minimum. Dewater into a sediment trap and comply with requirements specified in Section 02125 of these Specifications.

3.03 Safety

A. Provide all necessary bracing, bulkheads and shields to ensure complete safety to all traffic, persons and property at all times during the work. Perform the work in such a manner as to not permanently damage the roadbed or interfere with normal traffic over it.

B. Observe all applicable requirements of the regulations of the authorities having jurisdiction over this site. Conduct the operations in such a manner that all work will be performed below the level of the roadbed.

C. Perform all activities in accordance with the Occupational Safety and Health Act of 1970 (PL-596), as amended, applicable regulations of the Federal Government, OSHA 29CFR 1926 and applicable criteria of ANSI A10.16-81, "Safety Requirements for Construction of Tunnel Shafts and Caissons".

3.04 Boring and Jacking

A. Shaft

1. Conduct boring and jacking operations from a shaft excavated at one end of the section to be bored. Where conditions and accessibility are suitable, place the shaft on the downstream end of the bore.

2. The shaft shall be rectangular and excavated to a width and length required for ample working space. If necessary, sheet and shore shaft properly on all sides. Shaft sheeting shall be timber or steel piling of ample strength to safely withstand all structural loadings of whatever nature due to site and soil

conditions. Keep preparations dry during all operations. Perform pumping operations as necessary.

3. The bottom of the shaft shall be firm and unyielding to form an adequate foundation upon which to work. In the event the shaft bottom is not stable, excavate to such additional depth as required and place a gravel sub-base or a concrete sub-base if directed by the Town due to soil conditions.

B. Jacking Rails and Frame

1. Set jacking rails to proper line and grade within the shaft. Secure rails in place to prevent settlement or movement during operations. The jacking rails shall cradle and hold the casing pipe on true line and grade during the progress of installing the casing.

2. Place backing between the heels of jacking rails and the rear of the shaft. The backing shall be adequate to withstand all jacking forces and loads.

3. The jacking frame shall be of adequate design for the magnitude of the job. Apply thrust to the end of the pipe in such a manner to impart a uniformly balanced load to the pipe barrel without damaging the joint ends of the pipe.

C. Boring and jacking of casing pipes shall be accomplished by the dry auger boring method without jetting, sluicing or wet boring.

D. Auger the hole and jack the casing through the soil simultaneously.

E. Bored installations shall have a bored-hole diameter essentially the same as the outside diameter of the casing pipe to be installed.

F. Execute boring ahead of the casing pipe with extreme care, commensurate with the rate of casing pipe penetration. Boring may proceed slightly in advance of the penetrating pipe and shall be made in such a manner to prevent any voids in the earth around the outside perimeter of the pipe. Make all investigations and determine if the soil conditions are such as to require the use of a shield.

G. As the casing is installed, check the horizontal and vertical alignment frequently. Make corrections prior to continuing operation. For casing pipe installations over 100 feet in length, the auger shall be removed and the alignment and grade checked at minimum intervals of 60 feet.

H. Any casing pipe damaged in jacking operations shall be repaired, if approved by the Town, or removed and replaced at Contractor's own expense.

I. Lengths of casing pipe, as long as practical, shall be used except as restricted otherwise. Joints between sections shall be butt joint, single groove welded in accordance with AWS recommended procedures. Prior to welding the joints, the Contractor shall ensure that both ends of the casing sections being welded are

square.

J. The Contractor shall prepare a contingency plan, which will allow the use of a casing lubricant, such as Bentonite, in the event excessive frictional forces jeopardize the successful completion of the casing installation.

K. Once the jacking procedure has begun, it should be continued without stopping until completed, subject to weather and conditions beyond the control of the Contractor.

L. Care shall be taken to ensure that casing pipe installed by boring and jacking method will be at the proper alignment and grade.

M. The Contractor shall maintain and operate pumps and other necessary drainage system equipment to keep work dewatered at all times.

N. Adequate sheeting, shoring and bracing for embankments, operating pits and other appurtenances shall be placed and maintained to ensure that work proceeds safely and expeditiously. Upon completion of the required work, the sheeting, shoring and bracing shall be left in place, cut off or removed, as designated by the Town.

O. Trench excavation, all classes and type of excavation, the removal of rock, muck, debris, the excavation of all working pits and backfill requirements of Section 02225 are included under this Section.

P. All surplus material shall be removed from the right-of-way and the excavation finished flush with the surrounding ground.

Q. Grout backfill shall be used for unused holes or abandoned pipes.

3.05 Free Boring

A. Where the Drawings indicate a pipeline is to be installed by boring without casing, the Contractor shall construct the crossing by the free bore method. The free bore method shall be accomplished by the dry auger boring method without jetting, sluicing, wet boring, or by "punching".

B. The diameter of the free bore shall not exceed the pipe bell outside diameter or the pipe barrel outside diameter plus 1-inch, whichever is greater.

C. Free boring, where indicated on the Drawings, is to be performed at the Contractor's option. The Contractor may choose to construct the crossing by the conventional bore and jack casing methodology.

D. The Contractor shall be responsible for any settlement of the roadway caused by the free bore construction activities.

E. If the Contractor elects to free bore, and an acceptable installation does not result for any reason, the Contractor shall install a casing pipe by the bore and jack method at no additional cost to the Owner.

3.06 Ventilation and Air Quality

Provide, operate and maintain for the duration of casing project a ventilation system to meet safety and OSHA requirements.

3.07 Rock Excavation

A. In the event that rock is encountered during the installation of the casing pipe which, in the opinion of the Town, cannot be removed through the casing, the Town may authorize the Contractor to complete the crossing by a method established in a change order.

B. At the Contractor's option, the Contractor may continue to install the casing and remove the rock through the casing at no additional cost to the Owner.

3.08 Installation of Pipe

A. After construction of the casing is complete, and has been accepted by the Town, install the pipeline in accordance with the Drawings and Specifications.

B. Check the alignment and grade of the casing and prepare a plan to set the pipe at proper alignment, grade and elevation, without any sags or high spots.

C. The carrier pipe shall be held in the casing pipe by one of the following methods:

1. The carrier pipe shall be held in the casing pipe by the use of hardwood blocks spaced radially around the pipe and secured together so that they remain firmly in place. The spacing of such blocks longitudinally in the casing pipe shall not be greater than 10 feet.

2. The pipe shall be supported within the casing by use of casing spacers sized to limit radial movement to a maximum of 1-inch. Provide a minimum of one casing spacer per nominal length of pipe. Casing spacers shall be attached to the pipe at maximum 18 to 20 foot intervals.

D. Close the ends of the casing with 4-inch brick walls or seal ends with one-piece synthetic rubber especially formulated for sealing casing/carrier pipe.

3.09 Sheeting Removal

Remove sheeting used for shoring from the shaft and off the job site. The removal of sheeting, shoring and bracing shall be done in such a manner as not to endanger or damage either new or existing structures, private or public properties and also to avoid cave-ins or sliding in the banks.

END OF SECTION

Part 1 General

1.01 Scope

The work to be performed under this Section shall consist of removing and replacing existing pavement, sidewalks and curbs in paved areas where such have been removed for construction of water mains, fire hydrants, sewers, manholes and all other water, sewer and utility appurtenances and structures.

1.02 Submittals

Provide certificates stating that materials supplied comply with Specifications. Certificates shall be signed by the asphalt producer and the Contractor.

1.03 Conditions

A. Weather Limitations

1. Do not conduct paving operations when surface is wet or contains excess of moisture which would prevent uniform distribution and required penetration.

2. Construct prime and tack coats, and asphaltic courses only when atmospheric temperature in the shade is above 50 degrees F, when the underlying base is dry and when weather is not rainy.

3. Place base course when air temperature is above 35 degrees F and rising.

B. Grade Control: Establish and maintain the required lines and grades for each course during construction operations.

C. Town of Bean Station Streets: All work within Town of Bean Station Road rights-of-way shall be performed in accordance with the requirements and specification of the Town of Bean Station department of Public Works. The Town of Bean Station Department of Public Works shall be notified at least 24 hours prior to starting.

Part 2 Products

2.01 Materials

A. Mineral Aggregate Base Course: Mineral aggregate base course shall conform to the requirements of the Tennessee Department of Transportation Standard Specifications for Road and Bridge Construction, Section 303, Type A base or Section 303, Class B, Grading D base.

B. Binder (Hot Mix): The base of all paved roadways shall conform to the requirements of Section 307 of the Tennessee Department of Transportation Standard Specifications for Road and Bridge Construction.

C. Asphaltic Concrete Surface (Hot Mix): The surface course for all pavement shall conform to the requirements of the Tennessee Department of Transportation Standard Specifications for Road and Bridge Construction, Section 411, Grading "E".

D. Double Bituminous Surface Treatment: The surface for all pavements shall conform to the requirements of the Tennessee Department of Transportation Standard Specifications for Road and Bridge Construction, Section 404.

E. Concrete: Provide concrete and reinforcing for concrete pavement or base courses in accordance with the requirements of the Tennessee Department of Transportation Standard Specifications for Road and Bridge Construction, Section 501.

F. Special Surfaces: Where driveways or roadways are disturbed or damaged which are constructed of specialty type surfaces, e.g. brick or stone, these driveways and roadways shall be restored utilizing similar, if not original, materials. Where the nature of these surfaces dictate, a specialty contractor shall be used to restore the surfaces to their previous or better condition. Special surfaces shall be removed and replaced to the limits to which they were disturbed.

2.02 Types of Pavements

A. General: All existing pavement removed, destroyed or damaged by construction shall be replaced with the same type and thickness of pavement as that existing prior to construction, unless otherwise directed by the Town. Materials, equipment and construction methods used for paving work shall conform to the Tennessee Department of Transportation specifications applicable to the particular type required for replacement, repair or new pavements.

B. Aggregate Base: Aggregate base shall be constructed in accordance with the requirements of Section 303, Class B, Grading D of the Town of Dandridge Department of Public Works. Material shall be mixed and placed by the stationary plant method. If the finished compacted base course depth is 6-inches or more, the course shall be constructed in two or more layers of approximately equal thickness.

C. Concrete Pavement: Concrete pavement or base courses shall be replaced with concrete. The surface finish of the replaced concrete pavement shall conform to that of the existing pavement. The surface of the replaced concrete base course shall be left rough. The slab depth shall be equivalent to the existing concrete pavement or base course, but in no case less than 4-inches thick. Transverse and longitudinal joints removed from concrete pavement shall be replaced at the same locations and to the same types and dimensions as those removed. Concrete pavements or concrete base courses shall be reinforced and shall conform to the Tennessee Department of Transportation Standard Specifications, Section 501. If edge of trench

is within three feet of an expansion joint, concrete shall be removed and replaced to the edge of the joint.

D. Asphalt Concrete Base, Binder and Surface Course: Asphalt concrete base, binder and surface course construction shall conform to the Tennessee Department of Transportation Standard Specifications, Section 307 for bituminous plant mix base course and Section 411, Grading "E" for asphalt concrete surface course. The pavement mixture shall not be spread until the designated surface has been previously cleaned and prepared, is intact, compacted as specified herein, properly cured, dry and the prime and/or tack coat has been applied. Apply and compact the asphalt concrete in maximum layer thickness by asphalt spreader equipment of design and operation approved by the Town. After compaction, the asphalt concrete shall be smooth and true to established profiles and sections. Immediately correct any high, low or defective areas by cutting out the course, replacing with fresh hot mix, and immediately compacting to conform and thoroughly bond to the surrounding area.

E. Gravel Surfaces: Existing gravel road, drive and parking area replacement shall meet the requirements of aggregate base course. This surfacing may be authorized by the Town as a temporary surface for paved streets until replacement of hard surfaced pavement is authorized.

F. Temporary Measures: During the time period between pavement removal and complete replacement of permanent pavement, maintain highways, streets and roadways by the use of steel running plates anchored to prevent movement. The backfill above the pipe shall be compacted, as specified elsewhere, up to the existing pavement surface to provide support for the steel running plates.

Part 3 Execution

3.01 Removing Pavement

A. General: Remove existing pavement as necessary for installing the pipe line and appurtenances.

B. Marking: Before removing any pavement, mark the pavement neatly paralleling pipe lines and existing street lines. Space the marks the width of the trench.

C. Breaking: Break asphalt pavement along the marks using pavement shearing equipment, jack hammers or other suitable tools. Break concrete pavement along the marks by scoring with a rotary saw and breaking below the score by the use of jack hammers or other suitable tools.

D. Machine Pulling: Do not pull pavement with machines until the pavement is completely broken and separated from pavement to remain.

E. Damage to Adjacent Pavement: Do not disturb or damage the adjacent pavement. If

the adjacent pavement is disturbed or damaged, remove and replace the damaged pavement.

F. Damage to Traffic Signal Loops: Any pavement removal which will include removal of traffic signal loops embedded in the pavement shall be coordinated with the Traffic Engineering Department having jurisdiction over the traffic signal five days prior to pavement removal.

G. Sidewalk: Remove and replace any sidewalks disturbed by construction for their full width and to the nearest undisturbed joint.

H. Curbs: Tunnel under or remove and replace any curb disturbed by construction to the nearest undisturbed joint.

3.02 Replacing Pavement

A. Pavement shall be replaced no later than seven days after the original surface was cut, unless an alternate time is approved by Town.

B. Preparation of Subgrade: During backfilling and compaction of the backfill, arrange to have the compaction tested by an independent testing laboratory. After compaction testing has been satisfactorily completed, replace all pavements, sidewalks and curbs removed.

1. The existing street pavement or surface shall be removed along the lines of the work for the allowable width specified for the trench or structure. After the installation of the sewerage or water works facilities and after the backfill has been compacted suitably, the additional width of pavement to be removed, as shown on the Standard Detail Drawings, shall be done immediately prior to replacing the pavement.

2. Trench backfill shall be compacted for the full depth of the trench as specified in Section 02225 of these Specifications.

3. Temporary trench backfill along streets and driveways shall include 6-inches of crushed stone or cherty clay as a temporary surfacing of the trenches or asphalt as directed by the Town. This temporary surface shall be maintained carefully at grade and dust-free by the Contractor until the backfill of the trench has thoroughly compacted in the opinion of the Town and permission is granted to replace the street pavement.

4. When temporary crushed stone or chert surface is considered by the Town to be sufficient surface for gravel pavement, the surface shall be graded smooth and to an elevation that will make the final permanent surfacing level with the adjacent surfacing that was undisturbed.

C. Pavement Replacement

1. Prior to replacing pavement, make a final cut in concrete pavement 12-inches back from the edge of the damaged pavement with a concrete saw. Remove asphalt pavement 12-inches back from the edge of the damaged pavement using pavement shearing equipment, jackhammers or other suitable tools.

2. Replace all street and roadway pavement as shown on the Drawings. Replace driveways, sidewalks and curbs with the same material, to nearest existing undisturbed construction joint and to the same dimensions as those existing.

3. If the temporary crushed stone or chert surface is to be replaced, the top 6-inches shall be removed and the crushed stone surfacing for unpaved streets or the base for the bituminous surface shall be placed.

4. Following this preparation, the chert or crushed stone base shall be primed with a suitable bituminous material and surfaced with the proper type of bituminous surface treatment.

5. Where the paved surface is to be replaced with asphaltic concrete pavement, concrete pavement or with a concrete base and a surface course, the temporary chert or crushed stone surface and any necessary backfill material, additional existing paving and new excavation shall be removed to the depth and width shown on the Standard Detail Drawings. All edges of the existing pavement shall be cut to a straight, vertical edge. Care shall be used to get a smooth joint between the old and new pavement and to produce an even surface on the completed street. Concrete base slabs and crushed stone bases, if required, shall be placed and allowed to cure for three days before bituminous concrete surface courses are applied. Expansion joints, where applicable, shall be replaced in a manner equal to the original joint.

6. Where driveways or roadways, constructed of specialty type surfaces, e.g. brick or stone are disturbed or damaged, these driveways and roadways shall be restored utilizing similar materials. Where the nature of these surfaces dictate, a specialty contractor shall be used to restore the surfaces to their previous or better condition. Special surfaces shall be removed and replaced to the limits to which they were disturbed.

D. Pavement Resurfacing

1. Certain areas to be resurfaced may be specified or noted on the Drawings. Where pavement to be resurfaced has been damaged with potholes, the Contractor shall remove all existing loose pavement material and fill the hole with Bituminous Plant Mix Base, as specified, to the level of the existing pavement. After all pipe line installations are complete and existing pavement has been removed and replaced along the trench route, apply tack coat and surface course as specified.

2. Resurfacing limits shall be perpendicular to the road centerline. The limits of

resurfacing shall be 10 feet beyond the edge of the pavement replacement on the main road being resurfaced, and to the point of tangency of the pavement on the side streets.

E. Pavement Striping: Pavement striping removed or paved over shall be replaced with the same type, dimension and material as original unless directed otherwise by the Town.

F. Traffic Signal Loops: The replacement or repair of all traffic signal loops removed or damaged during the removal and replacement of pavement shall be coordinated by the Contractor with the Traffic Engineering Department having jurisdiction over each traffic signal. The Contractor shall be responsible for payment of all fees associated with replacement or repair of traffic signal loops.

3.03 Sidewalk and Curb Replacement

A. Construction

1. All concrete sidewalks and curbs shall be replaced with concrete.

2. Preformed joints shall be 1/2-inch thick, conforming to the latest edition of AASHTO M 59 for sidewalks and AASHTO M 122 for curbs.

3. Forms for sidewalks shall be of wood or metal, shall be straight and free from warp, and shall be of sufficient strength, when in place, to hold the concrete true to line and grade without springing or distorting.

4. Forms for curbs shall be metal and of an approved section. They shall be straight and free from distortions, showing no vertical variation greater than 1/8-inch in 10 feet and no lateral variation greater than 1/4-inch in 10 feet from the true plain surface on the vertical face of the form. Forms shall be of the full depth of the structure and constructed such to permit the inside forms to be securely fastened to the outside forms.

5. Securely hold forms in place true to the lines and grades to match existing.

6. Wood forms may be used on sharp turns and for special sections, as approved by the Town. Where wooden forms are used, they shall be free from warp and shall be the nominal depth of the structure.

7. All mortar and dirt shall be removed from forms and all forms shall be thoroughly oiled or wetted before any concrete is deposited.

B. When a section is removed, the existing sidewalk or curb shall be cut to a neat line, perpendicular to both the centerline and the surface of the concrete slab. Existing concrete shall be cut along the nearest existing construction joints; if such joints do not exist, the cut shall be made at minimum distances to match existing.

C. Existing concrete sidewalks and curbs that have been cut and removed for construction purposes shall be replaced with the same width and surface as the portion removed. Sidewalks shall have a minimum uniform thickness of 4-inches. The new work shall be neatly jointed to the existing concrete so that the surface of the new work shall form an even, unbroken plane with the existing surfaces.

D. The subgrade shall be formed by excavating to a depth equal to the thickness of the concrete, plus 2-inches. Subgrade shall be of such width as to permit the proper installation and bracing of the forms. Subgrades shall be compacted by hand tamping or rolling. Soft, yielding or unstable material shall be removed and backfilled with satisfactory material. Place 2-inches of porous crushed stone under all sidewalks and curbs and compact thoroughly, then finish to a smooth, unyielding surface at proper line, grade and cross section.

E. Joint for Curbs

1. Joints shall be constructed to match existing and as specified. Construct joints true to line with their faces perpendicular to the surface of the structure and within 1/4-inch of their designated position.

2. Thoroughly spade and compact the concrete at the faces of all joints filling all voids.

3. Install expansion joint materials at the point of curve at all street returns. Install expansion joint material behind the curb at abutment to sidewalks and adjacent structures.

4. Place contraction joints every 10 feet along the length of the curbs and gutters. Form contraction joints using steel templates or division plates, which conform to the cross section of the structure. Leave the templates in place until the concrete has set sufficiently to hold its shape, but remove them while the forms are still in place. Contraction joint templates or plates shall not extend below the top of the steel reinforcement or they shall be notched to permit the reinforcement to be continuous through the joint. Contraction joints shall be a minimum of 1-1/2-inches deep.

F. Expansion joints shall be required to replace any removed expansion joints. Expansion joints shall be true and even, shall present a satisfactory appearance, and shall extend to within 1/2-inch of the top of finished concrete surface.

G. Finishing

1. Strike off the surface with a template and finish the surface with a wood float using heavy pressure, after which, contraction joints shall be made and the surface finished with a wood float or steel trowel.

2. Finish the face of the curbs at the top and bottom with an approved finishing tool of the radius to match existing.

3. Finish edges with an approved finishing tool having a 1/4-inch radius.

4. Provide a final broom finish by lightly combing with a stiff broom after troweling is complete.

5. The finished surface shall not vary more than 1/8-inch in 10 feet from the established grade.

H. Driveway and Sidewalk Ramp Openings

1. Provide driveway openings of the widths and at the locations to match existing and as directed by the Town.

2. Provide sidewalk ramp openings to match existing, in conformance with the applicable regulations and as directed by the Town.

I. Concrete shall be suitably protected from freezing and excessive heat. It shall be kept covered with burlap or other suitable material and kept wet until cured. Provide necessary barricades to protect the work. All damage caused by people, vehicles, animals, rain, the Contractor's operations and the like shall be repaired by the Contractor, at no additional expense to the Owner.

3.04 Maintenance

The Contractor shall maintain the surfaces of roadways built and pavements replaced until the acceptance of the Project. Maintenance shall include replacement, scraping, reshaping, wetting and rerolling as necessary to prevent raveling of the road material, the preservation of reasonably smooth surfaces and the repair of damaged or unsatisfactory surfaces, to the satisfaction of the Town. Maintenance shall include sprinkling as may be necessary to abate dust from the gravel surfaces.

3.05 Supervision and Approval

A. Pavement restoration shall meet the requirements of the regulatory agency responsible for the pavement. Obtain agency approval of pavement restorations before requesting final payment.

B. Obtain the Town's approval of restoration of pavement, such as private roads and drives that are not the responsibility of a regulatory agency.

C. Complete pavement restoration as soon as possible after backfilling.

D. Failure of Pavement: Should any pavement restoration or repairs fail or settle during the life of the Contract, including the bonded period, promptly restore or repair defects.

3.06 Cleaning

The Contractor shall remove all surplus excavation materials and debris from the street surfaces and rights-of-way and shall restore street, roadway or sidewalk surfacing to its original condition.

END OF SECTION

Part 1 General

1.01 Scope

A. This Section describes products to be incorporated into the sanitary sewer system and requirements for the installation and use of these items. Work under this Section includes furnishing all labor, equipment and materials, and performing all operations in connection with installation of sanitary sewerage systems. Sanitary sewerage includes, but is not limited to installing pre-cast manholes, gravity and pressurized sewer lines, and trenching, backfilling, compaction and testing. Furnish all products and perform all labor necessary to fulfill the requirements of these Specifications.

B. General: Supply all products and perform all work in accordance with applicable American Society for Testing and Material (ASTM), American Water Works Association (AWWA), American National Standards Institute (ANSI), or other recognized standards. Latest revisions of all standards are applicable.

1.02 Qualifications

If requested by the Town, submit evidence that manufacturers have consistently produced products of satisfactory quality and performance for a period of at least two years.

1.03 Submittals

Complete shop drawings, product data, engineering data and as-builts for all products shall be submitted to the Town. Electronic as-builts are required after completion.

1.04 Transportation and Handling

A. Unloading: Furnish equipment and facilities for unloading, handling, distributing and storing pipe, fittings, valves, manholes and accessories. Make equipment available at all times for use in unloading. Do not drop or dump materials. Any materials dropped or dumped will be subject to rejection without additional justification. Pipe handled on skids shall not be rolled or skidded against the pipe on the ground.

B. Handling: Handle pipe, fittings, valves, manholes and accessories carefully to prevent shock or damage. Handle pipe by rolling on skids, forklift, or front-end loader. Do not use material damaged in handling. Slings, hooks or pipe tongs shall be padded and used in such a manner as to prevent damage to the exterior coatings or internal lining of the pipe.

1.05 Storage and Protection

A. Store all pipe, which cannot be distributed along the route. Make arrangements for the use of suitable storage areas.

B. Stored materials shall be kept safe from damage. The interior of all pipe, fittings and other appurtenances shall be kept free from dirt or foreign matter at all times. Valves and hydrants shall be drained and stored in a manner that will protect them from damage by freezing.

C. Pipe shall not be stacked higher than the limits recommended by the manufacturer. The bottom tier shall be kept off the ground on timbers, rails or concrete. Pipe in tiers shall be alternated: bell, plain end; bell, plain end. At least two rows of timbers shall be placed between tiers and chocks, affixed to each other in order to prevent movement. The timbers shall be large enough to prevent contact between the pipes in adjacent tiers.

D. Stored mechanical and push-on joint gaskets shall be placed in a cool location out of direct sunlight. Gaskets shall not come in contact with petroleum products. Gaskets shall be used on a first-in, first-out basis.

E. Mechanical-joint bolts shall be handled and stored in such a manner that will ensure proper use with respect to types and sizes.

1.06 Quality Assurance

The manufacturer shall provide written certification to the Town that all products furnished comply with all applicable requirements of these specifications.

Part 2 Products

2.01 Piping Materials and Accessories

A. Polyvinyl Chloride (PVC) Pipe and Fittings

1. Pipe shall be manufactured from virgin, National Sanitation Foundation (NSF) approved resin conforming to ASTM D-1784.

2. Unless shown otherwise on the Drawings, all PVC pipe shall have integral belled ends for push-on type jointing and shall conform to ASTM D 3034. The pipe shall have a Standard Dimension Ratio (SDR) of 21 for pipes 10-inches and larger and SDR 35 for pipes less than 10-inches in diameter, unless indicated otherwise on the Drawings. Pipe shall be supplied in minimum lengths of 20 feet.

3. The gaskets used for joining the PVC sewer pipe shall conform to ASTM F-477.

4. All PVC gravity sewer pipe shall be clearly marked with the manufacturers name, nominal diameter, SDR, ASTM D-3034, and NSF approval seal.

B. Ductile Iron Pipe (DIP)

1. Ductile iron pipe shall be manufactured in accordance with AWWA C151. All pipe, except specials, shall be furnished in nominal lengths of 18 to 20 feet. Sizes will be as shown on the Drawings. All pipe shall be Pressure Class 350 and have corresponding minimum wall thickness, unless otherwise specified or shown on the Drawings.

2. Pipe and fittings shall be cement lined in accordance with AWWA C104. The seal coat is optional. Pipe and fittings shall be furnished with a bituminous outside coating.

3. Fittings shall be ductile iron and shall conform to AWWA C110 or AWWA C153 with a minimum rated working pressure of 250 psi.

4. Joints

   a. Unless shown or specified otherwise, joints shall be push-on or restrained joint type for pipe and standard mechanical, push-on or restrained joints for fittings. Push-on and mechanical joints shall conform to AWWA C111.

   b. The only acceptable restrained joint systems are identified in the table below. No field welding of restrained joint pipe will be allowed.

Acceptable Restrained Joints					
Size	ACIPCO	U.S. Pipe	McWane	Griffin	Generic*
4 - 12	Fast-Grip Flex Ring	Field Lok TR Flex	Push-On Restrained Joint Type A	SNAP-LOCK	MJ with Retainer Gland

*Fittings and valves only, and only where specifically allowed.

5. Provide the appropriate gaskets for mechanical and flange joints. Gaskets for flange joints shall be made of 1/8-inch thick, cloth reinforced rubber; gaskets may be ring type or full-face type.

6. Bolts and Nuts

   a. Provide the necessary bolts for connections. All bolts and nuts shall be threaded in accordance with ANSI B1.1, Coarse Thread Series, Class 2A external and 2B internal fit. All bolts and nuts shall be made in the U.S.A.

   b. Bolts and nuts for mechanical joints shall be Tee Head Bolts and nuts of high strength low-alloy steel in accordance with ASTM A 242 to the dimensions shown in AWWA C111/ANSI A21.11.

c. Bolts for exposed service shall be zinc plated, cold pressed, steel machine bolts conforming to ASTM A 307, Grade B. Nuts for exposed service shall be zinc plated, heavy hex conforming to ASTM A 563. Zinc plating shall conform to ASTM B 633, Type II.

7. Mechanical joint glands shall be ductile iron.

8. Thrust collars shall be welded-on ductile iron body type designed to withstand thrust due to 250-psi internal pressure on a dead end.

9. Acceptance will be on the basis of the Town's inspection and the manufacturer's written certification that the pipe was manufactured and tested in accordance with the applicable standards.

2.02 Concrete

Concrete shall have a compressive strength of not less than 3000 psi, with not less than 5.5 bags of cement per cubic yard and a slump between 3 and 5-inches. For job mixed concrete, submit the concrete mix design for approval by the Town. Ready-mixed concrete shall be mixed and transported in accordance with ASTM C 94. Reinforcing steel shall conform to the requirements of ASTM A 615, Grade 60.

2.03 Detection Wire

A. Detection wire shall be 10-gauge THHN (Thermo High Heat Nylon) copper locator wire. Detection wire shall be stubbed up at all valve locations.

B. Detection wire is required for all pipe installations.

Part 3 Execution

3.01 Existing Utilities and Obstructions

A. The Drawings indicate utilities or obstructions that are known to exist according to the best information available to the Owner. This information is not to be relied upon as being exact or complete. The Contractor shall call the Tennessee One Call System, Inc. (1-800-351-1111) as required by the Tennessee Law "Underground Utility Damage Prevention Act" (Code Section 65-31-106). Additionally, the Contractor shall call the utility companies to request a field location of their utilities.

B. Existing Utility Location: The following steps shall be exercised to avoid interruption of existing utility service.

1. Provide the required notice to the utility owners and allow them to locate their

facilities according to Tennessee law. Field utility locations are valid for only 15 days after original notice. The Contractor shall ensure, at the time of any excavation, that a valid utility location exists at the point of excavation.

2. Expose the facility, for a distance of at least 200 feet in advance of pipeline construction, to verify its true location and grade. Repair, or have repaired, any damage to utilities resulting from locating or exposing their true location.

3. Avoid utility damage and interruption by protection with means or methods recommended by the utility owner.

4. Maintain a log identifying when phone calls were made, who was called, area for which utility relocation was requested and work orders issued by the Town of Bean Station, if any. The Contractor shall provide the Town an updated copy of the log bi-weekly, or more frequently if required.

C. Conflict with Existing Utilities

1. Horizontal Conflict: Horizontal conflict shall be defined as when the actual horizontal separation between a utility, main, or service and the proposed water main does not permit safe installation of the water main by the use of sheeting, shoring, tieing-back, supporting or temporarily suspending service of the parallel or crossing facility. The Contractor may change the proposed alignment of the water main to avoid horizontal conflicts if the new alignment remains within the available right-of-way or easement, complies with regulatory agency requirements and after a written request to and subsequent approval by the Town. If, in the opinion of the Town, the water main's proposed location cannot be adjusted, thus requiring the relocation of an existing utility, the Owner will direct the Contractor to relocate the utility as part of the Contract with the costs of such relocation being paid for as part of a change order.

2. Vertical Conflict: Vertical conflict shall be defined as when the actual vertical separation between a utility, main, or service and the proposed water main does not permit the crossing without immediate or potential future damage to the utility, main, service, or the water main. The Contractor may change the proposed grade of the water main to avoid vertical conflicts if the changed grade maintains adequate cover and complies with regulatory agencies requirements after written request to and subsequent approval by the Town. If, in the opinion of the Town, the water main's proposed location cannot be adjusted, thus requiring the relocation of an existing utility, the Owner will direct the Contractor to relocate the utility as part of the Contract with the costs of such relocation being paid for as part of a change order.

D. Electronic Locator: Have available at all times an electronic pipe locator and a magnetic locator, in good working order, to aid in locating existing pipe lines or other obstructions.

E. Water and Sewer Separation

1. Water mains should maintain a minimum 10 foot edge-to-edge separation from sewer lines, whether gravity or pressure. If the main cannot be installed in the prescribed easement or right-of-way and provide the 10 foot separation, the separation may be reduced, provided the bottom of the water main is a minimum of 18-inches above the top of the sewer. Should neither of these two separation criteria be possible, the water main shall be installed below the sewer with a minimum vertical separation of 18-inches.

2. The water main, when installed below the sewer, shall be encased in concrete with a minimum 6-inch concrete depth to the first joint in each direction. Where water mains cross the sewer, the pipe joint adjacent to the pipe crossing the sewer shall be cut to provide maximum separation of the pipe joints from the sewer.

3. No water main shall pass through, or come in contact with, any part of a sanitary sewer manhole.

F. ANY DAMAGES TO PRIVATE sewer or water lines are to be repaired at Contractor's expense.

3.02 Construction Along Highways, Streets and Roadways

A. Install pipe lines and appurtenances along highways, streets and roadways in accordance with the applicable regulations of, and permits issued by, the Tennessee Department of Transportation and the county with reference to construction operations, safety, traffic control, road maintenance and repair.

B. Traffic Control

1. The Contractor shall provide, erect, and maintain all necessary barricades, suitable and sufficient lights and other traffic control devices; provide qualified flagmen where necessary to direct traffic; take all necessary precautions for the protection of the work and the safety of the public.

2. Construction traffic control devices and their installation shall be in accordance with the current Manual On Uniform Traffic Control Devices for Streets and Highways.

3. Placement and removal of construction traffic control devices shall be coordinated with the Tennessee Department of Transportation and the county a minimum of 48 hours in advance of the activity.

4. Placement of construction traffic control devices shall be scheduled ahead of associated construction activities. Construction time in street right-of-way shall be conducted to minimize the length of time traffic is disrupted. Construction traffic control devices shall be removed immediately following their useful

purpose. Traffic control devices used intermittently, such as "Flagmen Ahead", shall be removed and replaced when needed.

5. Existing traffic control devices within the construction work zone shall be protected from damage. Traffic control devices requiring temporary relocation shall be located as near as possible to their original vertical and horizontal locations. Original locations shall be measured from reference points and recorded in a log prior to relocation. Temporary locations shall provide the same visibility to affected traffic as the original location. Relocated traffic control devices shall be reinstalled in their original locations as soon as practical following construction.

6. Construction traffic control devices shall be maintained in good repair and shall be clean and visible to affected traffic for daytime and nighttime operation. Traffic control devices affected by the construction work zone shall be inspected daily.

7. Construction warning signs shall be black legend on an orange background. Regulatory signs shall be black legend on a white background. Construction sign panels shall meet the minimum reflective requirements of the Tennessee Department of Transportation and the county. Sign panels shall be of durable materials capable of maintaining their color, reflective character and legibility during the period of construction.

8. Channelization devices shall be positioned preceding an obstruction at a taper length as required by the current Manual on Uniform Traffic Control Devices for Streets and Highways, as appropriate for the speed limit at that location. Channelization devices shall be patrolled to insure that they are maintained in the proper position throughout their period of use.

C. Construction Operations

1. Perform all work along highways, streets and roadways to minimize interference with traffic.

2. Stripping: Where the pipeline is laid along road right-of-way, strip and stockpile all sod, topsoil and other material suitable for right-of-way restoration.

3. Trenching, Laying and Backfilling: Do not open the trench any further ahead of pipe laying operations than is necessary. Backfill and remove excess material immediately behind laying operations. Complete excavation and backfill for any portion of the trench in the same day.

4. Shaping: Reshape damaged slopes, side ditches, and ditch lines immediately after completing backfilling operations. Replace topsoil, sod and any other materials removed from shoulders.

5. Construction operations shall be limited to 400 feet along areas, including

clean-up and utility exploration.

D. Excavated Materials: Do not place excavated material along highways, streets and roadways in a manner, which obstructs traffic. Sweep all scattered excavated material off of the pavement in a timely manner.

E. Drainage Structures: Keep all side ditches, culverts, cross drains, and other drainage structures clear of excavated material. Care shall be taken to provide positive drainage to avoid ponding or concentration of runoff.

F. Landscaping Features: Landscaping features shall include, but are not necessarily limited to: fences; property corners; cultivated trees and shrubbery; manmade improvements; subdivision and other signs within the right-of-way and easement. The Contractor shall take extreme care in moving landscape features and promptly re-establishing these features.

G. Maintaining Highways, Streets, Roadways and Driveways

1. Maintain streets, highways, roadways and driveways in suitable condition for movement of traffic until completion and final acceptance of the Work.

2. During the time period between pavement removal and completing permanent pavement replacement, maintain highways, streets and roadways by the use of steel running plates. Running plate edges shall have asphalt placed around their periphery to minimize vehicular impact. The backfill above the pipe shall be compacted as specified elsewhere up to the existing pavement surface to provide support for the steel running plates.

3. Furnish a road grader or front-end loader for maintaining highways, streets, and roadways. The grader or front-end loader shall be available at all times.

4. Immediately repair all driveways that are cut or damaged. Maintain them in a suitable condition for use until completion and final acceptance of the Work.

3.03 Pipe Distribution

A. Pipe shall be distributed and placed in such a manner that will not interfere with traffic.

B. No pipe shall be strung further along the route than 1,000 feet beyond the area in which the Contractor is actually working without written permission from the Owner. The Owner reserves the right to reduce this distance to a maximum distance of 200 feet in residential and commercial areas based on the effects of the distribution to the adjacent property owners.

C. No street or roadway may be closed for unloading of pipe without first obtaining permission from the proper authorities. The Contractor shall furnish and maintain proper warning signs and obstruction lights for the protection of traffic along highways, streets and roadways upon which pipe is distributed.

D. No distributed pipe shall be placed inside drainage ditches.

E. Distributed pipe shall be placed as far as possible from the roadway pavement, but no closer than five feet from the roadway pavement, as measured edge-to-edge.

3.04 Preparation

A. Prior to laying pipe, prepare suitable bedding according to Section 02003.

B. Before placing pipe in the trench, field inspect for cracks or other defects, remove defective pipe from the construction site.

C. Swab the interior of the pipe to remove all undesirable material.

D. Establish line and grade for pipe and appurtenances. Verify location and elevation of existing manholes and other utilities.

3.05 Installing Gravity Sanitary Sewers

A. Lay pipe true to the lines and grades from the grade and alignment stakes, or equally usable reference.

1. Where laser equipment is used, provide offset hubs at every manhole location for purposes of checking grade between sections.

2. Where batter boards are used, furnish stakes at intervals of 50 feet along the route of the pipeline.

3. Set stakes at such distance from the centerline of excavation as is suitable for the excavating method and machinery used.

4. Provide and use accurately set batter boards at each 50-foot interval in establishing the bottom invert of each pipe laid.

B. Lay pipe progressively up grade, with bell upstream, in such a manner as to form close, concentric joints with smooth bottom inverts. Joining of all pipe shall be in accordance with the manufacturer's specifications.

C. Bed each pipe section in accordance with Section 02003.

D. Unless otherwise specified, provide all gravity sewer lines with a minimum of 4 feet of cover in roadways and 2-1/2 feet of cover in open areas unless ductile iron pipe or concrete encasement is used.

E. Do not allow walking on complete pipelines until backfill has been placed to a depth of at

least 6-inches above the crown of the pipe.

F. Keep the interior of the pipe free of all unneeded material, and upon completion of a section between any two manholes it shall be possible to view a complete circle of light when looking through the pipe.

G. When laying pipe ceases, close the open ends of the pipe with a suitable plug for preventing the entrance of foreign materials.

H. Couplings and adaptors used for joining dissimilar gravity pipe materials, repairing and rejoining sections of gravity sewer, and for connecting the first full joint of pipe to a short stub through a manhole wall shall meet the requirements of ASTM C-425.

I. All couplings and adaptors for gravity sewer pipe shall be of rubber, plastic and metallic materials that will not be attacked by municipal wastewaters or aggressive elements in the soil and conform to ASTM C-425 Section 5.

3.06 Initial Proof Testing of Sanitary Sewers

A. It is the intent to specify a "test as you go" procedure in order to establish confidence in the installation and avoid the necessary delay of final acceptance.

B. Before a section of pipeline is approved, a successful proof test for grade, alignment, cleanliness and leakage must be completed and approved by the owner.

C. In the event that four or more pipe sections fail to satisfactorily pass proof testing procedures, cease pipe laying until deficiencies are identified and corrected.

D. The basis for grade, cleanliness and alignment testing will be visual inspection. Leakage testing will be by means of low-pressure air or exfiltration or infiltration as deemed by the Owner.

E. Proof test pipeline installation for deflection by pulling a " go-no go" test mandrel of 95/100 of the pipe diameter through the line after the initial backfill is complete but before final dress up work to avoid unnecessary digups. This mandrel test shall be conducted no sooner than 24 hours after completion of backfilling.

3.07 Final Testing

A. Before the construction is accepted and before any service connection is made, a final testing procedure is to be followed.

B. Perform a visual inspection when groundwater levels are above the pipeline if possible. All visible leaks shall be repaired.

C. If there is evidence of infiltration, make measurement with suitable pipe weirs:

1. If the flow through the lower most manhole of a continuous section of the sewer does not exceed 50 gallons/day/inch/mile of pipeline and the groundwater level is representative of the highest annual level, the entire continuous section shall be approved for leakage.

2. The leakage test will be conducted with all lines connected (including service lines).

3. If the apparent infiltration rate exceeds 50 gallons/day/inch/mile, then take additional weir measurements to isolate those sections leaking.

4. Any single reach of pipeline, which exhibits an apparent infiltration rate in excess of 50 gallons/day/inch/mile, will not be accepted and all leaks will be located and corrected.

D. The contractor must perform a low-pressure air exfiltration (or other approved exfiltration) test. This test will be conducted in accordance with ASTM C-828 or latest revision.

E. If flexible pipe is used, pull a approved go-no go deflection mandrel of 95/100-pipe diameter through all reaches of gravity sewer main. This test shall be conducted no sooner than 24-hours after completion of backfilling of the tested reach. No sections will be accepted that exhibit a deflection of more than 5%.

3.08 Low Pressure Air Exfiltration Test

A. Calculate the pressure drop as the number of minutes for the air pressure to drop from a stabilized pressure of 3-1/2 PSIG to 2-1/2 PSIG.

B. Times for mixed pipe sized of varying lengths should be calculated as described in ASTM C828-76T using formula t=K d/q (q=0.0020).

C. Lengths of section under test shall not exceed 500 linear feet.

D. The following times are for one pipe size only.

Time Required for Pipe to Maintain Pressure Between 3-1/2 PSIG to 2-1/2 PSIG

Pipe Diameter	100'	150'	200'	250'	300'	350'	400'	500'
8"	3:47	3:47	3:47	3:47	3:48	4:26	5:04	
10"	4:43	4:43	4:43	4:57	5:56	6:55	7:54	
12"	5:40	5:40	5:40	7:08	8:33	9:48	11:24	
15"	7:05	7:05	8:43	11:08	13:21	15:35	17:48	
18"	8:03	9:37	12:49	16:01	19:14	22:26	25:38	
21"	8:05	10:40	14:15	17:45	21:20	24:50	28:36	35:30
24"	11:24	17:06	22:48	28:30	34:11	39:53	45:35	46:30

3.09 Sewer Manholes - General

A. Unless otherwise specified, all manholes shall have a diameter of not less than 4 feet and a vertical wall height of not less than 2.5 ft.

B. The clear opening in the manhole shall not be less than 2.0 feet.

C. Depth of the manhole shall be the vertical distance from the lowest invert in the manhole to the base of the ring.

D. Backfill manholes with the same material used for pipeline.

E. Vacuum test manholes as outlined in section 3.13 of this specification.

3.10 Standard Precast Concrete Manholes

A. Standard precast manhole construction shall comply with ASTM C-478.

B. The base of the manhole shall be Class A concrete not less than 8-inches in depth with inverts not less than 4-inches in depth.

C. Shape manhole inverts from Class B concrete to be smooth, accurately shaped, and in accordance with the plans.

D. Manhole invert deflections shall not exceed 90-degrees.

E. Inlets and outlets from each manhole shall be finished smooth and flush with the sides of manhole walls so as not to obstruct the flow of liquid through the manhole.

F. Inlets and outlets pipes shall be connected to manhole with Kor-n-Seal rubber boot or owner approved alternative.

G. When possible, the base of the manhole shall be placed on dry, consolidated and undisturbed soil.

H. When wet or unconsolidated material occurs or when over excavation of the base occurs, provide a sub base with a minimum of 12-inches of Class I, granular material well compacted with mechanical taming equipment.

I. When completed, the manhole shall be free from channel obstructions and leakage.

J. Seal joints between sections with a rubber o-ring or RAMNEK gasket.

3.11 Manhole Rings and Covers

A. Grout manhole rings and covers in place with cement mortars.

B. The bearing surfaces between cast rings and covers shall be machined, fitted together, and matched marked to prevent rocking.

C. All castings shall be of the type, dimension, and weights as shown on the plans and shall be free of faults, cracks, blowholes, or other defects.

3.12 Drop Manhole Assemblies

A. Drop manhole assemblies shall be constructed with a drop pipe outside the manhole at a invert elevation no more than 12-inches above the elevation of the manhole outlet elevation.

B. The material used in the drop manhole pipe construction shall be ductile iron pipe and Class B concrete.

3.13 Manhole Vacuum Testing

A. The contractor shall provide all equipment and materials required for vacuum testing.

B. All manholes are to be vacuumed tested upon completion and prior to backfilling. The testing equipment shall consist of a gasoline powered vacuum pump with sufficient vacuum hose length and a test head of proper size to fit the inside opening of the manhole. The test head shall be equipped with an inflatable rubber bladder to affect the seal to the manhole, an air pressure gauge, and a safety valve for filling the rubber bladder, and a 0 to 30-inch Hg (mercury) liquid filled vacuum gauge.

C. The contractor shall plug all pipe openings, taking care to securely brace the plugs and the pipes. The plugs shall be placed a minimum of 6-inches beyond the manhole wall.

D. With the vacuum tester in place, inflate the compression band to affect the seal between the vacuum base and the structure. Connect the vacuum pump to the outlet port with the valve open and evacuate the manhole to 10-inches Hg (0.3 bar), which is equivalent to approximately 5 PSIG backpressure.

E. Close the vacuum inlet/outlet ball valve, disconnect the vacuum pump, and monitor the vacuum gauge for the specified time period (see table below). If the vacuum does not drop in excess of 1-inch Hg over the specified time period, the manhole is considered acceptable and passes the test. If the manhole fails the test, identify the leaking areas by removing the head assembly, coating the interior surfaces of the manhole with a soap and water solution, and repeating the vacuum test for approximately thirty seconds. Leaking areas will have soapy bubbles. Once the leaks have been identified, complete all necessary repairs by sealing the leaks on the inside and on the outside of the manhole to the satisfaction of the owner, and repeat the test procedure until satisfactory results are obtained.

Vacuum Test Timetable

Depth – Feet	Diameter – Inches 48"	60"	72"	gau
6'	20 seconds	26 seconds	32 seconds	
8'	20 seconds	26 seconds	32 seconds	
12'	30 seconds	39 seconds	48 seconds	
16'	40 seconds	52 seconds	64 seconds	
20'	50 seconds	65 seconds	80 seconds	
24'	60 seconds	78 seconds	96 seconds	
*	05 seconds	6.5 seconds	8.0 seconds	

* Add "T" times for each additional 2-foot depth.

3.14 Protection and Restoration of Work Area

A. General: Return all items and all areas disturbed, directly or indirectly by work under these Specifications, to their original condition or better, as quickly as possible after work is started.

1. The Contractor shall plan, coordinate, and prosecute the work such that disruption to personal property and business is held to a practical minimum.

2. All construction areas abutting lawns and yards of residential or commercial property shall be restored promptly. Backfilling of underground facilities, ditches, and disturbed areas shall be accomplished on a daily basis as work is completed. Finishing, dressing, and grassing shall be accomplished immediately thereafter, as a continuous operation within each area being constructed and with emphasis placed on completing each individual yard or business frontage. Care shall be taken to provide positive drainage to avoid ponding or concentration of runoff.

3. Handwork, including raking and smoothing, shall be required to ensure that the removal of roots, sticks, rocks, and other debris is removed in order to provide a neat and pleasing appearance.

4. The Department of Transportation's engineer shall be authorized to stop all work by the Contractor when restoration and cleanup are unsatisfactory and to require appropriate remedial measures.

B. Man-Made Improvements: Protect, or remove and replace with the Town's approval, all fences, walkways, mail boxes, pipe lines, drain culverts, power and telephone lines and cables, property pins and other improvements that may be encountered in the Work.

C. Cultivated Growth: Do not disturb cultivated trees or shrubbery unless approved by

the Town. Any such trees or shrubbery, which must be removed, shall be heeled in and replanted under the direction of an experienced nurseryman.

D. Cutting of Trees: Do not cut trees for the performance of the work except as absolutely necessary. Protect trees that remain in the vicinity of the work from damage from equipment. Do not store spoil from excavation against the trunks. Remove excavated material stored over the root system of trees within 30 days to allow proper natural watering of the root system. Repair any damaged tree over 3-inches in diameter, not to be removed, under the direction of an experienced nurseryman. All trees and brush that require removal shall be promptly and completely removed from the work area and disposed of by the Contractor. No stumps, woodpiles, or trash piles will be permitted on the work site.

E. Disposal of Rubbish: Dispose of all materials cleared and grubbed during the construction of the Project in accordance with the applicable codes and rules of the appropriate county, state and federal regulatory agencies.

F. Swamps and Other Wetlands

1. The Contractor shall not construct permanent roadbeds, berms, drainage structures or any other structures, which alter the original topographic features within the easement.

2. All temporary construction or alterations to the original topography will incorporate measures to prevent erosion into the surrounding swamp or wetland. All areas within the easement shall be returned to their original topographic condition as soon as possible after work is completed in the area. All materials of construction and other non-native materials shall be disposed by the Contractor.

3. The Contractor shall provide temporary culverts or other drainage structures, as necessary, to permit the free migration of water between portions of a swamp, wetland or stream, which may be temporarily divided by construction.

4. The Contractor shall not spread, discharge or dump any fuel oil, gasoline, pesticide, or any other pollutant to adjacent swamps or wetlands.

END OF SECTION

PART 1 GENERAL

1.1 This section covers all valves and hydrants specified to be installed in the process and yard piping, excluding all water supply and waste piping that is to be installed inside and within 5 feet outside building walls.

1.2 Furnish all materials and equipment and install the valves at the locations shown on the drawings.

1.3 Refer to the Replacement Valve Schedule in the drawings for the minimum requirements of valves for operation. In addition, where required for satisfactory operation of valves, provide extension stems, stem guides, cast iron valve boxes, floor boxes, floor stands, bench stands, chain wheel with chain (valve centerline greater than 6 feet above a walking surface), handwheels, and other valve appurtenances. Underground extension stems shall be complete with guide bearings, wrench nut, and tee handle wrench. All valve stems and machinery stuffirig boxes shall be packed with material selected for the service intended. Maintain all packing until final acceptance by the Owner.

1.4 Safely store materials needed for the work that have been received at the project site until they have been incorporated into the completed project. Store the materials in strict accordance with the instructions for storage of each valve and hydrant supplier and manufacturer.

1.5 Refer to Section 102, Submittals and Substitutions, for the requirements of shop drawing submittals. Valves proposed for use at each location shall be identified in the submittals by the valve numbers indicated in the Valve Schedule incorporated on the drawings.

1.6 Refer to other sections for items affecting valves and hydrants Coordinate this work with that specified by other sections for timely completion.

PART 2 PRODUCTS

2.1 GATE VALVE

A Gate valves of the sizes, classes, and types required shall be furnished with flanged, mechanical joint or hub ends as shown on the drawings conforming to AWWA C500 as extended and modified herein. Gate valves shall be tested at double their working pressure. Gate valves shall open by being turned to the left.

B. If for inside service, the exterior surface of the valve, except finished flanges, shall be painted with one priming coat of Tnemec 77 Chem Prime, Inertol 621 or approved equal primer. Products containing lead are prohibited. Exterior or buried valves shall be coated with black asphaltum varnish.

C. The valves shall be nonrising stem (NRS), with cast or ductile iron body and bonnet bronze mounted in accordance with AWWA C500. At a minimum, the disc seat rings body seat rings, stem nut, stem, and wedge shall be of bronze.

D. In flanged valves, the body shall have end flanges dimensioned and machined to the ANSI 25 pound standard for 25 pound and 50 pound valves and dimensioned and machined to the ANSI 125 pound standard for 75 pound through 200 pound valves, with flanges drilled to the 125 pound standard. Where noted as Class 250 pound, valves shall be so rated, and flanges shall be drilled and with raised face in accordance with ANSI Bl6b, 250 pound.

E. The body flange that connects to the bonnet shall be machined and drilled

F. The stem, collar bearing recess, stem opening, top of the bonnet, and flange that bolts to the body flange shall all be machined.

G. The discs shall be of cast iron. Dovetail grooves shall be machined in the discs to receive the bronze seat rings, which shall be rolled or peened into the grooves.

H. The stem shall be of forged or cast bronze with a mechanically upset collar. The stem shall have modified ACME threads. Stem diameters shall comply with the appropriate AWWA Standards. Stem packing on valves 12 inches and smaller shall be of the 0 ring type unless otherwise specified.

I. The stem nut shall be of cast or forged bronze and shall have threads machined to fit the stem.

J. Body seat rings shall be of cast bronze threaded and screwed into the body, after which they shall be machined on the face. The width of the body seat ring shall be sufficient to result in a bearing pressure of the gate on the body seat ring of not more am 2,000 psi under a hydrostatic pressure of 300 psi.

K. Disc seat rings shall be of cast bronze of such composition that they can be rolled or peened into dovetailed grooves machined in the disc, after which they shall be machined on the face. They shall be wider than the body seat rings. The valves shall be equipped with an internal wedging device of the wedge or spreader type which, in closing the valve, will operate when the discs reach a position opposite the ports to spread the discs apart and force them against the seat rings in the body. In the wedge type, the wedges shall be of solid bronze and the hooks that actuate the wedges shall

be of cast iron In the spreader type, at least one wedging surface shall be bronze faced.

L. The stuffing box shall be of cast iron and shall be machined on the bottom to fit the top of the bonnet and to provide the upper thrust surface for the stem collar. The stem opening through the stuffing box shall be machined to a close clearance with the stem to provide the lateral bearing for the stem.

M The gland assembly, where used, shall be cast iron The gland bolts shall be of steel with steel nuts.

N. The bolts connecting the body and bonnet flanges shall be of commercial steel with square heads and hexagon nuts.

O. The gaskets between the body and bonnet and the stuffing box flanges shall be of a composite material or synthetic rubber. Gaskets containing asbestos in any form will not be acceptable.

P. There shall be cast on the body or bonnet of the valve the manufacturer's name, monogram, or initials; the valve's pressure rating; the size of the valve; and the year of manufacture.

Q. The valves shall be carefully inspected for any defects and shall be operated through the full travel to ensure free and perfect functioning of all operating parts. Each valve shall be subjected to a hydrostatic test: the shell to the rated test pressure and the seals to the rated working pressure.

R. Furnish a manufacturer's certificate indicating that the required tests have been made and the results of the tests conform to the requirements of these specifications.

2.2 RESILIENT WEDGE GATE VALVE

A. Valves shall be manufactured to meet all applicable requirements of AWWA C500 Valves 12 inches and smaller shall be bubbletight at 200 psi water working pressure,

B. Each valve shall have a nonrising stem. Opening of the valve shall be by turning to the left, and there shall be an arrow cast in metal to indicate the direction of opening.

C. Each valve shall have the manufacturer's name, the valve's pressure rating, and the year of manufacture cast on the body. Prior to shipment from the factory, each valve shall be tested by hydrostatic pressure.

D. Each cast iron wedge shall have the sealing surfaces of the wedge permanently bonded with resilient material to meet ASTM tests for rubber to metal bond (ASTM D429).

E. Low friction torque reduction thrust bearings shall be located both above and below the stem collar.

F. Each valve shall have a smooth, unobstructed waterway free from any sediment pockets.

G. Body and cover bolts and nuts shall meet ASTM A307 and shall be suitably rustproofed.

H. Stem nuts shall be independent of the wedge and shall be made of solid bronze conforming to ASTM B62 or equivalent.

I. Stuffing boxes shall be of the O-ring type with 2 rings located in the stem or packing gland above the thrust collar or one O-ring above and one O-ring below the thrust collar.

J. Nonrising stems shall be in full compliance with AWWA specifications, with a cast integral stem collar, and ftimished of bronze conforming to ASTM B584, Alloy A.

K. Valves shall be given hydrostatic shell test at 400 psi and shutoff test at 200 psi. At the 200 psi shutoff test, the valve must be bubbletight (i.e., no leakage will be allowed).

2.3 SLOW CLOSING AIR AND VACUUM VALVES

A. Air and vacuum valves shall be top outlet, antislam, regulated closure devices that prevent the air and vacuum valves from being slammed shut during critical operation. The valve body shall be semisteel bronze seat, adjustable, with stainless steel spring loaded and screwed ends. The valves shall be capable of discharging 25 cfs air at 2.0 psig.

2.4 SWING CHECK VALVES

A. Swing Check

1. Swing check valves shall be iron body, bronze mounted, with seat rings, faces, and hinge pins suitable for operation in horizontal or vertical lines. Unless otherwise shown on the drawings, operation shall be by means of an outside lever and spring.

2. A removable cover shall be provided for the removal of internal parts without necessitating the removal of the valve from the line. The high point of the valve shall be tapped and equipped with a plug. When shown on the drawings, a valve or curb cock for the removal of air shall be provided. Unless otherwise shown, all check valves shall be flanged with flanges dimensioned and drilled to the ANSI 125 pound standard.

B. Nonslam Type Swing Check

1. Each swing check valve shall be constructed with a cast iron or cast steel body with a bronze or stainless steel seat ring, a noncorrodible shaft for attachment of weight and lever, and complete noncorrodible cushion chamber.

2. It shall absolutely prevent the return of water, oil, or gas back through the valve when the inlet pressure decreases below the delivery pressure. The valve must be tight seating and must operate without hammer or shock. The seat ring must be renewable and shall be securely held in place by a threaded joint.

3. The cushion chamber, or chambers, shall be attached to the side of the valve body externally and constructed with a piston operating in a chamber that will effectively permit the valve to be operated without any hammering action. The cushioning shall be by air, and the cushion chamber shall be arranged so that the closing speed will be ad ustable to meet the service requirements.

4. The valve disc shall be of cast iron or cast steel and shall be suspended from a noncorrodible shaft which will pass through a stuffing box and be connected to the cushion chamber on the outside of the valve.

5. A removable cover shall be provided for the removal of internal parts without necessitating the removal of the valve from the line. The high point of the valve shall be tapped and equipped with a plug. When shown on the drawings, a valve or curb cock for the removal of air shall be provided. Unless otherwise shown all check valves shall be flanged with flanges dimensioned and drilled to the ANSI 125 pound standard.

2.5 SMALL VALVES

.A. Unless otherwise shown on the drawings, gates valves 2 inches and smaller shall be all-bronze, single wedge disc, nonrising stem, and handwheel operated. Such valves shall be Crane No. 438, Lunkenheimer Figure 2129, or equal, for screwed end valves, and Crane No. 1320, Lunkenheimer Figure 2133, or equal, for solder joint valves.

B. Check valves 2 inches and smaller shall be bronze body, composition disc, with screwed ends, similar to Crane No. 34-1/2, Lunkenheimer Figure 230-70, or equal.

C. Standard screwed end globe valves 2 inches and smaller shall be bronze valves with plug disc and shall be Crane No. 14-1/2 P, Lunkenheimer Figure 73-PS, or equal. Needle point globe valves 3/4 inch and smaller shall be bronze valves similar to Crane No. 88, Jenkins, or equal.

2.6 SOLENOID VALVES

A. Solenoid valves shall be of the globe valve type, 2-way normally closed valves unless otherwise noted on the drawings. These shall be controlled by a 115V, single phase, 60 Hz power supply.

2.7 PRESSURE RELIEF VALVE

A. Each pressure relief valve shall maintain constant upstream pressure by relieving excess pressure and shall maintain close pressure limits without causing surges.

B. In valves larger than 2 inches, the main valve shall be of the hydraulically operated, pilot controlled diaphragm type and shall have a single removable seat and resilient disc. The delrin stem shall be guided at both ends by a bearing in the valve cover and an integral bearing in the valve seat. No external packing glands shall be permitted, and the diaphragm shall not be used as a seating surface. The pilot control shall be a direct acting, adjustable, spring loaded diaphragm valve designed to permit flow when the controlling pressure exceeds the spring setting. The pilot control system shall operate so that, as excess line pressure is dissipated, the main valve gradually closes to a positive, driptight seating. The valve body shall be epoxy lined and shall be of either globe or angle pattern, as shown on the drawings.

C. Pressure relief valves for water that are 2 inches and smaller shall be of bronze body with spring loaded stainless steel ball and screwed ends. The relief pressure setting shall be adjustable in the range of 25 to 100 psi. The valve shall be Watts Type LF, Lunkenheimer No. 650, Cash-Acme Type MC, or equal.

2.8 FOOT VALVES

A. Each valve shall be of cast iron body, bronze fitted, with piston and seat ring. Each valve shall be furnished with ANSI B16.1 125 pound or 250 pound flanges and drilling.

2.9 AIR PRESSURE RELIEF VALVES

A. Air pressure relief valves shall be top outlet, bronze body, adjustable, spring loaded and with screwed ends. The relief pressure setting shall be adjustable in the range of 1 to 5 psi.

2. 10 PLUG DRAIN OR MUD VALVES

A. Plug drain or mud valves shall be cast iron, bronze fitted, nonrising stem. Unless otherwise shown on the drawings, plug drain valves shall be furnished with a 2 inches square nut for floor box operation. Seat, disc, or gate ring and valve stem shall be bronze. Extension stems and stem guides shall be as specified elsewhere in this

section. Valves shall be furnished with spigot or flanged end as shown on the drawings and shall open by being turned to the left. Plug drain valves shall be set 1 inch below the floor and the floor sloped to the opening.

2. 11 FLAP VALVES

A. Flap valves shall be of the single hinged type, fully bronze mounted, with a bronze hinge pin, flap ring, and seat ring.

2.12 BALL VALVES

A. Each ball valve for chemical piping systems shall be a top entry ball valve with wedge seat and threaded or flanged end connection. The valve body material shall be solid PVC, and seats shall be of Teflon.

2.13 BUTTERFLY VALVES AND OPERATORS

A. Wafer Butterfly Valves: Wafer butterfly valves for air service shall have ductile iron body and blade, shall be suitable for mounting between ANSI 125 pound flanges, and shall be metal seated. The valve shall have Type 304 stainless steel stub shafts and taper pin, cast iron bearings, bronze packing nut, and Buna-N packing. The valve shall be lever operated with positive lever position locking arrangement.

B. Butterfly Valves

1. All butterfly valves shall be of the tight closing, resilient seat type. No metal to metal seating surfaces shall be permitted. Valves shall be bubbletight at rated pressures with flow in either direction and shall be satisfactory for applications involving throttling service and/or frequent operation after long periods of inactivity. Valve discs shall rotate 90 degrees from the fully open position to the tight shut position. Valves 20 inches and smaller shall meet the full requirements of AWWA C504 for Class 150B.

2. Valve bodies shall be constructed of cast iron, ASTM A126, Class B, for flanged end valves or ASTM A48, Class 40, for wafer valves. The flange drilling shall be in accordance with ANSI B16.1 for cast iron flanges. A total of 2 trunnions for shaft bearings shall be integral with each valve body. Body thickness shall be in strict accordance with AWWA C504.

3. Valve discs shall be constructed of alloy cast iron, ASTM A436, Type (Ni Resist).

4. Shafts of all valves shall be turned, ground, and polished. Valve shafts shall be constructed of 18-8 Type 304 or Type 316 stainless steel. Shaft diameters must meet the minimum requirements established by AWWA C504 for Class 150B.

5. The resilient seating shall be obtained by either of the following 2 designs:

   a. Resilient Seat in the Valve Body: Valve seats shall be of a synthetic compound. Valves shall have seats that are simultaneously molded in, vulcanized, and bonded to the body. The seat bond must withstand 75 pounds of pull under test procedure ASTM D429, Method B.

   b. Resilient Seat Attached to the Valve Disc: The valve disc shall be fitted with a resilient seat of synthetic rubber fixed in place with a retaining ring and cap screws passing through the rubber seat. The seat retaining ring and cap screws shall be of 18-8 stainless steel. The rubber drive shall be replaceable in the field.

6. Valves shall be fitted with sleeve bearings. Bearings shall be corrosion resistant and self-lubricating. Bearing loads shall not exceed 115 of the compressive strength of the bearing or shaft material.

   a. Packing shall be of the self-adjusting Chevron type

   b. Valve operators shall conform to AWWA C504.

C. Manual Operators: Manual operators shall be of the traveling nut, self-locking type and shall be designed to hold the valve in any intermediate position between fully open and fully closed without creeping or fluttering. Operators shall be equipped with mechanical stop limiting devices to prevent overtravel of the disc in the open and closed positions. Valves shall close with a clockwise rotation. Operators shall be fully enclosed and designed to produce the specified torque with a maximum pull of 80 pounds on the handwheel or chainwheel. Operator components shall withstand an input of 450 foot-pounds at the extreme operator position without damage.

D. Manual Operators for Buried Service: Manual operators for buried service shall be of the traveling nut, self-locking type and shall be designed to hold the valve in any intermediate position between ftilly open and fully closed without creeping or fluttering. Operators shall be equipped with mechanical stop limiting devices to prevent overtravel of the disc in the open and closed positions. Operator housings, supports, and connections to the valve shall have provisions for 4-bolt mounting. Operators shall be equipped with a 2 inches square operating nut and shall be fully gasketed and grease packed for buried service. Valves shall close with a clockwise rotation of the nut. On 6 inch through 30 inch diameter valves, operator components shall withstand an input torque of 450 foot-pounds at the extreme operator positions without damage. On valves 36 inch in diameter and larger, operator components shall withstand an input torque of 300 foot-pounds at extreme operator positions without damage.

E. Butterfly Valve Motor Operators

1. The valve positioner shall be a reversible electric motor type, the speed of which shall be proportional to the error signal or speed called for by the controller.

2. The valve positioner shall provide 75 foot-pounds for 4 inch diameter and smaller and 300 foot-pounds for 24 inch diameter and larger torque output. The motor shall be AC reversible to operate from a 120V, single phase, 60 Hz power supply and shall incorporate internal braking to prevent coasting. Position accuracy shall be I part in 1,000. Gearing shall be worm and worm gear to eliminate backdriving by the valve and to provide self-locking in position when the positioner is receiving no signal from the controller. Gearing and motor shall be permanently lubricated. True value position measurement shall be fed back to the controller by a slidewire potentiometer directly coupled to the positioner output shaft. Mounting shall be in any position up to 90 degrees from the normal vertical. Output shaft shall move through a total travel of 85 angular degrees in one minute. The positioner shall provide a scale graduated from 0 to 100 to indicate output shaft position locally. A handwheel for local manual operation of the positioner and field adjustable limit switches shall be provided.

2.14 VALVE APPURTENANCES

A. Valve Boxes

1. All valves not inside structures shall be equipped with standard cast iron valve boxes with covers unless otherwise shown on the drawings. The base shall be round or oval. Valve boxes shall be 3-piece slip type with a 5-1/4 inch shaft. Valve box covers shall be marked as shown on the drawings or, if not shown, shall be marked "water," "sewage," or "bypass," as necessary.

2. Mount each valve box in a concrete pad with bronze disc, giving the particulars of the valve as shown on the drawings. Install the valve box on a firm base at the proper elevation only after the valve has been completely installed, and test before backfilling the excavation. Following the installation of the valve box, carefully backfill. the ground, and tamp so that the top surface, after completion, will be no more than 2 inches above the ground surface or exactly even with paved surfaces. In its final position, the box shall not touch the valve or stem at any point.

3. Unless otherwise shown or noted, pour a 2 foot square or 2 foot diameter by 6 inches thick concrete pad around the tops of all valve boxes that are not in paved surfaces.

B. Wall Hydrants: Wall hydrants shall be of the compression type, brass or bronze, nonfreeze, with a 3/4 inch union right angled inlet and a 3/4 inch hose pipe thread outlet. Install hydrants 3 feet 6 inches above the floor at the locations shown on the

drawings. Hydrants shall also be provided with a hose rack to be installed adjacent to the wall hydrant.

C. Yard Hydrants: Yard hydrants shall be nonfreeze for 2.5 feet of bury with a 1 inch inlet and threaded outlet for hose connection with a vacuum breaker. Each yard hydrant shall have a hose rack conveniently located. Paint yard hydrants after installation.

D. Extension Stems

1. Extension stems shall be provided for all valves in buried locations and in other locations shown on the drawings.

2. Extension stems shall be fabricated from solid steel shafting not smaller in diameter than the stem of the valve or from Schedule 80 steel pipe having an internal diameter not smaller than the diameter of the valve stem. Stem couplings shall be both threaded and keyed to the coupled stems and shall be of approved design and construction. Pipe couplings will not be acceptable.

3. Extension stems for buried valves shall extend to within 12 inches of the surface of the ground. Connect each extension stem to the valve operator. Pin all connections. Each extension stem shall be provided with spacers that will center the stem in a valve box and shall be equipped with a standard AWWA wrench nut as described in Section 19 of AWWA C500, except when handwheels are indicated.

E. Valve Stem Guides: Stem guides shall be cast iron, bronze bushed, and mounted on cast iron brackets. They shall be adjustable in 2 directions and shall be spaced at sufficiently close intervals to support the stem adequately. Stem guide spacing shall not exceed 10 feet, nor shall the 1/r ratio exceed 200.

F. Valve Identification Tags and Discs

1. Valve identification tags shall be installed on all exposed valves. The tags shall be 1-1/2 inch diameter, round, about 19 gauge thick brass discs with a 3/16 inch diameter top hole. The tags shall have on one face, in vertical block style, etched, and backfilled, a 1/2 inch high valve number, in accordance with the Valve Schedule, placed under 1/4 inch high letters indicating the line content or function in abbreviation. The tags shall be Style 250-BL as manufactured by the Seton Nameplate Corporation, New Haven, Connecticut, or equal. All valve tags shall be fastened to the valve stem with 4 ply Monel wire meter seals.

2. Buried valves shall be installed with a valve identification disc attached to the surface of the concrete placed around the valve box. A valve extension stem and floor box shall also have a valve identification disc installed on the concrete floor

adjacent to the floor box. Valve identification discs shall be 2 inch diameter, 1/8 inch thick bronze discs with etched lettering and be attached to the concrete in the manner shown on Standard Drawing 825. The following information shall be etched on the disc:

a. Line content or function

b. Valve number as listed in the Valve Schedule

c Arrow mark indicating the direction= rotation to open, with the word OPEN beside it.

G. Floor Boxes: Floor boxes shall be bushing type to preserve valve stem alignment. Each floor box shall have a cover similar to the valve box covers specified above. Floor boxes shall be Clow, Mueller, or approved equal.

END OF SECTION

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Furnishing and installing duplex pump systems.

B. Equipment includes submersible non-clog sewage pumps, hydraulic sealing flanges, discharge base elbows, stainless steel guide rails and guide brackets, piping, access frames and doors, pump and alarm controller with submersible level transducer, lifting chains, and duplex control panel.

1.2 PRODUCTS INSTALLED BUT NOT FURNISHED UNDER THIS SECTION

A. Flanged ductile iron pipe not furnished with packaged sewage pump station.

B. Valve vault swing check and eccentric plug valves.

1.3 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

A. Wetwell and valve vault access hatch frames.

1.4 RELATED SECTIONS

A. Section 02607 – Sanitary Sewer Wetwell and Valve Vault

B. Section 02640—Valves, Fire Hydrants, and Accessories

C. Section 02732—Sanitary Sewage Force Main

1.5 REFERENCES

A. NFPA #70—National Electrical Code

B. NEMA MG-1—Motors and Generators

C. ASTM A48—Gray Iron Castings

D. AFBMA Standard 20—Deep Groove Ball Bearings

E. SSPC-SP10—Near White Blast Cleaning

F. TDOT "Standard Specifications for Road and Bridge Construction"

1.6 SUBMITTALS

A. Submit under provisions of Section 01300

B. Provide product data for all components.

C. Provide manufacturer certified shop drawings on dimensioned general arrangement drawings, submersible pumps, and electrical enclosures.

D. Submit operation and maintenance data under provisions of Section 01700.

PART 2 – PRODUCTS

2.1 SUBMERSIBLE PUMP

A. Minimum operating conditions:
1. Maximum 3600 RPM
2. 50% Pump efficiency
3. Capable of handling 3" spherical solids
4. Non-overloading throughout the entire range of operation without employing service factor
5. Wet well defined by NEC as Class 1, Division 1, Hazardous locations, Section 501-B(a) requiring explosion-proof construction.

B. Construction
1. Pump Casing, pump impeller, seal housing, motor casing: ASTM A48, Class 30 gray cast iron.
2. Pump discharge: ANSI 125 lb. Flange faced and drilled
3. External mating parts machined and Buna N rubber O-ring sealed. Mo gaskets permitted.
4. Fasteners: 300 series stainless steel throughout
5. Provide lifting means on pump casing

C. Electrical Power Cord
1. Type STW-A water resistant, 600 volt, 60°C, UL approved
2. Connection box assembly:
a. Use Buna-N compression fittong on power and control cord entrance to connection box
b. Strip each lead down to bare wire at staggered intervals and fill entrance area with epoxy compound containing stripped leads.
3. Connect power cord leads to motor leads with wire nuts or Buchanan pressure crimped connectors
4. Separate connection box wiring from motor housing wiring by same stripping/epoxy method used for entrance area assembly.

D. Motor
1. Mount stator, rotor and bearings in sealed submersible type housing designed to withstand 200 psi water pressure at all seal locations
2. Nema B design 1.154 minimum service factor
3. Class F rated insulation materials
4. UL listed for Class 1, Group C and D for hazardous locations
5. Copper windings
6. Design pump and motor for continuous submerged duty in sewage and minimum water jackets or external fins permitted
7. Equip stator with two low resistance, bi-metal thermal sensors sized to open at 130°C and to automatically reset at 90°C. Connect in series with motor starter coil.
8. Key rotor to shaft and rotating assembly dynamically balanced to NEMA limits per MG1-12.05. Secure balance weights with rivets.

E. Bearings and Shaft
1. Heavy duty, single row, deep groove, Conrad type ball bearings having Class 3 internal fit conforming to AFBMA Standard 20
2. Upper Bearing: radial
3. Lower Bearing: radial and thrust
4. Minimum 17,500 hours 8-1O life with bearing temperature rise limited to 60°C under full

load conditions.

5. Shaft: Machined from solid 303 stainless steel forging. Large diameter with minimum overhand.

F. Seals

1. Tandem mounted mechanical seal (2) with an oil filled chamber between seals.
2. Carbon rotating seal faces, ceramic stationary seal faces.
3. Lower seal to be replaceable without disassembly of seal chamber.
4. Equip pump with dual lower seal leak detection probes and warning system.
5. Opposed mechanical seals are not acceptable.

G. Impeller

1. Non-clogging recessed impeller design with pump out vanes on the back. Enclosed, non-clogging impellers acceptable.
2. Coated impellers not acceptable.
3. Dynamically balanced with tolerance value according to International Standard Organization grade 6.3 for rotors in rigid frames.
4. Slip fit on tapered shaft, key driven, with 300 series stainless steel washer and impeller bolt fastening method.

H. Painting

1. Abrasive blast cleaning: SSPC-SP10, near white blast cleaning prior to or after complete assembly.
2. Epoxy: Polyamide paint system, first coat 3.0-5.0 mils DFT, semi-gloss finish second coat 4.0-6.0 mils DFT, total 7.0-11.0 mils DFT. TNEMEC system #66-2 or equal.

I. Serviceability

1. Capable of complete rotating assembly removal from volute without disturbing suction piping, discharge piping, and volute.
2. Pump volute must have feet to support unit when removed for service.

J. Testing

1. Inspect pump for conformance with specifications regarding HP, voltage, phase, and Hertz.
2. Megger motor seal and housing chambers for insulation defects or moisture.
3. Check pump rotation by running dry.
4. Attach discharge piping, submerge in water and operate pump. Take amperage readings in each leg to check for an imbalanced stator winding. Check stator windings with a wheatstone bridge to determine if an unbalanced resistance exists if there is a significant difference in amperage readings.
5. Megger motor after pump has run submerged in water at maximum load for a 30-minute minimum time.
6. Hydrostatic test the pump for leaks with pressurized water to 150% of the maximum pump shot off pressure. Maintain pressure for a 5 minute minimum time.
7. Perform a Hydraulic Institute performance test.
   a. Test at the design point plus 3 other points to develop head-capacity, **KW** Input and amperage curve.
   b. No minus tolerance allowed at the allowed at the specified design condition for capacity, total head or efficiency.
   c. Maintain complete test data records.
   d. Submit written test report prepared, signed and dated by the manufacturer's test engineer. Include curves, pump serial number, test number, date, speed, volts, phase, impeller diameter, and certification number.

2.2 HYDRAULLIC SEALING FLANGES

A. Mount on each pump discharge a hydraulically operated sealing flange, complete with Buna-N

rubber diaphragm type sealing gasket
B. Diaphragm held in place by a clamp ring with 300 series stainless steel
C. Upon pump activation, discharge pressure forces diaphragm seal against discharge elbow flange face providing a leak proof seal
D. Upon pump deactivation, diaphragm seal relaxes allowing easy pump removal

2.3 OPTIONAL METAL-TO-METAL SEALING FLANGES
A. Submit engineering design details, material types, and justification submittals

2.4 GUIDE RAILS AND GUIDE BRACKETS
A. Guide rail(s) used to direct the pump into proper alignment with stationary discharge piping.
B. Either non-corrosive; non-sparking, fiberglass reinforced plastic (FRP) structuralshape or stainless-steel pipe is acceptable
C. Automatic connection of pump to discharge elbow when pump is lowered into place without need for personnel to enter wet well.
D. Sliding guide connector to be integral part of the pump unit.

2.5 DISCHARGE EASE ELBOWS
A. Furnish a discharge base elbow for each pump
B. Base elbow to rest squarely on and securely anchored with stainless steel fasteners to wet well floor
C. 90° and 4" steel piping size with inlet flange faced only and outlet flange ANSI 125 lb Faced and drilled.
D. Provide inlet flange face with corrosion and abrasion resistant coating

2.6 ACCESS FRAMES AND DOORS
A. Supply separate access frame and hinged door assembly for each pump
B. Access frame and door assembly: Aluminum
C. Hinges and hardware: 300 series stainless steel
D. Door: Aluminum tread plate for skid-resistant surface with recessed, stainless-steel handle and safety latch to hold door open.
E. Minimum nominal clear opening: see drawings
F. Load rating: 300psf
G. Access frame to support guide rail(s) and float mounting bracket

2.7 PUMP AND ALARM CONTROLLER
A. The Contractor shall provide a pump and alarm controller with a submersible level transducer (Consolidated Electric D152 or approved equal) that will be incorporated into the duplex control panel by the control panel manufacturer.

2.8 LIFTING CHAIN
A. Provide stainless steel lifting chain of sufficient length and capacity for each pump.
B. Provide access frame mounted hook to attached the lifting chain when not in use.

2.9 DUPLEX CONTROL PANEL
A. General
1. Motor control panel assembled and tested by a shop meeting UL standard 508 for industrial controls
2. Prefer panel assembled and tested by the pump manufacturer to unsure equipment single source responsibility
B. Construction
1. Contained in a non-corrosive enclosure meeting NEMA 4x and UL V-0 requirements
2. Provide padlocking provisions
3. Attach enclosure door with non-corrosive lift off hinge and quarter turn stainless steel

screws

4. Permanently attach non-corrosive nameplate containing model number, voltage, phase, hertz, ampere rating, and horsepower rating.
5. Permanently attach warning label against electric shock on enclosure door exterior surface
6. Provide stainless back panel mounted on stainless steel bolts with stainless steel washers and nuts.

C. Incoming Power
   1. Provide thermal magnetic circuit breakers sized to meet NEC requirements for motor controls to disconnect pump station from incoming power and to disconnect individual pumps.

D. Magnetic starters
   1. Provide across-the-line magnetic starter for each pump
      i. Contactor rated for a minimum mechanical life of 3,000,000 operations and a minimum contact life of 1,000,000 operations
      ii. Auto transformer taps at 65% and 80% of full line voltage
   2. Provide three pole, block type, overload relay for each pump
      i. Ambient temperature compensated and bimetallic
      ii. Capable of being set in either a manual or automatic reset mode

E. Control voltage
   1. Provide control transformer with 120 volts AC output
   2. Provide circuit breaker and on/off switch on high voltage (primary) side and fuse on low voltage (secondary)

F. Switches and pilot light devices
   1. Provide a "hand-off-automatic" selector switch and "green" run light properly labeled for each pump
   2. Mount devices on sub door

G. Wiring
   1. Provide schematic wiring diagram permanently attached to the enclosure door interior surface
   2. Provide "black" power wiring identified with wire marker number
   3. Provide "red" control wiring identified with wire marker numbers
   4. Provide "green" ground wiring
   5. Maintain panel wiring in neat bundles with plastic wire ties and anchored to back panel
   6. Make ground connections with ring tongue connectors and star washers.

H. Duplex pump controller
   1. Provide solid state pump control logic
   2. Provide printed circuit board made of UL listed materials
   3. Use "red" LED indicator lights to indicate float circuit operations. Permanently label each LED as to function. LED indicator lights shall provide adequate information to troubleshoot float circuit problems.
   4. Provide permanently labeled terminal blocks to connect float level controls and heat sensor monitors. Phenolic type terminal blocks are not acceptable.
   5. Provide low voltage type pump alternator consisting of alternating relay which alternately switches when voltage is removed from its circuit. Provide totally isolated ground for alternating circuit.
   6. Terminate external wiring devices on printed circuit board with male-female spade connectors. Pale on printed circuit board; female on external wiring end.

I. Alarm light
1.Provide exterior watertight high-intensity alarm light operated by alarm level switch
2. Bolted from inside with bulb easily changed from inside panel
3."Red" lens

2.10 OPERATION AND MAINTENANCE INSTRUCTIONS

A. Furnish six complete bound Operation and Maintenance Instruction Manuals covering initial start-up, operating procedures, maintenance, troubleshooting, and servicing procedures on pump station component parts.
B. Ship one manual with the station; the remaining five to the Contractor.

2.11 WARRANTY

A. Warrant pump station or any furnished part thereof against defects in material or workmanship within one year of initial start-up by factory service representative.
B. Contractor responsible for removal, reinstallation and freight expenses but not responsible for incidental damages or any damage due to accident, alteration, design, misuse, or abuse.
C. Pump manufacturer to provide their standard extended warranty.

PART 3 – EXECUTION

3.1 EXAMINATON

A. Verify that field conditions are acceptable and ready to receive work
B. Verify lines, levels and measurements before proceeding with installation
C. Beginning work means existing conditions are acceptable

3.2 INSTALLATION

A. Install pump station component parts in accordance with manufacturer's installation instructions and project drawings
B. Install conduit and wiring in accordance with NEC requirements for Division 1, Class 1, Group C or D hazardous location
C. Connect flanged ductile iron pipe discharge piping to valve vault. Verify guide rails and discharge piping are plumb
D. Install swing check valves, plug valves, and piping in valve vault
E. Install power service in accordance with Appalachian Electric Cooperative and project electrical specifications.

3.3 INITIAL START-UP

A. Pump station manufacturer to provide a factory trained service representative for only one day (8 hours) on site to assist the contractor with initial start-up
B. Contractor to notify Town of Bean Station of initial start-up date and time one week prior to actual start-up date
C. Manufacturer's representative shall instruct all personnel attending in correct and required operation, maintenance, troubleshooting, and service procedures for the packaged submersible sewage pump station.

PART 4—FACTORY START-UP SERVICE

A. Start-up service technician shall be a regular employee of booster station manufacturer
B. As part of the submittal covering this equipment, list the factory service manager, his employee number, his telephone number with extension and his number of years with the company. List also each start-up service technician, his employee number and years of service with the company.
A. Verify that one or more of the service technicians listed above will perform the required start-up service on the equipment covered in the submittal
B. One full day at job site for start-up and training

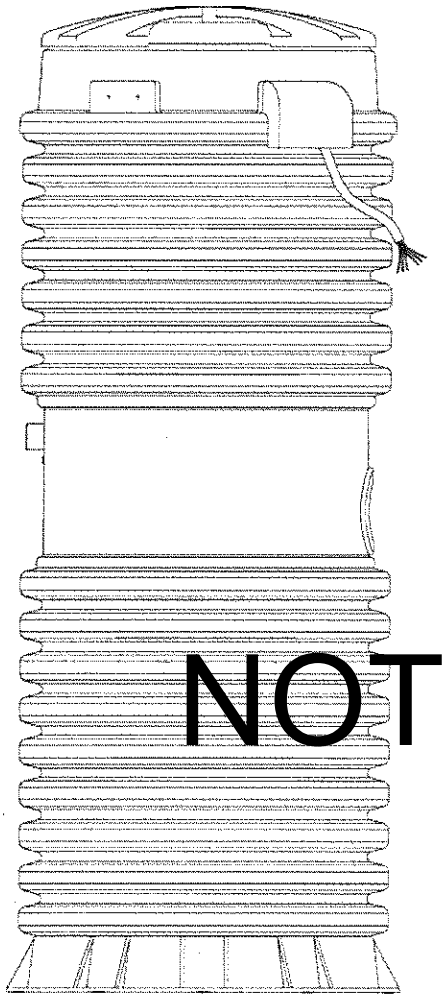
C. Start-up service to include 2 bound O&M manuals
D. Start-up service report attested to by start-up technician and representative of owner or engineer
E. Service report distributed to:
    1. Manufacturer's file
    2. Engineer's file
    3. Contractor's file
    4. Owner's file

PART 5—MANUFACTURER'S WARRANTY

A. The warranty is the sole responsibility of the station manufacturer and that manufacturer's warranty shall be provided in written form for inclusion with both the submittal covering the specified equipment and the O&M manuals provided with that equipment.
B. Said manufacturer's warranty shall at a minimum cover:
    1. A period of one (1) year commencing upon **successful start-up,** after authorized manufacturer's start-up., not to exceed eighteen (18) months from the date of shipment.
    2. The warranty period shall be inviolate regardless of any component manufacturer's warranty for equipment and components within the station
    3. The manufacturer's warranty shall cover all equipment, components and systems provided in or with the station by the manufacturer of the station, exclusive of those components supplied by and/or installed by others independent of the manufacturer of record for this station
    4. The warranty shall provide for the station manufacturer to bear the full cost of labor and materials for replacement and/or repair of faulty or defective components so there shall be no cost incurred by the Owner for this work during the warranty period.
    5. The manufacturer's warranty policy is inherited only by the items considered consumables, i.e., light bulbs, pump seals, pump packing, lubricants and other maintenance items consumed by usage.
    6. No assumption of contingent liabilities for any component failure during manufacturer's warranty is made.
    It is the intent of this manufacturer's warranty to gain for the owner a **single source** responsible party for all components specified herein. "Second party• or "pass through" warranties **will not** be accepted.
    If the submitted written manufacturer's warranty **does not** meet the minimum requirements set forth above, that submittal will forthrightly be rejected.

PART 6—GENERAL LIABILITY INSURANCE

A. The pump station manufacturer shall furnish premises/ operations and products/completed operations general liability insurance from an insurance company with a rating of A-V according to the most recent Best's Key Rating Guide, in an amount equal to $1,000,000 per occurrence. The insurance certificate must be included with the manufacturer's submittal. The coverage must be provided by an insurance carrier licensed and admitted in the state of manufacturer.



Town of Bean Station

Grinder Pump Station Specifications

Semi-Positive Displacement Type

NOT FOR BID

1.0 GENERAL

1.01 **GENERAL DESCRIPTION**: The **MANUFACTURER** shall furnish complete factory-built and tested Grinder Pump Station(s), each consisting of grinder pump(s) suitably mounted in a basin constructed of polyethylene (HDPE), NEMA 6P electrical quick disconnect (EQD), pump removal system, stainless steel discharge assembly/shut-off valve, anti-siphon valve/check valve, each assembled in the basin, electrical alarm panel and all necessary internal wiring and controls. All Grinder Pump Stations (tank, pump, and alarm panel) shall be manufactured by one (same) company. **For ease of serviceability, all pump, motor/grinder units shall same type and horsepower throughout the system such that they are interchangeable from station to station.** All furnished equipment and materials shall be in accordance with section 2.0 of this Product Specification.

GRINDER STATION MODEL SELECTION: Recognizing incoming waste flows, pumping distances, total dynamic head (TDH), etc. will vary, compatibility and like design for all grinder stations, pumping units and panels will be a prime consideration to minimize the quantity of spare parts required.

The **MANUFACTURER** of the grinder pumps station shall be Environment One Corporation (E/ONE), which will meet all specifications and given conditions.

If proposing an Alternate, the **CONTRACTOR** (supplier) must submit, no less than 15 business days in advance of the bid date, a complete description of any changes that will be necessary to the system design, a complete submittal package, a system hydraulic analysis based on the proposed pump (including pipe sizes, flows, velocities, retention times and number and location of recommended valves and cleanouts, if any), a list of all exceptions to this specification, and at a minimum a demonstration of 100% compliance to Section 1.01 GENERAL DESCRIPTION REQUIREMENTS, 1.02 EXPERIENCE CLAUSE, 1.03 SAFTETY, 1.04 OPERATING REQUIREMENTS, and 1.05 WARRANTY of this specification. The **CONTRACTOR** (supplier) must also complete the Manufacturer Disclosure Statement found at the end of this specification. This information must be submitted to the **ENGINEER** for pre-approval of the alternate equipment being proposed and determination of compliance with these Contract Documents. If the equipment differs materially or differs from the dimensions given on the Drawings, the **CONTRACTOR** (supplier) shall submit complete drawings showing elevations, dimensions, or any necessary changes to the Contract Documents for the proposed equipment and its installation. Pre-approval, if granted, will be provided in writing by the **ENGINEER** to the **CONTRACTOR** (supplier) at least five business days in advance of the bid date. If the **ENGINEER'S** approval is obtained for Alternate Equipment, the **CONTRACTOR** (supplier) must make any needed changes in the structures, system design, piping or electrical systems necessary to accommodate the proposed equipment at the expense of the **CONTRACTOR** (supplier).

1.02 **EXPERIENCE CLAUSE:** The equipment furnished hereunder shall be the product of a company experienced in the design and manufacture of grinder pumps specifically designed for use in low pressure systems. All manufacturers proposing equipment shall have at least 10 years of experience in the design and manufacture of units of identical size(s) and performance to the specified units. All manufacturers proposing equipment must also have not less than 500 successful installations of low-pressure sewer systems utilizing grinder pumps of like type to the grinder pumps specified herein. An installation is defined as a minimum of 60 pumps discharging into a common force main which forms a low-pressure sewer system. If proposing an alternate the **MANUFACTURER** proposing equipment will be required (prior to bid date) to submit an installation list with 60 grinder pump stations per project, with contact person(s), phone number(s) and date(s) of at least 10 installations of the type of pump specified herein that have been in operation for at least 10 years.

1.03 **SAFETY: Fall Protection, Electrical Shock/Fire Hazard and Confined Entry:** Special attention shall be called to all safety precautions listed in these specifications, no exceptions. To meet requirements, the tank shall include a shelf feature and be a Wetwell/Drywell design. The Drywell shall be an integral extension of the Wetwell assembly. In addition, the tank shall include a bolted cover

assembly with three lanyards preinstalled by the Manufacturer on the underside of the tank lid that allows padlocking the lid to the tank.

Alternative to Drywell/Wetwell Shelf: In lieu of a Drywell/Wetwell design, full protection such as safety netting or other approved means shall be required, must be designed and signed off on by the manufacturer, approved for a 300-pound load. The safety feature shall be pre-installed on the tank by the Manufacturer prior to shipping-delivery to the project site. In addition, the tank shall include a lockable cover assembly using three lanyards preinstalled by the Manufacturer on the underside of the tank lid that allows padlocking the lid to the tank.

The grinder pump shall be free from electrical and fire hazards as required in a residential environment. As evidence of compliance with this requirement, the completely assembled and wired grinder pump station shall be listed by Underwriters Laboratories, Inc. to be safe and appropriate for the intended use. UL listing of components of the station, or third-party testing to UL standard are not acceptable.

NSF CERTIFICATION: The grinder pump shall meet accepted standards for plumbing equipment for use in or near residences, shall be free from noise, odor, or health hazards, and shall have been tested by an independent laboratory to certify its capability to perform as specified in either individual or low-pressure sewer system applications. As evidence of compliance with this requirement, the grinder pump shall bear the seal of NSF International. Third-party testing to NSF standard is not acceptable.

OSHA CONFINED SPACE: All maintenance tasks for the grinder pump station must be possible without entry into the grinder pump station (as per **OSHA 1910.146**, permit-required confined spaces). *"Entry means the action by which a person passes through an opening into a permit-required confined space. Entry includes ensuing work activities in that space and is considered to have occurred as soon as any part of the entrant's body breaks the plane of an opening into the space.*

1.04 OPERATING CONDITIONS: The pumps shall be capable of delivering 15 GPM against a rated total dynamic head of 0 feet (0 PSIG), 11 GPM against a rated total dynamic head of 92 feet (40 PSIG), and 7.8 GPM against a rated total dynamic head of 185 feet (80 PSIG). The pump(s) must also be capable of operating at negative total dynamic head without overloading the motor(s). Under no conditions shall in-line piping or valving be allowed to create a false apparent head.

1.05 WARRANTY: The grinder pump **MANUFACTURER** shall provide a part(s) and labor warranty (including all travel expense) on the complete station (tank, pump and alarm panel) and accessories, including, but not limited to, panel and redundant check valve for a period of **2-Years** (24 months) after installation, no greater than 30 months after receipt of shipment. The warranty requirements include, but are not limited to, unjamming of grinder mechanism, periodic motor maintenance, and cleaning of liquid level controls (floats, probes, etc.). Any manufacturing defects found during the warranty period will be reported to the **MANUFACTURER** and will be corrected by the **MANUFACTURER** at no cost to the **OWNER**.

1.06 WARRANTY PERFORMANCE CERTIFICATION: As a certification requirement, SUPPLIER shall provide a Warranty Performance Certification statement executed by the most senior executive officer of the grinder pump station MANUFACTURER, which certifies a minimum of a 2-Year (24-month) warranty on pump tank and alarm panel and accessories. They must further detail any exclusions from the warranty or additional cost items required to maintain the equipment in warrantable condition, including all associated labor and shipping fees, and certify that the MANUFACTURER will bear all costs to correct any original equipment deficiency for the effective period of the warranty. All preventive maintenance type requirements shall be included in this form as exclusions. These requirements include, but are not limited to, unjamming of grinder mechanism, periodic motor maintenance, and periodic cleaning of liquid level controls.

2.0 PRODUCT

2.01 PUMP: The pump(s) shall be a custom designed, integral, vertical rotor, motor driven, solids handling pump of the **progressing cavity type** with a single mechanical seal. Double radial O-ring seals are required at all casting joints to minimize corrosion and create a protective barrier. All pump castings shall be cast iron, fully epoxy coated to 8-10 mil Nominal dry thickness, wet applied. The rotor shall be through-hardened, highly polished, precipitation hardened stainless steel. The stator shall be of a specifically compounded ethylene propylene synthetic elastomer. This material shall be suitable for domestic wastewater service. Its physical properties shall include high tear and abrasion resistance, grease resistance, water and detergent resistance, temperature stability, excellent aging properties, and outstanding wear resistance. Buna-N is not acceptable as a stator material because it does not exhibit the properties as outlined above and required for wastewater service.

2.02 GRINDER: The grinder shall be placed immediately below the pumping elements and shall be direct driven by a single, one-piece motor shaft. The grinder impeller (cutter wheel) assembly shall be securely fastened to the pump motor shaft by means of a threaded connection attaching the grinder impeller to the motor shaft. Attachment by means of pins or keys will not be acceptable. The grinder impeller shall be a one-piece, 4140 cutter wheel of the rotating type with inductively hardened cutter teeth. The cutter teeth shall be inductively hardened to Rockwell 50 – 60c for abrasion resistance. The shredder ring shall be of the stationary type and the material shall be white cast iron. The teeth shall be ground into the material to achieve effective grinding. The shredder ring shall have a staggered tooth pattern with only one edge engaged at a time, maximizing the cutting torque. These materials have been chosen for their capacity to perform in the intended environment as they are materials with wear and corrosive resistant properties.

This assembly shall be dynamically balanced and operate without objectionable noise or vibration over the entire range of recommended operating pressures. The grinder shall be constructed to minimize clogging and jamming under all normal operating conditions including starting. Sufficient vortex action shall be created to scour the tank free of deposits or sludge banks which would impair the operation of the pump. These requirements shall be accomplished by the following in conjunction with the pump:

1. The grinder shall be positioned in such a way that solids are fed in an upward flow direction.

2. The maximum flow rate through the cutting mechanism must not exceed 4 feet per second. This is a critical design element to minimize jamming and as such must be adhered to.

3. The inlet shroud shall have a diameter of no less than 5 inches. Inlet shrouds that are less than 5 inches in diameter will not be accepted due to their inability to maintain the specified 4 feet per second maximum inlet velocity which by design prevents unnecessary jamming of the cutter mechanism and minimizes blinding of the pump by large objects that block the inlet shroud.

4. The impeller mechanism must rotate at a nominal speed of no greater than 1800 rpm.

The grinder shall be capable of reducing all components in normal domestic sewage, including a reasonable amount of "foreign objects," such as paper, wood, plastic, glass, wipes, rubber and the like, to finely-divided particles which will pass freely through the passages of the pump and the 1-1/4" diameter stainless steel discharge piping.

2.03 ELECTRIC MOTOR: As a maximum, the motor shall be a 1 HP, 1725 RPM, 240 Volt 60 Hertz, 1 Phase, capacitor start, ball bearing, air-cooled induction type with Class F insulation, low starting current not to exceed 30 amperes and high starting torque of 8.4 foot-pounds. The motor shall be press-fit into the casting for better heat transfer and longer winding life. Inherent protection against running overloads or locked rotor conditions for the pump motor shall be provided by using an automatic-reset, integral thermal overload protector incorporated into the motor. The motor protector shall be specifically investigated and listed by Underwriters Laboratories Inc. for the application. Non-capacitor start motors or permanent split capacitor motors will not be accepted because of their reduced starting torque and consequent diminished grinding capability. The wet portion of the motor armature must be 300 Series stainless steel. To reduce the potential of environmental concerns, the expense of handling and disposing of oil, and the associated maintenance costs, oil-filled motors will

not be accepted. Pump operation during instances of potentially damaging high current or low voltage conditions shall be inhibited by an in-pump electrical monitoring system that has been investigated and listed by Underwriters Laboratories Inc. for the application. Motor start shall be controlled by a DC driven electromechanical relay integrated within the control compartment of the pump. Electrical monitoring shall ensure the relay operates reliably. AC Mechanical contactors for motor start are susceptible to damage from short cycling and will not be accepted.

2.04 MECHANICAL SEAL: The pump/core shall be provided with a mechanical shaft seal to prevent leakage between the motor and pump. The seal shall have a stationary ceramic seat and carbon rotating surface with faces precision lapped and held in position by a stainless-steel spring.

2.05 GRINDER PUMP TANK AND INTEGRAL ACCESSWAY MODEL DH071-61 (High Density Polyethylene)

The tank shall be a Wetwell/Drywell design made of high-density polyethylene, with a grade selected to provide the necessary environmental stress cracking resistance. Corrugated sections are to be made of a double wall construction with the internal wall being generally smooth to promote scouring. The corrugations of the outside wall are to be a minimum amplitude of 1-1/2" to provide necessary transverse stiffness. Any incidental sections of a single wall construction are to be 0.250" thick (minimum). All seams created during tank construction are to be thermally welded and factory tested for leak tightness. The tank wall and bottom must withstand the pressure exerted by saturated soil loading at maximum burial depth. All station components must function normally when exposed to 150 percent of the maximum external soil and hydrostatic pressure.

The tank shall be furnished with one EPDM grommet fitting to accept a 4.50" OD DWV or Schedule 40 pipe. The tank capacities shall be as shown on the contract drawings.

The Drywell accessway shall be an integral extension of the Wetwell assembly and shall include a lockable cover assembly providing low profile mounting and watertight capability. The accessway design and construction shall enable field adjustment of the station height in increments of 4" or less without the use of any adhesives or sealants requiring cure time before installation can be completed.

The station shall have all necessary penetrations molded in and factory sealed. To ensure a leak free installation no field penetrations will be acceptable.

All discharge piping shall be constructed of 304 stainless steel. The discharge shall terminate outside the accessway bulkhead with a stainless steel, 1-1/4" Female NPT fitting. The discharge piping shall include a stainless-steel ball valve rated for 235 psi WOG; PVC ball valves or brass ball/gate will not be accepted. The bulkhead penetration shall be factory installed and warranted by the manufacturer to be watertight.

The accessway shall include a single NEMA 6P Electrical Quick Disconnect (EQD) for all power and control functions, factory installed with accessway penetrations warranted by the manufacturer to be watertight. The EQD will be supplied with 32', 25' of useable Electrical Supply Cable (ESC) outside the station, to connect to the alarm panel. The ESC shall be installed in the basin by the manufacturer. The EQD shall require no tools for connecting, seal against water before the electrical connection is made, and include radial seals to assure a watertight seal regardless of tightening torque. Plug-type connections of the power cable onto the pump housing will not be acceptable due to the potential for leaks and electrical shorts. In addition, for safety concerns (electrical shock) and connectivity corrosion, junction box shall not be permitted in the accessway. There must be a means (EQD) to disconnect the pump inside the tank without pulling wire from the tank to alarm panel when servicing the station. The accessway shall also include an integral 2-inch vent to prevent sewage gases from accumulating in the tank.

2.06 CHECK VALVE: Pump discharges shall be equipped with a factory installed, gravity operated, flapper-type integral check valve built into the stainless-steel discharge piping or cast-iron housing. The check

valve will provide a full-ported passageway when open and shall introduce a friction loss of less than 6 inches of water at maximum rated flow. Moving parts will be made of a 300 Series stainless steel and fabric reinforced synthetic elastomer to ensure corrosion resistance, dimensional stability, and fatigue strength. A nonmetallic hinge shall be an integral part of the flapper assembly providing a maximum degree of freedom to assure seating even at a very low backpressure. The valve body shall be an injection molded part made of an engineered thermoplastic resin. The valve shall be rated for continuous operating pressure of 235 psi. Ball-type check valves are unacceptable due to their limited sealing capacity in slurry applications.

2.07 ANTI-SIPHON VALVE: The pump discharge shall be equipped with a factory-installed, gravity-operated, flapper-type integral anti-siphon valve built into the stainless-steel discharge piping. Moving parts will be made of 300 Series stainless steel and fabric-reinforced synthetic elastomer to ensure corrosion resistance, dimensional stability, and fatigue strength. A nonmetallic hinge shall be an integral part of the flapper assembly, providing a maximum degree of freedom to ensure proper operation even at a very low pressure. The valve body shall be injection-molded from an engineered thermoplastic resin. Holes or ports in the discharge piping are not acceptable anti-siphon devices due to their tendency to clog from the solids in the slurry being pumped. The anti-siphon port diameter shall be no less than 60% of the inside diameter of the pump discharge piping.

2.08 CORE (Pump) UNIT: The grinder pump station shall have a cartridge type, easily removable core assembly consisting of pump, motor, grinder, all motor controls, check valve, anti-siphon valve, level controls, electrical quick disconnect and wiring. The core unit shall be installed in the basin by the manufacturer. Field assembly of the pump and controls into the basin is not acceptable because of potential workmanship issues and increased installation time. In some cases, stations taller than 96" may be shipped on their side without the cores assembled in the basin for freight purposes but this is the only exception. The core unit shall seal to the tank deck with a stainless-steel latch assembly. The latch assembly must be actuated utilizing a single quick release mechanism requiring no more than a half turn of a wrench. The watertight integrity of each core unit shall be established by a 100 percent factory test at a minimum of 5 PSIG.

2.09 CONTROLS: All necessary motor starting controls shall be located in the cast iron enclosure of the core unit secured by stainless steel fasteners. Locating the motor starting controls in a plastic enclosure is not acceptable. The wastewater level sensing controls shall be housed in a separate enclosure from motor starting controls. The level sensor housing must be sealed via a radial type seal; solvents or glues are not acceptable. The level sensing control housing must be integrally attached to pump assembly so that it may be removed from the station with the pump and in such a way as to minimize the potential for the accumulation of grease and debris accumulation, etc. The level sensing housing must be a high-impact thermoplastic copolymer over-molded with a thermo plastic elastomer. <u>The use of PVC for the level sensing housing is not acceptable.</u>

Non-fouling wastewater level controls for controlling pump operation shall be accomplished by monitoring the pressure changes in an integral air column connected to a pressure switch. The air column shall be integrally molded from a thermoplastic elastomer suitable for use in wastewater and with excellent impact resistance. The air column shall have only a single connection between the water level being monitored and the pressure switch. Any connections are to be sealed radially with redundant O-rings. The level detection device shall have no moving parts in direct contact with the wastewater and shall be integral to the pump core assembly in a single, readily exchanged unit. Depressing the push to run button must operate the pump even with the level sensor housing removed from the pump.

All fasteners throughout the assembly shall be 300 Series stainless steel. High-level sensing will be accomplished in the manner detailed above by a separate air column sensor and pressure switch of the same type. Closure of the high-level sensing device will energize an alarm circuit as well as a redundant pump-on circuit. For increased reliability, pump ON/OFF and high-level alarm functions shall not be controlled by the same switch. Float switches of any kind, including float trees, will not be accepted due to the periodic need to maintain (rinsing, cleaning) such devices and their tendency to malfunction because of incorrect wiring, tangling, grease buildup, and mechanical cord fatigue. To

assure reliable operation of the pressure switches, each core shall be equipped with a factory installed equalizer diaphragm that compensates for any atmospheric pressure or temperature changes. Tube or piping runs outside of the station tank or into tank-mounted junction boxes providing pressure switch equalization will not be permitted due to their susceptibility to condensation, kinking, pinching, and insect infestation. The grinder pump will be furnished with a 6 conductor 14-gauge, type SJOW cable, pre-wired and watertight to meet UL requirements with a **FACTORY INSTALLED** NEMA 6P EQD half attached to it.

2.10 STAINLESS-STEEL CURB STOP/CHECK VALVE ASSEMBLY (UNI-LATERAL): The curb stop shall be pressure-tight in both directions. The ball valve actuator shall include position stop features at the fully opened and closed positions. The curb stop/check valve assembly shall be designed to withstand a working pressure of 235 psi.

The stainless-steel check valve shall be integral with the curb stop valve. The check valve will provide a full-ported 1-1/4" passageway and shall introduce minimal friction loss at maximum rated flow. The flapper hinge design shall provide a maximum degree of freedom and ensure seating at low back pressure.

The Uni-lateral Valve Assembly (redundant check valve) must be specifically designed for wastewater use. As a certification requirement, manufacturer shall provide a written statement from the redundant check valve manufacturer that the valve is designed for burial and approved for wastewater use.

All pipe connections shall be made using compression fitting connections including a Buna-N O-ring for sealing to the outside diameter of the pipe. A locking device shall be integrated into all pipe connection fittings to securely restrain the pipe from hydraulic pressure and external loading caused by shifting and settling.

Curb Stop/Check Valve Boxes – Curb boxes shall be constructed of ABS, conforming to ASTM-D 1788. Lid top casting shall be cast iron, conforming to ASTM A-48 Class 25, providing magnetic detectability, and be painted black. All components shall be inherently corrosion resistant to ensure durability in the ground. Curb boxes shall provide height adjustment downward (shorter) from their nominal height.

As an **approved alternate** to above referenced **Curb Stop/Check Valve Boxes**, Owner may prefer to use a "water meter style" meter box and cover to visually inspect the entire Uni-Lateral Valve without digging. Boxes shall be injection molded of structural foam recycled polyolefin material with melt index between 10 – 12. Box size shall be 14" x 19" x 18" deep. The black body shall be tapered and have a minimum wall thickness of 0.250". the body has a double wall at the top cover seat area with a minimum thickness of 0.22". The cover seat area shall have 26 structural ribs on the underside of the seat, each with a minimum thickness of 0.12". The bottom of the body to have a 0.50" flange. Cover color shall be green with words "sewer" and have an average thickness of 0.20".

REQUIREMENT AND LOCATION OF STAINLESS-STEEL CURB STOP/CHECK VALVE (UNI-LATERAL). A UNI-LATERAL VALVE is required to be installed in all pressure lateral lines from the grinder station to the discharge point (pressure main or manhole). It should be located at the furthermost point from the grinder station near the interface of private/public property. Coordinate location with Utility provider.

2.11 HIGH DENSITY POLYETHYLENE PIPE (SUPPLIED BY OTHERS)

Pipe shall have a working pressure of 160 psi minimum and shall be classified SDR per ASTM D 3035.

Pipe Dimensions – The SDR (Standard Dimension Ratio) of the pipe supplied shall be as specified by the **UTILITY AUTHORITY/ENGINEER**. SDR 7, 9 and 11 fittings are available from the **MANUFACTURERS**.

Piping Connections – Fused or mechanical connections shall be as required by the Utility or specifying Engineer.

2.12 ALARM PANELS

SIMPLEX ALARM PANEL

Each grinder pump station shall include a NEMA 4X, UL-listed alarm panel suitable for wall or pole mounting. The NEMA 4X enclosure shall be manufactured of thermoplastic polyester to ensure corrosion resistance. The enclosure shall include a hinged, lockable cover with padlock, preventing access to electrical components, and creating a secured safety front to allow access only to authorized personnel. The enclosure shall not exceed 10.5" W x 14" H x 7" D, or 12.5" W x 16" H x 7.5" D. Some panel options require larger enclosures.

The alarm panel shall contain one 15-amp, double-pole circuit breaker for the pump core's power circuit and one 15-amp, single-pole circuit breaker for the alarm circuit. The panel shall contain a push-to-run feature, an internal run indicator, and a complete alarm circuit. All circuit boards in the alarm panel are to be protected with a conformal coating on both sides and the AC power circuit shall include an auto resetting fuse.

The alarm panel shall include the following features: external audible and visual alarm; push-to-run switch; push-to-silence switch; redundant pump start; and high-level alarm capability. The alarm sequence is to be as follows when the pump and alarm breakers are on:

1. When liquid level in the sewage wet-well rises above the alarm level, the contacts on the alarm pressure switch activate, audible and visual alarms are activated, and the redundant pump starting system is energized.
2. The audible alarm may be silenced by means of the externally mounted push-to-silence button.
3. Visual alarm remains illuminated until the sewage level in the wet well drops below the "off" setting of the alarm pressure switch.

The visual alarm lamp shall be inside a red, oblong lens at least 3.75" L x 2.38" W x 1.5" H. Visual alarm shall be mounted to the top of the enclosure in such a manner as to maintain NEMA 4X rating. The audible alarm shall be externally mounted on the bottom of the enclosure, capable of 93 dB @ 2 feet. The audible alarm shall be capable of being deactivated by depressing a push-type switch that is encapsulated in a weatherproof silicone boot and mounted on the bottom of the enclosure (push-to-silence button).

The entire alarm panel, as manufactured and including any of the following options shall be listed by Underwriters Laboratories, Inc.

2.13 SERVICEABILITY: The grinder pump core, including level sensor assembly, shall have two lifting hooks complete with lift-out harness connected to its top housing to facilitate easy core removal when necessary. The level sensor assembly must be easily removed from the pump assembly for service or replacement. All mechanical and electrical connections must provide easy disconnect capability for core unit removal and installation. Each EQD half must include a water-tight cover to protect the internal electrical pins while the EQD is unplugged. A pump push-to-run feature will be provided for field trouble shooting. The push-to-run feature must operate the pump even if the level sensor assembly has been removed from the pump assembly. All motor control components shall be mounted on a readily replaceable bracket for ease of field service.

3.0 EXECUTION

3.01 FACTORY TEST: Each grinder pump shall be submerged and operated for 1.5 minutes (minimum). Included in this procedure will be the testing of all ancillary components such as, the anti-siphon valve, check valve, discharge assembly and each unit's dedicated level controls and motor controls. All factory tests shall incorporate each of the above listed items. Actual appurtenances and controls which will be installed in the field shall be particular to the tested pump only. A common set of appurtenances and controls for all pumps is not acceptable. Certified test results shall be available upon request showing the operation of each grinder pump at two different points on its curve. Additional validation tests include integral level control performance, continuity to ground and acoustic tests of the rotating components.

The **UTILITY** reserves the right to inspect such testing procedures at the **GRINDER PUMP MANUFACTURER'S** facility.

All completed stations shall be factory leak tested to assure the integrity of all joints, seams and penetrations. All necessary penetrations such as inlets, discharge fittings and cable connectors shall be included in this test along with their respective sealing means (grommets, gaskets etc.).

3.02 DELIVERY: All grinder pump units will be delivered to the job site 100 percent completely assembled, including testing, ready for installation. Field installation of the pump, level sensors etc., as applicable, in tanks under 96 inches is not allowed. Grinder pump stations will be individually mounted on wooden pallets.

3.03 INSTALLATION: Earth excavation and backfill may be specified under **SITE WORK (if using bidding documents)** but are also to be done as a part of the work under this section, including any necessary sheeting and bracing.

The **CONTRACTOR** shall be responsible for handling ground water to provide a firm, dry subgrade for the structure, and shall guard against flotation or other damage resulting from general water or flooding.

The grinder pump stations shall not be set into the excavation until the installation procedures and excavation have been approved by the **UTILITY**.

Remove packing material. User instructions MUST be given to the **OWNER**. Hardware supplied with the unit, if required, will be used at installation. The basin will be supplied with a standard 4" inlet grommet (4.50" OD) for connecting the incoming sewer line. Appropriate inlet piping must be used. The basin may not be dropped, rolled or laid on its side for any reason.

Installation shall be accomplished so that 1 inch to 4 inches of accessway, below the bottom of the lid, extends above the finished grade line. The finished grade shall slope away from the unit. The diameter of the excavated hole must be large enough to allow for the concrete anchor.

A 6"-inch (minimum) layer of naturally rounded aggregate, clean and free flowing, with particle size of not less than 1/8" or more than 3/4" shall be used as bedding material under each unit.

A concrete anti-flotation collar, as detailed on the drawings, and sized according to the manufacturer's instructions, shall be required and shall be pre-cast to the grinder pump or poured in place. Each grinder pump station with its pre-cast anti-flotation collar shall have a minimum of three lifting eyes for loading and unloading purposes.

If the concrete is poured in place, the unit shall be leveled, and filled with water, to the bottom of the inlet, to help prevent the unit from shifting while the concrete is being poured. The concrete must be manually vibrated to ensure there are no voids. If it is necessary to pour the concrete to a level higher than the inlet piping, an 8" sleeve is required over the inlet prior to the concrete being poured.

Stainless Steel Uni-Lateral assembly to be installed in the pipe lateral outside the home between the pump discharge and the street main on all installations.

The electrical enclosure shall be furnished, installed, and wired to the grinder pump station by the **CONTRACTOR**. An alarm device is required on every installation, there shall be **NO EXCEPTIONS**.

The **CONTRACTOR** shall mount the alarm device in a conspicuous location, as per national and local codes. The alarm panel will be connected to the grinder pump station by a length of 6-conductor type TC cable as shown on the contract drawings. The power and alarm circuits must be on separate power circuits. The grinder pump stations will be provided with electrical supply cable to connect the station to the alarm panel. Cable splices are not allowed. This cable shall be supplied with a **FACTORY INSTALLED** EQD half to connect to the mating EQD half on the core.

3.04 BACKFILL REQUIREMENTS for GRINDER STATIONS: Proper backfill is essential to the long-term reliability of any underground structure. Several methods of backfill are available to produce favorable results with different native soil conditions. The most highly recommended method of backfilling is to surround the unit to grade using Class I or Class II backfill material as defined in ASTM 2321. Class 1A and Class 1B are recommended where frost heave is a concern, Class 1B is a better choice when the native soil is sand or if a high, fluctuating water table is expected. Class 1, angular crushed stone offers an added benefit in that it does not need to be compacted.

Class II, naturally rounded stone, may require more compactive effort, or tamping, to achieve the proper density. If the native soil condition consists of clean compactible soil, with less than 12 percent fines, free of ice, rocks, roots and organic material, it may be an acceptable backfill. Soil must be compacted in lifts not to exceed one foot to reach a final Proctor Density of between 85 percent and 90 percent. Heavy, non-compactible clays and silts are *not* suitable backfill for this or any underground structure such as inlet or discharge lines.

If you are unsure of the consistency of the native soil, it is recommended that a geotechnical evaluation of the material is obtained before specifying backfill.

Another option is the use of a flowable fill (i.e., low slump concrete). This is particularly attractive when installing grinder pump stations in augured holes where tight clearances make it difficult to assure proper backfilling and compaction with dry materials. Flowable fills should not be dropped more than 4 feet from the discharge to the bottom of the hole to avoid separation of the constituent materials.

Backfill of clean native earth, free of rocks, roots, and foreign objects shall be thoroughly compacted in lifts not exceeding 12" to a final Proctor Density of not less than 85 percent. Improper backfilling may result in damaged accessways. The grinder pump station shall be installed at a minimum depth from grade to the top of the 1 1/4" discharge line, to assure maximum frost protection. The finish grade line shall be 1" to 4" below the bottom of the lid, and final grade shall slope away from the grinder pump station.

All restoration will be the responsibility of the **CONTRACTOR.** The properties shall be restored to their original condition in all respects, including, but not limited to, curb and sidewalk replacement, landscaping, loaming, and seeding, and restoration of the traveled ways.

3.05 START-UP AND FIELD TESTING:

ON SITE START UP AND FIELD TESTING - The **MANUFACTURER's Representative** shall provide services of qualified factory trained technician(s) after all Grinder Pump Stations are installed, who shall check installation of grinder station, verify placement of supply cable in conduit and confirm wiring connections inside the alarm panel. Technicians(s) will perform field tests as specified herein and instruct the **OWNER'S** personnel in the operation and maintenance of the equipment before stations are accepted by Owner.

The authorized technician(s) will perform the following test on each station:

1. Make certain the discharge shut-off valve in the station is fully open.
2. Turn ON the alarm power circuit and verify the alarm is functioning properly.

3. Turn ON the pump power circuit. Initiate the pump operation to verify automatic "on/off" controls are operative. The pump should immediately turn ON.
4. Consult the Manufacturer's Service Manual and follow detailed start-up procedures.

All equipment and materials necessary to perform testing shall be the responsibility of the **CONTRACTOR.** This includes, as a minimum, a portable generator and power cable (if temporary power is required), water in each basin (filled to a depth sufficient to verify the high-level alarm is operating) and opening of all valves in the system. These steps shall be completed prior to the qualified factory trained technician(s) arrival on site.

3.06 START UP FORM: Upon completion of the start-up and testing, the MANUFACTURER's Representative shall submit to the Owner/Utility the start-up authorization form describing the results of the tests performed for each grinder pump station. For septic tank abandonment projects, the existing home's sewer service shall not be connected to the grinder pump and the home's septic system shall not be disconnected/abandoned until the start-up and testing is complete and the form has been completed and signed. Final acceptance of the system will not occur until authorization forms have been received for each pump station installed and any installation deficiencies corrected.

4.0 OPERATION AND MAINTENANCE

4.01 SPARE CORES, ALARM PANELS and SUPPLY CABLES: The **MANUFACTURER** will supply spare grinder pump cores, alarm panels and 32' supply cables in accordance with the following:

Six cores, three alarm panels and three supply cables.

Cores shall be complete with all operational controls, level sensors, check valve, anti-siphon valve, pump/motor unit, and grinder.

4.02 MANUALS: The **MANUFACTURER's Representative** shall supply an electronic copy of Operation and Maintenance Manuals.

WARRANTY **PERFORMANCE CERTIFICATION**

Each MANUFACTURER shall provide a Warranty Performance Certification executed by the most senior executive officer, which certifies a minimum of a two (2) year warranty on complete station (tank, pump and alarm panel) and accessories, including, but not limited to redundant check valve including parts, labor and all travel expenses. They must further detail any exclusions from the warranty or additional cost items required to maintain the equipment in warrantable condition, including all associated labor and shipping fees, and certify that the manufacturer will bear **all** costs to correct original equipment deficiency for the effective period of the warranty.

I,_____, by and through my duly authorized signature below as its most senior operating executive, certify that _____ will provide a two (2) year warranty on grinder pump equipment manufactured and supplied by _____ for the _____ project. I further certify that, other than failure to install equipment in accordance with manufacturer's instructions, no exclusions and/or cost items to maintain said equipment in warrantable condition, including labor, travel and shipping fees, exist except as detailed immediately below:

EXCLUSIONS: 1. _____

2. _____

3. _____

COST ITEMS TO MAINTAIN EQUIPMENT IN WARRANTABLE CONDITION:	Required Frequency (mos.)	Avg. monthly cost ($) times warranty period
1. _____	_____	$ _____
2. _____	_____	$ _____
3. _____	_____	$ _____
4. _____	_____	$ _____
5. _____	_____	$ _____

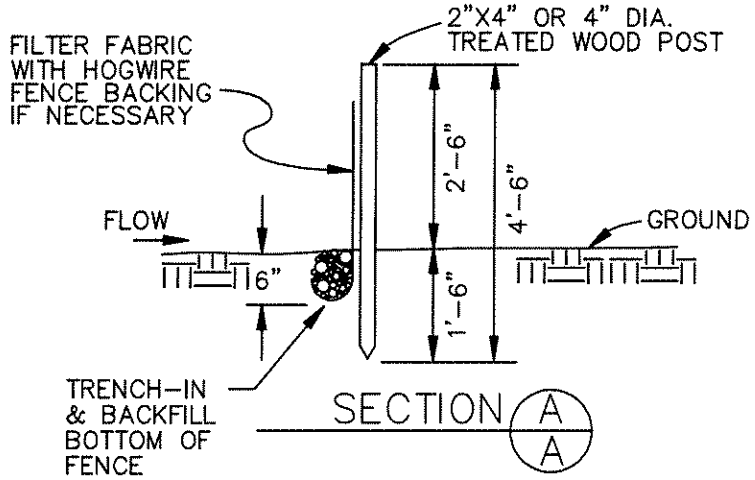
Total labor/material cost to maintain equipment in warrantable condition for warranty period ($):

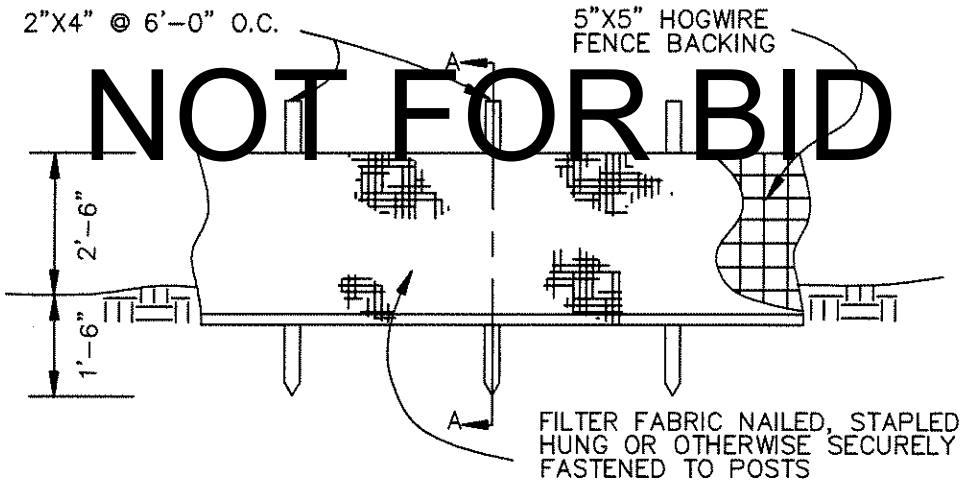
For any items not identified as exclusions or additional cost items above, OR for additional labor & material costs required to maintain equipment in warrantable condition that exceed the Avg. monthly cost ($) detailed above, _____ will bear all costs to correct such original equipment deficiency for the effective period of the warranty including all applicable labor, travel and shipping fees.

_____ Signature

_____ Date

_____ Title



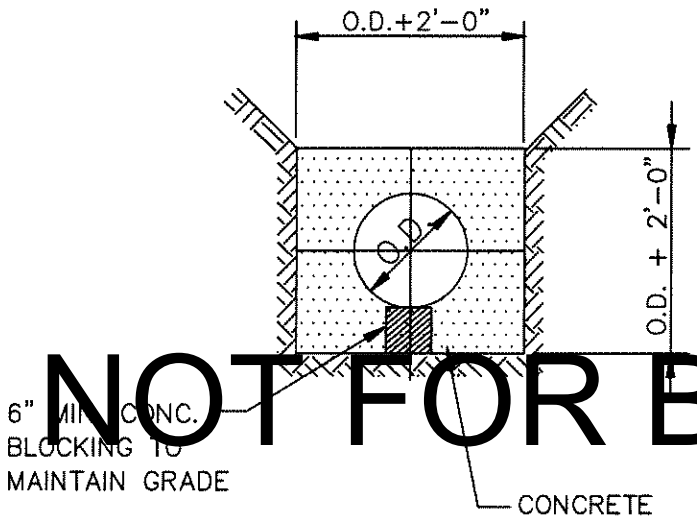


ELEVATION

SILT FENCE DETAIL

NTS

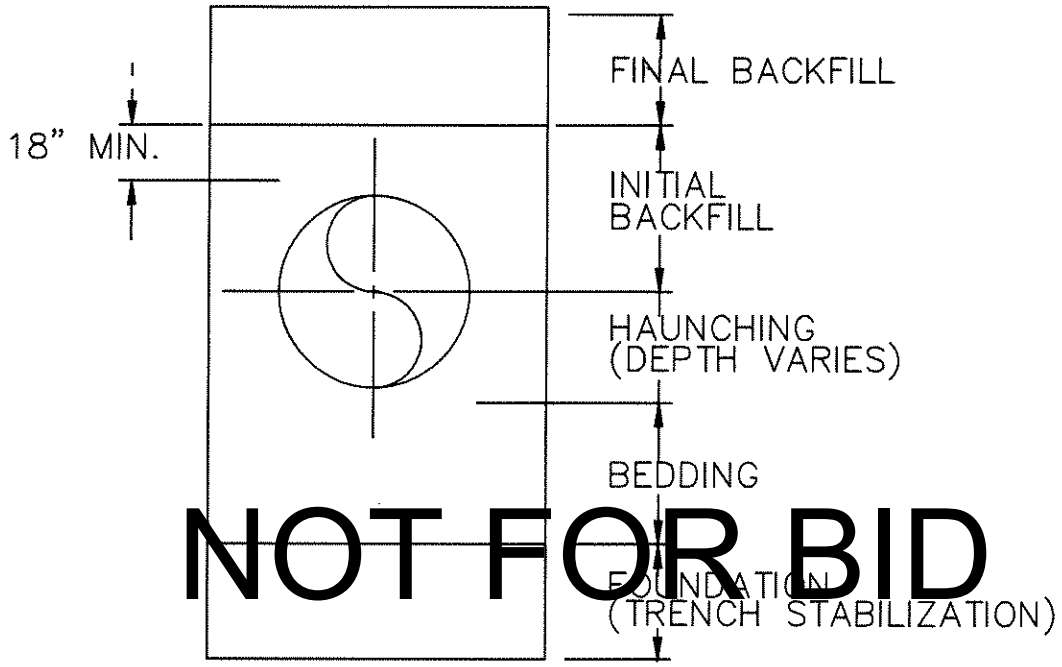
DATE: NOV 2007 SCALE: N.T.S.	STANDARD DETAILS	
SHEET 1	**TYPICAL CONSTRUCTION**	



CONCRETE ENCASEMENT DETAIL

N.T.S.

DATE: DEC 2005 SCALE: N.T.S.	**STANDARD DETAILS**	
SHEET 2	**TYPICAL CONSTRUCTION**	

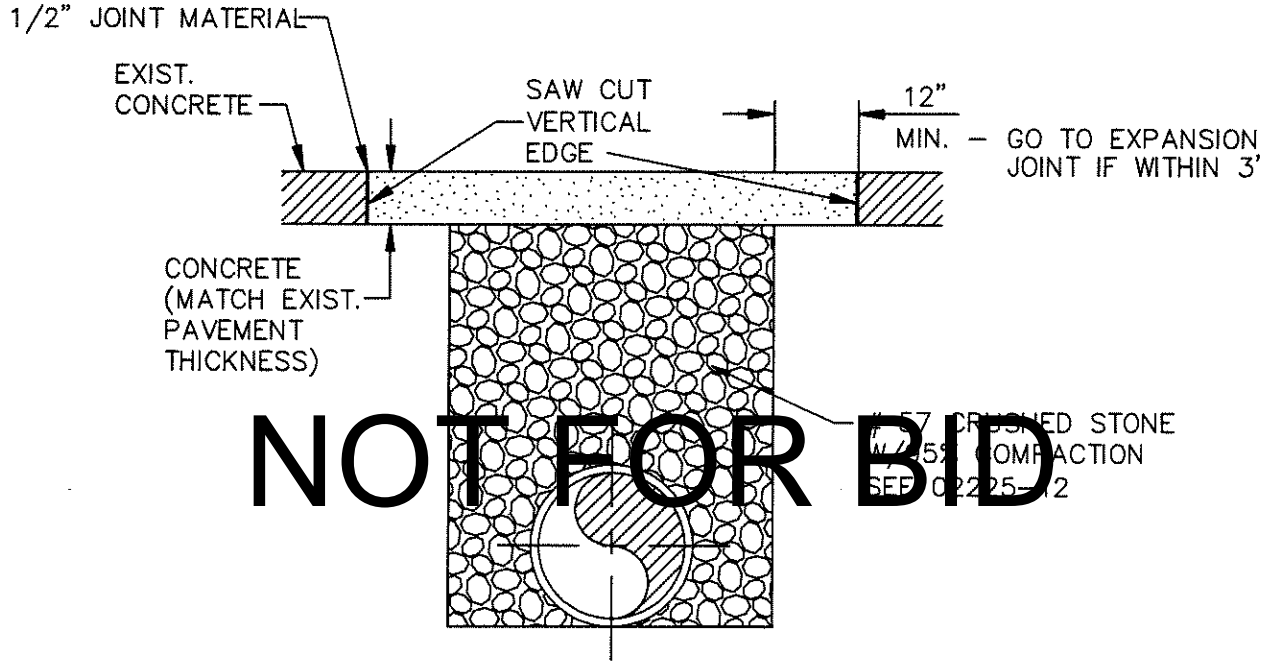


NOTE: SEE SPECIFICATIONS AND PIPE BEDDING AND HAUNCHING DETAILS FOR DIMENSIONS AND MATERIALS

TRENCH TERMINOLOGY DETAIL

N.T.S.

DATE: DEC 2005 SCALE: N.T.S.	**STANDARD DETAILS**	
SHEET 3	**TYPICAL CONSTRUCTION**	



CONCRETE REPLACEMENT DETAIL

NTS

DATE: DEC 2005 SCALE: N.T.S.	STANDARD DETAILS	
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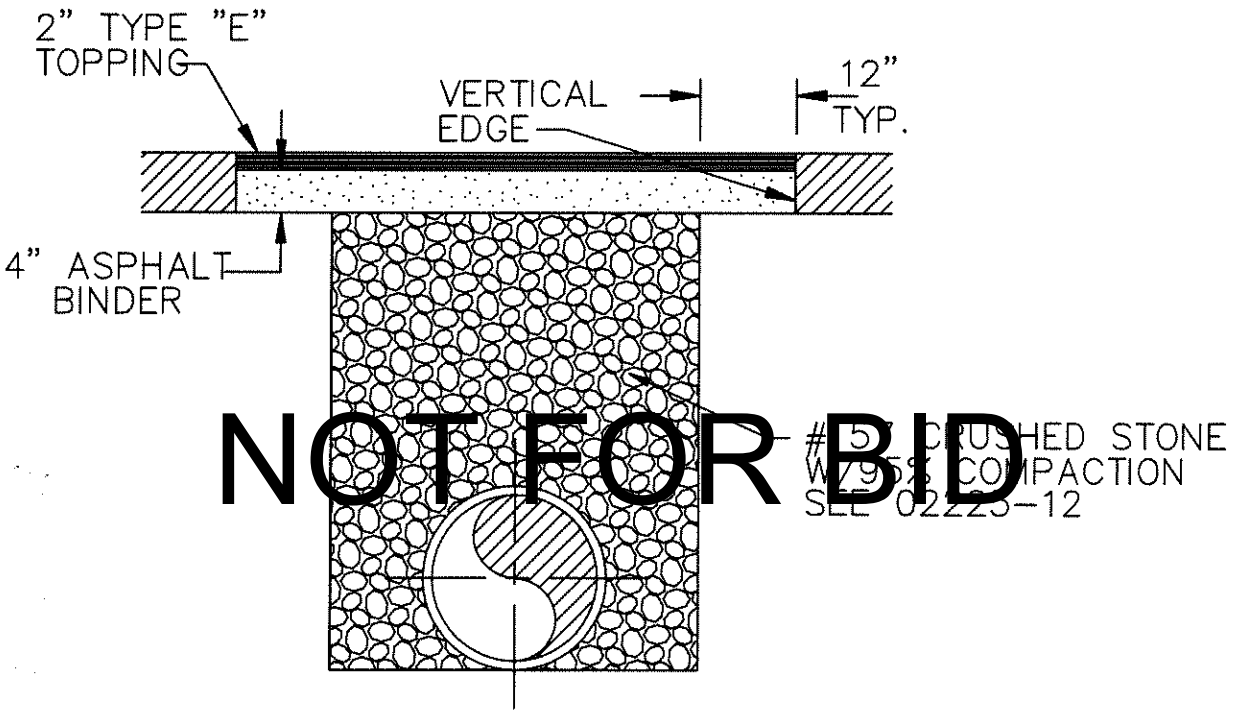
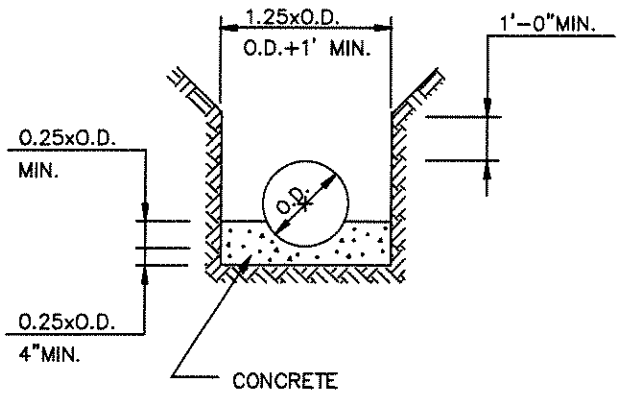


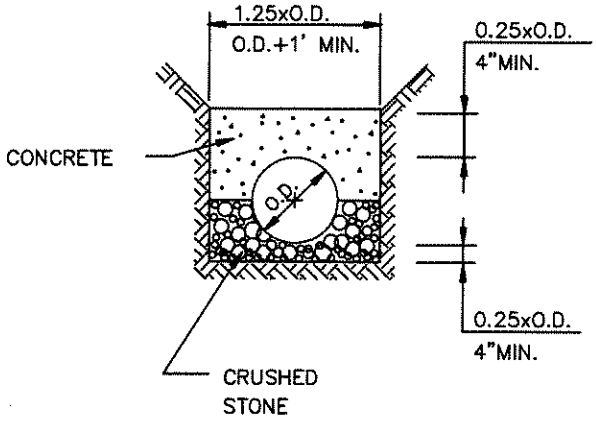
ASPHALT REPLACEMENT DETAIL

NTS

DATE: DEC 2005 SCALE: N.T.S.	STANDARD DETAILS	
SHEET 5	**TYPICAL CONSTRUCTION**	

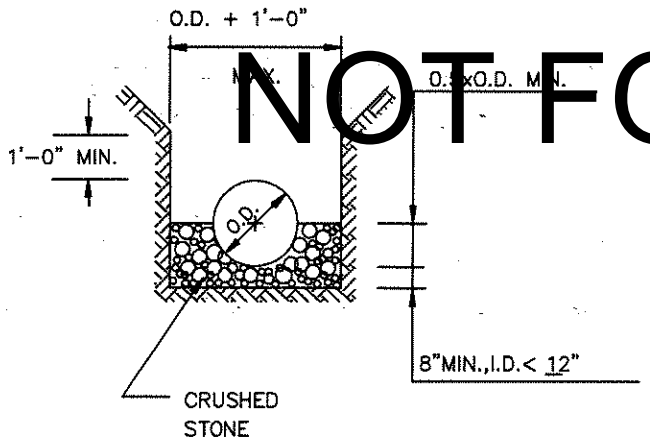


CONCRETE CRADLE



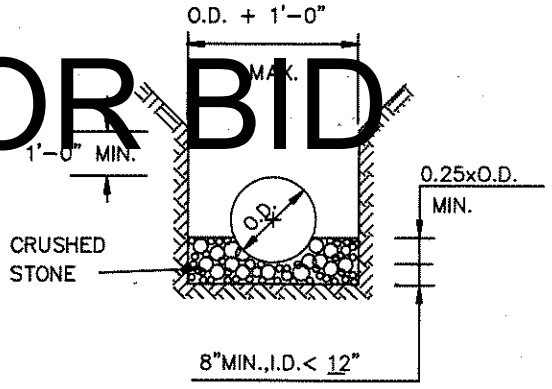
CONCRETE ARCH.

CLASS "A"



CLASS "B"

TOP AT GRADE



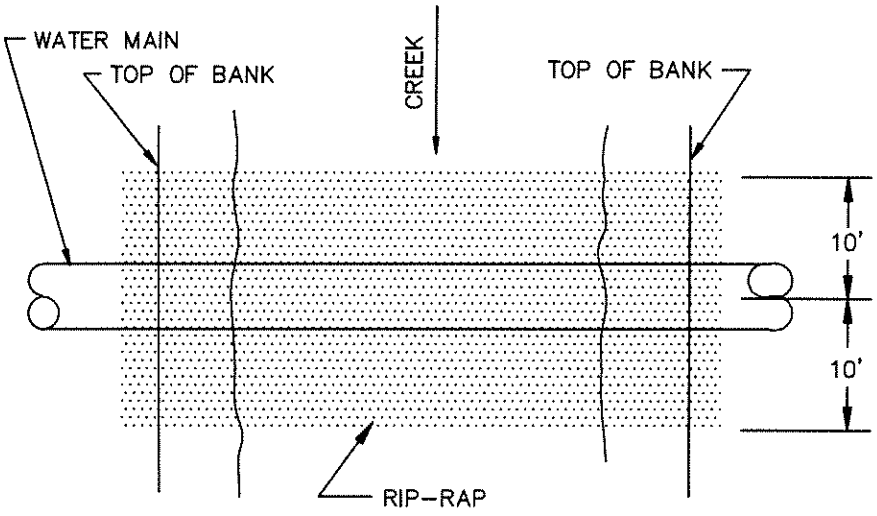
CLASS "C"

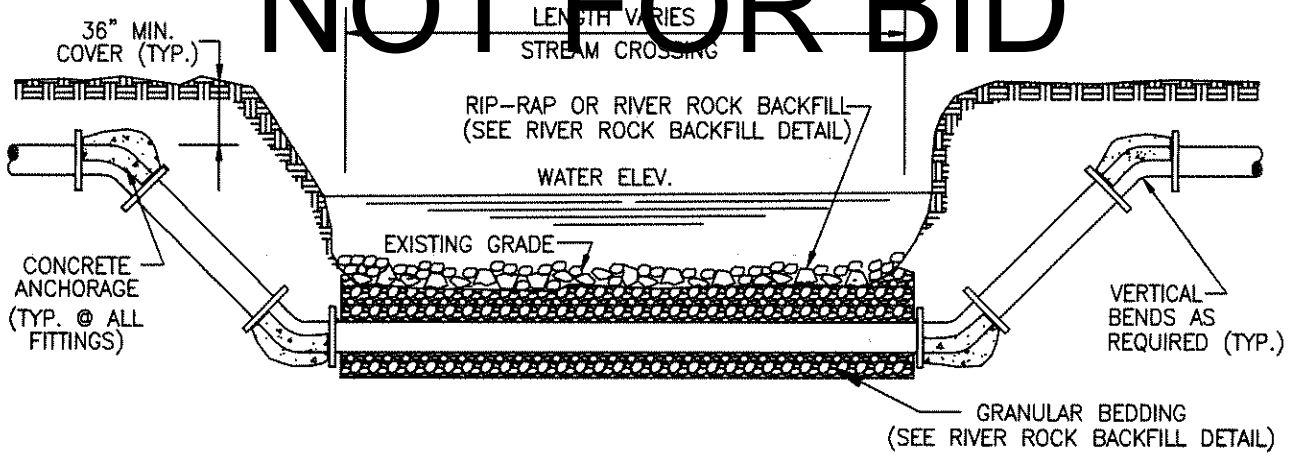
TOP ABOVE GRADE

PIPE BEDDING AND HAUNCHING DETAILS

N.T.S.

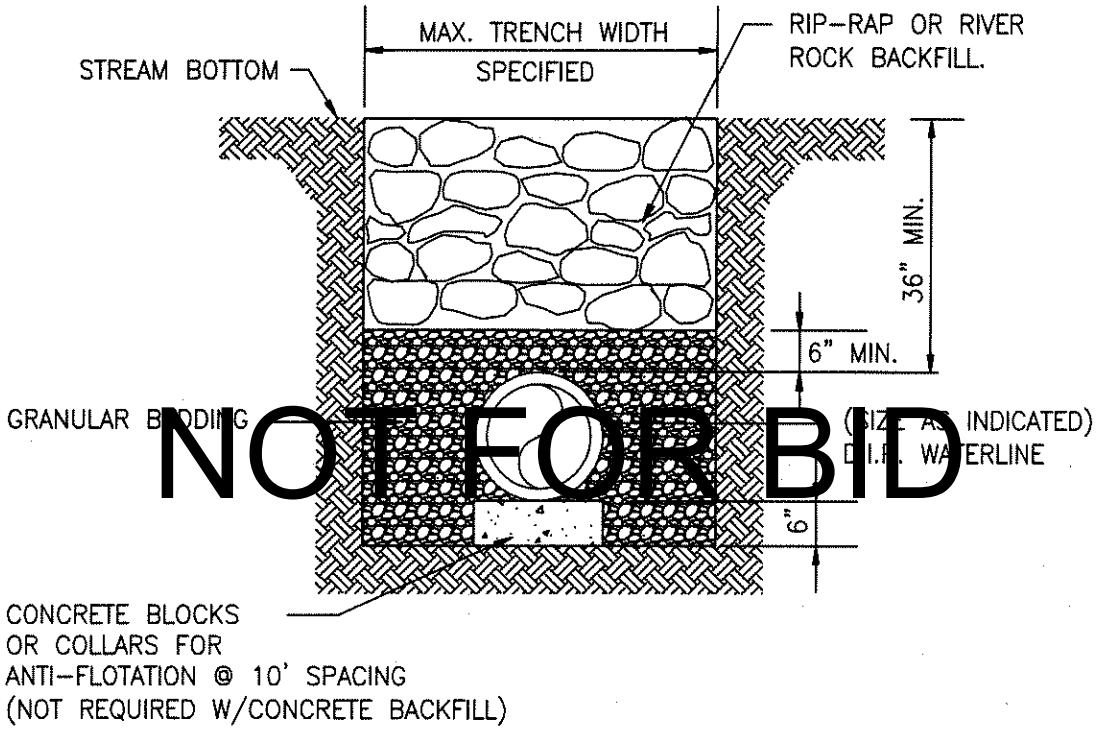
DATE: DEC 2005 SCALE: N.T.S.	**STANDARD DETAILS**	
SHEET 6	**TYPICAL CONSTRUCTION**	





CREEK CROSSING DETAIL
N.T.S.

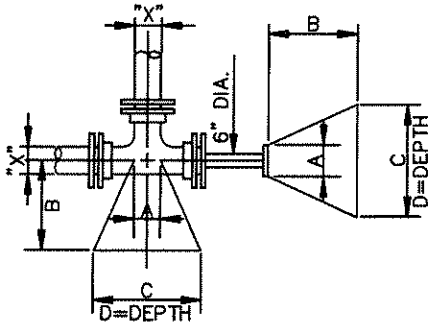
DATE: DEC 2005 **SCALE: N.T.S.**	**STANDARD DETAILS**	
SHEET 7	**TYPICAL CONSTRUCTION**	

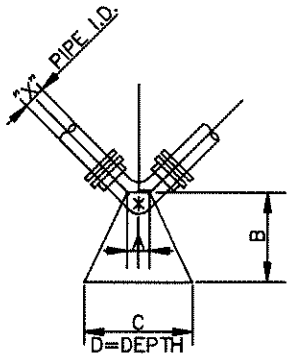


RIVER ROCK BACKFILL

N.T.S.

DATE: DEC 2005 SCALE: N.T.S.	**STANDARD DETAILS**	
SHEET 8	**TYPICAL CONSTRUCTION**	





200 PSI TEST PRESSURE
2000 PSF SOIL BEARING

BLOCKING DIMENSIONS

		X*	A	B	C	D
DEAD END & TEES		12"	1'-0"	3'-1"	4'-6"	3'-0"
		10"	1'-0"	2'-1"	3'-6"	2'-10"
		8"	0'-10"	2'-0"	2'-6"	2'-8"
		6"	0'-8"	2'-0"	2'-6"	1'-6"
		4"	0'-6"	2'-0"	2'-0"	1'-4"
BENDS	90°	12"	1'-0"	4'-9"	6'-6"	3'-0"
		10"	1'-0"	3'-4"	5'-0"	2'-10"
		8"	0'-10"	2'-10"	3'-5"	2'-8"
		6"	0'-8"	2'-6"	3'-6"	1'-6"
		4"	0'-6"	2'-0"	2'-0"	1'-4"
	45°	12"	1'-0"	2'-2"	3'-6"	3'-0"
		10"	1'-0"	2'-0"	2'-8"	2'-10"
		8"	0'-10"	2'-0"	2'-0"	2'-8"
		6"	0'-8"	2'-0"	2'-0"	1'-6"
		4"	0'-6"	2'-0"	2'-0"	1'-4"
	22 1/2°	12"	1'-0"	2'-0"	2'-0"	3'-0"
		10"	1'-0"	2'-0"	2'-0"	2'-10"
		8"	0'-10"	2'-0"	2'-0"	2'-8"
		6"	0'-8"	2'-0"	2'-0"	1'-6"
		4"	0'-6"	2'-0"	2'-0"	1'-4"
	11 1/4°	12"	1'-0"	2'-0"	2'-0"	3'-0"
		10"	1'-0"	2'-0"	2'-0"	2'-10"
		8"	0'-10"	2'-0"	2'-0"	2'-8"
		6"	0'-8"	2'-0"	2'-0"	1'-6"
		4"	0'-6"	2'-0"	2'-0"	1'-4"

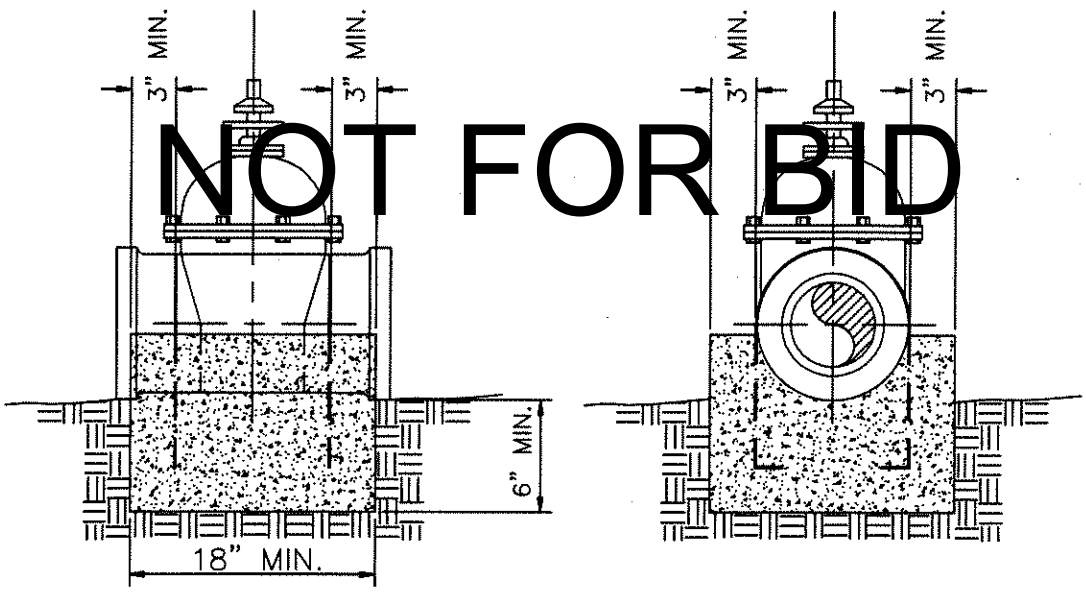
X* = DIAMETER OF PIPE TO BE BLOCKED

THRUST BLOCK DETAIL

N.T.S.

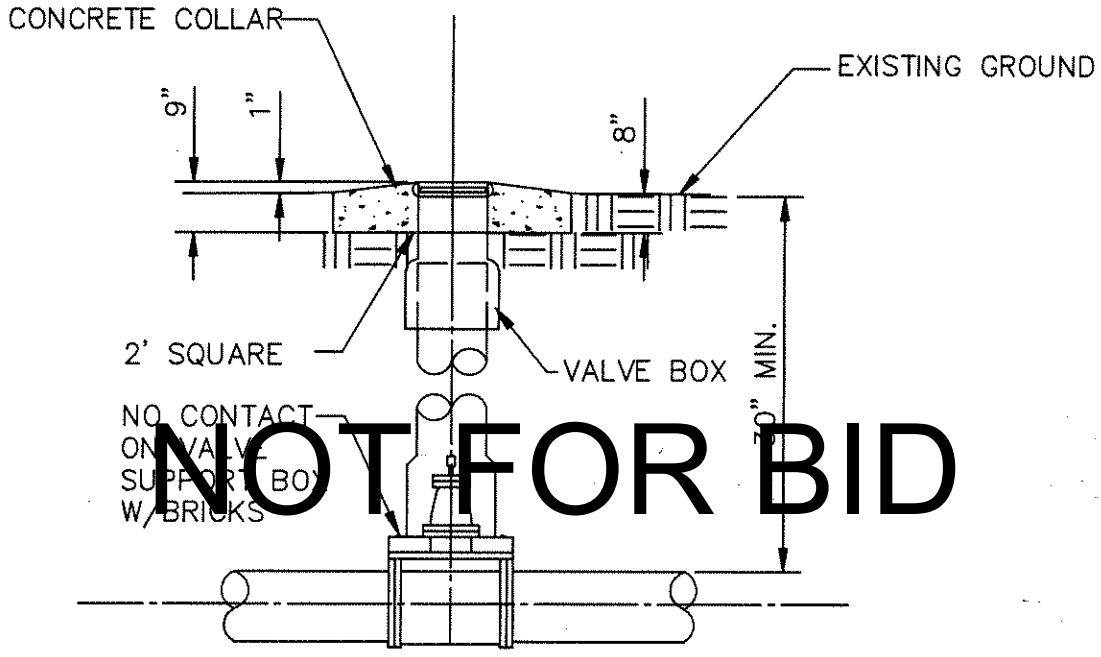
DATE: DEC 2005 SCALE: N.T.S.	**STANDARD DETAILS**	
SHEET 12	**TYPICAL CONSTRUCTION**	

SIZE OF VALVE	CONCRETE CU. FT.
2"& 2 1/4"	1.0
3"& 4"	1.0
6"	1.3
8"	1.5
10"	1.8
12"	2.5
14"	3.2
16"	3.4
18"	4.0



CONCRETE BLOCKING FOR VALVES
NTS

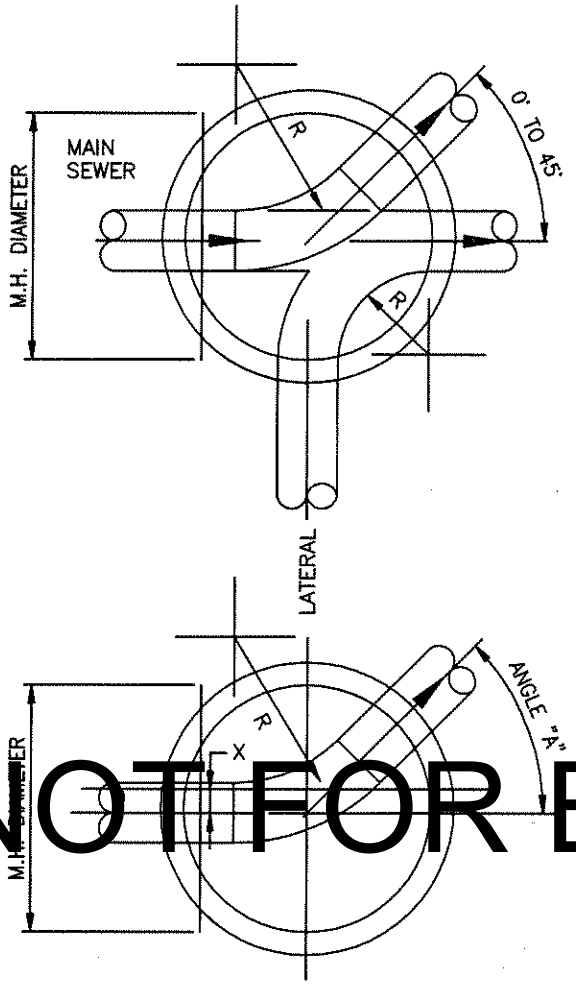
DATE: DEC 2005 SCALE: N.T.S.	**STANDARD DETAILS**	
SHEET 13	**TYPICAL CONSTRUCTION**	



GATE VALVE DETAIL

N.T.S.

DATE: NOV 2007 SCALE: N.T.S.	STANDARD DETAILS	
SHEET 17	**TYPICAL CONSTRUCTION**	



STANDARD MANHOLE SCHEDULE OF GOVERNING DIMENSIONS		
PIPE SIZE	ANGLE "A"	M.H. DIA.
8" TO 12"	0° TO 90°	4'-0"

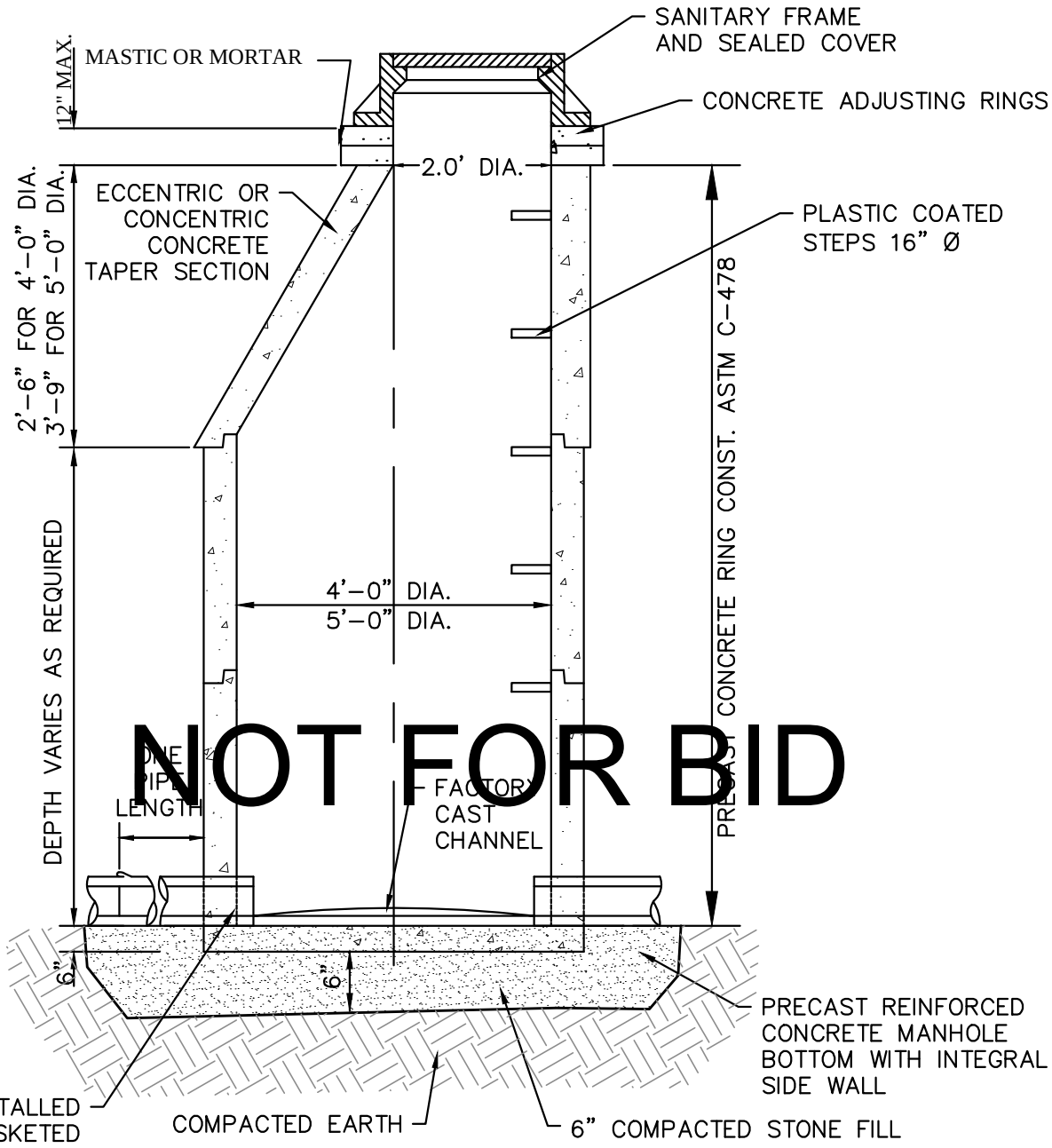
NOTE:
MINIMUM ℄ RADIUS (R) OF M.H. INVERT
= 1.5 X PIPE DIAMETER

TYPICAL PLANS

STANDARD MANHOLE DETAIL

N.T.S.

DATE: NOV 2007 **SCALE: N.T.S.**	**STANDARD DETAILS**	
	SEWER CONSTRUCTION	

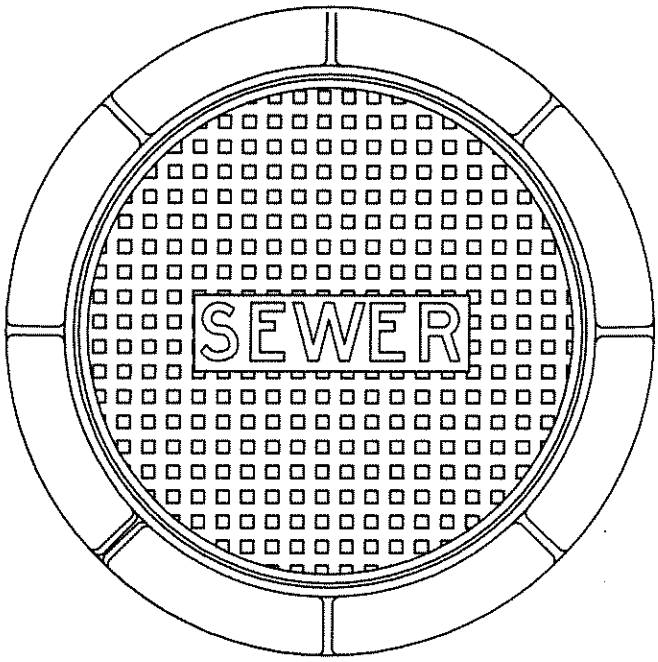


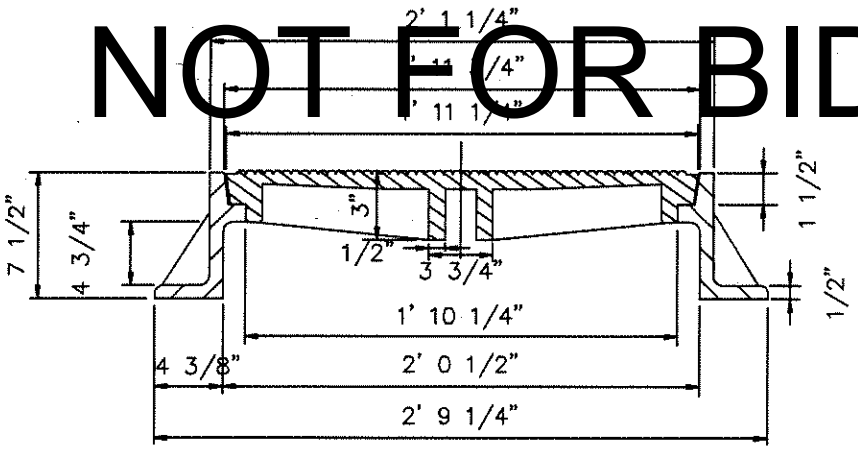
NOTES:

1. ALL NEW MANHOLES WILL HAVE FACTORY INSTALLED WATERPROOFING.
2. ALL NEW MANHOLES SHALL HAVE BOLTED WATERTIGHT CASTINGS AND ALL FRAMES AND GRATES SHALL HAVE WATERTIGHT SEALS.
3. SANITARY MANHOLES SHALL HAVE FACTORY INSTALLED RUBBER GASKETED PIPE SEALS PER ASTM C-923 AT INLET AND OUTLET POINTS OF MANHOLE.
4. ALL MANHOLES SHALL BE ADJUSTED TO FINAL FINISHED ELEVATIONS BY THE SEWER AND WATER CONTRACTOR.

CONCRETE MANHOLE DETAIL

NOT TO SCALE





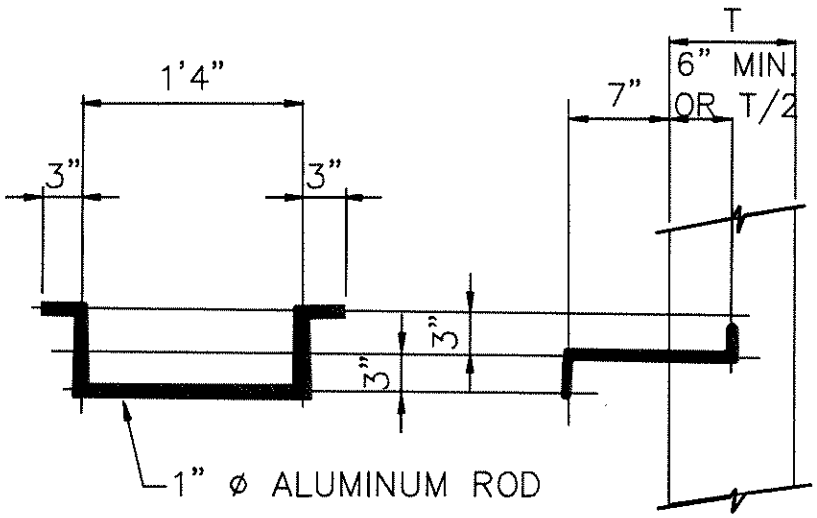
WEIGHT:
FRAME: 190 #
LID: 120 #
TOTAL: 310 #

NOTES:
1. ALL LETTERS CAST FLUSH WITH TOP OF LID.
2. LID HAS 1/2" CROWN.
3. SOLID COVER

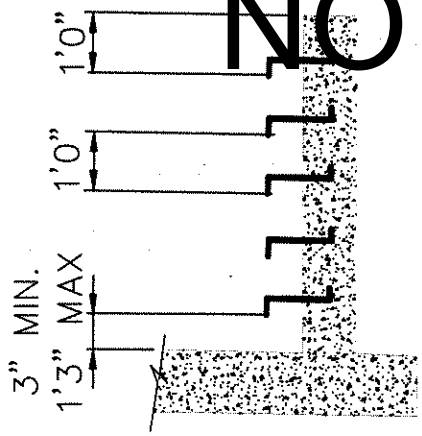
STANDARD MANHOLE FRAME WITH LID

N.T.S.

DATE: NOV 2007 **SCALE: N.T.S.**	**STANDARD DETAILS**	
	SEWER CONSTRUCTION	



NOT FOR BID

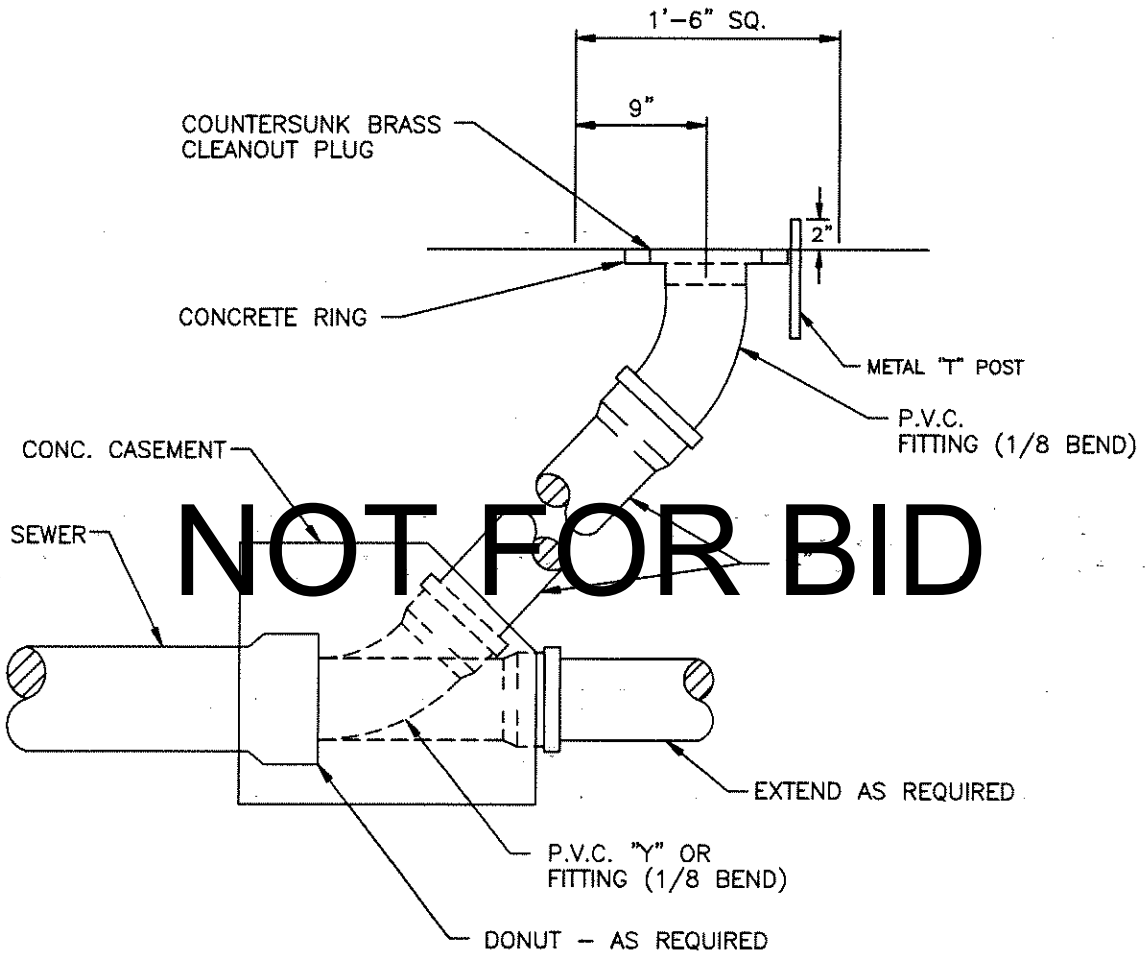


NOTE:
DIFFERENT CLEATS MAY BE USED BUT MUST BE APPROVED BY ENGINEER. A PRIMER COAT OF XINC CHROMATE OR BITUMASTIC SHALL BE APPLIED TO ALL SURFACES IN CONTACT WITH CONCRETE.

STANDARD MANHOLE STEPS

N.T.S.

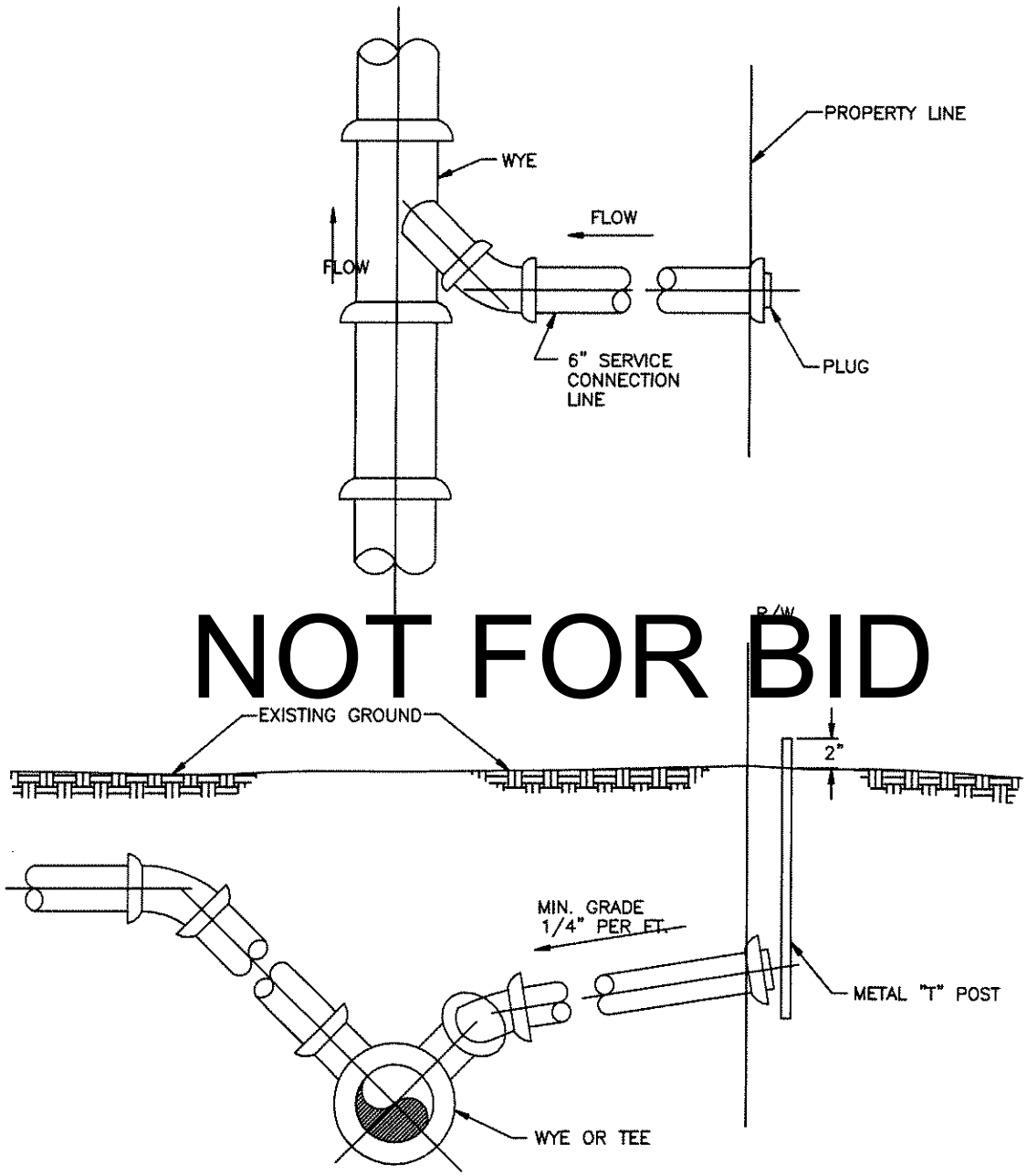
DATE: NOV 2007 **SCALE: N.T.S.**	**STANDARD DETAILS**	
SHEET 23	**SEWER CONSTRUCTION**	



CLEANOUT DETAIL

N.T.S.

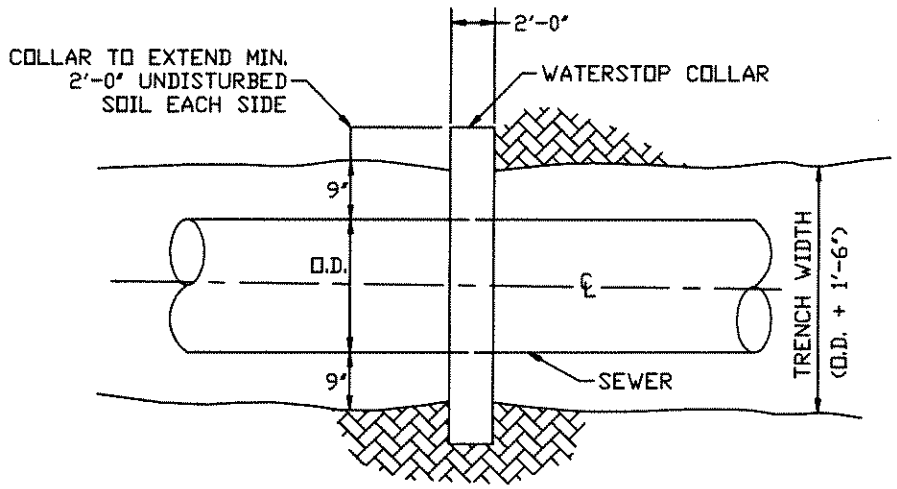
DATE: NOV 2007 **SCALE: N.T.S.**	**STANDARD DETAILS**	
SHEET 21	**SEWER CONSTRUCTION**	



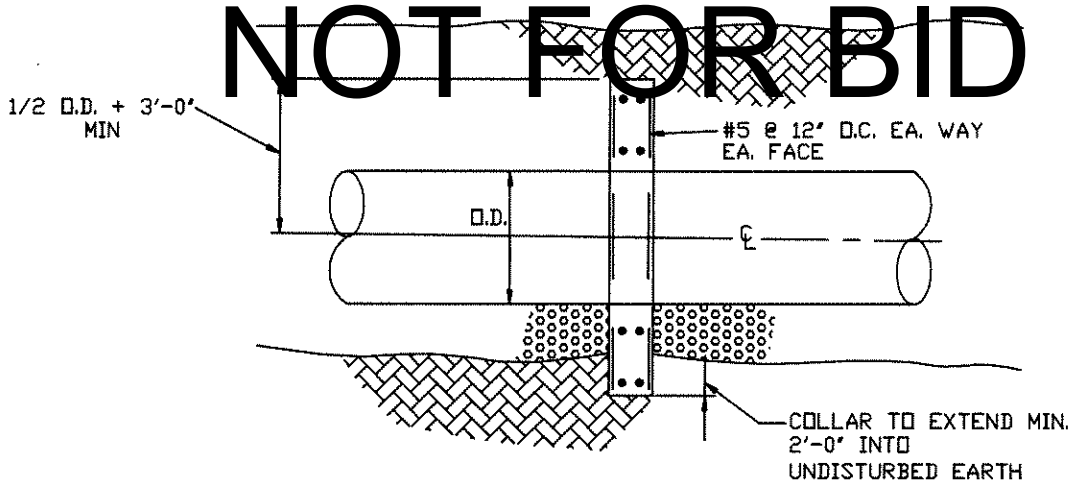
SERVICE CONNECTION DETAIL

N.T.S.

DATE: NOV 2007 **SCALE: N.T.S.**	**STANDARD DETAILS**	
	SEWER CONSTRUCTION	



PLAN



SECTION

WATERSTOP COLLAR DETAIL

DATE: NOV 2007 **SCALE: N.T.S.**	**STANDARD DETAILS**	
SHEET 24	**SEWER CONSTRUCTION**	