CONTRACT DOCUMENTS AND SPECIFICATIONS

CITY OF GOODLETTSVILLE
2018 SEWER REHABILITATION AND IMPROVEMENTS

3100-002

AUGUST 2018 - IFB

FUNDING

TDEC SRF

PREPARED BY:

TRESTLES LLC

ONE VANTAGE WAY, SUITE C-130
NASHVILLE, TENNESSEE 37228

PREPARED FOR:

GOODLETTSVILLE TENNESSEE

215 CARTWRIGHT STREET
GOODLETTSVILLE, TN 37072

DIVISION 00 - PROCUREMENT AND CONTRACTING REQUIREMENTS

CONTRACT DOCUMENTS AND SPECIFICATIONS

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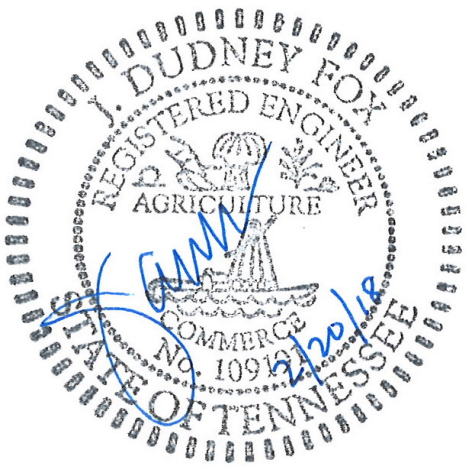
SEAL



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SECTION 00 1100

ADVERTISEMENT FOR BIDS

Mansker Creek Sewer Rehabilitation

The City of Goodlettsville
(Owner)

Separate sealed Bids for furnishing of all materials, labor, tools, equipment, and appliances necessary for the construction of Mansker Creek Sewer Rehabilitation will be received by the Owner at 105 South Main Street, Goodlettsville, TN 37072, until 2:00 p.m., local time, on September 20, 2018, and then at said office publicly opened and read aloud.

The Project consists of the following major elements: pipe bursting of gravity sewer, open cut replacement of gravity sewer, point repairs, CIPP lining of gravity sewer, manhole rehabilitation, sewer service lateral rehabilitation and replacement, and CCTV investigation, within and throughout the sanitary sewer system of the City of Goodlettsville, including all appurtenances necessary for a complete project as shown or specified in the Contract Documents.

The Project will consist of multiple phases, which will be defined and initiated by Work Orders issued over the duration of the Project. Each Work Order will consist of a portion of the work described above to be completed by the Contractor within the time period described in the respective Work Order.

A mandatory pre-bid meeting will be held at 10:00 a.m. local time, on September 12, 2018 at the Public Works Office, located at 215 Cartwright St, Goodlettsville, TN 37072.

Copies of the Contract Documents and Specifications, including bidding documents and requirements and Contract Drawings may be obtained from the Engineer, Trestles LLC, Nashville, TN (Address below), upon payment of $250 for each set. This payment is not refundable. Copies may be examined at the following locations:

Trestles LLC, One Vantage Way, Suite C-130, Nashville, Tennessee 37228, 615.476.0706

Builders Exchange of Tennessee (Nashville Office), 2322 Winford Ave. Nashville, TN 37211

Builders Exchange of Tennessee (Knoxville Office), 300 Clark Street Knoxville, TN 37921

Associated General Contractors & iSqFt, 1811 Church Street, Nashville, TN 37203

TDEC-SRF, Tennessee Tower, 312 Rosa L. Parks Ave, 12th Floor, Nashville, TN 37243

Nashville Minority Business Center, 1919 Charlotte Avenue, Nashville, TN 37203

Bidders must be listed on Engineer's list of plan holders who have purchased the Contract Documents, Specifications, and Drawings.

No bid may be withdrawn within 60 days after the scheduled time for receipt of bids.

Engineer shall be provided with the following information: mailing address for U.S. Postal Service, physical delivery address, telephone number, email address, and name of contact person.

This project is being funded by a State Revolving Fund loan on or after 2014 EPA Fiscal Year. The loan recipient must be in compliance with all applicable Davis-Bacon Act and American Iron and Steel requirements.

Any contract or contracts awarded by the Owner through this invitation for bids will be funded by a State Revolving Fund (SRF) loan from the State of Tennessee. State and Federal funds will be involved in this project, and, as a result, Bidders must comply with the SRF Loan Program's Disadvantaged Business Enterprises (DBE) requirements including contacting a minimum of 10 qualified DBE sub-contractors, professional service providers, vendors, and/or suppliers by certified mail to solicit bids. The apparent successful Bidder must submit to the Owner copies of the certified letters and return receipts prior to contract award. Neither the State of Tennessee nor any of its departments, agencies, or employees is or will be a party to this Invitation for Bids or any resulting contract(s) awarded by the Owner.

All qualified Disadvantaged Business Enterprises (DBE) firms desiring to bid as a General Contractor, sub-contractor, professional service provider, supplier, or equipment vendor are encouraged to contact Ms. Marilyn Robinson at the Nashville Minority Business Center Office listed above to review bidding/contract documents. Qualified Disadvantaged Business Enterprise (DBE) firms may also contact Trestles LLC, One Vantage Way, Suite C-130, Nashville, Tennessee 37228, 615.476.0706 in order to obtain a list of prospective bidding General Contractors or to obtain copies of bidding/contract documents.

All sealed bid envelopes should be clearly marked "RFB #1809-0067" on the face.

The City of Goodlettsville does not discriminate on the basis of age, race, sex, color, national origin, religion or disability in admission to, access to, or operation of its programs, services or activities, nor does it discriminate in its hiring, employment or purchasing practices. Contact the Human Resources Director at 615-851-2206 with questions, concerns, complaints and with requests for ADA accommodations.

City of Goodlettsville

Date: 08/22/18

Tim Ellis, City Manager

SECTION 00 2100

INFORMATION FOR BIDDERS

1. RECEIPT AND OPENING OF BIDS

The City of Goodlettsville (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 location and time noted in the Advertisement for Bids. The envelopes containing the Bids shall be sealed.

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 shall be submitted on the Bid forms bound in the Contract Documents. All blank spaces for Bid prices must be filled in, in ink or typewritten, in both words and figures. (In case of discrepancy, the amount shown in words will govern.) All required enclosed certifications must be fully completed and executed when submitted.

Each Bid must be submitted in a sealed envelope, addressed to the Owner. Each sealed envelope containing a Bid must be plainly marked on the outside as 2018 Sewer Rehabilitation and Improvements, and include all other information required by the state of Tennessee law.

If forwarded by mail, the sealed envelope containing the Bid must be enclosed in another envelope addressed to the Owner at 105 South Main Street, Goodlettsville, TN 37072.

Any and all Bids not meeting the aforementioned criteria for Bid submittal, will be declared nonresponsive, will **not** be opened, and will be returned to the Bidder unopened.

3. SUBCONTRACTS

The Bidder is specifically advised that any person, firm, or other party to whom it is proposed to award a subcontract under this Contract must be acceptable to the Owner and funding agencies and shall be subject to verification by the state of Tennessee as to eligibility status.

Bidder shall name any person, firm, or other party to whom it is proposed to award a subcontract to perform cured-in-place pipe (CIPP) or pipe bursting work. Bidder shall list their qualifications including linear feet of similar work performed and length of time performing similar work.

4. FACSIMILE MODIFICATIONS

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

5. OVERHEAD, PROFIT, AND REVISION OF QUANTITIES

The unit or lump sum price for each of the items in the proposal of each Bidder shall include its pro rata share of overhead and profit so that the sum of the products obtained by multiplying the quantity shown for each item by the unit price represents the total Bid. Any Bid not conforming to this requirement may be rejected as informal. The special attention of all Bidders is called to this provision, for should conditions make it necessary to revise the quantities, no limit will be fixed for such increased or decreased quantities nor extra compensation allowed, provided the net monetary value of all such addition or subtraction in quantities of such items of work (i.e., difference in cost) shall not increase or decrease the total original contract price by more than 25 percent, except for work not covered in the Drawings and Detailed Specifications as provided for under General Conditions and Supplemental General Conditions.

6. QUALIFICATIONS OF BIDDER

The Owner may make such investigations as deemed 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.

A Bidder must purchase a set of Contract Documents (including Bidding Requirements and Documents), Specifications, and Drawings through the Engineer in order to be considered a qualified bidder. Addenda will only be sent to those who have purchased documents and are on the list of planholders maintained by Trestles LLC.

7. BID SECURITY

Each Bid must be accompanied by a cashier's check on a duly authorized bank, certified check of the Bidder, or a bid bond prepared on the form of bid bond attached hereto, duly executed by the Bidder as principal and having as security thereon a surety company listed in the latest issue of U.S. Treasury Circular 570, in the amount of 5 percent of the Bid. Certified checks or cashier's checks shall be made payable to the Owner. Such checks or bid bonds will be returned to all except the three lowest Bidders within three days after the opening of Bids; the remaining checks or bid bonds will be returned promptly after the Owner and the accepted Bidder have executed the contract, or, if no award has been made

within 60 days after the date of the opening of Bids, upon demand of the Bidder at any time thereafter, so long as he has not been notified of the acceptance of his Bid.

8. LIQUIDATED DAMAGES FOR FAILURE TO ENTER INTO CONTRACT

The successful Bidder, upon his failure or refusal to execute and deliver the Contract and bonds required within 10 days after he has received notice of the acceptance of his Bid, shall forfeit to the Owner, as liquidated damages for such failure or refusal, the security deposited with his Bid.

9. TIME FOR COMPLETION AND LIQUIDATED DAMAGES

Bidder must agree to commence work on or before a date to be specified in written Work Orders of the Owner and to fully complete the Project within the time specified within the respective Work Order. Bidder must agree also to pay as liquidated damages the sum of $600 for each consecutive calendar day in default as hereinafter provided in the General Conditions and Supplemental General Conditions.

10. WORK ORDERS

The work described in these Contract Documents shall be constructed in phases over the duration of the project as described above. Each phase will be initiated by a Work Order issued by the Engineer. Bidder must agree to commence work on or before the date specified in each Work Order and to fully complete work described in the Work Order within the prescribed time. Bidder must agree to complete at least 85% of the current Work Order and 100% of previous Work Orders before commencing work on subsequent Work Orders. The Owner reserves the right to delay or withhold issuance of additional Work Orders until all requirements of previously issued Work Orders are completed, including all field work and project documentation.

11. CONTRACT RENEWAL

The Contract shall renew up to three (3) times on an annual basis (365 calendar days) for a maximum duration of 1,095 days, unless the Owner provides notice of intent not to renew the Contract a minimum of 30 days prior to the date of renewal. If the Owner elects to do so, the Contract shall remain in effect until all Work Orders previously issued are completed in accordance with the Contract Documents. The Owner reserves the right to adjust quantities as described in Section 5 above at the time of renewal.

12. CONDITIONS OF WORK

Each Bidder must inform himself 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 obligation to furnish all material and labor necessary to carry out the provision of his Contract. Insofar as possible the Contractor, in carrying out his work, must employ such methods or means as will not cause any interruption of or interference with the work of any other Contractor or the operations of the Owner.

13. ADDENDA AND INTERPRETATIONS

No interpretation of the meaning of the Drawings, Specifications, or other prebid documents will be made to any Bidder orally.

Every request for such interpretation should be in writing addressed to Dudney Fox, P.E.(dudneyfox@trestlesllc.com); Trestles LLC, at 1 Vantage Way, Suite C-130, Nashville, Tennessee 37228, 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 transmitted electronically to all prospective Bidders not later than two days prior to the date fixed for the opening of Bids, or in accordance with Tennessee statute. Failure of any Bidder to receive any such addendum or interpretation shall not relieve such Bidder from any obligation under his Bid as submitted. All addenda so issued shall become a part of the Contract Documents.

14. SECURITY FOR FAITHFUL PERFORMANCE

Simultaneously with his 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. 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.

15. 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.

16. 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. Surveys, permits, and regulations
E. State Allowances

The federal regulations enclosed or herein referred to supersede all conflicting requirements of the Contract Documents.

17. 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.

18. 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 Drawings 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 Bid.

19. EXECUTION OF BID DOCUMENTS

The Contractor, in signing his Bid on the whole or any portion of the work, shall conform to the following requirements:

A. Bids which are not signed by individuals making them shall have attached thereto a power of attorney evidencing authority to sign the Bid in the name of the person for whom it is signed.

B. Bids which are signed for a partnership shall be signed by all of the partners or by an attorney-in-fact. If a Bid is signed by an attorney-in-fact, there should be attached to the Bid a power of attorney executed by the partners evidencing authority to sign the Bid.

20. Bids which are signed for a corporation shall have the correct corporate name thereof and the signature of the President or other authorized officer of the corporation manually written below the corporate name following the wording "By _____." Corporation seal shall also be affixed to the Bid.

21. METHOD OF AWARD - LOWEST QUALIFIED BIDDER

The Contract will be awarded to the responsive, responsible Bidder submitting the lowest Bid complying with the conditions of the Information for Bidders. Award will be made on the basis of the prices given in the Base Bid either with or without alternates at the discretion of the Owner. The Bidder to whom the award is made will be notified at the earliest possible date. The Owner reserves the right to reject any and all Bids and to waive any informality in Bids received whenever such rejection or waiver is in its interest.

A responsive Bidder shall be one who submits his Bid in the proper form without qualification or intent other than as called for in the Specifications and on the Contract Drawings and who binds himself on behalf of his Bid to the Owner with the proper bid bond or certified check completed and attached, and who properly completes all forms required to be completed and submitted at the time of the bidding.

A responsible Bidder shall be one who can fulfill the following requirements:

A. The Bidder shall maintain a permanent place of business. This requirement applies to the Bidder where the Bidder is a division of a corporation, or where the Bidder is 50 percent or more owned by a person, corporation, or firm.

B. The Bidder shall demonstrate that he has adequate construction management experience and sufficient equipment resources to properly perform the work under and in conformance with these Contract Documents. This evaluation will be based upon a list of completed and active projects and a list of construction equipment available to the

Bidder to perform the work. This evaluation shall also include the qualifications and experience of proposed personnel to be assigned to the work.

C. The Bidder shall demonstrate that he is familiar with the work under these Contact Documents. This evaluation will be based upon a list of major equipment items the Bidder proposes to furnish and a list of subcontractors the Bidder proposes to use in prosecuting the work.

D. The Bidder shall demonstrate that he has financial resources of sufficient strength to meet the obligations incident to the performance of the work covered by these Contract Documents. The Bidder shall complete the Statement of Bidder's Qualifications in the Bid forms. The ability to obtain the required Performance and Payment Bonds will not alone demonstrate adequate financial capability.

E. The Bidder may demonstrate financial capability by submitting a suitable financial statement of an Equity Partner, provided an agreement is executed binding the Bidder and said Equity Partner, jointly and severally, to fulfill all duties, obligations, and responsibilities of the Contractor under these Contract Documents if the Contract is awarded to the Bidder. The agreement shall be submitted with the Bid and shall be satisfactory to the Owner's attorney or the Bid may be declared nonresponsive.

F. The Bidder shall furnish all data required by these Contract Documents. Failure to do so may result in the Bid being declared nonresponsive. Acceptance of the Bidder's documentation and substantiation or contract award by the Owner does not relieve the Bidder of liability for nonperformance as covered in the Contract Documents, nor will the Bidder be exempted from any other legal recourse the Owner may elect to pursue.

21. EMPLOYMENT OF LOCAL LABOR

Preference in employment on the Project shall, insofar as practicable, be given to qualified local labor.

22. BID ENVELOPE

All Bidders must be licensed contractors in the State of Tennessee. In compliance with all the requirements of Chapter No. 135, Public Acts of 1945 of the General Assembly of the State of Tennessee, and House Bill No. 2180 (Public Chapter No. 882) known as the Contractor's Licensing Act of 1976 (and all amendments thereto), the envelope in which the Bid is contained must also bear on the outside the following:

A. Name of Bidder

1. Address of the Bidder;
2. Name of Project for which Bid is submitted;
3. Bidder's License Number;
4. Bidder's License Category or Classification; and
5. Bidder's License Expiration Date.

B. Name of Electrical; Plumbing; Heating, Ventilation and Air Conditioning; or Masonry Sub-Contractors

1. Contractor's License Number;
2. Contractor's License Expiration Date; and
3. License Classification.

Bid envelopes that do not bear the above information will be returned to the Bidder unopened.

A copy of the form found on the last page of this section properly completed to provide the required information as identified above shall be affixed to the front of the envelope containing the Bidder’s proposal.

CONTRACTOR'S IDENTIFICATION

This form shall be attached to the sealed envelope containing the Bid. Failure to provide the following information on the sealed envelope will be considered a non-responsive Bid.

BIDDER:

Name _____

Address _____

_____

_____

Tennessee License No._____

Expiration Date _____

Monetary Limit $_____

Classification _____

_____

_____

Complete the following for all applicable Electrical; Plumbing; Heating, Ventilation and Air-Conditioning; or Masonry Subcontractors:

Subcontractor: _____

_____

Tennessee License No._____

License Expiration Date _____

License Classification _____

Subcontractor: _____

_____

Tennessee License No._____

License Expiration Date _____

License Classification _____

Subcontractor: _____

_____

Tennessee License No._____

License Expiration Date _____

License Classification _____

SEALED BID PROPOSAL FOR THE CONSTRUCTION OF

2018 SEWER REHABILITATION AND IMPROVEMENTS

FOR THE CITY OF GOODLETTSVILLE

Bid Date _____ Bid Time _____

PROCUREMENT FORMS AND SUPPLEMENTS

SECTION 00 4100

BID

Project Description: 2018 Sewer Rehabilitation and Improvements

Proposal of_____

(hereinafter called "Bidder"), doing business as_____
(a corporation, a partnership, an individual)

to the City of Goodlettsville (hereinafter called "Owner").

Gentlemen:

The Bidder, in compliance with your Advertisement for Bids for the construction of this project having examined the Drawings 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 price(s) stated below. This price(s) is to cover all expenses including overhead and profit incurred in performing the work required under the Contract Documents, of which this proposal is a part.

Bidder agrees to perform work in phases as defined by Work Orders issued under this Contract.

Bidder hereby agrees to commence work under this contract on or before a date to be specified in written Work Orders of the Owner and to fully complete each Work Order within the time period described in the respective Work Order as stipulated in the Specifications. Bidder further agrees to pay as liquidated damages, the sum of $600 for each consecutive calendar day thereafter as hereinafter provided in the General Conditions.

Bidder acknowledges receipt of the following addenda:

_____

_____

_____

Bidder agrees to perform all the construction of the project complete with appurtenant and accessory work described in the Specifications and shown on the plans for the attached price(s).

The attached price(s) shall include all labor, materials, bailing, shoring, removal, overhead, profit, insurance, etc., to cover the finished work of the several kinds called for.

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

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

Upon receipt of written notice of the acceptance of this Bid, Bidder will execute the formal contract attached within ten days and deliver a surety bond or bonds as required by the General Conditions. The Bid security attached in the sum of 5 percent of the total Bid is to become the property of the Owner in the event the contract and bond are not executed within the time above set forth, as liquidated damages for the delay and additional expense to the Owner caused thereby.

Respectfully submitted:

_____

By_____
(Signature)

Title_____

_____

_____
(Business Address)

ATTEST:

_____

Name_____
(Please Type)

Title_____ (SEAL)

Note: Attest for a corporation must be by the corporate secretary; for a partnership by another partner; for an individual by a Notary.

SECTION 00 4143

BID SCHEDULE

CITY OF GOODLETTSVILLE

MANSKER CREEK SEWER REHABILITATION

GOODLETTSVILLE, TENNESSEE

Note: Unless otherwise stated, all bid items shall be a complete installation as Specified and/or shown on Drawings.

Item No.	Description	Unit	Estimated Quantity	Unit Price	Item Total
	Pipe Bursting				
1	6” HDPE Pipe Bursting, DR17, Gravity Sewer	LF	400	$	$
2	8” HDPE Pipe Bursting, DR17, Gravity Sewer	LF	21,000	$	$
3	10” HDPE Pipe Bursting, DR17, Gravity Sewer	LF	1,200	$	$
4	12” HDPE Pipe Bursting, DR17, Gravity Sewer	LF	1,400	$	$
5	16” HDPE Pipe Bursting, DR17, Gravity Sewer	LF	2,500	$	$
6	Insertion/Receiving Pit - Depth 0 - 10' **(Improved)***	EA	41	$	$
7	Insertion/Receiving Pit - Depth 11' - 20' **(Improved)***	EA	7	$	$
8	Insertion/Receiving Pit - Depth 0' - 10' (**Not Improved)***	EA	50	$	$
9	Insertion/Receiving Pit - Depth 11' - 20' (**Not Improved)***	EA	10	$	$
10	Slipline Removal	LF	500	$	$
11	Sag Repair - Depth 0' - 10' **(Improved)***	EA	2	$	$
12	Sag Repair - Depth 11' - 20' **(Improved)***	EA	2	$	$
13	Sag Repair - Depth 0' - 10' **(Not Improved)***	EA	2	$	$
14	Sag Repair - Depth 11' - 20' **(Not Improved)***	EA	2	$	$
	Cured-in-Place Pipe (CIPP)				
15	8” CIPP Liner, Gravity Sewer	LF	2,400	$	$
16	10” CIPP Liner, Gravity Sewer	LF	400	$	$
17	12” CIPP Liner, Gravity Sewer	LF	400	$	$
18	15” CIPP Liner, Gravity Sewer	LF	800	$	$
	Open Cut Replacement & Repair				
19	8” PVC, DR35, Gravity Sewer - Depth 0' - 10'	LF	400	$	$
20	8” PVC, DR35, Gravity Sewer - Depth 11' - 20'	LF	400	$	$
21	10” PVC, DR35, Gravity Sewer - Depth 0' - 10'	LF	400	$	$
22	10” PVC, DR35, Gravity Sewer - Depth 11' - 20'	LF	400	$	$
23	12” PVC, DR35, Gravity Sewer - Depth 0' - 10'	LF	400	$	$
24	12” PVC, DR35, Gravity Sewer - Depth 11' - 20'	LF	400	$	$
25	15" PVC, DR35, Gravity Sewer - Depth 0' - 10'	LF	300	$	$
26	15" PVC, DR35, Gravity Sewer - Depth 11' - 20'	LF	300	$	$

27	Point Repair of Sewer - Depth 0' - 10' **(Improved)***	EA	3	$	$
28	Point Repair of Sewer - Depth 11' - 20' **(Improved)***	EA	1	$	$
29	Point Repair of Sewer - Depth 0' - 10' **(Not Improved)***	EA	3	$	$
30	Point Repair of Sewer - Depth 11' - 20' **(Not Improved)***	EA	1	$	$
31	ARAP Creek Crossing w/ Concrete Encasement	LS	1	$	$
32	Concrete Water Stop (CWS)	EA	4	$	$
	Surface Restoration				
33	Pavement Repair - TDOT Roadways	LF	300	$	$
34	Pavement Repair - TDOT Right-of-Way	LF	500	$	$
35	Pavement Repair - City Streets	LF	500	$	$
36	Pavement Repair - Driveways and Parking Lots	LF	500	$	$
37	Crushed Stone Gravel Backfill	Ton	700	$	$
38	Final Grading and Seeding - Right-of-Way	LF	600	$	$
39	Final Grading and Seeding - Easement	LF	600	$	$
	Manholes				
40	Manhole Replacement - Repair Method 1 **(Improved)***	EA	2	$	$
41	Manhole Replacement - Repair Method 1 **(Not Improved)***	EA	2	$	$
42	Extra Depth for Manhole (Depths over 8 feet)	VF	10	$	$
43	Install Grout Lining - Repair Method 2	VF	550	$	$
44	Construct Bench and Channel - Repair Method 3	EA	10	$	$
45	Install Manhole Inserts in Frame - Repair Method 4	EA	80	$	$
46	Install Chimney Seal - Repair Method 5	EA	10	$	$
47	Replace Frame and Cover with Watertight Casting - Repair Method 6*	EA	20	$	$
48	Seal Pipe Connection to Manhole - Repair Method 7	EA	25	$	$
53	Reset Manhole Frame and Cover **(Improved)** - Repair Method 8*	EA	5	$	$
54	Reset Manhole Frame and Cover **(Not Improved)** - Repair Method 8*	EA	5	$	$
55	Interior Manhole Drop	EA	3	$	$
56	Exterior Manhole Drop	EA	1	$	$
57	Manhole Abandonment **(Improved)***	EA	1	$	$
58	Manhole Abandonment **(Not Improved)***	EA	1	$	$
59	Vent Pipe Assembly **(Not Improved)***	EA	1	$	$
	Sewer Service Laterals (To Right-of-Way)				
60	Sewer Service Lateral Main Connection **(Improved)***	EA	100	$	$
61	Sewer Service Lateral Main Connection **(Not Improved)***	EA	60	$	$

62	Sewer Service Lateral Line **(Improved)***	LF	4,000	$	$
63	Sewer Service Lateral Line **(Not Improved)***	LF	1,000	$	$
64	Sewer Service Lateral Cleanout **(Improved)***	EA	10	$	$
65	Sewer Service Lateral Cleanout **(Not Improved)***	EA	150	$	$
66	Cap and Abandon Service **(Improved)***	EA	5	$	$
67	Cap and Abandon Service **(Not Improved)***	EA	5	$	$
	Investigation				
68	Clean & CCTV	LF	20,000	$	$
69	Smoke Testing	LF	30,000	$	$
	Allowances				
70	Allowances as specified in Section 01 2113	LS	1	$100,000	$100,000
	TOTAL BID			$	

TOTAL BID _____ Dollars & Cents
(Words)

Amounts are to be shown in both words and figures. In case of a discrepancy, amount shown in words will govern.

Unit Prices have been computed in accordance with the Contract Documents. Initially the contract price will be deemed to include for all unit price work an amount equal to the sum of the Unit Price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.

Bidder acknowledges that estimated quantities are not guaranteed, and are solely for the purpose of comparison of Bids, and final payment for all Unit Price Bid Items will be based on actual quantities, determined as provided in the Contract Documents. Owner may award the project with or without alternates and alternates may be used to determine lowest responsive and responsible bidder.

Discrepancies between the multiplication of units of Work and unit prices will be resolved in favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.

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.

Each Unit Price will be considered valid for the duration of the project including any and all Work Orders and Contract renewals issued under the Contract Documents.

* Indicates surface restoration included in pay item.

BIDDER _____ DATE _____

BY _____ TITLE _____

ADDRESS _____

CITY _____ ZIP CODE _____

EMAIL

SECTION 00 4313

BID BOND

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

_____as Principal, and

_____as Surety,

are hereby held and firmly bound unto City of Goodlettsville as Owner in the penal sum of five percent of the total Bid which equals _____

_____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.

The condition of the above obligation is such that whereas the Principal has submitted to City of Goodlettsville a certain Bid, attached hereto and hereby made a part hereof to enter into a contract in writing for the construction of the 2018 Sewer Rehabilitation and Improvements.

NOW, THEREFORE,

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

b. If said Bid shall be accepted and the Principal shall execute and deliver a contract in the Form of Contract attached hereto (properly completed in accordance with said Bid) and shall furnish a bond for his faithful performance of said contract, and for the payment of all persons performing labor or furnishing materials in connection therewith, and shall in all other respects perform the agreement created by the acceptance of said Bid,

then this obligation shall be void, otherwise the same shall remain in force and effect; it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall in no event exceed the penal amount of this obligation as herein stated.

The Surety, for value received, hereby stipulates and agrees that the obligations of said Surety and its bond shall be in no way impaired or affected by 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 Surety have executed this bond by causing their respective names to be hereunto subscribed and their seals to be hereunto affixed by their duly authorized officers, on this the _____ day of _____, 20 __.

CONTRACTOR - **PRINCIPAL**:

_____

By _____

Name _____
(Please Type)

Title _____

ATTEST:

_____

Name _____
(Please Type)

Title _____ (SEAL)

Note: Attest for a Corporation must be by the corporate secretary; for a partnership by another partner; for an individual by a Notary.

SURETY:

_____

By _____

Name _____
(Please Type)

Title _____
(Attach Power of Attorney)

ATTEST:

_____

Name _____
(Please Type)

Title _____ (SEAL)

Note: 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.

SECTION 00 4513

STATEMENT OF BIDDER'S QUALIFICATIONS

All questions must be answered and the data given must be clear and comprehensive. This statement must be notarized. If necessary, questions may be answered on separate attached sheets. The Bidder may submit any additional information he desires. Attach all additional sheets to these Contract Documents.

1. Name of Bidder.

2. Permanent main office address.

3. When organized.

4. If a corporation, where incorporated.

5. How many years have you been engaged in the contracting business under your present firm or trade name?

6. Contracts on hand: (Schedule these, showing amount of each contract and the appropriate anticipated dates of completion.)

7. General character of work performed by your company.

8. Have you ever failed to complete any work awarded to you? If so, where and why?

9. Have you ever defaulted on a contract? If so, where and why?

10. Have you ever performed work in a phased approach similar to the Work Orders described in the Contract Documents? If so, where?

11. List the most important projects recently completed by your company, stating the approximate cost for each, and the month and year completed.

12. List your major equipment available for this project. (Use form provided in Section 00 4514.)

13. Experience in construction work similar in importance to this project.

14. Background and experience of the principal members of your organization, including officers.

15. Credit available: $ _____

16. Give bank reference.

17. Will you, upon request, fill out a detailed financial statement and furnish any other information that may be required by the Local Public Agency?

The undersigned hereby authorizes and requests any person, firm, or corporation to furnish any information requested by the Local Public Agency in verification of the recitals comprising this Statement of Bidder's Qualifications.

Dated this_____day of _____, 20___.

_____
Name of Bidder

By _____

Title _____

State of _____

County of _____

_____ being duly sworn deposes and says that he is

_____of _____

_____and that the answers to the foregoing

questions and all statements therein contained are true and correct. Subscribed and sworn to

before me this _____ day of _____ , 20 __ .

_____
Notary Public

My Commission Expires:

_____
(Date) (SEAL)

SECTION 00 4514

STATEMENT OF EQUIPMENT

Showing machinery and other equipment available to Contractor for prosecuting the work included in contract. (To be filled in by Contractor and submitted with Bid.)

Available Machinery and Other Equipment Kind-Size-Capacity	Location	Ownership	Date Proposed To be Placed On Work

The above is a true statement of the equipment available to the undersigned Bidder for prosecuting the work included in the contract. Where it is shown that the equipment is not owned by the Bidder, arrangements have been made with the owners to furnish the equipment.

Signed _____

Name _____

Title _____

SECTION 00 4519

NONCOLLUSION AFFIDAVIT OF PRIME BIDDER

State of _____)
)ss.
County of _____)

_____, being first duly sworn, deposes and says that:

1. He is_____ of _____

   (owner, partner, officer, representative, or agent)

   _____ , the Bidder that has submitted the attached Bid;

2. He is fully informed respecting the preparation and contents of the attached Bid and of all pertinent circumstances respecting such Bid;

3. Such Bid is genuine and is not a collusive or sham Bid;

4. Neither the said Bidder nor any of its officers, partners, owners, agents, representatives, employees or parties in interest, including this affiant, has in any way colluded, conspired, connived or agreed, directly or indirectly with any other Bidder, firm or person to submit a collusive or sham Bid in connection with the Contract for which the attached Bid has been submitted or to refrain from bidding in connection with such Contract, or has in any manner, directly or indirectly, sought by agreement or collusion or communication or conference with any other Bidder, firm or person to fix the price or prices in the attached Bid or of any other Bidder, or to fix any overhead, profit or cost element of the Bid price or the Bid price of any other Bidder, or to secure through any collusion, conspiracy, connivance or unlawful agreement any advantage against the _____ (Local Public Agency) or any person interested in the proposed Contract; and

5. The price or prices quoted in the attached Bid are fair and proper and are not tainted by any collusion, conspiracy, connivance or unlawful agreement on the part of the Bidder or any of its agents, representatives, owners, employees, or parties in interest, including this affiant.

(Signed)_____

_____
(Title)

Subscribed and sworn to before me this _____ day of _____ , 20 ___ .

_____

_____
(Title)
My commission expires _____

(Date) (SEAL)

SECTION 00 4544.10

PARTNERSHIP CERTIFICATE

STATE OF_____

COUNTY OF_____

On this _____ day of _____ , 20 _____, before me personally appeared

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

and that said firm consists of himself and _____

and that he executed the foregoing instrument on behalf of said firm for the uses and purposes stated therein, and that no one except the above named members of the firm have any financial interest whatsoever in said proposed contract.

_____ Partner

_____ Partner

_____ Partner

_____ Partner

Subscribed and sworn to before me, this _____ day of _____ , 20 __ .

_____ Notary Public

My Commission Expires:

(Date) (SEAL)

NOTE: If only one partner signs, a power of attorney executed by all other partners authorizing him to act in the name of the company must be attached; otherwise, all partners must sign.

SECTION 00 4544.20

CORPORATE CERTIFICATE

I, _____, certify that I am the Secretary of the corporation named as Contractor in the foregoing proposal; that _____ _____, who signed said proposal in behalf of the Contractor was then _____ of said corporation; that said proposal was duly signed for and in behalf of said corporation by authority of its Board of Directors, and is within the scope of its corporate powers; that said corporation is organized under the laws of the State of _____.

This _____day of _____, 20 _____.

_____

(SEAL)

SECTION 00 4545

JOINT VENTURE QUESTIONNAIRE

In the event a joint venture bid is submitted, the following questions shall be answered, submitted with the bid and signed by the owner, partner, officer, representative, or agent of each joint venturer.

1. What is the separate bonding capability of each member of the joint venture?

2. What other work is in progress by the total contract dollar amount and percentage of completion for each joint venturer?

3. Are there any particular risks associated with this Contract which contributed to the decision to joint venture, and if so, what?

4. Has consideration been given to utilization of subcontract as opposed to formation of a joint venture, and if so, why was the joint venture format chosen?

5. Has either member of the joint venture been separately awarded a contract by the City of Goodlettsville, and if so, what was the most recent contract awarded to each?

6. What will be the contribution of each participant in the joint venture with respect to personnel, equipment, and other resources of each company allocated to this contract?

7. What will be the specific contribution of each participant of the joint venture for the completion of work to be performed and material to be supplied under this Contract?

8. Will there be separate management for the joint venture? If not, which company will supervise, or how will the contract be supervised?

9. Why will the joint venture be more efficient than the possibility of both companies separately bidding and either company being awarded the contract separately?

10. Does the formation of the joint venture promote competition on this Contract, and if so, how?

11. Has the joint venture, or any participant therein, received any legal advice with respect to the antitrust implications of formation of a joint venture, and if so, from what attorneys?

_____	_____
Name of Joint Venturer	Name of Joint Venturer
By _____	By _____
Title _____	Title _____

State of _____

County of _____

_____ being duly sworn deposes and says that he

is _____ of _____ and

_____ being duly sworn deposes and says that he

is _____ of _____ and

that the answers to the foregoing questions and all statements therein contained are true and correct. Subscribed and sworn to before me this _____ day of _____, 20____.

_____
Notary Public

My Commission Expires:

_____ (SEAL)
(Date)

END OF SECTION

SECTION 00 4550

STATEMENT OF LICENSE CERTIFICATE

Each Contractor bidding shall fill in and sign the following:

This is to certify that _____
has fully complied with all the requirements of Chapter No. 135, Public Acts of 1945 of the General Assembly of the State of Tennessee and House Bill No. 2180 (Public Chapter No. 822), known as the Contractors Licensing Act of 1976. The Contractor's license number, other information outlined in the Instructions for Bidders, expiration date, and that part of classification applying to the Bid shall appear on the envelope containing the Bid, otherwise the Bid will not be considered.

The State Board for Licensing General Contractors issued to _____

_____Certificate No._____

which expires on _____, 20 _____.

Signed _____

Name _____

Title _____

SECTION 00 4560

ILLEGAL IMMIGRANTS

CERTIFICATE OF COMPLIANCE

EACH CONTRACTOR BIDDING SHALL FILL IN AND SIGN THE FOLLOWING:

This is to certify that _____ has 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.

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.

Signature _____

Print or Type Name _____

State of _____)
) ss
County of _____)

Personally appeared before me, _____ the undersigned Notary

Public,_____, the within named bargainer, with whom I am

personally acquainted, and known to me to be the _____of the
(President, Owner, Partner)

_____, and acknowledged to me that he executed the foregoing
(corporation, partnership, sole proprietorship)

document for the purposes recited therein.

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

_____
Notary Public

My commission expires _____

SECTION 00 4570

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 purpose therein contain.

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

_____
Notary Public

My Commission expires: _____

END OF SECTION

SECTION 00 4580

IRAN DIVESTMENT ACT

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

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

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

Date	Signature of Bidder
	Company

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

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

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

This form must be completed and accompany the bid documents.

CONTRACTING AND BONDING FORMS

SECTION 00 5100

NOTICE OF AWARD

To: _____

_____

_____

Project Description: The site of the proposed work is the in Goodlettsville, Tennessee. The project consists of 2018 Sewer Rehabilitation and Improvements.

The Owner has considered the Bid submitted by you for the above described work in response to its Advertisement for Bids dated _____ , 20 ___ , and Information for Bidders.

You are hereby notified that your bid has been accepted for items in the amount of

$ _____.

You are required by the Information for Bidders to execute the Contract and furnish the required Contractor's Performance Bond, Payment Bond and certificates of insurance within ten calendar days from the date of this notice to you.

If you fail to execute said Contract and to furnish said bonds within ten days from the date of this notice, said Owner will be entitled to consider all your rights arising out of the Owner's acceptance of your bid as abandoned and as a forfeiture of your Bid Bond will be entitled to such other rights as may be granted by law.

You are required to return an acknowledged copy of this Notice of Award to the Owner.

Dated this _____ day of _____ , 20 ____ .

By_____

Name_____

Title_____

ACCEPTANCE OF NOTICE

Receipt of the above Notice of Award is hereby acknowledged by_____

_____, this the _____day of _____, 20___.

By_____

Name_____

Title_____

SECTION 00 5200

CONTRACT

THIS CONTRACT, made this _____ day of _____, 20_____by and between the City of Goodlettsville , hereinafter called "Owner" and _____ _____ doing business as a_____hereinafter called "Contractor"

(Corporation, Individual, or Partnership)

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

1. The Contractor will commence and complete 2018 Sewer Rehabilitation and Improvements.
2. The Contractor will furnish all of the material, supplies, tools. equipment, labor and other services necessary for the completion of the work described herein.
3. The Contractor will commence the work required by the Contract Documents within 10 calendar days after the contract start date of the written Work Orders and will complete the work within the time period described within the respective Work Order unless the periods of completion are extended otherwise by the Contract Documents. The Contractor further agrees to pay as liquidated damages, the sum of $600 for each consecutive calendar day in default thereafter as hereinafter provided in the General Conditions.
4. The Contractor will complete a minimum of 85% of the current Work Order and 100% of previous Work Orders to the satisfaction of the Owner and Engineer before commencing work on subsequent Work Orders. The Owner reserves the right to delay or withhold issuance of additional Work Orders until all requirements of previously issued Work Orders are completed, including all field work and project documentation.
5. Contractor agrees to perform all of the Work described in the Contract Documents and comply with the terms therein for the sum of $_____or as shown in the Bid Schedule.
6. The term "Contract Documents" means and includes the following:

    a. Advertisements for Bids

    b. Information for Bidders

    c. Bid

    d. Bid Bond

e. Contract
f. General Conditions
g. Supplemental General Conditions
h. Payment Bond
i. Performance Bond
j. Notice of Award
k. Work Orders
l. Change Order(s)
m. Drawings prepared by Trestles LLC, dated February 2018.
n. Specifications prepared or issued by Trestles LLC, dated February 2018.
o. Addenda:

No. _____, dated _____, 20____
No. _____, dated _____, 20____
No. _____, dated _____, 20____

6. The Owner will pay to the Contractor in the manner and at such times as set forth in the General Conditions and Supplemental General Conditions such amounts as required by the Contract Documents.

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

8. This Contract and all Contract Documents shall apply to all Work Orders issued under the terms described within.

9. This Contract shall renew up to three (3) times on an annual basis (365 calendar days) for a maximum duration of 1,095 days, unless the Owner provides notice of intent not to renew the Contract a minimum of 30 days prior to the date of renewal. If the Owner elects to do so, the Contract shall remain in effect until all Work Orders previously issued are completed in accordance with the Contract Documents.

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

OWNER:

The City of Goodlettsville

By _____

Name _____

Title _____

WITNESS:

_____

Name _____

Title _____
(Please Print or Type)

(SEAL)

CONTRACTOR:

_____

By _____

Name _____

Title _____
(Please Type)

ATTEST:

_____

Name _____

Title _____
(Please Type)

(SEAL)

Note: Attest for a Corporation must be by the corporate secretary; for a partnership by another partner; for an individual by a Notary.

SECTION 00 5600

WORK ORDER

To: _____

_____

_____

Work Order #__ Description: The site of the proposed work is in Goodlettsville, Tennessee. The Work Order consists of the work described in the attached documents:

1. Location drawings prepared by Trestles LLC, numbered ___ to ___ and dated _____ _____, 20__.
2. Work Order Scope dated _____ ___, 20__ detailing work to be performed at locations shown on the drawings described above.

You are hereby notified to commence work in accordance with the Contract dated _____ _____, 20 ___ , on or before _____ ____ , 20 ___ , and you are to complete the work within ___ consecutive calendar days thereafter. The date of completion of the work is therefore _____ ____, 20 __, or as follows:

Portion of Work	Completion Date
1. _____	1. _____
2. _____	2. _____
3. _____	3. _____

Contractor agrees that, should subsequent Work Orders be issued, work contained within this Work Order shall be a minimum of 85% complete before commencing work on Work Order #__. Work shall be 100% complete to the satisfaction of the Owner and Engineer before commencing work on Work Order #__, including cleanup, testing, surface restoration, and closeout documentation including Certificate of Substantial Completion and Certificates of Property Restoration.

Dated this _____ day of _____, 20 ___.

The City of Goodlettsville

By _____

Name _____

Title _____

ACCEPTANCE OF NOTICE

Receipt of the above Notice to Proceed is hereby acknowledged by _____

_____, this the _____ day of _____, 20 _____.

By _____

Name _____

Title _____

SECTION 00 6113.13

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS: that _____

_____
(Name and Address of Contractor)
_____ of the State of _____
(Corporation, Partnership, or Individual)
the "Principal," and _____

_____the "Surety,"
(Name and Address of Surety)

are held and firmly bound unto the City of Goodlettsville, the "Owner," existing under and by virtue of the laws of the State of Tennessee, in the sum of _____
_____($)
in lawful money of the United States, for the payment of which sum in lawful money of the United States well and truly to be made we do hereby bind ourselves, our heirs, executors, administrators, successors, and assigns jointly and severally.

The condition of this obligation is such that whereas Principal has entered into a certain Contract with the Owner, dated as of the _____ day of _____ , 20 __ , which is by reference incorporated in and made a part hereof as fully as if copied here verbatim, for the following work: 2018 Sewer Rehabilitation and Improvements.

NOW, THEREFORE, if the Principal shall in all respects comply with and perform all the terms and conditions of the Contract (which includes the Drawings, Specifications, and Contract Documents) and such alterations as may be made in said contract as the documents therein provide for, during the original term thereof and any extensions thereof which may be granted by the Owner, with or without notice to Surety, and during the one-year warranty period, and if Principal shall satisfy all claims and demands and shall indemnify and save harmless the Owner against and from all costs, expenses, damages, injury, or conduct, want of care, skill, negligence, or default, including compliance with performance guarantees and patent infringement by the Principal, then this obligation shall be void; otherwise Principal and Surety jointly and severally agree to pay to Owner any difference between the sum to which the Principal would be entitled on completion of the contract and that which the Owner may be obliged to pay for the completion of the work by contract or otherwise, together with any damages, direct or indirect, or consequential, which Owner may sustain on account of such work, or on account of the failure of the Principal to keep and execute all provisions of the Contract.

Principal and Surety further bind themselves, their heirs, executors, administrators, and assigns, jointly and severally, that if the Principal shall keep and perform its agreement to repair or replace defective work or equipment during the warranty period of one (1) year as provided, then this paragraph shall be void; but if default shall be made by Principal in the performance of its contract to so repair or replace said work, then this paragraph shall be in effect and Owner shall have and recover from Principal and its Surety damages for all defective conditions arising by reason of defective materials, work, or labor performed by or on the account of Principal and

it is further understood and agreed that this obligation shall be a continuing one against the Principal and Surety hereon, and that successive recoveries may be had hereon for successive breaches until the full amount shall have been exhausted; and it is further understood that the obligation therein to maintain said work shall continue throughout said maintenance period, and the same shall not be changed, diminished, or in any manner affected from any cause during said time; and to fully save and hold the Owner harmless for any damages it may be caused to pay on account of injury to person, loss of life or damage to property.

And the Surety, for value received, hereby stipulates and agrees that the obligations of the Surety and this Bond shall in no way be impaired or affected by any extension of time, modification, omission, addition, or change in or to the contract, the work to be performed thereunder, or by any payment thereunder before the time required therein, or by any waiver of any provision thereof, or by any assignment subletting or other transfer thereof, or of any part thereof, of any work to be performed, or of any moneys due to become due thereunder; and the said Surety does hereby waive notice of any and all such extensions, modifications, omissions, additions, changes, payments, waivers, assignments, subcontracts, and transfer, and hereby stipulates and agrees that any and all things done and omitted to be done by and in relation to executors, administrators, successors, assignees, subcontractors, and other transferees shall have the same effect as to said Surety as though done or omitted to be done by and in relation to the Principal.

IN WITNESS WHEREOF, the Principal and Surety have executed this Bond by causing their respective names to be hereunto subscribed and their seals to be hereunto affixed by their duly authorized officers, on this the _____ day of _____ , 20 __ .

CONTRACTOR - PRINCIPAL:

_____

By _____

Name _____
(Please Print or Type)

Title _____

ATTEST:

_____

Name _____
(Please Print or Type)

Title _____ (SEAL)

Note: Attest for a corporation must be by the corporate secretary; for a partnership by another partner; for an individual by a Notary.

SURETY:

_____

By _____

Name _____
(Please Print or Type)

(Attach Power of Attorney)

WITNESS:

_____

Name _____
(Please Print or Type)

Title _____ (SEAL)

Note: 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.

SECTION 00 6113.16

PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS: that _____
(Name and Address of Contractor)

_____

_____ of the State of _____
(A Corporation, a partnership, or Individual)
the "Principal," and _____
(Name and Address of Surety)
_____ the "Surety,"

are held and firmly bound unto the City of Goodlettsville, the "Owner," existing under and by virtue of the laws of the State of Tennessee, in the sum of _____

_____ ($ _____)

in lawful money of the United States, for the payment of which sum in lawful money of the United States well and truly to be made we do hereby bind ourselves, our heirs, executors, administrators, successors, and assigns jointly and severally.

The condition of this obligation is such that whereas Principal has entered into a certain Contract with the Owner, dated as of the _____ day of _____ , 20 __ , which is by reference incorporated in and made a part hereof as fully as if copied here verbatim, for the following work: 2018 Sewer Rehabilitation and Improvements.

NOW, THEREFORE, if the Principal shall fully pay for all the labor and materials used by said Principal or any immediate or remote subcontractor or furnisher of labor or materials under him in the performance of the work in lawful money of the United States as the same shall become due, including all amounts due for materials, lubricants, oil, gasoline, electricity, coal and coke, repairs on machinery, equipment, and tools, consumed or used in connection with performance of the work and all insurance premiums and other charges incurred under said contract, then this obligation shall be void; otherwise to remain in full force and effect.

Principal and Surety further bind themselves, their heirs, executors, administrators, and assigns, jointly and severally, that they shall promptly make payments of all taxes, licenses, assessments, contributions, penalties, and interest thereon, when, and if, the same may be lawfully due the State of Tennessee, or any County, Municipality, or political subdivision thereof by reason of and directly connected with the performance of the Contract, or any part thereof.

And the Surety, for value received, hereby stipulates and agrees that the obligations of the Surety and this Bond shall in no way be impaired or affected by any extension of time, modification, omission, addition, or change in or to the contract, the work to be performed thereunder, or by any payment thereunder before the time required therein, or by any waiver of any provision thereof, or by any assignment subletting or other transfer thereof, or of any part thereof, of any work to be performed, or of any moneys due to become due thereunder; and the said Surety does hereby waive notice of any and all such extensions, modifications, omissions, additions, changes, payments, waivers, assignments, subcontracts, and transfer, and hereby

stipulates and agrees that any and all things done and omitted to be done by and in relation to executors, administrators, successors, assignees, subcontractors, and other transferees shall have the same effect as to said Surety as though done or omitted to be done by and in relation to the Principal.

IN WITNESS WHEREOF, the Principal and Surety have executed this Bond by causing their respective names to be hereunto subscribed and their seals to be hereunto affixed by their duly authorized officers, on this the _____ day of _____ , 20 ___ .

CONTRACTOR - PRINCIPAL:

_____

By _____

Name _____
(Please Print or Type)

Title _____

ATTEST:

_____

Name _____
(Please Print or Type)

Title _____ (SEAL)

Note: Attest for a corporation must be by the corporate secretary; for a partnership by another partner; for an individual by a Notary.

SURETY:

_____

By _____

Name _____
(Please Print or Type)

Title _____
(Attach Power or Attorney)

WITNESS:

_____

Name _____

Title _____ (SEAL)

Note: 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.

SECTION 00 6363

CHANGE ORDER

Order No._____

Date: _____

Agreement Date: _____

NAME OF PROJECT: 2018 Sewer Rehabilitation and Improvements
OWNER: The City of Goodlettsville
CONTRACTOR: _____

The following changes are hereby made to the Contract Documents:

Change to Contract Price

Original Contract Price	$_____
Current Contract Price adjusted by previous Change Order	$_____
The Contract Price due to this Change Order will be increased/decreased by:	$ _____
The new Contract Price including this Change Order will be	$ _____

Change to Contract Time

The Contract Time will be increased/decreased by _____ calendar days.
The date for completion of all work will be _____ (date).

Justification

_____

_____

Approvals Required

To be effective this Order must be approved by the Federal agency if it changes the scope or objective of the Project, or as may otherwise be required by the Supplemental General Conditions.

Accepted by: _____ (CONTRACTOR)

Recommended by: _____ Trestles, LLC

Ordered by: _____ (The City of Goodlettsville)

FUNDING AGENCY FORMS AND REQUIREMENTS

SECTION 00 6400

U.S. Environmental Protection Agency

CERTIFICATION REGARDING

DEBARMENT, SUSPENSION AND OTHER RESPONSIBILITY

MATTERS

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

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

(b) 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;

(c) 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

(d) 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.

_____

Typed Name & Title of Authorized Representative

_____

Signature of Authorized Representative Date

____ I am unable to certify to the above statements. My explanation is attached.

Name of Prime Contractor Project Number

INSTRUCTIONS

This certification is required pursuant to Executive Order 11246, Part II, Section 203 (b), 30 F.R. 12319-25). 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 indicated that the prime or subcontractor has not filed a compliance report due under applicable instruction, such contractor shall be required to submit a compliance report.

CONTRACTOR'S CERTIFICATION

Contractor's Name: _____

Address: _____

_____

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

   If yes, state what reports were filed and with what agency.

   _____

3. Bidder has filed all compliance reports due under applicable instructions, including SF-100.

   Yes No

4. If answer to Item 3 is NO, please explain in detail on reverse side of this certification.

Certification - The information above is true and complete to the best of my knowledge and belief. (A willfully false statement is punishable by law-U.S. Code, Title 18, Section 1001.)

_____
Name and title of signer (Please type)

_____ _____
Signature Date

Bidder's Requirements for Solicitation and Documentation
of
Disadvantaged Business Enterprises (DBE) Participation
On State Revolving Fund (SRF) Projects

A goal-oriented system has been established to promote **Disadvantaged Business Enterprises (DBE)** participation by providing construction services, professional services, supplies, and/or equipment on SRF Loan-funded water and wastewater projects. It is the Bidder's responsibility to make a good faith effort to secure participation by **DBE** subcontractors, professional service providers, suppliers, and/or equipment vendors.

DEFINITIONS

DBE - Minority Business Enterprise (MBE): A qualified socially and economically disadvantaged minority-owned business certified by any State or Federal agency, such as the Tennessee Department of Transportation, U.S. EPA's Office of Small and Disadvantaged Business Utilization, or the U.S. Small Business Administration.

DBE - Women's Business Enterprise (WBE): A qualified independent business at least 51% owned by a woman or women and certified by any State or Federal agency such as the Tennessee Department of Transportation, U.S. EPA's Office of Small and Disadvantaged Business Utilization, or the U.S. Small Business Administration.

Fair-Share Goals: The MBE fair-share goal is 2.6% for construction and 5.2% for supplies, services, and equipment. The WBE fair share goal is 2.6% for construction and 5.2% for supplies, services, and equipment.

INSTRUCTIONS TO BIDDERS

Pre-Bid Requirements

All Bidders must send letters by certified mail with return receipt requested to a minimum of 10 certified **DBE** subcontractors, professional service providers, suppliers, and/or equipment vendors to solicit their subcontract participation in the work. Lists of certified **DBE** firms may be obtained from various State and Federal agencies, including the following:

Tennessee Department of Transportation
Small Business Development
505 Deaderick Street, Suite 1800
Nashville, TN 37243-0347
(615) 741-3681
http://www.tdot.state.tn.us/construction/DBE%20list/dbe_list.pdf

Mr. W. Clinton Smith, District Director
U.S. Small Business Administration
50 Vantage Way, Suite 201
Nashville, TN 37228
(615) 736-5881
http://pro-net.sba.gov/

U.S. Environmental Protection Agency
Office of Small and Disadvantaged Business Utilization
1200 Pennsylvania Avenue, N.W. (1230A)
Washington, D.C. 20460
(202) 564-4100
http://www.epa.gov/osdbu/

Post-Bid Requirements

Whether or not DBE participation was obtained, the successful Bidder (Prime Contractor) must maintain supporting documents such as certification lists, solicitation documents, letters of intent, contracts, etc., for the duration of the project.

If DBE participation was obtained, the apparent successful Bidder must identify to the Loan Recipient all **DBE** firms to be utilized on the contract and the respective **DBE** type--subcontractors, supplies vendors, service providers, and/or equipment vendors (see "Loan Recipient's Certification and Summary" form). Copies of the State's or Federal agency's **DBE** certification list(s) identifying that the **DBE** firms are certified minority or women's business enterprises must be provided to the Loan Recipient. In addition, copies of the **Prime Contractor's Notice Letter for EPA Form 6100-2, EPA Form 6100-3** (to be co-completed by the Prime Contractor and each DBE subcontractor), and **EPA Form 6100-4** must also be provided to the Loan Recipient prior to tentative loan award. The Prime Contractor must provide **EPA Form 6100-2** to each **DBE** utilized on the contract.

If no DBE participation was obtained by the apparent successful Bidder, it remains the responsibility of the Prime Contractor to provide documentation to the Loan Recipient, prior to contract award, that a good faith effort was made to obtain **DBE** participation. Copies of the **certified letters** sent to a minimum of 10 qualified **DBE** potential subcontractors, supplies vendors, service providers, and/or equipment vendors and the corresponding **return mail receipts** are the only documentation of a good-faith effort that will be acceptable to the Loan Recipient.

*Failure to provide the required certified letters, return receipts, State or Federal agency **DBE** certification list(s), **Prime Contractor's Notice Letter for EPA Form 6100-2, EPA Form 6100-3, and EPA Form 6100-4** to the Loan Recipient may delay the contract award until the required documentation has been provided to and accepted by the Loan Recipient.*

SECTION 00 6403.10

STATE REVOLVING FUND LOAN PROGRAM
BID PACKAGE SUBMITTAL REQUIREMENTS

PRIOR TO FINAL CONTRACT AWARD by the State Revolving Fund (SRF) Loan Program, the Loan Recipient must prepare and submit a completed Bid Package to the SRF Loan Program for review and **written approval**. An **Authority-to-Award (ATA)** letter from the SRF Loan Program must be obtained prior to the final contract award and the initiation of construction activities.

A completed Bid Package submittal consists of the following:

1. A copy of the **Advertisement for Bids** appearing in a local or major regional newspaper or the Dodge Report (40 CFR 31.36 (d)(2)(ii)(A)). *The project must be advertised for a minimum of 14 days prior to the bid opening.*
2. An original copy of either the **Award Resolution or the minutes** from the meeting of the governing body (or a certified copy of either) that tentatively awards the contract(s) to the lowest, responsible, responsive bidder(s)
3. A **certified bid tabulation** stamped and signed by the consulting engineer reviewing the bids
4. A copy of the **signed Bid Proposal** of the apparent successful bidder
5. **Equal Employment Opportunity (EEO) documentation** signed by the apparent successful bidder
6. **Bid Bond with Power of Attorney** (40 CFR 31.36(h))
7. Signed and dated U.S. EPA (or other agency) **Contractor Debarment Form**, such as the U.S. Environmental Protection Agency Certification Regarding Debarment, Suspension and Other Responsibility Matters
8. An original, notarized certification of publication **(Publisher's Affidavit)** signed by the editor of the newspaper
9. Copies of a minimum of 10 **certified letters** and **"Return Receipt Requested"** forms sent to potential **Disadvantaged Business Enterprises (DBE)** subcontractors, supplies vendors, service providers, and/or equipment vendors
10. A copy of the current **Davis-Bacon** wage rates used on this project (Davis-Bacon Act)
11. A completed **Loan Recipient's Certification and Summary** of **DBE** Participation on SRF Projects (40 CFR 31.36 (e)(2)(i through vi))
12. If **DBE** participation was obtained,
    Prime Contractor's Notice Letter for EPA Form 6100-2
    EPA Form 6100-3 completed by Prime Contractor and **DBE Subcontractor(s)**
    EPA Form 6100-4 completed by the Prime Contractor
13. If no **DBE** participation was obtained, a **"Good Faith Effort"** letter (See Good Faith Effort Steps at 40 CFR 31.36 (e)(2)(i through vi))
14. Reference documents:
    Loan Recipient's Requirements for Solicitation and Documentation of **DBE** Participation on SRF Projects
    Bidder's Requirements for Solicitation and Documentation of **DBE** Participation on SRF Projects
    Loan Recipient's Certification and Summary of **DBE** Participation on SRF Loan-Funded Projects
    Guidance Document for **DBE** Requirements for SRF loans
15. If applicable, documentation of the justification for not awarding the contract to the lowest bidder if the award is to be made to a bidder other than the low bidder. The justification must indicate why the low bidder is not responsive or responsible and include documentation of any negotiations leading to the determination.
16. Resume of the resident inspector(s)
17. Documentation of the extension of the bid proposal and bid bond expiration dates, if necessary

If the lowest bid received exceeds the amount budgeted for construction in the SRF-approved SRF Loan Budget, the loan recipient must choose only from the following options:

Re-allocate SRF funds through a budget revision. A revised Budget/Re-budget Form must be submitted to the SRF for review and approval if the re-budgeting option is chosen.

Provide additional funds needed to pay the contract from **local funds** or funding source(s) other than the SRF loan

Apply for an **SRF loan increase**. Application for a loan increase will require re-evaluation of the loan recipient's user rates to determine if the anticipated revenues will be sufficient to repay the requested loan increase and fund the additional depreciation.

Principal forgiveness does not apply to loan increases.

Reject all bids and **re-bid the project**

Please contact Dr. Bagher Sami by telephone at (615) 532-0501 or by e-mail at bagher.sami@tn.gov if you have any questions concerning the contents of the Bid Package submittal for State Revolving Fund projects.

END OF SECTION

Disadvantaged Business Enterprise (DBE) Requirements
for
State Revolving Fund Loans Awarded After May 27, 2008

GUIDANCE DOCUMENT

Items included in the Guidance Document:

- General Contract Administration Provisions Table
- Six Good Faith Efforts, Purpose and Definitions Table
- List of DBE Forms for Loans Awarded After May 27, 2008

GENERAL CONTRACT ADMINISTRATION PROVISIONS — www.epa.gov			
Requirement	Circumstance	Responsible Party:	Submitted To:
A Loan Recipient must be notified in writing by its Prime Contractor prior to any termination of a DBE Subcontractor for convenience by the Prime Contractor.	Termination of a DBE Subcontractor for convenience by the Prime Contractor	Prime Contractor	Loan Recipient
A Loan Recipient must require its Prime Contractor to pay its Subcontractor for satisfactory performance no more than 30 days from the Prime Contractor's receipt of payment from the Loan Recipient.	DBE Subcontractor's satisfactory performance	Loan Recipient Prime Contractor	DBE Subcontractor
If a DBE Subcontractor fails to complete work under the subcontract for any reason, the Loan Recipient must require the Prime Contractor to employ the Six Good Faith Efforts (see Table below) if soliciting a replacement Subcontractor.	DBE Subcontractor fails to complete work under the subcontract for any reason and will be replaced	Loan Recipient Prime Contractor	SRF Loan Program
A Loan Recipient must require its Prime Contractor to employ the Six Good Faith Efforts (see Table below) even if the Prime Contractor has achieved its fair share objectives.	Employment of the Six Good Faith Efforts	Loan Recipient Prime Contractor	SRF Loan Program

Disadvantaged Business Enterprise (DBE) Requirements
for
State Revolving Fund Loans Awarded After May 27, 2008

GUIDANCE DOCUMENT

GENERAL CONTRACT ADMINISTRATION PROVISIONS — www.epa.gov			
Requirement	Circumstance	Responsible Party:	Submitted To:
Inclusion, completion, and/or transmittal of required DBE Forms as instructed below: Loan Recipient Requirements Bidder Requirements DBE Participation/Certification Summary Advertisement for Bids and Publisher's Affidavit 10 Certified Letters and Return Receipts to certified DBEs Good Faith Letter Prime Contractor's Notice Letter for EPA Form 6100-2 EPA Form 6100-2 EPA Form 6100-3 EPA Form 6100-4	---	Loan Recipient Prime Contractor DBE Subcontractor	See instructions below and on Forms

GUIDANCE DOCUMENT

SIX GOOD FAITH EFFORTS — www.epa.gov	
PURPOSE	The Good Faith Efforts are required methods employed by all EPA financial assistance agreement recipients to ensure that all disadvantaged business enterprises (DBEs) have the opportunity to compete for procurements funded by EPA financial assistance dollars.
Definitions	
EFFORT 1	Ensure DBEs are made aware of contracting opportunities to the fullest extent practicable through outreach and recruitment activities. For Indian Tribal, State and Local and Government recipients, this will include placing DBEs on solicitation lists and soliciting them whenever they are potential sources.
EFFORT 2	Make information on forthcoming opportunities available to DBEs and arrange time frames for contracts and establish delivery schedules, where the requirements permit, in a way that encourages and facilitates participation by DBEs in the competitive process. This includes, whenever possible, posting solicitations for bids or proposals for a minimum of 30 calendar days before the bid or proposal closing date.
EFFORT 3	Consider in the contracting process whether firms competing for large contracts could subcontract with DBEs. For Indian Tribal, State and local Government recipients, this will include dividing total requirements when economically feasible into smaller tasks or quantities to permit maximum participation by DBEs in the competitive process.
EFFORT 4	Encourage contracting with a consortium of DBEs when a contract is too large for one of these firms to handle individually.
EFFORT 5	Use the services and assistance of the Small Business Administration (SBA) and the Minority Business Development Agency of the Department of Commerce.
EFFORT 6	If the Prime Contractor awards subcontracts, require the Prime Contractor to take the steps in the Good Faith Efforts 1 through 5 (above) and in the General Contract Administration Provisions (above).

Disadvantaged Business Enterprise (DBE) Requirements
for
State Revolving Fund Loans Awarded After May 27, 2008

GUIDANCE DOCUMENT

DBE FORMS FOR SRF LOANS AWARDED AFTER MAY 27, 2008 — www.epa.gov				
Form	Requirement	Provided By:	Completed By:	Submitted To:
List of certified DBE contractors, subcontractors, supplies vendors, equipment vendors, and service providers	Keep list with project files/information for duration of project	SRF Loan Program	---	---
Loan Recipient's Requirements regarding DBEs	Include this information sheet in the Information for Bidders section of bid documents	SRF Loan Program	---	To be included in the contract specifications book
Bidder's Requirements regarding DBEs	Include this information sheet in the Information for Bidders section of bid documents	SRF Loan Program	---	To be included in the contract specifications book
Loan Recipient's Certification and Summary of DBE Participation	To be completed and submitted with the Authority-to-Award/ Bid Package. The SRF Loan Program must be notified of any changes, additions, or deletions to the contract during construction.	SRF Loan Program	Loan Recipient	SRF Loan Program
Advertisement for Bids and Publisher's Affidavit	DBE solicitation information must be included in the actual advertisement for bids. A Publisher's Affidavit (signed, original, notarized certification of publication) denoting the actual published date of the advertisement will be submitted to the SRF Loan Program as part of the Authority-to- Award/Bid Package documents.	An example advertisement with appropriate DBE language is supplied to the Loan Recipient by the SRF Loan Program	Loan Recipient	A copy of the actual advertisement and a Publisher's Affidavit will be submitted to the SRF Loan Program as part of the Authority- to-Award/Bid Package documents
10 Certified Letters and Return Receipts to potential certified DBE subcontractors, supplies vendors, service providers, and/or equipment vendors	These certified letters and copies of the corresponding return mail receipts are submitted with the completed Loan Recipient's DBE Participation and Certification Summary Form.	Prime Contractor and/or Loan Recipient	Loan Recipient	SRF Loan Program as part of the Authority- to-Award/Bid Package documents
Good Faith Letter	If no DBE participation is obtained for the contract, the "Good Faith" letter must be written.	Form letter provided by the SRF Loan Program	Loan Recipient	SRF Loan Program

Disadvantaged Business Enterprise (DBE) Requirements
for
State Revolving Fund Loans Awarded After May 27, 2008

GUIDANCE DOCUMENT

DBE FORMS FOR SRF LOANS AWARDED AFTER MAY 27, 2008 — www.epa.gov				
Form	Requirement	Provided By:	Completed By:	Submitted To:
Prime Contractor's Notice Letter for EPA Form 6100-2	The Prime Contractor must submit the Notice Letter to verify that Form 6100-2 was supplied to all DBE Subcontractors participating in the contract.	SRF Loan Program	Prime Contractors	Loan Recipient for inclusion in the Authority-to- Award / Bid / Proposal package
EPA Form 6100-2	Loan Recipient required to have Prime Contractors provide form to DBE Subcontractors This form gives a DBE Subcontractor the opportunity to describe the work the DBE Subcontractor received from the Prime Contractor, how much the DBE Subcontractor was paid, and any other concerns the DBE Subcontractor might have.	Loan Recipient Prime Contractors	DBE Subcontractors	EPA DBE Coordinator at the conclusion of DBE Subcontractor participation in the project (Address on Form)
EPA Form 6100-3	Loan Recipient required to have Prime Contractors provide form to DBE Subcontractors This form captures an intended Subcontractor's description of work to be performed for the Prime Contractor and the price of the work submitted to the Prime Contractor.	Loan Recipient	Prime Contractors DBE Subcontractors	Loan Recipient for inclusion in the Authority-to- Award / Bid / Proposal package
EPA Form 6100-4	Loan Recipient required to have Prime Contractors complete the form This form captures the Prime Contractor's intended use of an identified DBE Subcontractor and the estimated dollar amount of the subcontract.	Loan Recipient	Prime Contractors	Loan Recipient for inclusion in the Authority-to- Award / Bid / Proposal package

Loan Recipient's Requirements for Solicitation and Documentation
of
Disadvantaged Business Enterprises (DBE) Participation
On State Revolving Fund (SRF) Projects

A goal-oriented system has been established to promote **Disadvantaged Business Enterprises (DBE)** participation by providing construction services, professional services, supplies, and/or equipment on SRF Loan-funded water and wastewater projects. It is the Loan Recipient's responsibility to ensure that Bidders make a good faith effort during the bidding phase to solicit for subcontractor participation by **DBE** subcontractors, service professionals, suppliers, and/or equipment vendors on all SRF-funded projects.

DEFINITIONS

DBE - Minority Business Enterprise (MBE): A qualified socially and economically disadvantaged minority-owned business certified by any State or Federal agency, such as the Tennessee Department of Transportation, U.S. EPA's Office of Small and Disadvantaged Business Utilization, or the U.S. Small Business Administration.

DBE - Women's Business Enterprise (WBE): A qualified independent business at least 51% owned by a woman or women and certified by any State or Federal agency such as the Tennessee Department of Transportation, U.S. EPA's Office of Small and Disadvantaged Business Utilization, or the U.S. Small Business Administration.

Fair-Share Goals: The MBE fair-share goal is 2.6% for construction and 5.2% for supplies, services, and equipment. The WBE fair share goal is 2.6% for construction and 5.2% for supplies, services, and equipment.

INSTRUCTIONS TO LOAN RECIPIENTS

Pre-Bid Requirements

Loan Recipients must include the SRF Loan Program's "Bidder's Requirements for Solicitation and Documentation of **DBE** Participation on SRF-Funded Projects" information sheet in the Information for Bidders section of bid documents. Loan Recipients must also ensure that Bidders take the following affirmative steps that constitute a good-faith effort to secure **DBE** participation:

- Include certified **DBEs** on solicitation lists whenever they are potential sources,
- Divide construction contracts into subcontracts, when economically feasible, to encourage maximum participation by **DBEs**,
- Establish delivery schedules, where requirements of the work permit, that encourage participation by **DBEs**,
- Use the services and assistance of the Office of Minority Business Enterprises of the U.S. Department of Commerce, or the U.S. EPA's Office of Small and Disadvantaged Business Utilization. For assistance or information, Bidders may be referred to:

Tennessee Department of Transportation
Small Business Development
505 Deaderick Street, Suite 1800
Nashville, TN 37243-0347
(615) 741-3681
http://www.tdot.state.tn.us/construction/DBE%20list/dbe_list.pdf

Mr. W. Clinton Smith, District Director
U.S. Small Business Administration
50 Vantage Way, Suite 201
Nashville, TN 37228
(615) 736-5881
http://pro-net.sba.gov/

Ms. Jeanette L. Brown, Director
U.S. Environmental Protection Agency
Office of Small and Disadvantaged Business Utilization
1200 Pennsylvania Avenue, N.W. (1230A)
Washington, D.C. 20460
(202) 564-4100 http://www.epa.gov/osdbu/

POST-BID REQUIREMENTS

Whether or not DBE participation was obtained, the Loan Recipient must complete the **"Loan Recipient's Certification and Summary"** form for every contract detailing whether or not **DBE** participation of subcontractors, professional service providers, suppliers, and/or equipment vendors was obtained. The **"Loan Recipient's Certification and Summary"** form must be submitted to the Administrative Section of the SRF Loan Program prior to the award of any construction contract(s) along with the newspaper **advertisement**, a **Publisher's Affidavit**, and **return receipts** and copies of the **certified letters** that were mailed to a minimum of 10 qualified **DBEs**.

Loan Recipient's Requirements for Solicitation and Documentation
of
Disadvantaged Business Enterprises (DBE) Participation
On State Revolving Fund (SRF) Projects

If DBE participation was obtained, the **"Loan Recipient's Certification and Summary"** form must clearly indicate whether **DBE** participation was obtained from either a subcontractor, professional service provider, supplier, and/or equipment vendor participation; identify the **DBE** firm(s) to be used; and certify that the **DBE** firm(s) is a certified **DBE**. In addition to the **"Loan Recipient's Certification and Summary"** form, the Loan Recipient must include in the submittal to the SRF Loan Program, copies of the **Prime Contractor's Notice Letter for EPA Form 6100-2**, **EPA Form 6100-3**, and **EPA Form 6100-4**.

If no DBE participation was obtained, the Loan Recipient must submit a separate letter documenting that a "**good-faith effort**" was made to secure **DBE** participation. This letter is submitted along with the above-mentioned **"Loan Recipient's Certification and Summary"** form, newspaper **advertisement**, **Publisher's Affidavit**, **return receipts,** and copies of the **certified letters.** The SRF Loan Program provides a template to the Loan Recipient for this letter.

This documentation is the only form of documentation that will be accepted by the SRF Loan Program. Failure to provide the required documentation may result in a delay of the SRF Loan Program's approval of the Authority-to-Award/Bid Package, thereby delaying the award of the construction contract(s).

The Loan Recipient should direct all inquiries regarding the SRF Loan Program's requirements for **DBE** solicitation and documentation to Dr Bagher Sami at (615) 532-0445, bagher.sami@state.tn.us, or the following address:

Dr. Bagher Sami, Manager
Administrative Section
Tennessee State Revolving Fund Loan Program
L&C Tower, 8th Floor
401 Church St.
Nashville, TN 37243

SECTION 00 6404.20

LOAN RECIPIENT'S GOOD FAITH EFFORT LETTER FOR DBE PARTICIPATION

INSERT ON LOAN RECIPIENT'S LETTERHEAD

Date

Dr. Bagher Sami, Ph.D., Manager
Administrative Section
State Revolving Fund Loan Program
8th Floor, L & C Tower
401 Church Street
Nashville, Tennessee 37243

Subject: Good Faith Effort – Disadvantaged Business Enterprises (DBE) Participation
City/County/UD/Authority, CWSRF/DWSRF 200?-???
Contract No. ????, Contract Description
A/E Consultant, A/E Consultant's Project No. ????

Dear Dr. Sami:

This letter is to inform you that the City of Goodlettsvile did, in good faith, encourage Disadvantaged Business Enterprises (DBE) to participate in the above referenced project by placing a special notice to Disadvantaged Business Enterprises (DBE) firms in both the invitation to bid and the public advertisement for bids. The City of Goodlettsville through the consulting engineer, Trestles, LLC, sent a copy of the invitation to bid and a set of contract documents to the Office of Minority Business Enterprises. The City of Goodlettsville also sent certified letters, return receipts requested, to a minimum of ten (10) DBE potential subcontractors, professional service providers, suppliers, and equipment vendors requesting DBE participation through their office, A/E, or their contractor. The consulting engineer on this project is Dudney Fox, Trestles LLC.

We have not received any DBE participation; we believe we have done a good faith effort.

If you have any questions, please don't hesitate to contact us.
Sincerely,

(Authorized Representative Name)
(Authorized Representative Title)

cc: (Dudney Fox, Trestles, LLC)

Loan Recipient's Certification and Summary of Disadvantaged Business Enterprises (DBE) Participation On State Revolving Fund (SRF) Projects

SRF Loan Recipient: _____ SRF Loan No. _____

INSTRUCTIONS TO SRF LOAN RECIPIENTS

The SRF Loan Recipient's Authorized Representative must clearly indicate the Contractor's **Disadvantaged Business Enterprises (DBE)** participation results by placing a check in the appropriate box below. The remainder of the form must be completed if **DBE (Minority Business Enterprise-MBE or Women's Business Enterprise –WBE)** participation was obtained. The form must be signed and dated and returned to Dr. Bagher Sami of the Administrative Section of the SRF Loan Program.

The **completed Form** must be accompanied by **copies of the certified letters** sent from the selected Bidder to a minimum of 10 qualified DBE potential subcontractors, supplies vendor, services provider, and/or equipment vendors, and **copies of the corresponding return mail receipts.**

The SRF Loan Program must be notified of any changes, additions, or deletions to the contract during construction.
No, Disadvantaged Business Enterprises (DBE) participation was not obtained for this SRF-funded project. I certify that a good-faith effort was made to solicit DBE participation in accordance with the four affirmative steps outlined in the SRF Loan Program's Requirements for Solicitation and Documentation of DBE Participation on SRF-Funded Projects. A letter documenting that a good–faith effort was made to secure DBE participation has been provided to the SRF Loan Program.

Or

Yes, Disadvantaged Business Enterprises (DBE) participation was obtained for this SRF-funded project. I certify that the DBE firms participating in this SRF-funded project are qualified in accordance with the SRF Loan Program's Requirements for Solicitation and Documentation of DBE Participation on SRF-Funded Projects. Below is a listing of firms to be utilized and the amounts of their respective participation.

1. DBE type (circle one): Subcontractor, Supplies Vendor, Service Provider, Equipment Vendor

   DBE Name: _____

   Address: _____

   Subcontract Amount: $_____ MBE ____ WBE ____ %of Contract $_____ %

2. DBE type (circle one): Subcontractor, Supplies Vendor, Service Provider, Equipment Vendor

   DBE Name: _____

   Address: _____

   Subcontract Amount: $_____ MBE ____ WBE ____ %of Contract $_____ %

3. DBE type (circle one): Subcontractor, Supplies Vendor, Service Provider, Equipment Vendor

   DBE Name: _____

   Address: _____

   Subcontract Amount: $_____ MBE ____ WBE ____ %of Contract $_____ %

4. DBE type (circle one): Subcontractor, Supplies Vendor, Service Provider, Equipment Vendor

   DBE Name: _____

   Address: _____

   Subcontract Amount: $_____ MBE ____ WBE ____ %of Contract $_____ %

PARTICIPATION SUMMARY

Total SRF Loan Amount: $_____ Total Construction Contract Amount: $_____

Total MBE Participation: $ _____ Total WBE Participation: $_____

_____ _____

Signature and Title of SRF Loan Recipient's Authorized Representative Date

CERTIFIED DISADVANTAGED BUSINESS ENTERPRISES (DBE) LIST

Using Governor's Diversity Business Office and State DOT and CCR DBE Directories to Find Certified WBEs and MBEs

Here are the links:

http://tn.diversitysoftware.com/FrontEnd/VendorSearchPublic.asp?TN=tn&XID=1215

www.osdbu.dot.gov/DBEProgram/StateDOTDBESites.cfm

CCR can be used to search for SBA SDBs. Since the SBA SDB certification is considered acceptable under the EPA DBE Program, firms found using the following search criteria can count toward EPA MBE/WBE fair share objectives.

Access the CCR search page at www.bpn.gov/CCRSearch/Search.aspx

http://www.epa.gov/osbp/dbe_team.htm

STATE REVOLVING FUND LOAN PROGRAM
Bidder's Requirements

Davis-Bacon Act Wage Determination

The Loan Recipient must ensure the bidder is in compliance with the Davis-Bacon Act as outlined below. Additionally, ten (10) days prior to the scheduled bid opening date, the wage rates need to be checked to ensure they have not changed.

The Davis-Bacon Act as amended, requires that each contract over $2,000 to which the United States or the District of Columbia is a party for the construction, alteration, or repair of public buildings or public works shall contain a clause setting forth the minimum wages to be paid to various classes of laborers and mechanics employed under the contract. Under the provisions of the Act, contractors or their subcontractors are to pay workers employed directly upon the site of the work no less than the locally prevailing wages and fringe benefits paid on projects of a similar character. The Davis-Bacon Act directs the Secretary of Labor to determine such local prevailing wage rates.

The **wage determination** (including any additional **classifications** and **wage rates** conformed) **and** a Davis-Bacon poster (WH-1321) **must be posted on the work site at all times** by the contractor and its subcontractors in a prominent and accessible place where it can be easily seen. The WH-1321 poster **may be obtained at no charge** from offices of the Wage and Hour Division.

With each **pay estimate** submitted, the contractors **must submit** a certification stating that workers have been paid the current prevailing wage rates for each classification according to the Davis-Bacon wage rate schedule currently in effect for this project.

Wage Determinations

A "wage determination" is the listing of wage rates and fringe benefit rates for each classification of laborers and mechanics which the Administrator of the Wage and Hour Division of the U.S. Department of Labor has determined to be prevailing in a given area for a particular type of construction (e.g., building, heavy, highway, or residential).

Extensions of Wage Determinations

When a general wage determination has not been awarded within 90 days after bid opening, the head of the contracting/assisting agency may request an extension of the 90 day period from the Wage and Hour Administrator. When, due to unavoidable circumstances, a project wage determination expires before award but after bid opening, the head of the contracting/assisting agency may request an extension of the expiration date of the project wage determination in the bid specifications instead of issuing a new wage determination.

Extension requests should be supported by a written finding including a brief statement of the factual support, that extension of the expiration date of the determination is necessary and proper in the public interest to prevent injustice or undue hardship or to avoid serious impairment in the conduct of Government business.

The Administrator of the Wage and Hour Division of the U.S. Department of Labor will either grant or deny the request for an extension after consideration of all the circumstances, including an examination to determine if the previously issued rates remain prevailing. If a request for the extension of a project wage determination is denied, a new wage determination will be issued to replace an expired project wage determination.

Additional information concerning the Davis-Bacon Act and current wage rate determinations can be obtained at the following sites: www.gpo.gov/davisbacon/referencemat.html and www.wdol.gov/ .

Wage Rate Requirements Under FY 2010 Appropriations

3. Contract and Subcontract provisions.

(a) The Recipient shall insure that the subrecipient(s) shall insert in full in any contract in excess of $2,000 which is entered into for the actual construction, alteration and/or repair, including painting and decorating, of a treatment work under the CWSRF or a construction project under the DWSRF financed in whole or in part from Federal funds or in accordance with guarantees of a Federal agency or financed from funds obtained by pledge of any contract of a Federal agency to make a loan, grant or annual contribution (except where a different meaning is expressly indicated), and which is subject to the labor standards provisions of any of the acts listed in § 5.1 or the FY 2010 appropriation , the following clauses:

(1) Minimum wages.

(i) All laborers and mechanics employed or working upon the site of the work will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (a)(1)(iv) of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in § 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph (a)(1)(ii) of this section) and the DavisBacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

Subrecipients may obtain wage determinations from the U.S. Department of Labor’s web site, www.dol.gov.

(ii)(A) The subrecipient(s), on behalf of EPA, shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The State award official shall approve a request for an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(1) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(2) The classification is utilized in the area by the construction industry; and

(3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(B) If the contractor and the laborers and mechanics to be employed in the classification (ifknown), or their representatives, and the subrecipient(s) agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), documentation of the action taken and the request, including the local wage determination shall be sent by the subrecipient (s) to the State award official. The State award official will transmit the request, to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210 and to the EPA DB Regional Coordinator concurrently. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification request within 30 days of receipt and so advise the State award official or will notify the State award official within the 30-day period that additional time is necessary.

(C) In the event the contractor, the laborers or mechanics to be employed in the classification ortheir representatives, and the subrecipient(s) do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the award official shall refer the request and the local wage determination, including the views of all interested parties and the recommendation of the State award official, to the Administrator for determination. The request shall be sent to the EPA DB Regional Coordinator concurrently. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt of the request and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(D) The wage rate (including fringe benefits where appropriate) determined pursuant toparagraphs (a)(1)(ii)(B) or (C) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers ormechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(iv) If the contractor does not make payments to a trustee or other third person, the contractormay consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

(2) Withholding. The subrecipient(s), shall upon written request of the EPA Award Official or an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor under this contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the (Agency) may, after written notice

to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

(3) Payrolls and basic records.

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

(ii)(A) The contractor shall submit weekly, for each week in which any contract work is performed, a copy of all payrolls to the subrecipient, that is, the entity that receives the sub-grant or loan from the State capitalization grant recipient. Such documentation shall be available on request of the State recipient or EPA. As to each payroll copy received, the subrecipient shall provide written confirmation in a form satisfactory to the State indicating whether or not the project is in compliance with the requirements of 29 CFR 5.5(a)(1) based on the most recent payroll copies for the specified week. The payrolls shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on the weekly payrolls. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at http://www.dol.gov/esa/whd/forms/wh347instr.htm or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the subrecipient(s) for transmission to the State or EPA if requested by EPA , the State, the contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the subrecipient(s).

(B) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(1) That the payroll for the payroll period contains the information required to be provided under § 5.5 (a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under § 5.5 (a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;

(2) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;

(3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(C) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph (a)(3)(ii)(B) of this section.

(D) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.

(iii) The contractor or subcontractor shall make the records required under paragraph (a)(3)(i) of this section available for inspection, copying, or transcription by authorized representatives of the State, EPA or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the Federal agency or State may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

(4) Apprentices and trainees--

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

registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

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

(iii) Equal employment opportunity. The utilization of apprentices, trainees and journeymenunder this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

(5) Compliance with Copeland Act requirements. The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.

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

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

(8) Compliance with Davis-Bacon and Related Act requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.

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

(10) Certification of eligibility.

(i) By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

4. **Contract Provision for Contracts in Excess of $100,000.**

(a) Contract Work Hours and Safety Standards Act. The subrecipient shall insert the following clauses set forth in paragraphs (a)(1), (2), (3), and (4) of this section in full in any contract in an amount in excess of $100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by Item 3, above or 29 CFR 4.6. As used in this paragraph, the terms laborers and mechanics include watchmen and guards.

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

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

(3) Withholding for unpaid wages and liquidated damages. The subrecipient**,** upon written request of the EPA Award Official or an authorized representative of the Department of Labor, shall 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 (a)(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 (a)(1) through (4) of this section.

(b) In addition to the clauses contained in Item 3, above, in any contract subject only to the Contract Work Hours and Safety Standards Act and not to any of the other statutes cited in 29 CFR 5.1, the Subrecipient shall insert a clause requiring that the contractor or subcontractor shall maintain payrolls and basic payroll records during the course of the work and shall preserve them for a period of three years from the completion of the contract for all laborers and mechanics, including guards and watchmen, working on the contract. Such records shall contain the name and address of each such employee, social security number, correct classifications, hourly rates of wages paid, daily and weekly number of hours worked, deductions made, and actual wages paid. Further, the Subrecipient shall insert in any such contract a clause providing hat the records to be maintained under this paragraph shall be made available by the contractor or subcontractor for inspection, copying, or transcription by authorized representatives of the (write the name of agency) and the Department of Labor, and the contractor or subcontractor will permit such representatives to interview employees during working hours on the job.

Loan Recipient's Requirements

Davis-Bacon Act Wage Determination

The Loan Recipient must ensure the bidder is in compliance with the Davis-Bacon Act as outlined below. Additionally, ten (10) days prior to the scheduled bid opening date, the wage rates need to be checked to ensure they have not changed.

The Davis-Bacon Act as amended, requires that each contract over $2,000 to which the United States or the District of Columbia is a party for the construction, alteration, or repair of public buildings or public works shall contain a clause setting forth the minimum wages to be paid to various classes of laborers and mechanics employed under the contract. Under the provisions of the Act, contractors or their subcontractors are to pay workers employed directly upon the site of the work no less than the locally prevailing wages and fringe benefits paid on projects of a similar character. The Davis-Bacon Act directs the Secretary of Labor to determine such local prevailing wage rates.

The specifications must incorporate a clause stating that the current Davis-Bacon wage rate is required **(**with the Davis-Bacon links and information).

The Bid Advertisement **must include** a clause that the **Davis-Bacon wage rates** are a requirement. (Refer to the ADVERTISEMENT FOR BIDS EXAMPLE – DBE, ARRA)

If modifications to the existing **wage rates** occur **ten (10) days** prior to the Bid Opening Date, the Loan Recipient **must** incorporate the proper **wage rates** into the plans and specifications by Addendum. All Bidders **must** be informed that this addendum **must** be incorporated into the plans and specifications that they have received.

However, if these modifications occur **less than ten (10) days** prior to the Bid Opening Date, these modifications **shall be effective unless** the agency **finds** that there is not a reasonable time still available before the Bid Opening to notify bidders of the modifications. (A report of this **finding** shall be inserted in the contract file.)

The **wage determination** (including any additional **classifications** and **wage rates** conformed) **and** a Davis-Bacon poster (WH-1321) **must be posted on the work site at all times** by the contractor and its subcontractors in a prominent and accessible place where it can be easily seen. The WH-1321 poster **may be obtained at no charge** from offices of the Wage and Hour Division.

With each **pay estimate** submitted, the contractors **must** certify that workers have been paid the current prevailing wage rates for each classification according to the Davis-Bacon wage rate schedule currently in effect for this project.

The loan recipients **must keep a file** in which all documentation **must be filed** for the current classifications and wage rates (under the Davis-Bacon Act) for the construction of their projects. This file must be kept for three (3) years after the project is completed and **will** be subject to audit by the State of Tennessee and the Environmental Protection Agency (EPA).

Wage Determinations

A "wage determination" is the listing of wage rates and fringe benefit rates for each classification of laborers and mechanics which the Administrator of the Wage and Hour Division of the U.S. Department of Labor has determined to be prevailing in a given area for a particular type of construction (e.g., building, heavy, highway, or residential).

Extensions of Wage Determinations

When a general wage determination has not been awarded within 90 days after bid opening, the head of the contracting/assisting agency may request an extension of the 90 day period from the Wage and Hour Administrator. When, due to unavoidable circumstances, a project wage determination expires before award but after bid opening, the head of the contracting/assisting agency may request an extension of the expiration date of the project wage determination in the bid specifications instead of issuing a new wage determination.

Extension requests should be supported by a written finding including a brief statement of the factual support, that extension of the expiration date of the determination is necessary and proper in the public interest to prevent injustice or undue hardship or to avoid serious impairment in the conduct of Government business.

The Administrator of the Wage and Hour Division of the U.S. Department of Labor will either grant or deny the request for an extension after consideration of all the circumstances, including an examination to determine if the previously issued rates remain prevailing. If a request for the extension of a project wage determination is denied, a new wage determination will be issued to replace an expired project wage determination.

Additional information concerning the Davis-Bacon Act and current wage rate determinations can be obtained at the following sites: www.gpo.gov/davisbacon/referencemat.html and www.wdol.gov/ .

Wage Rate Requirements Under FY 2010 Appropriations

3. Contract and Subcontract provisions.

(a) The Recipient shall insure that the subrecipient(s) shall insert in full in any contract in excess of $2,000 which is entered into for the actual construction, alteration and/or repair, including painting and decorating, of a treatment work under the CWSRF or a construction project under the DWSRF financed in whole or in part from Federal funds or in accordance with guarantees of a Federal agency or financed from funds obtained by pledge of any contract of a Federal agency to make a loan, grant or annual contribution (except where a different meaning is expressly indicated), and which is subject to the labor standards provisions of any of the acts listed in § 5.1 or the FY 2010 appropriation , the following clauses:

(1) Minimum wages.

(i) All laborers and mechanics employed or working upon the site of the work will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (a)(1)(iv) of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and

mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in § 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph (a)(1)(ii) of this section) and the DavisBacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

Subrecipients may obtain wage determinations from the U.S. Department of Labor's web site, www.dol.gov.

(ii)(A) The subrecipient(s), on behalf of EPA, shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The State award official shall approve a request for an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(1) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(2) The classification is utilized in the area by the construction industry; and

(3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(B) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the subrecipient(s) agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), documentation of the action taken and the request, including the local wage determination shall be sent by the subrecipient (s) to the State award official. The State award official will transmit the request, to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210 and to the EPA DB Regional Coordinator concurrently. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification request within 30 days of receipt and so advise the State award official or will notify the State award official within the 30-day period that additional time is necessary.

(C) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the subrecipient(s) do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the award official shall refer the request and the local wage determination, including the views of all interested parties and the recommendation of the State award official, to the Administrator for determination. The request shall be sent to the EPA DB Regional Coordinator concurrently. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt of the request and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(D) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs (a)(1)(ii)(B) or (C) of this section, shall be paid to all workers performing work in the

classification under this contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

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

(2) Withholding. The subrecipient(s), shall upon written request of the EPA Award Official or an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor under this contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the (Agency) may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

(3) Payrolls and basic records.

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

(ii)(A) The contractor shall submit weekly, for each week in which any contract work is performed, a copy of all payrolls to the subrecipient, that is, the entity that receives the sub-grant or loan from the State capitalization grant recipient. Such documentation shall be available on

request of the State recipient or EPA. As to each payroll copy received, the subrecipient shall provide written confirmation in a form satisfactory to the State indicating whether or not the project is in compliance with the requirements of 29 CFR 5.5(a)(1) based on the most recent payroll copies for the specified week. The payrolls shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on the weekly payrolls. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at http://www.dol.gov/esa/whd/forms/wh347instr.htm or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the subrecipient(s) for transmission to the State or EPA if requested by EPA , the State, the contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the subrecipient(s).

(B) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(1) That the payroll for the payroll period contains the information required to be provided under § 5.5 (a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under § 5.5 (a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;

(2) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;

(3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(C) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph (a)(3)(ii)(B) of this section.

(D) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.

(iii) The contractor or subcontractor shall make the records required under paragraph (a)(3)(i) of this section available for inspection, copying, or transcription by authorized representatives of the State, EPA or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the Federal agency or State may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the

suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

(4) Apprentices and trainees--

(i) Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(ii) Trainees. Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe

benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

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

(5) Compliance with Copeland Act requirements. The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.

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

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

(8) Compliance with Davis-Bacon and Related Act requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.

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

(10) Certification of eligibility.

(i) By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

4. **Contract Provision for Contracts in Excess of $100,000.**

(a) Contract Work Hours and Safety Standards Act. The subrecipient shall insert the following clauses set forth in paragraphs (a)(1), (2), (3), and (4) of this section in full in any contract in an amount in excess of $100,000 and subject to the overtime provisions of the Contract Work Hours

and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by Item 3, above or 29 CFR 4.6. As used in this paragraph, the terms laborers and mechanics include watchmen and guards.

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

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

(3) Withholding for unpaid wages and liquidated damages. The subrecipient**,** upon written request of the EPA Award Official or an authorized representative of the Department of Labor, shall 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 (a)(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 (a)(1) through (4) of this section.

(b) In addition to the clauses contained in Item 3, above, in any contract subject only to the Contract Work Hours and Safety Standards Act and not to any of the other statutes cited in 29 CFR 5.1, the Subrecipient shall insert a clause requiring that the contractor or subcontractor shall maintain payrolls and basic payroll records during the course of the work and shall preserve them for a period of three years from the completion of the contract for all laborers and mechanics, including guards and watchmen, working on the contract. Such records shall contain the name and address of each such employee, social security number, correct classifications, hourly rates of wages paid, daily and weekly number of hours worked, deductions made, and actual wages paid. Further, the Subrecipient shall insert in any such contract a clause providing hat the records to be maintained under this paragraph shall be made available by the contractor or subcontractor for inspection, copying, or transcription by authorized representatives of the (write the name of agency) and the Department of Labor, and the contractor or subcontractor will permit such representatives to interview employees during working hours on the job.

SECTION 00 6431

DAVIS-BACON WAGE RATES

This project is classified as heavy construction. Contractor shall adhere to the attached Davis Bacon Wage Rates for Heavy Construction in Davidson County, TN.

If a classification considered necessary by the Contractor for the performance of the work is not listed on the attached wage determination, the Contractor must initiate a request for approval of an additional classification along with the proposed wage and benefit rates for the classification. The instructions and forms for this procedure are provided at the end of this section.

SECTION 00 6431.10

DAVIS BACON WAGE RATE SHEET

General Decision Number: TN180143 07/06/2018 TN143

Superseded General Decision Number: TN20170143

State: Tennessee

Construction Type: Heavy
Including Water and Sewer Line Construction

Counties: Cannon, Cheatham, Davidson, Dickson, Hickman, Macon, Rutherford, Smith, Williamson and Wilson Counties in Tennessee.

HEAVY CONSTRUCTION PROJECTS (including sewer/water construction).

Note: Under Executive Order (EO) 13658, an hourly minimum wage of $10.35 for calendar year 2018 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least $10.35 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2018. The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/05/2018
1	07/06/2018

* ELEC0429-007 06/01/2018

	Rates	Fringes
Electrician	$ 26.77	12.94

ENGI0369-016 05/02/2013

Cheatham, Davidson, Dickson, Hickman, Rutherford, Williamson and Wilson Counties

	Rates	Fringes
Operating Engineers:		
Bulldozer, Crane, and Forklift	$ 22.97	9.85

ENGI0917-024 05/01/2017

Cannon, Macon, and Smith Counties

	Rates	Fringes

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Operating Engineers:
     Bulldozer and Crane.....$ 28.26            10.10
     Forklift................$ 25.97            10.10
------------------------------------------------------------------
  SUTN2009-141 12/02/2009

                                   Rates          Fringes

LABORER:  Common or General......$ 10.25             0.00

LABORER:  Flagger...............$  8.73             0.00

LABORER:  Pipelayer.............$ 11.71             0.00

OPERATOR:
Backhoe/Excavator/Trackhoe.....$ 17.35             0.00

OPERATOR:  Loader...............$ 13.50             0.00

TRUCK DRIVER:  Dump Truck.......$ 10.76             0.00
------------------------------------------------------------------

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

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave
for Federal Contractors applies to all contracts subject to the
Davis-Bacon Act for which the contract is awarded (and any
solicitation was issued) on or after January 1, 2017.  If this
contract is covered by the EO, the contractor must provide
employees with 1 hour of paid sick leave for every 30 hours
they work, up to 56 hours of paid sick leave each year.
Employees must be permitted to use paid sick leave for their
own illness, injury or other health-related needs, including
preventive care; to assist a family member (or person who is
like family to the employee) who is ill, injured, or has other
health-related needs, including preventive care; or for reasons
resulting from, or to assist a family member (or person who is
like family to the employee) who is a victim of, domestic
violence, sexual assault, or stalking.  Additional information
on contractor requirements and worker protections under the EO
is available at www.dol.gov/whd/govcontracts.

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


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

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

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

Survey Rate Identifiers

Classifications listed under the "SU" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

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

Union Average Rate Identifiers

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

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

WAGE DETERMINATION APPEALS PROCESS

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

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

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

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

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

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

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

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

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

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

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

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END OF GENERAL DECISION

SECTION 00 6432.10

DAVIS BACON POSTER - ENGLISH

EMPLOYEE RIGHTS
UNDER THE DAVIS-BACON ACT

FOR LABORERS AND MECHANICS EMPLOYED ON FEDERAL OR FEDERALLY ASSISTED CONSTRUCTION PROJECTS

THE UNITED STATES DEPARTMENT OF LABOR WAGE AND HOUR DIVISION

PREVAILING WAGES — You must be paid not less than the wage rate listed in the Davis-Bacon Wage Decision posted with this Notice for the work you perform.

OVERTIME — You must be paid not less than one and one-half times your basic rate of pay for all hours worked over 40 in a work week. There are few exceptions.

ENFORCEMENT — Contract payments can be withheld to ensure workers receive wages and overtime pay due, and liquidated damages may apply if overtime pay requirements are not met. Davis-Bacon contract clauses allow contract termination and debarment of contractors from future federal contracts for up to three years. A contractor who falsifies certified payroll records or induces wage kickbacks may be subject to civil or criminal prosecution, fines and/or imprisonment.

APPRENTICES — Apprentice rates apply only to apprentices properly registered under approved Federal or State apprenticeship programs.

PROPER PAY — If you do not receive proper pay, or require further information on the applicable wages, contact the Contracting Officer listed below:

or contact the U.S. Department of Labor's Wage and Hour Division.

For additional information:

1-866-4-USWAGE

(1-866-487-9243) TTY: 1-877-889-5627

U.S. Wage and Hour Division

WWW.WAGEHOUR.DOL.GOV

U.S. Department of Labor | Employment Standards Administration | Wage and Hour Division

WH 1321(Revised April 2009)

SECTION 00 6432.20

DAVIS BACON POSTER - SPANISH

DERECHOS DEL EMPLEADO
BAJO LA LEY DAVIS-BACON

PARA OBREROS Y MECÁNICOS EMPLEADOS EN PROYECTOS DE CONSTRUCCIÓN FEDERAL O CON ASISTENCIA FEDERAL

LA SECCIÓN DE HORAS Y SUELDOS DEL DEPARTAMENTO DE TRABAJO DE EEUU

SALARIOS PREVALECIENTES No se le puede pagar menos de la tasa de pago indicada en la Decisión de Salarios Davis-Bacon fijada con este Aviso para el trabajo que Ud. desempeña.

SOBRETIEMPO Se le ha de pagar no menos de tiempo y medio de su tasa básica de pago por todas las horas trabajadas en exceso de 40 en una semana laboral. Existen pocas excepciones.

CUMPLIMIENTO Se pueden retener pagos por contratos para asegurarse que los obreros reciban los salarios y el pago de sobretiempo debidos, y se podría aplicar daños y perjuicios si no se cumple con las exigencias del pago de sobretiempo. Las cláusulas contractuales de Davis-Bacon permiten la terminación y exclusión de contratistas para efectuar futuros contratos federales hasta tres años. El contratista que falsifique los registros certificados de las nóminas de pago o induzca devoluciones de salarios puede ser sujeto a procesamiento civil o criminal, multas y/o encarcelamiento.

APRENDICES Las tasas de aprendices sólo se aplican a aprendices correctamente inscritos bajo programas federales o estatales aprobados.

PAGO APROPIADO Si Ud. no recibe el pago apropiado, o precisa de información adicional sobre los salarios aplicables, póngase en contacto con el Contratista Oficial que aparece abajo:

o póngase en contacto con la Sección de Horas y Sueldos del Departamento de Trabajo de EEUU.

Para obtener información adicional:

1-866-4-USWAGE

(1-866-487-9243) TTY: 1-877-889-5627

WWW.WAGEHOUR.DOL.GOV

WHD U.S. Wage and Hour Division

U.S. Department of Labor | Employment Standards Administration | Wage and Hour Division

WH 1321 SPA (Revised April 2009)

STATE REVOLVING FUND LOAN PROGRAM

Loan Recipient's and Contractor's Guidance

FY2010 and After

Tracking and Reporting

For tracking and reporting purposes, the **Loan Recipient** is responsible for the following:

- Ensuring that the Contractor is in compliance with the Davis Bacon provisions of ARRA
- The loan recipients **must keep a file** in which all documentation **must be stored** for the current classifications and wage rates (under the Davis-Bacon Act) for the construction of their projects. This file must be kept for three (3) years after the project is completed and **will** be subject to audit by the State of Tennessee and the Environmental Protection Agency (EPA).
- Any additional tracking and reporting requirements from EPA

For tracking and reporting purposes, the **Contractor** is responsible for the following:

- Achieving and maintaining compliance with the Davis Bacon provisions of ARRA
- Submitting with each **pay estimate** a certification stating that workers have been paid the current prevailing wage rates for each classification according to the Davis-Bacon wage rate schedule currently in effect for this project
- Any additional tracking and reporting requirements from EPA

Please contact Dr. Bagher Sami, Administrative Section Manager for the SRF Loan Program, at 615-532-0501 or bagher.sami@tn.gov to obtain details.

SECTION 00 6450

PROJECT SIGN

The Contractor shall erect one sign identifying the construction project at a location to be designated by the Engineer. The sign shall be substantially in accordance with the drawing within this Section and shall be made of oil base paint on 3/4-inch exterior plywood and maintained in good condition until completion of the work defined under these Contract Documents. The Contractor shall submit a layout of the sign for approval by the Engineer.

No separate payment will be made for the sign. Payment shall be included in the lump sum bid price.

CLEAN WATER STATE REVOLVING FUND

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:

CLEAN WATER FOR TENNESSEE

DEPARTMENT OF ENVIRONMENT AND CONSERVATION

GOVERNOR
BILL HASLAM

COMMISSIONER
SHARI
MEGHREBLIAN

CITY OF

MAYOR

STATE REVOLVING FUND PROJECT

CWSRF LOAN: $ _____

PRINCIPAL FORGIVENESS: $ _____

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.

Revised: April 30, 2018

SECTION 00 6460
AIS CERTIFICATION SAMPLE LETTER

The following information is provided as a sample letter of **step** certification for AIS compliance. Documentation must be provided on company letterhead.

Date

Company Name

Company Address

City, State Zip

Subject: American Iron and Steel Step Certification for Project (XXXXXXXXXX)

I, (company representative), certify that the (melting, bending, coating, galvanizing, cutting, etc.) process for (manufacturing or fabricating) the following products and/or materials shipped or provided for the subject project is in full compliance with the American Iron and Steel requirement as mandated in EPA's State Revolving Fund Programs.

Item, Products and/or Materials:

1. Xxxx
2. Xxxx
3. Xxxx

Such process took place at the following location:

_____

If any of the above compliance statements change while providing material to this project we will immediately notify the prime contractor and the engineer.

Signed by company representative

The following information is provided as a sample letter of certification for AIS compliance. Documentation must be provided on company letterhead.

Date

Company Name

Company Address

City, State Zip

Subject: American Iron and Steel Certification for Project (XXXXXXXXXX)

I, (company representative), certify that the following products and/or materials shipped/provided to the subject project are in full compliance with the American Iron and Steel requirement as mandated in EPA's State Revolving Fund Programs.

Item, Products and/or Materials:

1. Xxxx
2. Xxxx
3. Xxxx

Such process took place at the following location:

_____

If any of the above compliance statements change while providing material to this project we will immediately notify the prime contractor and the engineer.

Signed by company representative

SECTION 00 6461
AIS CONTRACTORS CERTIFICATION REQUIREMENTS

The Contractor acknowledges to and for the benefit of Lincoln County ("Purchaser") and the State of Tennessee (the "State") that it understands the goods and services under this Agreement are being funded with monies made available by the Clean Water State Revolving Fund and/or Drinking Water State Revolving Fund that have statutory requirements commonly known as "American Iron and Steel;" that requires all of the iron and steel products used in the project to be produced in the United States ("American Iron and Steel Requirement") including iron and steel products provided by the Contactor pursuant to this Agreement. The Contractor hereby represents and warrants to and for the benefit of the Purchaser and the State that (a) the Contractor has reviewed and understands the American Iron and Steel Requirement, (b) all of the iron and steel products used in the project will be and/or have been produced in the United States in a manner that complies with the American Iron and Steel Requirement, unless a waiver of the requirement is approved, and (c) the Contractor will provide any further verified information, certification or assurance of compliance with this paragraph, or information necessary to support a waiver of the American Iron and Steel Requirement, as may be requested by the Purchaser or the State. Notwithstanding any other provision of this Agreement, any failure to comply with this paragraph by the Contractor shall permit the Purchaser or State to recover as damages against the Contractor any loss, expense, or cost (including without limitation attorney's fees) incurred by the Purchaser or State resulting from any such failure (including without limitation any impairment or loss of funding, whether in whole or in part, from the State or any damages owed to the State by the Purchaser). While the Contractor has no direct contractual privity with the State, as a lender to the Purchaser for the funding of its project, the Purchaser and the Contractor agree that the State is a third-party beneficiary and neither this paragraph (nor any other provision of this Agreement necessary to give this paragraph force or effect) shall be amended or waived without the prior written consent of the State.

SECTION 00 6462
AIS Information Checklist

The purpose of this checklist is to help ensure that all appropriate and necessary information is submitted to EPA. EPA recommends that States review this checklist carefully and provide all appropriate information to EPA. This checklist is for informational purposes only and does not need to be included as part of a waiver application.

Items	✓	Notes
General • Waiver request includes the following information: — Description of the foreign and domestic construction materials — Unit of measure — Quantity — Price — Time of delivery or availability — Location of the construction project — Name and address of the proposed supplier – A detailed justification for the use of foreign construction materials • Waiver request was submitted according to the instructions in the memorandum • Assistance recipient made a good faith effo11to solicit bids for domestic iron and steel products, as demonstrated by language in requests for proposals, contracts, and communications with the prime contractor		
Cost Waiver Requests • Waiver request includes the following infom1ation: — Comparison of overall cost of project with domestic iron and steel products to overall cost of project with foreign iron and steel products — Relevant excerpts from the bid documents used by the contractors to complete the comparison — Supporting documentation indicating that the contractor made a reasonable survey of the market, such as a description of the process for identifying suppliers and a list of contacted suppliers		
Availability Waiver Requests • Waiver request includes the following supporting documentation necessary to demonstrate the availability, quantity, and/or quality of the materials for which the waiver is requested: — Supplier information or pricing information from a reasonable number of domestic suppliers indicating availability/delivery date for construction materials — Documentation of the assistance recipient's efforts to find available domestic sources, such as a description of the process for identifying suppliers and a list of contacted suppliers. — Project schedule — Relevant excerpts from project plans, specifications, and permits indicating the required quantity and quality of construction materials • Waiver request includes a statement from the prime contractor and/or supplier confirming the non-availability of the domestic construction materials for which the waiver is sought • Has the State received other waiver requests for the materials described in this waiver request, for comparable projects?		

SECTION 00 6463

AIS ACT REQUIREMENTS

Implementation

The Act states:

Sec. 436. (a)(l) None of the funds made available by a State water pollution control revolving fund as authorized by title VI of the Federal Water Pollution Control Act (33 U.S.C. 1381 et seq.) or made available by a drinking water treatment revolving loan fund as authorized by section 1452 of the Safe Drinking Water Act (42 U.S.C . 300j-12) shall be used for a project for the construction,
alteration, maintenance, or repair of a public water system or treatment works unless all of the iron and steel products used in the project are produced in the United States.

(2) In this section, the term "iron and steel products" means the following products made primarily of iron or steel: lined or unlined pipes and fittings, manhole covers and other municipal castings, hydrants, tanks, flanges, pipe clamps and restraints, valves, structural steel, reinforced precast concrete, and construction materials.

(b) Subsection (a) shall not apply in any case or category of cases in which the Administrator of the Environmental Protection Agency (in this section referred to as the "Administrator") finds that-

(1) applying subsection (a) would be inconsistent with the public interest;

(2) iron and steel products are not produced in the United States in sufficient and reasonably available quantities and of a satisfactory quality; or

(3) inclusion of iron and steel products produced in the United States will increase the cost of the overall project by more than 25 percent.

(c) If the Administrator receives a request for a waiver under this section, the Administrator shall make available to the public on an informal basis a copy of the request and information available to the Administrator concerning the request, and shall allow for informal public input on the request for at least 15 days prior to making a finding based on the request. The Administrator shall make the request and accompanying information available by electronic means, including on the official public Internet Web site of the Environmental Protection Agency.

(d) This section shall be applied in a manner consistent with United States obligations under international agreements.

(e) The Administrator may retain up to 0.25 percent of the funds appropriated in this Act for the Clean and Drinking Water State Revolving Funds for carrying out

the provisions described in subsection (a)(l) for management and oversight of the requirements of this section.

(f) This section does not apply with respect to a project if a State agency approves the engineering plans and specifications for the project, in that agency's capacity to approve such plans and specifications prior to a project requesting bids, prior to the date of the enactment of this Act.

The following questions and answers provide guidance for implementing and complying with the AIS requirements:

Project Coverage

1) **What classes of projects are covered by the AIS requirement?**

All treatment works projects funded by a CWSRF assistance agreement, and all public water system projects funded by a DWSRF assistance agreement, from the date of enactment through the end of Federal Fiscal Year 2014, are covered. The AIS requirements apply to the entirety of the project, no matter when construction begins or ends. Additionally, the AIS requirements apply to all parts of the project, no matter the source of funding.

2) **Does the AIS requirement apply to nonpoint source projects or national estuary projects?**

No. Congress did not include an AIS requirement for nonpoint source and national estuary projects unless the project can also be classified as a 'treatment works' as defined by section 2 12 of the Clean Water Act.

3) **Are any projects for the construction, alteration, maintenance, or repair of a public water system or treatment works excluded from the AIS requirement?**

Any project, whether a treatment works project or a public water system project, for which engineering plans and specifications were approved by the responsible state agency prior to January 17. 2014, is excluded from the AIS requirements.

4) **What if the project does not have approved engineering plans and specifications but has signed an assistance agreement with a CWSRF or DWSRF program prior to January 17, 2014?**

The AIS requirements do not apply to any project for which an assistance agreement was signed prior to January 17, 2014.

5) **What if the project does not have approved engineering plans and specifications, but bids were advertised prior to January 17, 2014 and an assistance agreement was signed after January 17, 2014?**

If the project does not require approved engineering plans and specifications, the bid advertisement date will count in lieu of the approval date for purposes of the exemption in section 436(f).

6) **What if the assistance agreement that was signed prior to January 17, 2014, only funded a part of the overall project, where the remainder of the project will be funded later with another SRF loan?**

If the original assistance agreement funded any construction of the project, the date of the original assistance agreement counts for purposes of the exemption. If the original assistance agreement was only for planning and design, the date of that assistance agreement will count for purposes of the exemption only if there is a written commitment or expectation on the part of the assistance recipient to fund the remainder of the project with SRF funds.

7) **What if the assistance agreement that was signed prior to January 17, 2014, funded the first phase of a multi-phase project, where the remaining phases will be funded by SRF assistance in the future?**

In such a case, the phases of the project will be considered a single project if all construction necessary to complete the building or work, regardless of the number of contracts or assistance agreements involved, are closely related in purpose, time and place. However, there are many situations in which major construction activities are clearly undertaken in phases that are distinct in purpose, time, or place. In the case of distinct phases, projects with engineering plans and specifications approval or assistance agreements signed prior to January 17, 2014 would be excluded from AIS requirements while those approved/signed on January 17, 2014, or later would be covered by the AIS requirements.

8) **What if a project has split funding from a non-SRF source?**

Many States intend to fund projects with "split" funding, from the SRF program and from State or other programs. Based on the Act language in section 436, which requires that American iron and steel products be used in any project for the construction, alteration, maintenance, or repair of a public water system or treatment works receiving SRF
funding between and including January 17, 2014 and September 30, 2014, any project that is funded in whole or in part with such funds must comply with the AIS requirement. A "project" consists of all construction necessary to complete

the building or work regardless of the number of contracts or assistance agreements involved so long as all contracts and assistance agreements awarded are closely related in purpose, time and place. This precludes the intentional splitting of SRF projects into separate and smaller contracts or assistance agreements to avoid AIS coverage on some portion of a larger project, particularly where the activities are integrally and proximately related to the whole. However, there are many situations in which major construction activities are clearly undertaken in separate phases that are distinct in purpose, time, or place, in which case, separate contracts or assistance agreement for SRF and State or other funding would carry separate requirements.

9) **What about refinancing?**

If a project began construction, financed from a non-SRF source, prior to January 17, 2014 , but is refinanced through an SRF assistance agreement executed on or after January 17, 2014 and prior to October 1, 2014, AIS requirements will apply to all construction that occurs on or after January 17, 2014, through completion of construction, unless, as is likely, engineering plans and specifications were approved by a responsible state agency prior to January 17, 2014 . There is no retroactive application of the AIS requirements where a refinancing occurs for a project that has completed construction prior to January 17, 2014.

10) **Do the AIS requirements apply to any other EPA programs, besides the SRF program, such as the Tribal Set-aside grants or grants to the Territories and DC?**

No, the AIS requirement only applies to funds made available by a State water pollution control revolving fund as authorized by title VI of the Federal Water Pollution Control Act (33 U.S.C. 1381 et seq.) or made available by a drinking water treatment revolving loan fund as authorized by section 1452 of the Safe Drinking Water Act (42
U.S.C. 300j-12)

Covered Iron and Steel Products

11) **What is an iron or steel product?**

For purposes of the CWSRF and DWSRF projects that must comply with the AIS requirement, an iron or steel product is one of the following made primarily of iron or steel that is permanently incorporated into the public water system or treatment works:

Lined or unlined pipes or fittings; Manhole Covers;
Municipal Castings (defined in more detail below);
Hydrants;
Tanks;
Flanges;

Pipe clamps and restraints;
Valves;
Structural steel (defined in more detail below);
Reinforced precast concrete; and
Construction materials (defined in more detail below).

12) What does the term 'primarily iron or steel' mean?

'Primarily iron or steel' places constraints on the list of products above. For one of the listed products to be considered subject to the AIS requirements, it must be made of greater than 50% iron or steel, measured by cost. The cost should be based on the material costs.

13) Can you provide an example of how to perform a cost determination?

For example, the iron portion of a fire hydrant would likely be the bonnet, body and shoe, and the cost then would include the pouring and casting to create those components. The other material costs would include non-iron and steel internal workings of the fire hydrant (i.e., stern, coupling, valve, seals, etc.). However, the assembly of the internal workings into the hydrant body would not be included in this cost calculation. If one of the listed products is not made primarily of iron or steel, United States (US) provenance is not required. An exception to this definition is reinforced precast concrete, which is addressed in a later question.

14) If a product is composed of more than 50% iron or steel, but is not listed in the above list of items, must the item be produced in the US? Alternatively, must the iron or steel in such a product be produced in the US?

The answer to both question is no. Only items on the above list must be produced in the US. Additionally, the iron or steel in a non-listed item can be sourced from outside the US.

15) What is the definition of steel?

Steel means an alloy that includes at least 50 percent iron, between .02 and 2 percent carbon and may include other elements. Metallic elements such as chromium, nickel, molybdenum, manganese, and silicon may be added during the melting of steel for the purpose of enhancing properties such as corrosion resistance, hardness, or strength. The definition of steel covers carbon steel, alloy steel, stainless steel, tool steel and other specialty steels.

16) What does 'produced in the United States' mean?

Production in the United States of the iron or steel products used in the project requires that all manufacturing processes, including application of coatings, must take place in the United States, with the exception of metallurgical processes involving refinement of steel additives. All manufacturing

processes includes processes such as melting, refining, forming, rolling, drawing, finishing, fabricating and coating. Further, if a domestic iron and steel product is taken out of the US for any part of the manufacturing process, it becomes foreign source material. However, raw materials such as iron ore, limestone and iron and steel scrap are not covered by the AIS requirement, and the material(s), if any, being applied as a coating are similarly not covered. Non-iron or steel components of an iron and steel product may come from non-US sources. For example, for products such as valves and hydrants, the individual non-iron and steel components do not have to be of domestic origin.

17) Are the raw materials used in the production of iron or steel required to come from US sources?

No. Raw materials, such as iron ore, limestone, scrap iron, and scrap steel, can come from non-US sources.

18) If an above listed item is primarily made of iron or steel, but is only at the construction site temporarily, must such an item be produced in the US?

No. Only the above listed products made primarily of iron or steel, permanently incorporated into the project must be produced in the US. For example trench boxes, scaffolding or equipment, which are removed from the project site upon completion of the project, are not required to be made of U.S. Iron or Steel.

19) What is the definition of 'municipal castings'?

Municipal castings are cast iron or steel infrastructure products that are melted and cast. They typically provide access, protection, or housing for components incorporated into utility owned drinking water, storm water, wastewater, and surface infrastructure. They are typically made of grey or ductile iron, or steel. Examples of municipal castings are:

Access Hatches;
Ballast Screen;
Benches (Iron or Steel);
Bollards;
Cast Bases;
Cast Iron Hinged Hatches,
Square and Rectangular; Cast Iron Riser Rings;
Catch Basin Inlet;
Cleanout/Monument Boxes;
Construction Covers and
Frames; Curb and Corner
Guards;
Curb Openings;
Detectable Warning Plates;
Downspout Shoes (Boot, Inlet);

Drainage Grates,
Frames and Curb Inlets;
Inlets;
Junction Boxes;
Lampposts;
Manhole Covers, Rings and Frames,
Risers;
Meter Boxes;
Service Boxes;
Steel Hinged Hatches, Square and Rectangular;
Steel Riser Rings;
Trash receptacles;
Tree Grates;
Tree Guards;
Trench Grates;
and
Valve Boxes, Covers and Risers.

20) What is "structural steel" ?

Structural steel is rolled flanged shapes, having at least one dimension of their cross-section three inches or greater, which are used in the construction of bridges, buildings, ships, railroad rolling stock, and for numerous other constructional purposes. Such shapes are designated as wide-flange shapes, standard I-beams, channels, angles, tees and zees. Other shapes include H-piles, sheet piling, tie plates, cross ties, and those for other special purposes.

21) What is a 'construction material' for purposes of the AIS requirement?

Construction materials are those articles, materials, or supplies made primarily of iron and steel, that are permanently incorporated into the project, not including mechanical and/or electrical components, equipment and systems. Some of these products may overlap with what is also considered "structural steel". This includes, but is not limited to, the following products: wire rod, bar, angles, concrete reinforcing bar, wire, wire cloth, wire rope and cables, tubing, framing, joists, trusses, fasteners (i.e., nuts and bolts) , welding rods, decking, grating, railings, stairs, access ramps, fire escapes, ladders, wall panels, dome structures, roofing, ductwork, surface drains, cable hanging systems, manhole steps, fencing and fence tubing, guardrails, doors, and stationary screens.

22) What is not considered a 'construction material' for purposes of the AIS requirement?

Mechanical and electrical components, equipment and systems are not considered construction materials. Mechanical equipment is typically that which has motorized parts and/or is powered by a motor. Electrical equipment is typically any machine powered by electricity and includes components that are part of the electrical distribution system.

The following examples (including their appurtenances necessary for their intended use and operation) are NOT considered construction materials: pumps, motors, gear reducers, drives (including variable frequency drives (VFDs)), electric/pneumatic/manual accessories used to operate valves (such as electric valve actuators) , mixers, gates, motorized screens (such as traveling screens), blowers/aeration equipment , compressors, meters, sensors, controls and switches, supervisory control and data acquisition (SCADA), membrane bioreactor systems, membrane filtration systems, filters, clarifiers and clarifier mechanism s, rakes, grinders, disinfection systems, presses (including belt presses), conveyors, cranes, HYAC (excluding ductwork), water heaters, heat exchangers, generators, cabinetry and housings (such as electrical boxes/enclosures), lighting fixtures, electrical conduit, emergency life systems, metal office furniture, shelving, laboratory equipment, analytical instrumentation, and dewatering equipment.

23) If the iron or steel is produced in the US, may other steps in the manufacturing process take place outside of the US, such as assembly?

No. Production in the US of the iron or steel used in a listed product requires that all manufacturing processes must take place in the United States, except metallurgical processes involving refinement of steel additives.

24) What processes must occur in the US to be compliant with the AIS requirement for reinforced precast concrete?

While reinforced precast concrete may not be at least 50% iron or steel, in this particular case, the reinforcing bar and wire must be produced in the US and meet the same standards as for any other iron or steel product. Additionally, the casting of the concrete product must take place in the US. The cement and other raw materials used in concrete production are not required to be of domestic origin.

If the reinforced concrete is cast at the construction site, the reinforcing bar and wire are considered to be a construction material and must be produced in the US.

Compliance

25) How should an assistance recipient document compliance with the AIS requirement?

In order to ensure compliance with the AIS requirement, specific AIS contract language must be included in each contract, starting with the assistance agreement, all the way down to the purchase agreements Sample language for assistance agreements and contracts can be found in Appendix 3 and 4

EPA recommends the use of a step certification process, similar to one used by the Federal Highway Administration. The step certification process is a

method to ensure that producers adhere to the AIS requirement and assistance recipients can verify that products comply with the AIS requirement. The process also establishes accountability and better enables States to take enforcement actions against violators.

Step certification creates a paper trail which documents the location of the manufacturing process involved with the production of steel and iron materials. A step certification is a process under which each handler (supplier, fabricator, manufacturer, processor, etc.) of the iron and steel products certifies that their step in the process was domestically performed. Each time a step in the manufacturing process takes place, the manufacturer delivers its work along with a certification of its origin. A certification can be quite simple. Typically, it includes the name of the manufacturer, the location of the manufacturing facility where the product or process took place (not its headquarters), a description of the product or item being delivered, and a signature by a manufacturer's responsible party. Attached, as Appendix 5, are sample certifications. These certifications should be collected and maintained by assistance recipients.

Alternatively, the final manufacturer that delivers the iron or steel product to the worksite, vendor, or contractor, may provide a certification asserting that all manufacturing processes occurred in the US. While this type of certification may be acceptable, it may not provide the same degree of assurance. Additional documentation may be needed if the certification is lacking important information. Step certification is the best practice.

26) How should a State ensure assistance recipients are complying with the AIS requirement?

In order to ensure compliance with the AIS requirement, States SRF programs must include specific AIS contract language in the assistance agreement. Sample language for assistance agreements can be found in Appendix 3.

States should also, as a best practice, conduct site visits of projects during construction and review documentation demonstrating proof of compliance which the assistance recipient has gathered.

27) What happens if a State or EPA finds a non-compliant iron and/or steel product permanently incorporated in the project?

If a potentially non-compliant product is identified, the State should notify the assistance recipient of the apparent unauthorized use of the non-domestic component, including a proposed corrective action, and should be given the opportunity to reply. If unauthorized use is confirmed, the State can take one or more of the following actions: request a waiver where appropriate; require the removal of the non-domestic item; or withhold payment for all or part of the project. Only EPA can issue waivers to authorize the use of a non-domestic item. EPA may use remedies available to it under the Clean Water Act, the Safe Drinking Water Act, and 40 CFR part 31 grant regulations, in the event of a

violation of a grant term and condition

It is recommended that the State work collaboratively with EPA to determine the appropriate corrective action, especially in cases where the State is the one who identifies the item in noncompliance or there is a disagreement with the assistance recipient.

If fraud, waste, abuse, or any violation of the law is suspected, the Office of Inspector General (OIG) should be contacted immediately. The OIG can be reached at 1-888-546-8740 or OIG Hotline@epa.gov. More information can be found at this website: http://www.epa.gov/oig/hotline.htm.

28) How do international trade agreements affect the implementation of the AIS requirements?

The AIS provision applies in a manner consistent with United States obligations under international agreements. Typically, these obligations only apply to direct procurement by the entities that are signatories to such agreements. In general, SRF assistance recipients are not signatories to such agreements, so these agreements have no impact on this AIS provision. In the few instances where such an agreement applies to a municipality, that municipality is under the obligation to determine its applicability and requirements and document the actions taken to comply for the State.

Waiver Process

The statute permits EPA to issue waivers for a case or category of cases where EPA finds (1) that applying these requirements would be inconsistent with the public interest; (2) iron and steel products are not produced in the US in sufficient and reasonably available quantities and of a satisfactory quality; or (3) inclusion of iron and steel products produced in the US will increase the cost of the overall project by more than 25 percent.

In order to implement the AIS requirements, EPA has developed an approach to allow for effective and efficient implementation of the waiver process to allow projects to proceed in a timely manner. The framework described below will allow States, on behalf of the assistance recipients, to apply for waivers of the AIS requirement directly to EPA Headquarters Only waiver requests received from states will be considered. Pursuant to the Act, EPA has the responsibility to make findings as to the issuance of waivers to the AIS requirements.

Definitions

The following terms are critical to the interpretation and implementation of the AIS requirements and apply to the process described in this memorandum:

Reasonably Available Quantity: The quantity of iron or steel products is available or will be available at the time needed and place needed, and in the proper form

or specification as specified in the project plans and design.

Satisfactory Quality: The quality of iron or steel products, as specified in the project plans and designs.

Assistance Recipient: A borrower or grantee that receives funding from a State CWSRF or DWSRF program.

Step-By-Step-Waiver-Process

Application by Assistance Recipient

Each local entity that receives SRF water infrastructure financial assistance is required by section 436 of the Act to use American made iron and steel products in the construction of its project. However, the recipient may request a waiver. Until a waiver is granted by EPA, the AIS requirement stands, except as noted above with respect to municipalities covered by international agreements.

The waiver process begins with the SRF assistance recipient. In order to fulfill the AIS requirement, the assistance recipient must in good faith design the project (where applicable) and solicit bids for construction with American made iron and steel products. It is essential that the assistance recipient include the AIS terms in any request for proposals or solicitations for bids, and in all contracts (see Appendix 3 for sample construction contract language). The assistance recipient may receive a waiver at any point before, during, or after the bid process, if one or more of three conditions is met:

1. Applying the American Iron and Steel requirements of the Act would be inconsistent with the public interest;
2. Iron and steel products are not produced in the United States in sufficient and reasonably available quantities and of a satisfactory quality; or
3. Inclusion of iron and steel products produced in the United States will increase the cost of the overall project by more than 25 percent.

Proper and sufficient documentation must be provided by the assistance recipient. A checklist detailing the types of information required for a waiver to be processed is attached as Appendix 1.

Additionally, it is strongly encouraged that assistance recipients hold pre-bid conferences with potential bidders. A pre-bid conference can help to identify iron and steel products needed to complete the project as described in the plans and specifications that may not be available from domestic sources. It may also identify the need to seek a waiver prior to bid, and can help inform the recipient on compliance options.

In order to apply for a project waiver, the assistance recipient should email

the request in the form of a Word document (.doc) to the State SRF program. It is strongly recommended that the State designate a single person for all AIS communications. The State SRF designee will review the application for the waiver and determine whether the necessary information has been included. Once the waiver application is complete, the State designee will forward the application to either of two email addresses. For CWSRF waiver requests, please send the application to: cwsrfwaiver@epa.gov. For DWSRF waiver requests, please send the application to: dwsrfwaiver@epa.gov.

Evaluation by EPA

After receiving an application for waiver of the AIS requirements, EPA Headquarters will publish the request on its website for 15 days and receive informal comment. EPA Headquarters will then use the checklist in Appendix 2 to determine whether the application properly and adequately documents and justifies the statutory basis cited for the waiver -that it is quantitatively and qualitatively sufficient – and to determine whether or not to grant the waiver.

In the event that EPA finds that adequate documentation and justification has been submitted, the Administrator may grant a waiver to the assistance recipient. EPA will notify the State designee that a waiver request has been approved or denied as soon as such a decision has been made. Granting such a waiver is a three-step process:

1. Posting -After receiving an application for a waiver, EPA is required to publish the application and all material submitted with the application on EPA's website for 15 days. During that period, the public will have the opportunity to review the request and provide informal comment to EPA. The website can be found at: http://water.epa.gov/grantsfunding/aisrequirement.cfm

2. Evaluation – After receiving an application for waiver of the AIS requirements, EPA Headquarters will use the checklist in Appendix 2 to determine whether the application properly and adequately documents and justifies the statutory basis cited for the waiver -that it is quantitatively and qualitatively sufficient – and to determine whether or not to grant the waiver.

3. Signature of waiver approval by the Administrator or another agency official with delegated authority – As soon as the waiver is signed and dated, EPA will notify the State SRF program, and post the signed waiver on our website. The assistance recipient should keep a copy of the signed waiver in its project files.

Public Interest Waivers

EPA has the authority to issue public interest waivers. Evaluation of a public interest waiver request may be more complicated than that of other waiver requests so they may take more time than other waiver requests for a

decision to be made. An example of a public interest waiver that might be issued could be for a community that has standardized on a particular type or manufacturer of a valve because of its performance to meet their specifications. Switching to an alternative valve may require staff to be trained on the new equipment and additional spare parts would need to be purchased and stocked, existing valves may need to be unnecessarily replaced, and portions of the system may need to be redesigned. Therefore, requi ring the community to install an alternative valve would be inconsistent with public interest.

EPA also has the authority to issue a public interest waiver that covers categories of products that might apply to all projects.

EPA reserves the right to issue national waivers that may apply to particular classes of assistance recipients, particular classes of projects, or particular categories of iron or steel products. EPA may develop national or (US geographic) regional categorical waivers through the identification of similar circumstances in the detailed justifications presented to EPA in a waiver request or requests. EPA may issue a national waiver based on pol icy decisions regarding the public's interest or a determination that a particular item is not produced domestically in reasonably available quantities or of a sufficient quality. In such cases, EPA may determine it is necessary to issue a national waiver.

If you have any questions concerning the contents of this memorandum, you may contact us, or have your staff contact Jordan Dorfman , Attorney-Advisor, State Revolving Fund Branch, Municipal Support Division, at dorfman.jordan @epa.gov or (202) 564-06 14 or Kiri Anderer, Environmental Engineer, Infrastructure Branch, Drinking Water Protection Division, at anderer.kirsten@epa.gov or (202) 564-3134.

SECTION 00 6464

COMPTROLLER'S WASTE, FRAUD, AND ABUSE HOTLINE NOTICE

NOTICE

THIS ENTITY IS A RECIPIENT OF STATE AND FEDERAL FUNDS. IF YOU HAVE KNOWLEDGE OF ANY ACTIVITY WHICH YOU CONSIDER TO BE ILLEGAL, IMPROPER, OR WASTEFUL, PLEASE CALL THE STATE COMPTROLLER'S TOLL-FREE HOTLINE:

1-800-232-5454

CLOSEOUT FORMS

SECTION 00 6516

CERTIFICATE OF SUBSTANTIAL COMPLETION

Project: 2018 Sewer Rehabilitation and Improvements

Work Order Number (if applicable): ___

Agreement Date:_____ ____, 20 ____

Contractor: _____

_____

_____

Owner: The City of Goodlettsville

105 South Main Street

Goodlettsville, TN 370721

Engineer: Trestles LLC

1 Vantage Way, Suite C-130

Nashville, Tennessee 37228

A walk-through inspection of the project was conducted on_____ _____, 20 __ , with representatives of the Contractor, Owner, and Engineer participating. A final Punch List of work remaining to be completed or deficiencies noted was prepared.

ENGINEER: The work performed under this (select one): ___Contract ___ Work Order has been reviewed and found to the Engineer's best knowledge, information, and belief to be substantially complete as of _____.

By: _____ Title: _____ Date: _____

CONTRACTOR: The Contractor will complete or correct all work noted on the list of remaining work items dated __ , and supplements issued thereto within ___ days of the substantial completion date unless time is extended by Owner. The failure to include any items on the list does not alter the responsibility of the Contractor to complete all work in accordance with the Contract Documents.

By: _____ Title: _____ Date: _____

OWNER: The Owner accepts the work as substantially complete and accepts full possession thereof including the responsibilities for security, maintenance, and insurance.

By: _____ Title: _____ Date: _____

SECTION 00 6519

PROJECT CLOSE OUT FORMS

The following forms must be fully filled out by the Contractor and properly executed prior to release of final payment:

1. Certificate of Property Restoration

2. Affidavit of Payment

3. Affidavit of Release of Liens

4. Consent of Surety for Final Payment

5. Final Waiver of Lien

   (To be executed by each and every subcontractor and supplier of materials.)

SECTION 00 6519.10

CERTIFICATE OF PROPERTY RESTORATION

Date _____

I, _____, easement property owner, agree that the Contractor for this project, _____

_____, has cleaned up and restored to my satisfaction my property at _____

_____ where the property was disturbed during construction.

Signed _____

Witness _____

END OF SECTION

SECTION 00 6519.13

AFFIDAVIT OF PAYMENT

To: _____
(Owner)

WHEREAS, the undersigned has been employed _____ _____ to furnish labor and materials for _____ _____ work, under a contract _____ for the improvement of the property described as _____ in the _____ of _____ , County of _____ _____, State of _____ of which _____ _____ is the Owner.

NOW, THEREFORE, this _____ day of _____, 20 _____. The undersigned, as the Contractor for the above-named Contract pursuant to the Conditions of the Contract hereby certifies that, except as listed below, he has paid in full or has otherwise satisfied all obligations for all materials and equipment furnished, for all work, labor, and services performed, and for all known indebtedness and claims against the Contractor for damages arising in any manner in connection with the performance of the Contract referenced above for which the Owner or his property might in any way be held responsible.

EXCEPTIONS: (If none, write "None." If required by the Owner, the Contractor shall furnish bond satisfactory to the Owner for each exception.)

ATTACHMENTS:

1. Consent of Surety to Final Payment. (Whenever Surety is involved, Consent of Surety is required.)
2. Contractor's Release or Waiver of Liens, conditional upon receipt of final payment.
3. Separate Releases or Waivers of Liens from Subcontractors and material and equipment suppliers.
4. Contractor's Affidavit of Release of Liens.

_____(SEAL)
CONTRACTOR (Name of sole ownership, corporation or partnership)

_____(SEAL)
(Signature of Authorized Representative)

(Affix corporate seal here)

TITLE:_____

SECTION 00 6519.16

AFFIDAVIT OF RELEASE OF LIENS

To: _____

(Owner)

WHEREAS, the undersigned has been employed by_____to furnish labor and materials for_____

_____work, under a contract _____
for the improvement of the property described as _____

_____ _____in the _____ of _____ County of _____, _____ State of _____ of which _____

_____ is the Owner.

NOW, THEREFORE, this _____day of _____, 20_____.

The undersigned, as the Contractor for the above-named Contract pursuant to the conditions of the Contract hereby certifies that to the best of his knowledge, information and belief, except as listed below, the Releases or Waivers of Lien attached hereto include the Contractor, all subcontractors, all suppliers of materials and equipment, and all performers of Work, labor or services, who have or may have liens against any property of the Owner arising in any manner out of the performance of the Contract referenced above.

EXCEPTIONS: (If none, write "None." If required by the Owner, the Contractor shall furnish bond satisfactory to the Owner for each exception.)

ATTACHMENTS:

1. Contractor's Release or Waiver of Liens, conditional upon receipt of final payment.
2. Separate Releases or Waivers of Liens from Subcontractors and material and equipment suppliers.

_____(SEAL)

CONTRACTOR (Name of sole ownership, corporation or partnership)

_____(SEAL)

(Affix corporate seal here)

(Signature of Authorized Representative)

TITLE: _____

SECTION 00 6519.19

CONSENT OF SURETY FOR FINAL PAYMENT

Project Name _____

Location _____

Project No. _____ Contract No._____

Type of Contract _____

Amount of Contract _____

In accordance with the provisions of the above-named contract between the Owner and the Contractor, the following named surety:

_____

_____

on the Payment Bond of the following named Contractor:

_____

_____

hereby approves of final payment to the Contractor, and further agrees that said final payment to the Contractor shall not relieve the surety company named herein of any of its obligations to the following named Owner: as set forth in said surety company's bond:

_____

_____

IN WITNESS WHEREOF, the surety company has hereunto set its hand and seal this _____ day of _____, 20_____.

_____
(Name of Surety Company)

_____
(Affix corporate (Signature of Authorized Representative)

seal here) Title: _____

SECTION 00 6519.27

FINAL WAIVER OF LIEN

To: _____
(Owner)

WHEREAS, the undersigned has been employed by (A) _____

to furnish labor and materials for (B) _____

_____ work,

under a contract (C) _____

for the improvement of the premises described as (D) _____

_____

in the _____ (City-Village) of _____

County of _____, State of _____

of which _____

_____is the Owner.

NOW, THEREFORE, this _____ day of _____ 20____, for and in consideration of the sum of (E) _____

Dollars paid simultaneously herewith, the receipt whereof is hereby acknowledged by the undersigned, the undersigned does hereby waive and release any lien rights to, or claim of lien with respect to and on said above-described premises, and the improvements thereon, and on the monies or other considerations due or to become due from the Owner, or account of labor, services, material, fixtures, apparatus or machinery heretofore or which may hereafter be furnished by the undersigned to or for the above-described premises by virtue of said contract.

(F) _____ (SEAL)
(Name of sole ownership, corporation or partnership)

_____(SEAL)
(Affix corporate seal here) (Signature of Authorized Representative)

TITLE: _____

INSTRUCTIONS FOR FINAL WAIVER

A. Person or firm with whom you agreed to furnish either labor, or services, or materials.
B. Fill in nature and extent of work; strike the word labor or the word materials if not in your contract.
C. If you have more than one contract on the same premises, describe the contract by number if available, date, and extent of work.
D. Furnish an accurate enough description of the improvement and location of the premises so that it can be distinguished from any other property.
E. Amount shown should be the amount actually received and equal to that amount of contract as adjusted.
F. If waiver is for a corporation, corporate name should be used, corporate seal affixed and title of officer signing waiver should be set forth; if waiver is for a partnership, the partnership name should be used, partner should sign and designate himself as partner.

CONDITIONS OF THE CONTRACT

SECTION 00 7200

GENERAL CONDITIONS

1. DEFINITIONS

1.1. Wherever used in the **CONTRACT DOCUMENTS**, the following terms shall have the meanings indicated which shall be applicable to both the singular and plural thereof:

1.2. **ADDENDA** - Written or graphic instruments issued prior to the execution of the Agreement which modify or interpret the CONTRACT DOCUMENTS, DRAWINGS, AND SPECIFICATIONS by additions, deletions, clarifications or corrections.

1.3. **BID** - The offer or proposal of the BIDDER submitted on the prescribed form setting forth the prices for the Work to be performed.

1.4. **BIDDER** - Any person, firm or corporation submitting a BID for the WORK.

1.5. **BONDS** - Bid, Performance, and Payment Bonds and other instruments of security, furnished by the CONTRACTOR and his surety in accordance with the CONTRACT DOCUMENTS.

1.6. **CHANGE ORDER** - A written order to the CONTRACTOR authorizing an addition, deletion or revision in the WORK within the general scope of the CONTRACT DOCUMENTS, or authorizing an adjustment in the CONTRACT PRICE OR CONTRACT TIME.

1.7. **CONTRACT DOCUMENTS** - The contract, including Advertisement For Bids, Information For Bidders, BID, Bid Bond, Agreement, Payment Bond, Performance Bond, NOTICE OF AWARD, WORK ORDER, CHANGE ORDER, DRAWINGS, SPECIFICATIONS, and ADDENDA.

1.8. **CONTRACT PRICE** - The total monies payable to the CONTRACTOR under the terms and conditions of the CONTRACT DOCUMENTS.

1.9. **CONTRACT TIME** - The number of calendar days stated in the CONTRACT DOCUMENTS for the completion of the WORK.

1.10. **CONTRACTOR** - The person, firm, or corporation with whom the OWNER has executed the Agreement.

1.11. **DRAWINGS** - The part of the CONTRACT DOCUMENTS which show the characteristics and scope of the WORK to be performed and which have been prepared or approved by the ENGINEER.

1.12. **ENGINEER** - The person, firm, or corporation named as such in the CONTRACT DOCUMENTS.

1.13. **FIELD ORDER** - A written order effecting a change in the WORK not involving an adjustment in the CONTRACT PRICE or an extension of the CONTRACTOR during construction.

1.14. **NOTICE OF AWARD** - The written notice of the acceptance of the BID from the OWNER to the successful BIDDER.

1.15. **OWNER** - A public or quasi-public body or authority, corporation, association, partnership, or individual for whom the WORK is to be performed.

1.16. **PROJECT** - The undertaking to be performed as provided in the CONTRACT DOCUMENTS.

1.17. **RESIDENT PROJECT REPRESENTATIVE** - The authorized representative of the OWNER who is assigned to the PROJECT site or any part thereof.

1.18. **SHOP DRAWINGS** - All drawings, diagrams, illustrations, brochures, schedules, and other data which are prepared by the CONTRACTOR, a SUBCONTRACTOR, manufacturer, SUPPLIER, or distributor, which illustrate how specific portions of the WORK shall be fabricated or installed.

1.19. **SPECIFICATIONS** - A part of the CONTRACT DOCUMENTS consisting of written descriptions of a technical nature of materials, equipment, construction systems, standards, and workmanship.

1.20. **SUBCONTRACTOR** - An individual, firm or corporation having a direct contract with the CONTRACTOR or with any other SUBCONTRACTOR for the performance of a part of the WORK at the site.

1.21. **SUBSTANTIAL COMPLETION** - That date as certified by the ENGINEER when the construction of the PROJECT or a specified part thereof is sufficiently completed, in accordance with the CONTRACT DOCUMENTS, so that the PROJECT or specified part can be utilized for the purposes for which it is intended.

1.22. **SUPPLEMENTAL GENERAL CONDITIONS** - Modifications to General Conditions required by a Federal agency for participation in the PROJECT and approved by the agency in writing prior to inclusion in the CONTRACT DOCUMENTS, or such requirements that may be imposed by applicable state laws.

1.23. **SUPPLIER** - Any person or organization who supplies materials or equipment for the WORK, including that fabricated to a specific design, but who does not perform labor at the site.

1.24. **WORK** - All labor necessary to produce the construction required by the CONTRACT DOCUMENTS, and all materials and equipment incorporated or to be incorporated in the PROJECT.

1.25. **WORK ORDER** – Written communication issued by the OWNER to the CONTRACTOR authorizing him to proceed with a portion of the WORK described within the WORK ORDER, establishing the scope of the WORK, and establishing the date of commencement and completion time of the WORK.

1.26. **WRITTEN NOTICE** - Any notice to any party of the Agreement relative to any part of this Agreement in writing and considered delivered and the service thereof completed, when posted by certified or registered mail to the said party at his last given address or delivered in person to said party or his authorized representative on the WORK.

2. ADDITIONAL INSTRUCTIONS AND DETAIL DRAWINGS

2.1. The CONTRACTOR may be furnished additional instructions and detail drawings, by the ENGINEER, as necessary to carry out the WORK required by the CONTRACT DOCUMENTS.

2.2. The additional drawings and instruction thus supplied will become a part of the CONTRACT DOCUMENTS. The CONTRACTOR shall carry out the WORK in accordance with the additional detail drawings and instructions.

3. SCHEDULES, REPORTS, AND RECORDS

3.1. The CONTRACTOR shall submit to the OWNER such schedule of quantities and costs, progress schedules, payrolls, reports, estimates, records and other data where applicable as are required by the CONTRACT DOCUMENTS for the WORK to be performed.

3.2. Prior to the first partial payment estimate the CONTRACTOR shall submit construction progress schedules showing the order in which he proposes to carry on the WORK, including dates at which he will start the various parts of the WORK, estimated date of completion of each part and, as applicable:

3.2.1. The dates at which special detail drawings will be required; and

3.3. Respective dates for submission of SHOP DRAWINGS, the beginning of manufacture, the testing and the installation of materials, supplies and equipment.

4. DRAWINGS AND SPECIFICATIONS

4.1. The intent of the DRAWINGS and SPECIFICATIONS is that the CONTRACTOR shall furnish all labor, materials, tools, equipment, and transportation necessary for the proper execution of the WORK in accordance with the CONTRACT DOCUMENTS and all incidental work necessary to complete the PROJECT in an acceptable manner, ready for use, occupancy or operation by the OWNER.

4.2. In case of conflict between the DRAWINGS and SPECIFICATIONS, the SPECIFICATIONS shall govern. Figure dimensions on DRAWINGS shall govern over scale dimensions, and detailed DRAWINGS shall govern over general DRAWINGS.

4.3. Any discrepancies found between the DRAWINGS and SPECIFICATIONS and site conditions or any inconsistencies or ambiguities in the DRAWINGS or SPECIFICATIONS shall be immediately reported to the ENGINEER, in writing, who shall promptly correct such inconsistencies or ambiguities in writing. WORK done by the CONTRACTOR after his discovery of such discrepancies, inconsistencies or ambiguities shall be done at the CONTRACTOR'S risk.

5. SHOP DRAWINGS

5.1. The CONTRACTOR shall provide SHOP DRAWINGS as may be necessary for the prosecution of the WORK as required by the CONTRACT DOCUMENTS. The ENGINEER shall promptly review all SHOP DRAWINGS. The ENGINEER'S approval of any SHOP DRAWING shall not release the CONTRACTOR from responsibility for deviations from the CONTRACT DOCUMENTS. The approval of any SHOP DRAWING which substantially deviates from the requirement of the CONTRACT DOCUMENTS shall be evidenced by a CHANGE ORDER.

5.2. When submitted for the ENGINEER'S review, SHOP DRAWINGS shall bear the CONTRACTOR'S certification that he has reviewed, checked, and approved the SHOP DRAWINGS and that they are in conformance with the requirements of the CONTRACT DOCUMENTS.

5.3. Portions of the WORK requiring a SHOP DRAWING or sample submission shall not begin until the SHOP DRAWING or submission has been approved by the ENGINEER. A copy of each approved SHOP DRAWING and each approved sample shall be kept in good order by the CONTRACTOR at the site and shall be available to the ENGINEER.

6. MATERIALS, SERVICES AND FACILITIES

6.1. It is understood that, except as otherwise specifically stated in the CONTRACT DOCUMENTS, the CONTRACTOR shall provide and pay for all materials, labor, tools, equipment, water, light, power, transportation, supervision, temporary construction of any nature, and all other services and facilities of any nature whatsoever necessary to execute, complete, and deliver the WORK within the specified time.

6.2. Materials and equipment shall be so stored as to insure the preservation of their quality and fitness for the WORK. Stored materials and equipment to be incorporated in the WORK shall be located so as to facilitate prompt inspection.

6.3. Manufactured supplies, materials, and equipment shall be applied, installed, connected, erected, used, cleaned, and conditioned as directed by the manufacturer.

6.4. Material, supplies, and equipment shall be in accordance with samples submitted by the CONTRACTOR and approved by the ENGINEER.

6.5. Materials, supplies, or equipment to be incorporated into the WORK shall not be purchased by the CONTRACTOR or the SUBCONTRACTOR subject to a chattel mortgage or under a conditional sale contract or other agreement by which an interest is retained by the seller.

7. INSPECTION AND TESTING

7.1. All materials and equipment used in the construction of the PROJECT shall be subject to adequate inspection and testing in accordance with generally accepted standards, as required and defined in the CONTRACT DOCUMENTS.

7.2. All materials and equipment used in the construction of the PROJECT shall be subject to adequate inspection and testing in accordance with generally accepted standards, as required and defined in the CONTRACT DOCUMENTS.

7.3. The CONTRACTOR shall provide at his expense the testing and inspection services required by the CONTRACT DOCUMENTS.

7.4. If the CONTRACT DOCUMENTS, laws, ordinances, rules, regulations, or orders of any public authority having jurisdiction require any WORK to specifically be inspected, tested, or approved by someone other than the CONTRACTOR, the CONTRACTOR will give the ENGINEER timely notice of readiness. The CONTRACTOR will then furnish the ENGINEER the required certificates of inspection, testing, or approval.

7.5. Inspections, tests, or approvals by the ENGINEER or others shall not relieve the CONTRACTOR from his obligations to perform the WORK in accordance with the requirements of the CONTRACT DOCUMENTS.

7.6. The ENGINEER and his representatives will at all times have access to the WORK. In addition, authorized representatives and agents of any participating Federal or State agency shall be permitted to inspect all work, materials, payrolls, records of personnel, invoices of materials, and other relevant data and records. The CONTRACTOR will provide proper facilities for such access and observation of the WORK and also for any inspection or testing thereof.

7.7. If any WORK is covered contrary to the written instructions of the ENGINEER it must, if requested by the ENGINEER, be uncovered for his observation and replaced at the CONTRACTOR'S expense.

7.8. If the ENGINEER considers it necessary or advisable that covered WORK be inspected or tested by others, the CONTRACTOR, at the ENGINEER'S request will uncover, expose, or otherwise make available for observation, inspection or testing as the ENGINEER may require, that portion of the WORK in question, furnishing all necessary labor, materials, tools, and equipment. If it is found that such WORK is defective, the CONTRACTOR will bear all the expenses of such uncovering, exposure, observation, inspection, and testing and of satisfactory reconstruction. If, however, such WORK is not found to be defective, the CONTRACTOR will 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 an appropriate CHANGE ORDER shall be issued.

8. SUBSTITUTIONS AND "OR-EQUALS"

8.1. Whenever a material, article, or piece of equipment is identified on the DRAWINGS or SPECIFICATIONS by reference to brand name or catalogue number, it shall be understood that this is referenced for the purpose of defining the performance or other salient requirements and that other products of equal capacities, quality, and function may be considered. The CONTRACTOR may recommend the use of an "or-equal" manufacturer or supplier or substitution of a material, article, or piece of equipment of equal substance and function for those referred to in the CONTRACT DOCUMENTS by reference to brand name or catalogue number, and if, in the sole opinion of the ENGINEER, such material, article, or piece of equipment is of equal substance and function to that specified, the ENGINEER may approve its substitution and use by the CONTRACTOR. Factors to be considered, but not limited to, include: materials of construction, quality, durability, appearance, strength, design characteristics, reliability, performance, experience, economy of operation, and availability of responsive service.

8.2. Any cost differential shall be deductible from the CONTRACT PRICE and the CONTRACT DOCUMENTS for substitute and "or-equal" items and shall be appropriately modified by a CHANGE ORDER. The CONTRACTOR warrants that if substitutes or "or-equals" are approved, no major changes in the function or general design of the PROJECT will result. Incidental changes or extra component parts required to accommodate the substitute or "or-equal" item will be made by the CONTRACTOR without a change in the CONTRACT PRICE or CONTRACT TIME. The CONTRACTOR shall be solely responsible for any changes to the design required to accommodate the use of substitute items, including reimbursement of the OWNER for ENGINEERS documented costs. Reimbursement of ENGINEERS cost to evaluate substitute items shall not depend on the final acceptability of substitute items. OWNER may require CONTRACTOR to furnish at CONTRACTORS expense a special performance guarantee or other surety with respect to any substitute. The CONTRACTOR shall provide all data in support of any proposed substitute or "or-equal" item at CONTRACTORS expense.

8.3. The ENGINEER will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to this paragraph. ENGINEER may require CONTRACTOR to furnish additional data about the proposed substitute or "or-equal" item. ENGINEER will be the sole judge of acceptability. No "or-equal" or substitute shall be ordered, installed, or utilized until ENGINEERS review is complete, which

will be evidenced by a CHANGE ORDER in the case of a substitute or an approved Shop Drawing for an “or-equal”. ENGINEER will advise CONTRACTOR in writing of any negative determination.

9. PATENTS

9.1. The CONTRACTOR shall pay all applicable royalties and license fees. He shall defend all suits or claims for infringement of any patent rights and save the OWNER harmless from loss on account thereof. Except that the OWNER shall be responsible for any such loss when a particular process, design, or the product of a particular manufacturer or manufacturers is specified, however, if the CONTRACTOR has reason to believe that the design process or product specified is an infringement of a patent, he shall be responsible for such loss unless he promptly gives such information to the ENGINEER.

10. SURVEYS, PERMITS, REGULATIONS

10.1. The OWNER shall furnish all boundary surveys and establish all base lines for locating the principal component parts of the WORK together with a suitable number of bench marks adjacent to the WORK as shown in the CONTRACT DOCUMENTS. From the information provided by the OWNER, unless otherwise specified in the CONTRACT DOCUMENTS, the CONTRACTOR shall develop and make all detail surveys needed for construction such as slope stakes, batter boards, stakes for pile locations and other working points, lines, elevations, and cut sheets.

10.2. The CONTRACTOR shall carefully preserve bench marks, reference points and stakes and, in case of willful or careless destruction, he shall be charged with the resulting expense and shall be responsible for any mistakes that may be caused by their unnecessary loss or disturbance.

10.3. Permits and licenses of a temporary nature necessary for the prosecution of the WORK shall be secured and paid for by the CONTRACTOR unless otherwise stated in the SUPPLEMENTAL GENERAL CONDITIONS. Permits, licenses, and easements for permanent structures or permanent changes in existing facilities shall be secured and paid for by the OWNER, unless otherwise specified. The CONTRACTOR shall give all notices and comply with all laws, ordinances, rules, and regulations bearing on the conduct of the WORK as drawn and specified. If the CONTRACTOR observes that the CONTRACT DOCUMENTS are at variance therewith, he shall promptly notify the ENGINEER in writing and any necessary changes shall be adjusted as provided in Section 13. CHANGES IN THE WORK.

11. PROTECTION OF WORK, PROPERTY

11.1. The CONTRACTOR will be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the WORK. He will take all necessary precautions for the safety of, and will provide the necessary protection to prevent damage, injury or loss to all employees on the WORK and other persons who may be affected thereby, all the WORK and all materials or equipment to be incorporated therein, whether in storage on or off the site, and other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways,

structures, and utilities not designated for removal, relocation or replacement in the course of construction.

11.2. The CONTRACTOR will comply with all applicable laws, ordinances, rules, regulations and orders of any public body having jurisdiction. He will erect and maintain, as required by the conditions and progress of the WORK, all necessary safeguards for safety and protection. He will notify owners of adjacent utilities when prosecution of the WORK may affect them. The CONTRACTOR will remedy all damage, injury, or loss to any property caused, directly or indirectly, in whole or in part, by the CONTRACTOR, any SUBCONTRACTOR or anyone directly or indirectly employed by any of them or anyone for whose acts any of them be liable, except damage or loss attributable to the fault of the CONTRACT DOCUMENTS or to the acts or omissions of the OWNER or the 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 the CONTRACTOR.

11.3. In emergencies affecting the safety of persons or the WORK or property at the site or adjacent thereto, the CONTRACTOR, without special instruction or authorization from the ENGINEER or OWNER, shall act to prevent threatened damage, injury, or loss. He will give the ENGINEER prompt WRITTEN NOTICE of any significant changes in the WORK or deviations from the CONTRACT DOCUMENTS caused thereby, and a CHANGE ORDER shall be issued covering the changes and deviations involved.

12. SUPERVISION BY CONTRACTOR

12.1. The CONTRACTOR will supervise and direct the WORK. He will be solely responsible for the means, methods, techniques, sequences and procedures of construction. The CONTRACTOR will employ and maintain on the WORK a qualified supervisor or superintendent who shall have been designated in writing by the CONTRACTOR as the CONTRACTOR'S representative at the site. The supervisor shall have full authority to act on behalf of the CONTRACTOR and all communications given to the supervisor shall be as binding as if given to the CONTRACTOR. The supervisor shall be present on the site at all times as required to perform adequate supervision and coordination of the WORK.

13. CHANGES IN THE WORK

13.1. The OWNER may at any time, as the need arises, order changes within the scope of the WORK without invalidating the Agreement. If such changes increase or decrease the amount due under the CONTRACT DOCUMENTS, or in the time required for performance of the WORK, an equitable adjustment shall be authorized by CHANGE ORDER.

13.2. The ENGINEER, also, may at any time, by issuing a FIELD ORDER, make changes in the details of the WORK. The CONTRACTOR shall proceed with the performance of any changes in the WORK so ordered by the ENGINEER unless the CONTRACTOR believes that such FIELD ORDER entitles him to a change in CONTRACT PRICE or TIME, or both, in which event he shall give the ENGINEER WRITTEN NOTICE thereof within seven (7) days after the receipt of the ordered

change. Thereafter the CONTRACTOR shall document the basis for the change in CONTRACT PRICE or TIME within thirty (30) days. The CONTRACTOR shall not execute such changes pending the receipt of an executed CHANGE ORDER or further instruction from the OWNER.

14. CHANGES IN CONTRACT PRICE

14.1. The CONTRACT PRICE may be changed only by a CHANGE ORDER. The value of any WORK covered by a CHANGE ORDER or of any claim for increase or decrease in the CONTRACT PRICE shall be determined by one or more of the following methods in the order of precedence listed below:

(a) Unit prices previously approved.

(b) An agreed lump sum.

(c) The actual cost for labor, direct over-head, materials, supplies, equipment, and other services necessary to complete the work. In addition there shall be added an amount to be agreed upon but not to exceed fifteen (15) percent of the actual cost of the WORK to cover the cost of general overhead and profit. In no case shall the value of materials, supplies, equipment, and other services exceed actual cost or as identified in RS Means or equivalent, latest edition.

15. TIME FOR COMPLETION AND LIQUIDATED DAMAGES

15.1. The date of beginning and the time for completion of the WORK are essential conditions of the CONTRACT DOCUMENTS and the WORK embraced shall be commenced on a date specified in the WORK ORDER.

15.2. The CONTRACTOR will proceed with the WORK at such rate of progress to insure full completion within the CONTRACT TIME. It is expressly understood and agreed, by and between the CONTRACTOR and the OWNER, that the CONTRACT TIME for the completion of the WORK described herein is a reasonable time, taking into consideration the average climatic and economic conditions and other factors prevailing in the locality of the WORK.

15.3. If the CONTRACTOR shall fail to complete the WORK within the CONTRACT TIME, or extension of time granted by the OWNER, then the CONTRACTOR will pay to the OWNER the amount for liquidated damages as specified in the BID for each calendar day that the CONTRACTOR shall be in default after the time stipulated in the CONTRACT DOCUMENTS.

15.4. The CONTRACTOR shall not be charged with liquidated damages or any excess cost when the delay in completion of the WORK is due to the following, and the CONTRACTOR has promptly given WRITTEN NOTICE of such delay to the OWNER or ENGINEER.

15.4.1. To any preference, priority, or allocation order duly issued by the OWNER.

15.4.2. To unforeseeable causes beyond the control and without the fault or negligence of the CONTRACTOR, including but not restricted to, acts of God or of the public enemy, acts of the OWNER, acts of another CONTRACTOR in the performance of a CONTRACT with the OWNER, fires, floods, epidemics, quarantine, restrictions, strikes, freight embargoes, and abnormal and unforeseeable weather; and

15.4.3. To any delays of SUBCONTRACTORS occasioned by any of the causes specified in paragraphs 15.4.1 and 15.4.2 of this article.

16. WORK ORDERS

16.1. All WORK under this CONTRACT will be performed under a WORK ORDER issued by the OWNER.

16.2. WORK ORDERS will be issued by the OWNER throughout the duration of the CONTRACT. WORK ORDERS shall be completed in the order of issuance, and WORK on subsequent WORK ORDERS shall not commence until: the current WORK ORDER is a minimum of 85% complete as measured by percentage of the WORK ORDER billable to the OWNER, and previous WORK ORDERS are 100% complete to the satisfaction of the OWNER and ENGINEER, including cleanup, testing, surface restoration, and any applicable closeout documentation.

16.3. The OWNER reserves the right to delay or withhold issuance of additional WORK ORDERS until all requirements of previously issued WORK ORDERS are completed, including all field work and project documentation.

17. CORRECTION OF WORK

17.1. The CONTRACTOR shall promptly remove from the premises all WORK rejected by the ENGINEER for failure to comply with the CONTRACT DOCUMENTS, whether incorporated in the construction or not and the CONTRACTOR shall promptly replace and re-execute the WORK in accordance with the CONTRACT DOCUMENTS and without expense to the OWNER and shall bear the expense of making good all WORK of other CONTRACTORS destroyed or damaged by such removal or replacement.

17.2. All removal and replacement WORK shall be done at the CONTRACTOR'S expense. If the CONTRACTOR does not take action to remove such rejected WORK within ten (10) days after receipt of WRITTEN NOTICE, the OWNER may remove such WORK and store the materials at the expense of the CONTRACTOR.

18. SUBSURFACE CONDITIONS

18.1. The CONTRACTOR shall promptly, and before such conditions are disturbed, except in the event of an emergency, notify the OWNER by WRITTEN NOTICE of:

18.1.1. Subsurface or latent physical conditions at the site differing materially from those indicated in the CONTRACT DOCUMENTS; or

18.1.2. Unknown physical conditions at the site, of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in WORK of the character provided for in the CONTRACT DOCUMENTS.

18.2. The OWNER shall promptly investigate the conditions, and if he finds that such conditions do so materially differ and cause an increase or decrease in the cost of, or in the time required for, performance of the WORK, an equitable adjustment shall be made and the CONTRACT DOCUMENTS shall be modified by a CHANGE ORDER. Any claim of the CONTRACTOR for adjustment hereunder shall not be allowed unless he has given the required WRITTEN NOTICE, provided that the OWNER may, if he determines the facts so justify, consider and adjust any such claims asserted before the date of final payment.

19. SUSPENSION OF WORK, TERMINATION AND DELAY

19.1. The OWNER may suspend the WORK or any portion thereof for a period of not more than ninety days or such further time as agreed upon by the CONTRACTOR, by WRITTEN NOTICE to the CONTRACTOR and the ENGINEER which notice shall fix the date on which WORK shall be resumed. The CONTRACTOR will resume that WORK on the date so fixed. The CONTRACTOR will be allowed an increase in the CONTRACT PRICE or an extension of the CONTRACT TIME, or both, directly attributable to any suspension.

19.2. If the CONTRACTOR is adjudged a bankrupt or insolvent, or if he makes a general assignment for the benefit of his creditors, or if a trustee or receiver is appointed for the CONTRACTOR or for any of his property, or if he files a petition to take advantage of any debtor's act, or to reorganized under the bankruptcy or applicable laws, or if he repeatedly fails to supply sufficient skilled workmen or suitable materials or equipment, or if he repeatedly fails to make prompt payments to SUBCONTRACTORS or for labor, materials, or equipment or if he disregards laws, ordinances, rules, regulations, or orders of any public body having jurisdiction of the WORK or if he disregards the authority of the ENGINEER, or if he otherwise violates any provision of the CONTRACT DOCUMENTS, then the OWNER may, without prejudice to any other right or remedy and after giving the CONTRACTOR and his surety a minimum of ten (10) days from delivery of a WRITTEN NOTICE, terminate the services of the CONTRACTOR and take possession of the PROJECT and of all materials, equipment, tools, construction equipment, and machinery thereon owned by the CONTRACTOR, and finish the WORK by whatever method he may deem expedient. In such case the 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 and indirect costs of completing the PROJECT, including compensation for additional professional services, such excess SHALL BE PAID TO THE CONTRACTOR. If such costs exceed such unpaid balance, the CONTRACTOR will pay the difference to the OWNER. Such costs incurred by the OWNER will be determined by the ENGINEER and incorporated in a CHANGE ORDER.

19.3. Where the CONTRACTOR'S services have been so terminated by the OWNER, said termination shall not affect any right of the OWNER against the CONTRACTOR then existing or which may thereafter accrue. Any retention or

payment of monies by the OWNER due the CONTRACTOR will not release the CONTRACTOR from compliance with the CONTRACT DOCUMENTS.

19.4. After ten (10) days from delivery of a WRITTEN NOTICE to the CONTRACTOR and the ENGINEER, the OWNER may without cause and without prejudice to any other right or remedy, elect to abandon the PROJECT and terminate the Contract. In such case, the CONTRACTOR shall be paid for all WORK executed and any expense sustained plus reasonable profit.

19.5. If, through no act or fault of the CONTRACTOR, the WORK is suspended for a period of more than ninety (90) days by the OWNER or under an order of court or other public authority, or the ENGINEER fails to act on any request for payment within thirty (30) days after it is submitted, or the OWNER fails to pay the CONTRACTOR substantially the sum approved by the ENGINEER or awarded by arbitrators within thirty (30) days of its approval and presentation, then the CONTRACTOR may, after ten (10) days from delivery of a WRITTEN NOTICE to the OWNER and the ENGINEER, terminate the CONTRACT and recover from the OWNER payment for all WORK executed and all expenses sustained. In addition, and in lieu of terminating the CONTRACT, if the ENGINEER has failed to act on a request for payment or if the OWNER has failed to make any payment as aforesaid, the CONTRACTOR may upon then (10) days WRITTEN NOTICE to the OWNER and the ENGINEER stop the WORK until he has been paid all amounts then due, in which event and upon resumption of the WORK, CHANGE ORDERS shall be issued for adjusting the CONTRACT PRICE or extending the CONTRACT TIME or both to compensate for the costs and delays attributable to the stoppage of the WORK.

19.6. If the performance of all or any portion of the WORK is suspended, delayed, or interrupted as a result of a failure of the OWNER or ENGINEER to act within the time specified in the CONTRACT DOCUMENTS, or if no time is specified, within a reasonable time, an adjustment in the CONTRACT PRICE or an extension of the CONTRACT TIME, or both, shall be made by CHANGE ORDER to compensate the CONTRACTOR for the costs and delays necessarily caused by the failure of the OWNER or ENGINEER.

20. CONTRACT RENEWAL

20.1. This CONTRACT shall renew on an annual basis (12 calendar months) on the date and month of issuance, unless the Owner provides notice of intent not to renew the Contract a minimum of 30 days prior to the date of renewal. If the Owner elects to do so, the Contract shall remain in effect until all Work Orders previously issued are completed in accordance with the Contract Documents. The Owner reserves the right to adjust quantities as described in Section 5 above at the time of renewal.

21. PAYMENTS TO CONTRACTOR

21.1. At least ten (10) days before each progress payment falls due (but not more often than once a month), the CONTRACTOR will submit to the ENGINEER a partial payment estimate filled out and signed by the CONTRACTOR covering the WORK performed during the period covered by the partial payment estimate and supported by such data as the ENGINEER may reasonably require. If payment is

requested on the basis of materials and equipment not incorporated in the WORK but delivered and suitably stored at or near the site, the partial payment estimate shall also be accompanied by such supporting data, satisfactory to the OWNER, as will establish the OWNER'S title to the material and equipment and protect his interest therein, including applicable insurance. The ENGINEER will, within ten (10) days after receipt of each partial payment estimate, either indicate in writing his approval of payment and present the partial payment estimate to the OWNER, or return the partial payment estimate to the CONTRACTOR indicating in writing his reasons for refusing to approve payment. In the latter case, the CONTRACTOR may make the necessary corrections and resubmit the partial payment estimate. The OWNER will, within ten (10) days of presentation to him of an approved partial payment estimate, pay the CONTRACTOR a progress payment on the basis of the approved partial payment estimate. The OWNER shall retain an amount not exceeding ten (10) percent of each payment limited to five (5) percent of the total contract amount until final completion and acceptance of all work covered by the CONTRACT DOCUMENTS. On completion and acceptance of a part of the WORK on which the price is stated separately in the CONTRACT DOCUMENTS, payment may be made in full, including retained percentages, less authorized deductions.

21.2. The request for payment may also include an allowance for the cost of such major materials and equipment which are suitably stored either at or near the site.

21.3. Prior to SUBSTANTIAL COMPLETION, the OWNER, with the approval of the ENGINEER and with the concurrence of the CONTRACTOR, may use any completed or substantially completed portions of the WORK. Such use shall not constitute an acceptance of such portions of the WORK.

21.4. The OWNER shall have the right to enter the premises for the purpose of doing work not covered by the CONTRACT DOCUMENTS. This provision shall not be construed as relieving the CONTRACTOR of the sole responsibility for the care and protection of the WORK, or the restoration of any damaged WORK except such as may be caused by agents or employees of the OWNER.

21.5. Upon completion and acceptance of the WORK ORDER, the ENGINEER shall issue a certificate attached to the final payment request that the WORK ORDER has been accepted by him under the conditions of the CONTRACT DOCUMENTS. The entire balance found to be due the CONTRACTOR, including the retained percentages, but except such sums as may be lawfully retained by the OWNER, shall be paid to the CONTRACTOR within thirty (30) days of completion and acceptance of the WORK ORDER.

21.6. The CONTRACTOR will indemnify and save the OWNER or the OWNER'S agents harmless from all claims growing out of the lawful demands of SUBCONTRACTORS, laborers, workmen, mechanics, materialmen, and furnishers of machinery and parts thereof, equipment, tools, and all supplies, incurred in the furtherance of the performance of the WORK. The CONTRACTOR shall, at the OWNER'S request, furnish satisfactory evidence that all obligations of the nature designated above have been paid, discharged, or waived. If the CONTRACTOR fails to do so the OWNER may, after having notified the CONTRACTOR, either pay unpaid bills or withhold from the CONTRACTOR'S unpaid compensation a sum of

money deemed reasonably sufficient to pay any and all such lawful claims until satisfactory evidence is furnished that all liabilities have been fully discharged where upon payment to the CONTRACTOR shall be resumed, in accordance with the terms of the CONTRACT DOCUMENTS, but in no event shall the provisions of this sentence be construed to impose any obligations upon the OWNER to either the CONTRACTOR, his Surety, or any third party. In paying any unpaid bills of the CONTRACTOR, any payment so made by the OWNER shall be considered as a payment made under the CONTRACT DOCUMENTS by the OWNER to the CONTRACTOR and the OWNER shall not be liable to the CONTRACTOR for any such payments made in good faith.

21.7. If the OWNER fails to make payment thirty (30) days after approval by the ENGINEER, in addition to other remedies available to the CONTRACTOR, there shall be added to each such payment interest at the maximum legal rate commencing on the first day after said payment is due and continuing until the payment is received by the CONTRACTOR.

22. ACCEPTANCE OF FINAL PAYMENT AS RELEASE

22.1. The acceptance by the CONTRACTOR of final payment shall be and shall operate as a release to the OWNER of all claims and all liability to the CONTRACTOR other than claims in stated amounts as may be specifically excepted by the CONTRACTOR for all things done or furnished in connection with this WORK ORDER and for every act and neglect of the OWNER and others relating to or arising out of this WORK ORDER. Any payment, however, final or otherwise, shall not release the CONTRACTOR or his sureties from any obligations under the CONTRACT DOCUMENTS or the Performance BOND and Payment BONDS.

23. INSURANCE

23.1. The CONTRACTOR shall purchase and maintain such insurance as will protect him from claims set forth below which may arise out of or result from the CONTRACTOR'S execution of the WORK, whether such execution be by himself or by any SUBCONTRACTOR or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

23.1.1. Claims under workmen's compensation, disability benefit, and other similar employee benefit acts:

23.1.2. Claims for damages because of bodily injury, occupational sickness or disease, or death of his employees:

23.1.3. Claims for damages because of bodily injury, sickness or disease, or death of any person other than his employees:

23.1.4. Claims for damages insured by usual personal injury liability coverage which are sustained (1) by any person as a result of an offense directly or indirectly related to the employment of such person by the CONTRACTOR, or (2) by any other person; and

23.1.5. Claims for damages because of injury to or destruction of tangible property, including loss of use resulting therefrom.

23.2. Certificates of Insurance acceptable to the OWNER shall be filed with the OWNER prior to commencement of the WORK. These Certificates shall contain a provision that coverages afforded under the policies will not be canceled unless at least fifteen (15) days prior WRITTEN NOTICE has been given to the OWNER.

23.3. The CONTRACTOR shall procure and maintain, at his own expense, during the CONTRACT TIME, liability insurance as hereinafter specified:

23.3.1. CONTRACTOR'S General Public Liability and Property Damage Insurance including vehicle coverage issued to the CONTRACTOR and protecting him from all claims for personal injury, including death, and all claims for destruction of or damage to property, arising out of or in connection with any operations under the CONTRACT DOCUMENTS, whether such operations be by himself or by any SUBCONTRACTOR under him, or anyone directly or indirectly employed by the CONTRACTOR or by a SUBCONTRACTOR under him. Insurance shall be written with a limit of liability of not less than $1,000,000 for all damages arising out of bodily injury, including death, at any time resulting therefrom, sustained by any one person in any one accident: and a limit of liability of not less than $1,000,000 aggregate for any such damages sustained by two or more persons in any one accident. Insurance shall be written with a limit of liability of not less than $500,000 for all property damage sustained by any one person in any one accident; and a limit of liability of not less than $500,000 aggregate for any such damage sustained by two or more persons in any one accident.

23.3.2. The CONTRACTOR shall acquire and maintain, if applicable, Fire and Extended Coverage insurance upon the PROJECT to the full insurable value thereof for the benefit of the OWNER, the CONTRACTOR, and SUBCONTRACTORS as their interest may appear. This provision shall in no way release the CONTRACTOR or CONTRACTOR'S surety from obligations under the CONTRACT DOCUMENTS to fully complete the PROJECT.

23.4. The CONTRACTOR shall procure and maintain, at his own expense, during the CONTRACT TIME, in accordance with the provisions of the laws of the state in which the work is performed. Workmen's Compensation Insurance, including occupational disease provisions, for all of his employees at the site of the PROJECT and in case any work is sublet, the CONTRACTOR shall require such SUBCONTRACTOR similarly to provide Workmen’s Compensation Insurance, including occupational disease provisions for all of the latter’s employees unless such employees are covered by the protection afforded by the CONTRACTOR. In case any class of employees engaged in hazardous work under this contract at the site of the PROJECT is not protected under Workmen's Compensation statue, the CONTRACTOR shall provide, and shall cause each SUBCONTRACTOR to provide, adequate and suitable insurance for the protection of his employees not otherwise protected.

23.5. The CONTRACTOR shall secure, if applicable, "All Risk" type Builder's Risk Insurance for WORK to be performed. Unless specifically authorized by the OWNER, the amount of such insurance shall not be less than the CONTRACT PRICE totaled in the BID. The policy shall cover not less than the losses due to fire, explosion, hail, lightning, vandalism, malicious mischief, wind, collapse, riot, aircraft, and smoke during the CONTRACT TIME, and until the WORK is accepted by the OWNER. The policy shall name as the insured the CONTRACTOR, the ENGINEER, and the OWNER.

24. CONTRACT SECURITY

24.1. The CONTRACTOR shall within ten (10) days after the receipt of the NOTICE OF AWARD furnish the OWNER with a Performance Bond and a Payment Bond in penal sums equal to the amount of the CONTRACT PRICE, conditioned upon the performance by the CONTRACTOR of all undertakings, covenants, terms, conditions, and agreements of the CONTRACT DOCUMENTS, and upon the prompt payment by the CONTRACTOR to all persons supplying labor and materials in the prosecution of the WORK provided by the CONTRACT DOCUMENTS. Such BONDS shall be executed by the CONTRACTOR and a corporate bonding company licensed to transact such business in the state in which the WORK is to be performed and named on the current "Department of the Treasury's Listing of Approved Sureties (Department Circular 570)." The expense of these BONDS shall be borne by the CONTRACTOR. If at any time a surety on any such BOND is declared a bankrupt or loses its right to do business in the state in which the WORK is to be performed or is removed from the listing of approved sureties, CONTRACTOR shall within ten (10) days after notice from the OWNER to do so, substitute an acceptable BOND (or BONDS) in such form and sum and signed by such other surety or sureties as may be satisfactory to the OWNER. The premiums on such BOND shall be paid by the CONTRACTOR. No further payments shall be deemed due nor shall be made until the new surety or sureties shall have furnished an acceptable BOND to the OWNER.

25. ASSIGNMENTS

25.1. Neither the CONTRACTOR nor the OWNER shall sell, transfer, assign, or otherwise dispose of the Contract or any portion thereof, or of his right, title, or interest therein, or his obligations thereunder, without written consent of the other party.

26. INDEMNIFICATION

26.1. The CONTRACTOR will indemnify and hold harmless the OWNER and the ENGINEER and their agents and employees from and against all claims, damages, losses, and expenses including attorney's fees arising out of or resulting from the performance of the WORK, provided that any such claims, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property including the loss of use resulting therefrom: and is caused in whole or in part by any negligent or willful act or omission of the CONTRACTOR, and SUBCONTRACTOR, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable.

26.2. In any and all claims against the OWNER or the ENGINEER, or any of their agents or employees, by any employee of the CONTRACTOR, any SUBCONTRACTOR, anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable, the indemnification obligation shall not be limited in any way be any limitation on the amount or type of damages, compensation, or benefits payable by or for the CONTRACTOR or any SUBCONTRACTOR under workmen's compensation acts, disability benefit acts or other employee benefits acts.

26.3. The obligation of the CONTRACTOR under this paragraph shall not extend to the liability of the ENGINEER, his agents or employees arising out of the preparation or approval of maps, DRAWINGS, opinions, reports, surveys, CHANGE ORDERS, designs, or SPECIFICATIONS.

27. SEPARATE CONTRACTS

27.1. The OWNER reserves the right to let other contracts in connection with this PROJECT. The CONTRACTOR shall afford other CONTRACTORS reasonable opportunity for the introduction and storage of their materials and the execution of their WORK, and shall properly connect and coordinate his WORK with theirs. If the proper execution or results of any part of the CONTRACTOR'S WORK depends upon the WORK of any other CONTRACTOR, the CONTRACTOR shall inspect and promptly report to the ENGINEER any defects in such WORK that render it unsuitable for such proper execution and results.

27.2. The OWNER may perform additional WORK related to the PROJECT by himself, or he may let other contracts containing provisions similar to these. The CONTRACTOR will afford the other CONTRACTORS who are parties to such Contracts (or the OWNER, if he is performing the additional WORK himself), reasonable opportunity for the introduction and storage of materials and equipment and the execution of WORK, and shall properly connect and coordinate his WORK with theirs.

27.3. If the performance of additional WORK by other CONTRACTORS or the OWNER is not noted in the CONTRACT DOCUMENTS prior to the execution of the CONTRACT, written notice thereof shall be given to the CONTRACTOR prior to starting any such additional WORK. If the CONTRACTOR believes that the performance of such additional WORK by the OWNER or others involves him in additional expense or entitles him to an extension of the CONTRACT TIME, he may make a claim therefor as provided in Sections 14 and 15.

28. SUBCONTRACTING

28.1. The CONTRACTOR may utilize the services of specialty SUBCONTRACTORS on those parts of the WORK which, under normal contracting practices, are performed by specialty SUBCONTRACTORS.

28.2. The CONTRACTOR shall not award WORK to SUBCONTRACTOR(S), in excess of fifty (50%) percent of the CONTRACT PRICE, without prior written approval of the OWNER.

28.3. The CONTRACTOR shall be fully responsible to the OWNER for the acts and omissions of his SUBCONTRACTORS, and of persons either directly or indirectly employed by them, as he is for the acts and omissions of persons directly employed by him.

28.4. The CONTRACTOR shall cause appropriate provisions to be inserted in all subcontracts relative to the WORK to bind SUBCONTRACTORS to the CONTRACTOR by the terms of the CONTRACT DOCUMENTS in so far as applicable to the WORK of SUBCONTRACTORS and to give the CONTRACTOR the same power as regards terminating any subcontract that the OWNER may exercise over the CONTRACTOR under any provision of the CONTRACT DOCUMENTS.

28.5. Nothing contained in this CONTRACT shall create any contractual relation between any SUBCONTRACTOR and the OWNER.

29. ENGINEER'S AUTHORITY

29.1. The ENGINEER shall act as the OWNER'S representative during the construction period. He shall decide questions which may arise as to quality and acceptability of materials furnished and WORK performed. He shall interpret the intent of the CONTRACT DOCUMENTS in a fair and unbiased manner. The ENGINEER will make visits to the site and determine if the WORK is proceeding in accordance with the CONTRACT DOCUMENTS.

29.2. The CONTRACTOR will be held strictly to the intent of the CONTRACT DOCUMENTS in regard to the quality of materials, workmanship, and execution of the WORK. Inspections may be made at the factory or fabrication plant of the source of material supply.

29.3. The ENGINEER will not be responsible for the construction means, controls, techniques, sequences, procedures, or construction safety.

29.4. The ENGINEER shall promptly make decisions relative to interpretation of the CONTRACT DOCUMENTS.

30. LAND AND RIGHTS-OF-WAY

30.1. Prior to issuance of WORK ORDERS, the OWNER shall obtain all land and rights-of-way necessary for carrying out and for the completion of the WORK to be performed pursuant to the CONTRACT DOCUMENTS, unless otherwise mutually agreed.

30.2. The OWNER shall provide to the CONTRACTOR information which delineates and describes the lands owned and rights-of-way acquired.

30.3. The CONTRACTOR shall provide at his own expense and without liability to the OWNER any additional land and access thereto that the CONTRACTOR may desire for temporary construction facilities, or for storage of materials.

31. GUARANTY

31.1. The CONTRACTOR shall guarantee all materials and equipment furnished and WORK performed for a period of one (1) year from the date of SUBSTANTIAL COMPLETION. The CONTRACTOR warrants and guarantees for a period of one (1) year from the date of SUBSTANTIAL COMPLETION of the system that the completed system is free from all defects due to faulty materials or workmanship and the CONTRACTOR shall promptly make such corrections as may be necessary by reason of such defects including the repairs of any damage to other parts of the system resulting from such defects. The OWNER will give notice of observed defects with reasonable promptness. In the event that the CONTRACTOR should fail to make such repairs, adjustments, or other WORK that may be made necessary by such defects, the OWNER may do so and charge the CONTRACTOR the cost thereby incurred. The Performance BOND shall remain in full force and effect through the guarantee period.

32. DISPUTES

32.1. If the parties are unable to resolve a dispute, claim, or controversy relating to this Contract by direct discussions or by voluntary nonbinding mediation, the OWNER and the CONTRACTOR may pursue their respective remedies at law or equity.

33. TAXES

33.1. The CONTRACTOR will pay all sales, consumer, use and other similar taxes required by the law of the place where the WORK is performed.

END OF SECTION

SECTION 00 7300

SUPPLEMENTAL GENERAL CONDITIONS

1. DEFINITIONS

1.1. The following shall be added to the definitions listed in the General Conditions:

(a) APPROVED - shall mean as approved, directed, required or permitted by the Engineer, unless specified otherwise.

(b) CITY, COUNTY, OR AUTHORITY - Goodlettsville, Tennessee

(c) CONTRACT DOCUMENTS - The Contract Documents shall also include Certificate of Owner's Attorney, General Conditions, Supplemental General Conditions, funding agency requirements, EEO and MBE/WBE requirements, wage rate decisions, and all other certificates, regulations and documents herein bound.

(d) ENGINEER - Trestles, LLC, or its lawfully designated successor.

(e) OWNER - City of Goodlettsville.

(f) OWNER'S ATTORNEY – Haynes, Freeman, & Bracey PLC

(g) SUBSTANTIAL COMPLETION - The determination as to whether the project is sufficiently complete so it can be utilized for its intended purposes will be based upon a consideration of completion items and submittals specified in the Specifications.

(h) SUPPLEMENTAL GENERAL CONDITIONS - Also such modifications to the General Conditions as the Owner or Engineer may deem necessary.

(i) THE SITE is the location of the proposed WORK as shown on the Drawings.

2. ADDITIONAL INSTRUCTIONS AND DETAIL DRAWINGS

2.1. (RESERVED)

3. SCHEDULES, REPORTS, AND RECORDS

3.1. Each such schedule is to be subject to change from time to time in accordance with the progress of the work.

3.2. The Contractor shall also furnish on forms to be supplied by the Owner and/or his Engineer:

(a) a detailed estimate giving a complete breakdown of a lump sum contract price and

(b) periodic itemized estimates of work done for the purpose of making partial payments thereon.

The costs employed in making up any of these schedules will be used only for determining the basis of partial payments and will not be considered as fixing a basis for additions to or deductions from the Contract Price.

4. DRAWINGS AND SPECIFICATIONS

4.1. The Drawings, Specifications and Addenda shall form part of this Contract and the provisions thereof shall be as binding upon the parties hereto as if they were herein fully set forth. The table of contents, titles, headings, running headlines and marginal notes contained in the Contract 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.

4.2. Upon award of the Contract, the Contractor upon request will be supplied free of charge up to six complete sets of the Drawings and Specifications. If the Contractor requests additional prints or specifications, they will be furnished to him at cost at the Contractor's expense.

4.3. The Contractor shall keep on the job a copy of the Drawings and Specifications and shall at all times give the Owner and Engineer access thereto. Anything mentioned in the Specifications and not shown on the Drawings or shown on the Drawings and not mentioned in the Specifications shall be of like effect as if shown or mentioned in both.

4.4. The Contractor shall not take advantage of any errors or omission which may exist in the Drawings and Specifications, but shall immediately call them to the attention of the Engineer whose prompt interpretation or correction thereof shall be conclusive.

5. SHOP DRAWINGS

5.1. After checking and verifying all field measurements, the Contractor shall submit to the Engineer for review one electronic PDF set of all Shop Drawings, which shall have been checked by and stamped with the approval of Contractor and identified as the Engineer may require. The data shown on the Shop Drawings will be complete with respect to dimensions, design criteria, materials of construction and the like to enable the Engineer to review the information as required.

5.2. The Contractor shall also submit for the Engineer's review 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 stamped with the approval of the Contractor, identified clearly as to material, manufacturer, any pertinent catalog numbers and the use for which intended.

5.3. At the time of each submission, the Contractor shall in writing call the Engineer's attention to any deviations that the Shop Drawing or sample may have from the requirements of the Contract Documents.

5.4. The Engineer will review with reasonable promptness those Shop Drawings and samples submitted in accordance with the Contractor's approved Submittal Schedule, but his review shall be only for general conformance with the information given in the Contract Documents. The Contractor shall make any corrections required by the Engineer and shall return the required number of corrected copies of Shop Drawings and resubmit new samples. The Contractor shall direct specific attention in writing or on resubmitted Shop Drawings to revisions other than the corrections called for by the Engineer on previous submissions. Contractor's stamp of approval on any Shop Drawing or sample shall constitute a representation to the Owner and the Engineer that the Contractor has either determined and verified all quantities, dimensions, field construction criteria, materials, catalog numbers, and similar data, or he assumes full responsibility for doing so, and that he has reviewed or coordinated each Shop Drawing or sample with the requirements of the work and the Contract Documents.

5.5. Engineer's review of Shop Drawings or samples shall not relieve the Contractor from his responsibility for any deviations from the requirements of the Contract Documents unless the Contractor has in writing called the Engineer's attention to such deviation at the time of submission and the Engineer has concurred in writing with the specific deviation, nor shall any review by the Engineer relieve the Contractor from responsibility for errors or omissions in the Shop Drawings.

5.6. Once approved, the Contractor shall submit four paper sets of all Shop Drawings.

6. MATERIALS, SERVICES AND FACILITIES

6.1. Any work necessary to be performed after regular working hours, on Sundays or on legal holidays, shall be performed without additional expense to the Owner.

6.2. The Contractor warrants that he has good title to all materials, supplies, and equipment used by him in the work.

6.3. All materials required in the work may be stored on the site upon which the project is to be constructed, subject to approval by the Engineer, but all such materials, tools, and machinery shall be neatly and compactly stored in such a manner as to not interfere with traffic and to cause the least inconvenience to the property owners. All fire hydrants must at all times be kept free and unobstructed, and water and gas shut-off boxes, underground power and telephone line manholes must not be covered by such materials.

6.4. Materials, tools, and machinery shall not be piled or placed against trees unless the trees shall be amply protected against injury therefrom. All materials, tools, machinery, etc., stored upon public thoroughfares must be provided with warning lights at night to warn the traffic of such obstruction.

6.5. The Contractor shall make his own arrangements for delivery and handling of equipment and materials as he may require for the prosecution of the work. The location of all temporary lines, roadways and similar facilities shall be subject to

the approval of the Engineer, and these shall be located and operated so as not to interfere with other work carried on by the Owner or by other contractors.

6.6. It is agreed that any temporary power lines, roadways or other facilities which the Contractor furnishes, installs, maintains, and removes at the completion of the work, may be used by the Owner or any of its contractors at such reasonable time or times as may be directed by the Engineer. Likewise it is provided that similar facilities of other contracts will become available to the Contractor under similar conditions.

6.7. Adequate sanitary facilities shall be provided by the Contractor. All such sanitary facilities shall conform to the requirements of the respective State and County Departments of Public Health.

6.8. Office space and furnishings for the Resident Project Representative, if required, will be as specified in the Specifications. If required, office space must be provided before the Contractor's first partial payment estimate will be approved. No separate payment shall be made for office space.

6.9. Contractor shall furnish six hard hats which shall be made available to authorized representatives and agents of the Owner and any interested governmental agency while visiting the job site.

7. INSPECTION AND TESTING

7.1. Where testing and inspection of materials or equipment are required by the Contract supplying the applicable materials and equipment, as no separate payment will be made for these services. The laboratory or inspection agency shall be approved by the Owner.

7.2. Where mill tests of materials are required by the Engineer under the Contract Documents, Contractor shall furnish certified copies of such mill tests.

7.3. Where shop equipment performance tests are specified, the Engineer shall be permitted to witness such tests. In the absence of a witnessed test, certified copies of shop tests shall be submitted at the discretion of the Engineer. Cost of Engineer's services and any travel and associated room and board to witness this test will be borne by the Contractor.

7.4. No payment will be made to the Contractor for samples taken for tests such as concrete cylinders, etc., where testing is required by the Contract Documents.

8. SUBSTITUTIONS AND “OR-EQUALS”:

8.1. The Owner, through the Engineer, will consider proposals for substitution of materials, equipment, and methods or “or-equal” items only when such proposals are accompanied by full and complete technical data and all other information required to evaluate the proposed substitution.

8.2. The Contractor shall not substitute materials, equipment, or methods unless such substitution or "or-equal" item has been specifically approved for this project by the Engineer.

8.3. The Contract, if awarded, will be on the basis of materials, equipment, and methods defined and specified in the Contract Documents, Specifications, and Drawings, or substitute or "or-equal" materials and equipment as defined in paragraph 8 of the General Conditions approved by the Engineer and identified by Addendum. Request for Engineer's clarification of materials and equipment considered "or-equal" prior to the Effective Date of the Agreement must be received by the Engineer at least 10 days prior to the date for receipt of bids. Request for Engineer's clarification of materials and equipment considered as substitutes prior to the Effective Date of the Agreement must be received by the Engineer at least 15 days prior to the date for receipt of bids. Each request must conform to the requirements of the General Conditions and shall be made only by the bidding Contractor. The burden of proof of the merit of the proposed item is upon the Contractor and the Engineer's decision of approval or disapproval will be final. If Engineer approves any proposed "or-equal" or substitute item, such approval will be set forth in an Addendum issued to all prospective Bidders. Bidding Contractors shall not rely upon approvals in any other manner.

8.4. The Contractor shall verify prior to bidding that all specified items will be available in time for installation during orderly and timely progress of the project.

8.5. In the event specified items will not be so available, the Contractor shall notify the Engineer prior to receipt of bids.

8.6. Costs of delays because of non-availability of specified items, when such delays could have been avoided by the Contractor, will be back charged as necessary and shall not be borne by the Owner.

8.7. In cases where experience clauses are used, an alternate bond or cash deposit may be accepted from manufacturers which do not meet the specified experience period. The bond or cash deposit provided by the manufacturer or supplier will guarantee replacement of the equipment or process in the event of failure or unsatisfactory service. The period of time for which the bond or cash deposit is required shall be the same as the experience period of the time specified.

9. PATENTS

9.1. License and/or royalty fees for the use of a process which is authorized by the Owner of the project must be reasonable and paid to the holder of the patent, or his authorized licensee, directly by the Owner and not by or through the Contractor.

10. SURVEYS, PERMITS, REGULATIONS

10.1. The baseline and benchmark, if applicable, are indicated on the Drawings. The Contractor shall be responsible for all surveying required for laying out and constructing the Work.

10.2. The Contractor shall procure all permits and licenses, pay all charges or fees, and give all notices necessary for the completion of the work.

11. SURVEYS, PERMITS, REGULATIONS

11.1. In order to protect the lives and health of his employees under the Contract, the Contractor shall comply with all pertinent provisions of the "Manual of Accident Prevention in Construction" issued by the Associated General Contractors of America, Inc., and shall maintain an accurate record of all cases of death, occupational disease and injury requiring medical attention or causing loss of time from work, arising out of and in the course of employment on work under the Contract.

11.2. The Contractor alone shall be responsible for the safety, efficiency, and adequacy of his plant, appliances and methods, and for any damage which may result from their failure or their improper construction, maintenance, or operation.

11.3. The Contractor shall, at his own expense, shore up and protect any buildings, bridges, or other public or private structures which may be encountered or endangered in the prosecution of the work, and that may not be otherwise provided for, and he shall repair and make good any damages to such property by reason of his operations. All existing fences which were removed by the Contractor due to prosecution of the work shall be replaced by the Contractor. No extra payment will be made for said work or materials.

11.4. Contractor shall repair or replace at his own expense any existing water pipes, power and communication lines, or other public utilities, roads, drain pipes, sewers, drainage ditches and all plantings (including grass) that are damaged during construction. The site shall be left in its present condition after all cleanup work has been done. Any damage to drainage or water pipes, local sewers, or plantings (including grass, utilities, roads, parking space, or other structures) shall be repaired and replaced immediately in the condition found. Such repairs and replacement shall be at the expense of the Contractor.

11.5. Contractor shall preserve all governmental markers (e.g. U.S.G.S., T.V.A., etc.), and none such will be removed or disturbed without prior approval of the Engineer. Any removal and replacement of such markers shall be at the expense of the Contractor.

11.6. The Contractor shall employ watchmen on the work as necessary to protect the work from damage, vandalism, etc., and shall, when necessary, erect and maintain such strong and suitable barriers and such lights as will effectually prevent the happening of any accident to health, limb or property. Lights shall be maintained between the hours of one-half hour before sunset and one-half hour after sunrise.

11.7. Contractor will be required, at his own expense, to do every thing necessary to support, protect and sustain all sewer, water or gas pipe; service pipes; electric lights; power, telephone, or telegraph poles; conduits; and other fixtures laid across or along the site of the work. The Engineer, as well as the company or

the corporation owning said poles, pipes or conduits, must be notified by the Contractor before any such fixtures are removed or molested. In case any of the said sewer, gas, or water pipes; service pipes; electric lights; power, telephone or telegraph poles; conduits; or other fixtures are damaged, they shall be repaired by the authorities having control of the same, and the expense of said repairs shall be deducted from the monies due or to become due the Contractor under this Contract.

11.8. Should it become necessary to temporarily change the position or remove any poles, electric conduits, water pipes, gas pipes, or other pipes or wires, the Contractor shall notify the Engineer and company or the corporation owning said poles, pipes or conduits of the location and circumstances, and shall cease work if necessary until satisfactory arrangements have been made by the owners of the said poles, pipes, conduits, or wires to properly care for the same. No claims for damages will be allowed on account of any delay occasioned thereby. The entire cost of such temporary changes or removal must be included in the unit or lump sum prices bid for the various items of work under this Contract.

11.9. In the event of temporary suspension of work, or during inclement weather, or whenever the Engineer shall direct, the Contractor will, and will cause his subcontractors to protect carefully his and their work and materials against damage or injury from the weather. If, in the opinion of the Engineer, any work or materials shall have been damaged or injured by reason of failure on the part of the Contractor or any of his subcontractors to so protect the work, such materials shall be removed and replaced at the expense of the Contractor.

11.10. Before, during, and after installation, the Contractor shall furnish and maintain satisfactory protection to all equipment against injury by weather, flood or breakage, thereby permitting the work to be left in a perfect condition at the completion of the contract. No extra payment will be made for this work but the entire cost of the same shall be included in the price bid for the construction of the work done under this contract.

11.11. All chemicals used during project construction or furnished for project operation, whether herbicide, pesticide, disinfectant, polymer, reactant, or of other classification, must show approval of either EPA or USDA. Use of all such chemicals and disposal of residues shall strictly conform with the manufacturer's instructions.

11.12. Reasonable care shall be taken during construction to avoid damage to vegetation. Ornamental shrubbery and tree branches shall be temporarily tied back, where appropriate, to minimize damage. Trees which receive damage to branches shall be trimmed of those branches to improve the appearance of the tree. Tree trunks receiving damage from equipment shall be treated with a tree dressing.

12. SUPERVISION BY CONTRACTOR

12.1. It is understood that the Contractor's representative shall be one who can be continued in that capacity for the particular job involved unless he ceases to be

on the Contractor's payroll. Changes in supervision must be approved by the Engineer.

13. CHANGES IN THE WORK

13.1. All Change Orders, including a change in technical design or an increase in cost, must be approved by the Owner, the Engineer and those governmental agencies whose approval is required.

13.2. Before executing any Change Order involving adjustment of the contract price, where necessary and desirable, the Contractor shall first obtain the consent of his surety.

13.3. No claim for extra work or cost shall be allowed unless the same was done in pursuance of a written order of the Engineer approved by the Owner. When the work is performed under the terms of the General Conditions, the Contractor shall furnish satisfactory bills, payrolls, and vouchers covering all items of cost and when requested by the Owner, give the Owner access to accounts relating thereto.

13.4. The location of utility lines, pavements, and other appurtenant construction shown on the Drawings may be raised or lowered, may be moved from one location to another, or may be lengthened or shortened by the Owner because of clearances needed, easement changes, design changes, or any other reason. In such case, the Contractor shall be entitled to payment for the work based on the unit prices shown in the Bid Schedule. No additional payment will be allowed because of such changes unless the Contractor notifies the Owner in writing prior to commencing that portion of the work and an appropriate change order is prepared.

13.5. If additional time is requested on account of a change in the work, the documentation of the basis for the requested time shall include a detailed justification and calculation relating the time extension to the project schedule and critical path. Any time extensions claimed for abnormal weather must be supported by historical weather records for the period in question. Generally, for changes that do not directly affect work elements on the critical path of the project, additional time will be granted only in proportion to the cost of the change over the original contract price.

13.6. Failure to submit the written notice or failure to document the basis for the change in contract price or time within the times specified shall bar the Contractor from all future claims for a change in contract price or an extension of time on account of the change.

13.7. Changes in contract price will not be granted in connection with so-called “Acts of God” or nature (i.e., floods, storms, earthquakes, etc.).

14. CHANGES IN CONTRACT PRICE

14.1. For any change in contract price, the Contractor shall submit a detailed price breakdown sufficient to permit analysis of all material, labor, equipment,

subcontract, and overhead costs, as well as profit, regardless of whether the change is an increase or a decrease in price. Any amounts claimed by subcontractors must be supported by a similar price breakdown.

14.2. The change in contract price shall be deemed to cover all costs, overhead, and profit attributable to the change, including any delays or impacts related thereto. There will be no reservation of rights for future or further increases in contract price in connection with a particular change.

15. TIME FOR COMPLETION AND LIQUIDATED DAMAGES

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

15.2. The Owner will suffer financial loss if the project is not "substantially completed" on the date set forth in the Contract Documents. The Contractor and his Surety shall be liable for and shall pay to the Owner the sums stipulated in the Bid or Contract as fixed, agreed, and liquidated damages for each calendar day of delay until the project is "substantially completed."

16. CORRECTION OF WORK

16.1. If, in the opinion of the Engineer, it is undesirable to replace any defective or damaged materials or to reconstruct or correct any portion of the work injured or not performed in accordance with the Contract Documents, the compensation to be paid to the Contractor hereunder shall be reduced by such amount as, in the judgment of the Engineer, shall be equitable.

17. SUBSURFACE CONDITIONS

17.1. Owner and Engineer make no representations or guarantee, either expressed or implied, about any subsurface conditions that may be encountered within the scope of the project. The Contractor should satisfy himself/herself by on-site inspections, core-drillings or other methods of the subsurface conditions that may be encountered. The risk of encountering and correcting such subsurface conditions shall be borne solely by the Contractor, and the Contract price shall include the cost of performing the work complete-in-place.

17.2. The Engineer may have made certain subsurface explorations in the vicinity of the work to be constructed under this Contract. These borings were made only for the Engineer's information in designing the project. Copies of these logs of borings and their locations will be provided to prospective Bidders upon request. These logs of borings are furnished only as information to Bidders for whatever interpretation and use they desire to make of conditions found when the borings were made. The Owner and Engineer do not warrant that the same conditions exist between borings and the Bidder shall satisfy himself as to the nature of the subsurface conditions throughout the project. If the Bidder wishes to make

borings at any location, he shall be afforded the opportunity to do so. Cost of such borings shall be at the Bidder's expense.

18. SUSPENSION OF WORK, TERMINATION, AND DELAY

18.1. In the event a portion of the work is delayed or interrupted, the Contractor shall continue to prosecute those portions of the work unaffected by the delay or interruption.

18.2. In the event of a delay or interruption in the work, the Contractor shall make reasonable and appropriate adjustments in his job site resources (manpower and equipment) to minimize the overall cost impact of the delay or interruption.

18.3. In the event of a delay or interruption in the work due to the failure of the Owner or Engineer to act within the time specified in the Contract Documents, or if no time is specified, within a reasonable time, the Contractor shall so notify the Engineer in writing immediately upon becoming aware of the delay. The Contractor shall submit a detailed justification for any claim for adjustment in contract price or extension in contract time on account of the delay or interruption as soon as the price or time impact can be quantified, but in no case later than 30 days following the end of the delay or interruption. Failure to submit the written notification or the justification within the time specified shall bar the Contractor from all future claims for adjustment in contract price or time on account of the delay.

19. PAYMENTS TO CONTRACTOR

19.1. No separate payment will be made for any items specified in the General Conditions or Supplemental General Conditions. Payments for such items shall be included in the unit price and lump sum prices bid by the Contractor for items listed in the Bid Schedule.

20. ACCEPTANCE OF FINAL PAYMENT AS RELEASE

20.1. (RESERVED)

21. INSURANCE

21.1. Each insurance policy shall be renewed at least 30 days before the expiration date thereof.

21.2. Insurance must be carried by a recognized insurance company licensed to do business in the state in which the project is constructed and approved by the Owner's Attorney.

21.3. The Contractor's and his Subcontractor's Public Liability and Property Damage Insurance shall provide protection in the amounts specified in Paragraph 21.3.1 of the General Conditions and as further specified in the Special Conditions (if included) against the following special hazards:

(a) Blasting damage

(b) Damage to existing structures

(c) Damage to private driveways, walks, shrubbery, plantings, etc.

(d) Damage to public utilities, electric, water, telephone, gas, sewerage, etc. Damage to U.S. Government markers.

21.4. The Contractor shall not commence work under this Contract until he has obtained all the insurance required and such insurance has been approved by the Owner, nor shall the Contractor allow any subcontractor to commence work on his subcontract until the insurance required of the subcontractor has been so obtained and approved.

21.5. In the event any insurance coverage should be canceled or allowed to lapse, Contractor will not be permitted to work until adequate and satisfactory insurance is in effect. Failure to keep insurance policies in effect WILL NOT be cause for any claims for extension of time under this Contract.

21.6. Limits of liability for general public liability and property damage insurance shall not be less than:

(a)	Bodily Injury	$1,000,000 each person $1,000,000 each occurrence
(b)	Property Damage	$500,000 each occurrence $500,000 aggregate

21.7. Limits of liability for comprehensive motor vehicle liability and property damage insurance.

(a)	Bodily Injury	$1,000,000 each person $1,000,000 each occurrence
(b)	Property Damage	$250,000 each occurrence

21.8. The Contractor shall provide builder's risk insurance to protect the Contractor and the Owner against risks of damage to buildings, structures, materials, and equipment not otherwise covered under installation floater insurance, from the perils of fire and lightning, the perils included in the standard extended coverage endorsement, and the perils of vandalism and malicious mischief. The amount of such insurance shall be not less than the insurable value of the work at completion less the value of the materials and equipment insured under installation floater insurance. If the work does not include the construction of building structures, builder's risk insurance may be omitted providing the installation floater insurance fully covers the work.

21.9. The Contractor shall provide installation floater insurance to protect the Contractor and the Owner from all insurable risks of physical loss or damage to materials, products and equipment not otherwise covered under builder's risk insurance while in warehouses or storage areas, during installation, during testing, and after the work is completed. Equipment such as pumps, motors, engine-generators, compressors, process equipment, switchgear, transformers, panel boards, control equipment, and other similar equipment shall be insured

under installation floater insurance when the aggregate value of the equipment exceeds $10,000.

21.10. If the work does not include the construction of building structures or installation of equipment, the builder's risk insurance and installation floater insurance may be omitted.

22. CONTRACT SECURITY

22.1. A Payment Bond in the amount of 100 percent of the contract price and a Performance Bond in the amount of 100 percent of the contract price shall be required in the form set forth in the Contract Documents.

23. ASSIGNMENTS

23.1. In case the Contractor assigns all or any part of any monies due or to become due under this Contract, the instrument of assignment shall contain a clause substantially to the effect that it is agreed that the right of the assignee in and to any monies due or to become due to the Contractor shall be subject to prior claims of all persons, firms and corporations for services rendered or materials supplied for the performance of the work called for in this contract.

24. INDEMNIFICATION

24.1. (RESERVED)

25. SEPARATE CONTRACTS

25.1. (RESERVED)

26. SUBCONTRACTING

26.1. The Contractor shall not award any work to any Subcontractor without prior written approval of the Owner, which approval will not be given until the Contractor submits to the Owner a written statement concerning the proposed award to the Subcontractor, which statement shall contain such information as the Owner may require.

27. ENGINEER'S AUTHORITY

27.1. The Engineer may appoint such resident project representatives as he may desire. Scope of the resident project representative's authority will extend to all parts of the work and to the preparation and manufacture of the materials to be used. A resident project representative is placed on the work to keep the Engineer and Owner informed as to the progress of construction and the manner in which it is being done and also to call to the attention of the Contractor any deviation from the Drawings and Specifications.

27.2. The resident project representatives have the authority to reject defective material or work that is being improperly done subject to the final decision of the Engineer. The resident project representatives are not authorized to revoke,

alter, enlarge, or relax the provisions of these conditions, nor are they authorized to approve or accept any portion of the completed work, or to issue instructions contrary to the Drawings and Specifications.

27.3. The Contractor may request written instructions from the Engineer upon any important items which lie within the resident project representative's jurisdiction.

28. LAND AND RIGHTS-OF-WAY

28.1. In the event all land and rights-of-way have not been obtained as herein contemplated before construction begins, the Contractor shall begin the work upon such land and rights-of-way as the Owner may have previously acquired, and no claim for damages whatsoever will be allowed by reason of the delay in obtaining the remaining land and rights-of-way. Should the Owner be prevented or enjoined from proceeding with the work, or from authorizing its prosecution, either before or after the commencement, by reason of any litigation, or by reason of its inability to procure any lands or rights-of-way for the work, the Contractor shall not be entitled to make or assert claim for damage by reason of said delay, or to withdraw from the Contract except by consent of the Owner; but time for completion of the work will be extended to such time as the Owner determines will compensate for the time lost by such delay such determination to be set forth in writing.

29. GUARANTY

29.1. (RESERVED)

30. ARBITRATION

30.1. (RESERVED)

31. TAXES

31.1. (RESERVED)

32. CONFLICTING CONDITIONS

32.1. Any provision in any of the Contract Documents which may be in conflict or inconsistent with any of the paragraphs in the General Conditions or the Federal Regulations shall be void to the extent of such conflict or inconsistency except if when and as clarified by the Supplemental General Conditions. Interpretations of any conflicts not clarified may be requested by the Contractor in writing to the Engineer. In the event of conflicts between funding agency documents, the more restrictive will apply.

32.2. In case of unresolved conflict between items of the Contract Documents, the following order of precedence shall govern, with the higher item taking precedence over a lower item:

(a) Contract (including Supplemental Agreements and Change Orders thereto)

(b) Addenda
(c) Bid Proposal
(d) Supplemental General Conditions
(e) General Conditions
(f) Specifications
(g) Governing Standard Specifications
(h) Schedules on Drawings
(i) Notes on Drawings
(j) Details on Drawings
(k) Large Scale Drawings
(l) Small Scale Drawings
(m) Dimensions Given in Figures
(n) Scaled Dimensions

32.3. In the event of any discrepancy between any drawing and the figure written thereon, the figures, unless obviously incorrect, shall be taken as correct.

33. REQUIRED PROVISIONS DEEMED INSERTED

33.1. Each and every provision of law and clause required by law to be inserted in this Contract shall be deemed to be inserted herein, and the Contract shall be read and enforced as though it were included herein, and if through mistake or otherwise any such provision is not inserted, or is not correctly inserted, then upon the application of either party the Contract shall forthwith be physically amended to make such insertion or correction.

34. PROHIBITED INTEREST

34.1. No member of or delegate to Congress, or resident commissioner, shall be admitted to any share or part of this Contract or to any benefit that may arise therefrom, but this provision shall not be construed to extend to this Contract if made with a corporation for its general benefit.

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

35. USE OF PREMISES AND REMOVAL OF DEBRIS

35.1. The Contractor expressly undertakes at his own expense:

(a) To take every precaution against injuries to persons or damage to property;

(b) To store his apparatus, materials, supplies and equipment in such orderly fashion at the site of the work as will not unduly interfere with the progress of his work or the work of any other contractors;

(c) To place upon the Work or any part thereof only such loads as are consistent with the safety of that portion of the Work;

(d) To clean up frequently all refuse, rubbish, scrap materials and debris caused by these operations, to the end that at all times the site of the Work shall present a neat, orderly and workmanlike appearance;

(e) Before final payment to remove all surplus material, false work, temporary structures, including foundations thereof, plant of any description and debris of every nature resulting from his operations, and to put the site in a neat, orderly condition;

(f) To effect all cutting, fitting or patching of his work required to make the same to conform to the Drawings and Specifications and, except with the consent of the Engineer, not to cut or otherwise alter the work of any other contractor.

36. ESTIMATE OF QUANTITIES

36.1. Wherever the estimated quantities of work to be done and materials to be furnished under this Contract are shown in any of the Contract Documents including the proposal, they are given for use in comparing Bids, and the right is especially reserved except as herein otherwise specifically limited, to increase or diminish them as may be deemed reasonably necessary or desirable by the Owner to complete the Work contemplated by this Contract, and such increase or decrease shall in no way nullify this Contract, nor shall any such increase or decrease give cause for claims or liability for damages.

37. CONTRACTOR'S OBLIGATIONS

37.1. The Contractor shall in good workmanlike manner perform all work and furnish all supplies and materials, machinery, equipment, facilities and means, except as herein otherwise expressly specified, necessary or proper to perform and complete the Work required by this Contract, within the time herein specified, in accordance with the provisions of this Contract and said Specifications and in accordance with the Drawings covered by this Contract and all supplemental drawings, and in accordance with the directions of the Engineer as given from time to time during the progress of the Work. He shall furnish, erect, maintain and remove such construction plant and such temporary works as may be required. The Contractor shall observe, comply with and be subject to all terms,

conditions, requirements, and limitations of the Contract and Specifications and shall do, carry on, and complete the entire work to the satisfaction of the Engineer and the Owner.

37.2. The Contractor shall restore disturbed areas to original or better condition.

37.3. When work performed under this Contract is in areas where easements and working agreements have been obtained by the Owner on private properties, it shall be the responsibility of the Contractor to protect trees, shrubs, gardens, etc., insomuch as is possible and to restore said properties to the satisfaction of the property owners, said protection and restoration shall include but not be limited to the fencing off of trees and shrubs, transplanting of trees and shrubs, etc., replacing topsoil removed with topsoil of equal or better quality, regrassing, and replacing fences. All expenses for said protection and restoration shall be borne by the Contractor, and no separate payment shall be made for this work.

37.4. When work is done on private property in easements and working agreements obtained by the Owner, the Contractor shall furnish affidavits from the property owners attesting to the fact that their property has been satisfactorily restored before that portion of the work will be considered for final payment.

38. PAYMENTS BY CONTRACTOR

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

39. INFORMATION TO BE FURNISHED

39.1. Contractor shall fill out all questionnaire forms completely in preparing his Bid and after award shall supply to the Engineer all pertinent information required.

40. WAIVER

40.1. It is expressly understood and agreed that any waiver granted by the Engineer or the Owner of any term, provision or covenant of this Contract shall not constitute a precedent nor breach of the same or any other terms, provisions or covenants of this Contract.

40.2. Neither the acceptance of the Work by the Owner nor the payment of all or any part of the sum due the Contractor hereunder shall constitute a waiver by the

Owner of any claim which the Owner may have against the Contractor or surety under this Contract or otherwise.

41. CONNECTING OF EXISTING WORK

41.1. Contractor shall remove such existing masonry and piping as is necessary in order to make the proper connections to these structures at the locations shown. Also, he shall make the necessary pipeline, roadway, and other connections at the several points in order that on completion of the Contract, all required flows may flow through the several pipelines and structures. No extra payment shall be made for this work, but the entire cost of the same shall be included in the price bid for the various items of the Work to be done under this Contract.

42. PROGRAM AND METHOD OF CONSTRUCTION

42.1. The order or sequence of execution of the Work and the general arrangements of the construction plant to be installed shall at all times be subject to the review of the Engineer. If at any time before the commencement or during the progress of the Work, or any part of it, such features, and appliances used or to be used appear to the Engineer as insufficient, or improper, he may order the Contractor to improve their character, and the Contractor shall conform to such orders, but the failure of the Engineer to demand any increase of safety, efficiency, adequacy, or any improvement shall not release the Contractor from his obligation to secure the safe conduct and quality of the Work specified.

43. BUILDINGS AND SHANTIES

43.1. No shanties, camps, or buildings for the housing of men employed on the Work shall be erected on land owned or leased by the Owner unless a permit, in writing, is secured from the Owner allowing their construction. Should permission be asked and granted, the Contractor must comply with all regulations regarding the construction and maintenance of such buildings.

44. CONSTRUCTION METHODS AND PROTECTION OF PROPERTIES

44.1. Cooperation with Utilities - The Contractor shall be cooperative at all times with all utilities, or their duly authorized agent or contractor, installing or connecting new services and shall coordinate all phases of the work with said utilities to avoid unnecessary delays or complications.

44.2. Damage to Property

(a) The Contractor is warned to prevent excessive dust or air pollution that may disfigure or soil any public or private facilities. The use of water sprinklers or other approved devices to reduce dust will be necessary if such is the case. Additionally, in cases of heavy rains or storms, every effort shall be made to prevent mud or water which may result due to the construction from accumulating on or damaging any property or any private owner.

(b) Contractor shall use special care in working in areas where the right-of-way crosses private property. Contractor shall also replace, at his/her own expense, any existing water pipes, power lines, communication lines, or other public utilities, roads, drain pipes, sewers, drainage ditches, and all plantings including grass and/or sod on private property. The site shall be left in its present condition after all cleanup work has been done. Any damage to drainage pipes, water pipes, local sewers, plantings (including grass and/or sod), utilities, roads, parking space, or other structures shall be repaired and replaced immediately in the condition found. Such repairs and replacement shall be at the expense of the Contractor.

44.3. Existing Sanitary, Combined and/or Storm Sewers

(a) Whenever existing sewers are broken or damaged as a result of traffic or excavation by the Contractor, the maintenance, replacement, and/or repairs to the damaged existing sanitary, combined, and/or storm sewer shall be the Contractor's responsibility, except as otherwise provided for on the Drawings and in the Contract Documents, or as authorized by the Engineer, and the expense of maintaining, repairing, replacing, or connecting to existing sewers shall be borne by the Contractor.

(b) No separate payment will be made for handling sewage from existing sewers or interrupted connections, since it shall be the responsibility of the Contractor to maintain services until such time as the proposed or relocated sewers can be constructed. If the Contractor should damage any existing sewer, such that it affects the public interest, health, or general welfare, the Contractor shall replace or repair that sewer at his/her own expense as directed by the Engineer.

(c) Contractor shall make all connections to existing sewerage facilities as shown on the Drawings.

45. SEWAGE, SURFACE, AND FLOOD FLOWS

45.1. The Contractor shall furnish all the necessary equipment, shall take all necessary precautions and shall assume the entire cost of handling any sewage, seepage, storm, surface, and flood flows which may be encountered at any time during the construction of the Work. The manner of providing for these flows shall meet the approval of the Engineer, and the entire cost of said work shall be included in prices bid for the various items of the Work to be done under this Contract.

45.2. The Contractor will minimize siltation and bank erosion during construction.

45.3. During the period of construction the Contractor shall cooperate with the Owner's employees in maintaining all existing collection, pumping, and treatment facilities in operation. The cost of any temporary conveyances or bypass pumping shall be included in the price bid for other items of work under this Contract, as no separate payment will be made.

45.4. The Contractor shall not discharge or allow discharge of pollutants, as defined in the Clean Water Act, including fill and sediment, into waters of the State or

United States, including wetlands, unless authorized by an appropriate State or Federal permit. This prohibition specifically applies to silt and sediment in storm water runoff and in water pumped from trenches and excavations.

45.5. In the event that pollutants are discharged or otherwise released to the environment as the result of the Contractor's negligence or unlawful conduct, it is understood and agreed that the Contractor shall bear all risks associated with such release(s), shall indemnify the Owner and the Engineer from any liabilities resulting from the release(s), and shall not make any claim for additional compensation for delays or damage resulting from such release(s).

46. OBSTRUCTIONS ENCOUNTERED

46.1. In addition to showing the structures to be built under this Contract, the Drawings show certain information obtained by the Owner regarding the pipelines and other structures which exist along the site of the Work, both at and below the surface of the ground. The Owner expressly disclaims any responsibility for the accuracy or completeness of the information given on the Drawings with regard to existing structures and pipelines, and the Contractor will not be entitled to any extra compensation on account of inaccuracy or incompleteness of such information, said structures and pipelines being shown only for the convenience of the Contractor who must verify the information to his own satisfaction. The giving of this information upon the Drawings will not relieve the Contractor of his obligations to support and protect all pipelines and other structures which may be encountered during the construction of the work and to make good all damages done to such pipelines and structures as provided in these Supplemental General Conditions.

47. USE OF STREETS

47.1. During the progress of the Work, the Contractor shall make ample provision for both vehicular and foot traffic on any public road, and shall indemnify and save harmless the Owner from any expense whatsoever due to his operations over said roadways. The Contractor shall also provide free access to all fire hydrants, water and gas valves located along the line of his work. Gutters and waterways must be kept open or other provisions made for the removal of storm water. Street intersections may be blocked only one-half at a time, and the Contractor shall lay and maintain temporary driveways, bridges and crossings such as in the opinion of the Engineer are necessary to reasonably accommodate the public and to provide access to needed private driveways. In the event of the Contractor's failure to comply with these provisions, the Owner may cause the same to be done and will deduct the cost of such work from any monies due or to become due the Contractor under this Contract, but the performance of such work by the Owner or at its insistence shall serve in no way to release the Contractor from his general or particular liability for the safety of the public or the Work.

47.2. Required line crossings of all streets and roads shall be done in accordance with the applicable state Department of Transportation procedures.

47.3. Contractor will be permitted to close a street when necessary for the proper prosecution of the work. The Contractor shall keep the Police and Fire Department continuously informed as to his intentions to close streets and give the Police Department sufficient notice in order that "No Parking" signs may be placed at the proper time to clear the street for construction.

47.4. The Contractor shall maintain property barricades and flagmen to detour traffic.

47.5. At all times the Contractor is responsible for damage to city and county streets as a result of their use in this project. The streets must be kept clear of all dirt, stone, or other debris. All debris, dirt, etc., whether caused by rains, storms, spillage from trucks or otherwise, shall be kept out of sewers. The Contractor is responsible for and may not plead ignorance of city and county ordinances and amendments thereto that may affect this use of streets or sewers.

48. CONSULTING AND RESIDENT OBSERVATION SERVICES DURING CONSTRUCTION

48.1. In providing the Owner with consulting services and resident project representation during construction, the Engineers and their employees do not assume any duty to supervise construction means or methods and safety procedures followed by any contractor, subcontractor and/or their respective employees or to any other person; nor for any public liability or for property damage caused through acts of the Contractor, subcontractor and/or their respective employees or any other person.

49. SAFETY AND HEALTH REGULATIONS

49.1. The Contractor shall comply with the Department of Labor Safety and Health Regulations for construction promulgated under the Occupational Safety and Health Act of 1970 (PL 91-596) and under Section 107 of the Contract Work Hours and Safety Standards Act (PL 91-54).

49.2. Contractor shall allow free access to any Department of Labor Representative for inspection purposes.

50. ACCESS BY REPRESENTATIVES OF GOVERNMENTAL AGENCIES

50.1. The authorized representatives and agents of all governmental agencies involved in this project shall have access to the work at all times and shall be permitted to inspect all work, materials, payrolls, records of personnel, invoices of materials, and other relevant data and records. Contractor shall provide proper facilities for the access and inspection of the work by such persons.

51. LOCAL AND STATE LAWS

51.1. The Contractor shall abide by all local and State laws or ordinances to the extent that such requirements do not conflict with Federal laws or regulations.

52. NEW JOB OPPORTUNITIES (WHERE REQUIRED BY FUNDING AGENCY ONLY)

52.1. The Contractor shall:

(a) To the maximum extent practicable, follow hiring and employment practices which will assure that performance of the Work results in new job opportunities for the unemployed and the underemployed; and

(b) Insert or cause to be inserted the same or similar provisions in each construction subcontract.

53. CONSTRUCTION RESTRICTIONS

53.1. Heavy construction machinery shall not be used within 500 feet of residential areas between the hours of 06:30 p.m. and 6:30 a.m except as otherwise provided herein.

53.2. No blasting or drilling shall be performed within 500 feet of residential areas between the hours of 06:30 p.m. and 6:30 a.m.

54. LEAD BASE PAINT AND JOINT SEALERS

54.1. No lead-based paints, protective coatings or joint sealers may be used on this project.

55. ASPHALT

55.1. Pursuant to the conditions as set out in the Specifications for hot asphaltic concrete binder and surface courses with particular reference to the limitations or temperature and weather conditions, the Owner may at its option and upon written notice, suspend the Contract over the winter and bad weather months. The Contract may then be resumed when weather conditions will permit the application of the above pavement, at the discretion of the Engineer. The notice to resume said contract shall be in writing. The suspended period will in no way be counted against the Contractor's allotted time to do the entire work.

55.2. This provision does not relieve the Contractor of the responsibility to maintain existing work already completed or any other responsibilities of the Contract; nor shall the Contractor, upon the basis of this fair notice herein; be eligible to make claim for or receive any damages for loss of overhead, plant expense, or anticipated profits, nor any other expenses incurred due to delay.

56. ABANDONMENT OR TERMINATION OF CONTRACT

56.1. For contracts over $10,000, the Owner reserves the right to abandon the Contract if it will be in the Owner's best interest. The Contractor will be paid a fair payment, as negotiated with the Owner, for the work completed to date.

57. EVIDENCE OF PAYMENT

57.1. Contractor may be asked to present acceptable evidence from time to time that all bills have been paid for labor, materials, and equipment for which payment on account has been made in monthly estimates. Before final payment is made, Contractor shall, if required by the Owner, present sworn affidavit that all labor,

materials, equipment, and service engaged for the work have been paid in full and that there are no outstanding debts or liens on any portions of the work.

58. ACCESSIBILITY OF RECORDS (PROJECTS WITH FEDERAL FUNDS ONLY)

58.1. The Owner, representatives of applicable federal agencies, the Comptroller General of the United States, or any of their duly authorized representatives, for a period of three years beyond completion of the Contract, shall have access to any books, documents, papers, and records of the Contractor which are directly pertinent to this Project for the purpose of making audit, examination, excerpts, and transcriptions of contracts in excess of $10,000.

59. WORK WEEK, OVERTIME PAY, SHOW-UP PAY, AND ON-CALL PAY

59.1. All work performed under this Contract shall be performed on a 40-hour work week basis and shall include not only the prime Contractor but any and all subcontractors. The 40-hour work week shall be established by the Contractor at the Pre-construction Conference. Any deviation from the established work week will be approved in advance in writing by the Owner. Any additional cost incurred by the Owner due to deviations from the established work week will be borne by the Contractor. The Contractor shall provide written acknowledgment that he will pay any overtime cost incurred by the Owner at the time of requesting an increase in the 40-hour work week.

59.2. The Contractor will be assessed for each hour of overtime incurred by the Engineer's field representative(s) as a result of extended work hours (i.e., a total of more than 40 hours per calendar week) by the Contractor or his subcontractors.

59.3. If the Contractor advises the Engineer's field representative(s) that he will work on a particular day and subsequently decides not to work and does not so advise the representative(s) before he departs for the job site, the Contractor will be assessed an amount equal to 2 hours of the representative's time for "show-up" pay plus round-trip travel time and mileage. Show-up pay will not be assessed in the event of inability to work due to unanticipated inclement weather.

59.4. If the Contractor requests that the Engineer's field representative(s) be available to work on a weekend or a holiday but does not actually commit to work, the Contractor will be assessed an amount equal to 8 hours of the representative's time for "on-call" pay for each day that the Contractor so requests.

59.5. The above assessments for field representative's overtime pay, show-up pay, and on-call pay will be deducted as a separate line item on the Contractor's next progress payment request. Unless otherwise stated, the Engineer's field representative's time will be assessed at $60.00 per hour for regular time and $90.00 per hour for overtime.

59.6. Available working times are Monday through Friday, 6:30 a.m. to 6:30 p.m except as otherwise provided herein. Work outside these times shall only be performed with the Owners permission.

END OF SECTION

SECTION 00 7373

SUPPLEMENTAL GENERAL CONDITIONS FOR TENNESSEE

A. LOCAL AND STATE LAWS

Senate Bill No. 1726 (Public Acts 1978 [Chapter 692]), known as the Underground Utility Damage Prevention Act (and all amendments thereto), enacted by the General Assembly of the State of Tennessee, is in its entirety to be considered a part of these documents.

B. TENNESSEE WATER QUALITY CONTROL ACT OF 1977

Tennessee Code Annotated (TCA) 69-3-108, Rule 1200-4-10-.05 (General NPDES Permit for Storm Water Discharges Associated with Construction Activity) requirements, in their entirety, shall be considered a part of these documents.

C. CONTRACTORS LICENSING ACT OF 1976

House Bill No. 2180 (Public Chapter No. 882) known as the Contractors Licensing Act of 1976 (and all amendments thereto), enacted by the General Assembly of the State of Tennessee, is in its entirety to be considered a part of these Specifications.

D. BLASTING - T.C.A. §68-105-103

Persons who conduct blasting operations must notify Department of Commerce and Insurance at least 72 hours prior to the commencement of the operation. Civil penalties may be imposed for failure to comply.

E. ESCROW ACCOUNT OF CONTRACTOR RETAINAGE (Contracts over $500,000)

1. Tennessee Code Annotated (TCA) 66-34-104 as amended (Public Chapter No. 340) House Bill No. 966 and Senate Bill No. 388. If applicable, the Owner will set up separate escrow account for deposit of retainage due Contractor in accordance with TCA 66-34-104 and amendments. These requirements shall be a part of these Specifications in their entirety.

2. TCA 66-34-104. Retention of Portion of Contract Price in Escrow — Applicability — Mandatory Compliance

    (a) Whenever, in any contract for the improvement of real property, a certain amount or percentage of the contract price is retained, that retained amount shall be deposited in a separate, interest bearing, escrow account with a third party which must be established upon the withholding of any retainage.

    (b) As of the time of the deposit of the retained funds, the funds shall become the sole and separate property of the prime contractor or remote contractor to whom they are owed, subject to the rights of the person withholding the retainage in the event the prime contractor or remote contractor otherwise entitled to the funds defaults on or does not complete its contract.

(c) In the event that the party withholding the retained funds fails to deposit the funds into an escrow account as provided herein, such party shall be responsible for paying the owner of the retained funds an additional three hundred dollar ($300) penalty per day for each and every day that such retained funds are not deposited into such escrow account.

(d) The party with the responsibility for depositing the retained amount in a separate, interest-bearing, escrow account with a third party shall have the affirmative duty to provide written notice that it has complied with the requirements of this section to any prime contractor upon withholding the amount of retained funds from each and every application for payment, including:

1. Identification of the name of the financial institution with whom the escrow account has been established;

2. Account number; and

3. Amount of retained funds that are deposited in the escrow account with the third party.

(e) Upon satisfactory completion of the Work Order, to be evidenced by a written release by the owner or prime contractor owing the retainage, all funds accumulated in the escrow account together with all interest on the account shall be paid immediately to the prime contractor or remote contractor to whom the funds and interest are owed.

(f) In the event the owner or prime contractor, as applicable, fails or refuses to execute the release provided for in subsection (c), then the prime contractor or remote contractor, as applicable, may seek any remedy in a court of proper jurisdiction and the person holding the fund as escrow agent shall bear no liability for the nonpayment of the fund to the prime contractor or remote contractor; provided, however, that all claims, demands, disputes, controversies, and differences that may arise between the owner, prime contractor or prime contractors, and remote contractor or remote contractors regarding the funds may be, upon written agreement of all parties concerned, settled by arbitration conducted pursuant to the Tennessee Uniform Arbitration Act, compiled in title 4, chapter 5, part 3, or the Federal Arbitration Act, 9 U.S.C. § 1, et seq., as may be applicable.

(g) In contracts to which the state or any department, board or agency of the state, including the University of Tennessee, is a party, interest shall be paid on the retained amounts at the same rate interest is paid on the funds of local governments participating in the local government investment pool established pursuant to § 9-4-704, for the contract period.

(h) The provisions of this section shall be applicable to the state, any department, board or agency of the state, including the University of Tennessee, and all counties and municipalities and all departments, boards or agencies of the counties and municipalities, including all school and education boards, and any other subdivision of the state.

(i) This section shall be applicable to all prime contracts and all subcontracts thereunder for the improvement of real property when the contract amount of such prime contract is five hundred thousand dollars ($500,000) or greater, notwithstanding the amount of such subcontracts.

(j) Compliance with this section shall be mandatory, and may not be waived by contract.

(k) Failure to deposit the retained funds into an escrow account as provided herein, within seven (7) days' receipt of written notice regarding such failure, is a class A misdemeanor.

[Acts 1975, ch. 345, §§ 1-4; TCA, §§ 64-1148—64-1151; Acts 1985, ch. 340, §§ 1, 2; 1986, ch. 551, § 9; 2007, ch. 189, § 43; 2007, ch. 201, §§ 1, 2; TCA § 66-11-144; Acts 2008, ch. 804, §§ 1, 2; 2010, ch. 875, § § 1, 2; 2012, ch. 609, § § 2-5.]

3. TCA 66-34-203. Withholding of Payment or Retainage by Owner

Nothing in this chapter shall prevent the owner from reasonably withholding payment or a portion of a payment to the contractor; provided, that such withholding is in accordance with the provisions of the written contract between the owner and the contractor. The owner may also withhold a reasonable amount of retainage as specified in the written contract between the owner and the contractor; provided, however, that the retainage amount may not exceed five percent (5%) of the amount of the contract.

[Acts 1991, ch. 45, § 1; 2007, ch. 201, § 4.]

4. TCA 66-34-103. Withholding of Retainage — Violations — Penalties

(a) All construction contracts on any project in this state, both public and private, may provide for the withholding of retainage; provided, however, that the retainage amount may not exceed five percent (5%) of the amount of the contract.

(b) The owner, whether public or private, shall release and pay all retainages for work completed pursuant to the terms of any contract to the prime contractor within ninety (90) days after completion of the work or within ninety (90) days

after substantial completion of the project for work completed, whichever occurs first. As used in this subsection (b), work completed shall be construed to mean the completion of the scope of the work and all terms and conditions covered by the contract under which the retainage is being held. The prime contractor shall pay all retainages due any subcontractor within ten (10) days after receipt of the retainages from the owner. Any subcontractor receiving the retainage from the prime contractor shall pay to any subcontractor or material supplier all retainages due the subcontractor or material supplier within ten (10) days after receipt of the retainages.

(c) Any default in the making of the payments shall be subject to those remedies provided in this part.

(d) In the event that an owner or prime contractor withholds retainage that is for the use and benefit of the prime contractor or its subcontractors pursuant to § 66-34-104(a) and (b), neither the prime contractor nor any of its subcontractors shall be required to deposit additional retained funds into an escrow account in accordance with § 66-34-104(a) and (b).

(e) (1) It is an offense for a person, firm, or corporation to fail to comply with subsection (a) or (b) or § 66-34-104(a).

(2) (A) A violation of this subsection (e) is a Class A misdemeanor, subject to a fine only of three thousand dollars ($3,000).

(B) Each day a person, firm or corporation fails to comply with subsection (a) or (b) or § 66-34-104(a) is a separate violation of this subsection (e).

(C) Until the violation of this subsection (e) is remediated by compliance, the punishment for each violation shall be consecutive to all other such violations.

(3) In addition to the fine imposed pursuant to subdivisions (e)(2)(A) and (B), the court shall order restitution be made to the owner of the retained funds. In determining the appropriate amount of restitution, the formula stated in § 40-35-304 shall be used.

[Acts 2007, ch. 201, § 3; 2008, ch. 804, § 3; 2012, ch. 609, § 1.]

F. CONFLICTS BETWEEN DOCUMENTS

In the event of conflicts between funding agency documents, the more restrictive shall apply.

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01 1100

SUMMARY OF WORK

1. GENERAL

1.1. SCOPE

A. The work described in these Contract Documents consists of furnishing, delivering, and installing all materials, equipment, and products for the construction of the 2018 Sewer Rehabilitation and Improvements, as shown on the Drawings.

B. Furnish all materials, power, equipment, tools, labor, transportation, and other items necessary or convenient to the Contractor for the installation of the equipment, materials, and products specified or described in these Contract Documents and for the completion of all work to be performed by the Contractor as specified herein.

C. The work includes, but is not limited to, the following major work elements: pipe bursting of gravity sewer, CIPP lining of gravity sewer, open cut replacement of gravity sewer, point repairs, manhole rehabilitation, sewer service lateral rehabilitation and replacement, CCTV investigation, and all other appurtenances necessary for a complete project as shown on the Drawings and Specifications. Incorporated by reference into these documents are the standards of the Owner titled “Specifications for Wastewater, City of Goodlettsville, Tennessee, September 2016”. In the event of a conflict between the Drawings and Specifications and the Owner standards, the more restrictive shall apply, subject to the interpretation of the Engineer.

1.2. SEQUENCE OF WORK

A. The work described in these Contract Documents shall be constructed in phases over the duration of the project. Each phase will be defined and initiated by a Work Order issued by the Owner and Engineer. The work will be within and throughout the sanitary sewer system of the City of Goodlettsville and will vary in location.

B. Each Work Order will consist of a Work Order Scope and location drawings detailing the work to be performed. Work shall commence within 10 days of issuance and the Contractor shall complete the work within the time specified within the Work Order. Work shall not commence until a video of the project location has been provided to the engineer as specified below.

C. Work on new Work Orders shall commence until the previous work order is a minimum of 85% complete and all previous work orders are complete to the satisfaction of the Owner and Engineer, including testing, cleanup, pavement repair, and final grading and seeding.

1.3. PROJECT COORDINATION

A. The Contractor shall be responsible for project coordination, which includes but is not limited to the following:

1. Work of employees and subcontractors under contract to him. Conduct work to ensure compliance with schedules.

2. Submission of all invoices, progress schedules, progress reports, progress estimates, and other data needed in support of requests for payment.

3. Product and equipment deliveries adequate to maintain the schedule of construction. Report noncompliance to Owner with a recommendation for remedy.

4. Obtaining and use of all temporary structures, offices, storage sheds, and utilities.

5. Obtaining any required building permits, special permits, and approvals from all authorities having jurisdiction.

6. Testing laboratory activities associated with Contractor's scope of work.

7. Check-out of systems and equipment and start-up operations.

8. Work and operations between the Contractor and all trades in such a manner that no union labor dispute of jurisdiction arises regarding unloading, handling, installations, and connections to utilities and otherwise of the various items in the various trades.

B. Coordination with Ongoing City Operations

1. No lanes shall be closed without prior approval from the City of Goodlettsville. The City shall be notified of lane closures a minimum of 48 hours in advance. During lane closures, priority shall be given to school buses and emergency vehicles to minimize impact to their operation.

2. At least one (1) lane shall remain open to traffic on all streets where work is being performed, unless noted otherwise.

3. One week prior to construction activities, the Contractor shall notify property owners adjacent to work areas in writing of proposed construction. The written notification shall include a brief description of activities to be accomplished, schedule of events, and an emergency contact phone number for the Contractor’s project superintendent.

4. The Contractor shall notify affected utility customers at least 24 hours before interrupting the customer’s service.

5. Work shall not be performed in residential areas between the hours of 6:00 p.m. and 7:00 a.m., unless noted otherwise or in the case of urgent necessity in the interest of public health and safety with Owner permission.

6. Where work shall occur in yards and easements near residences on surfaces that are not improved, the Contractor shall reduce impacts to these areas. Excavated material shall be stockpiled on plywood sheets to minimize disturbance to adjacent areas. Gravel shall be stockpiled in a central location and brought only as needed. Dump trucks shall not be used to bring construction materials or to remove excess excavated materials from these areas. Construction equipment (i.e. front-end loaders, backhoes, skid-steers, etc.) will be used within the easements to transport construction materials. Plywood shall be used to protect construction equipment pathways in locations that are not improved. Cleanup and surface restoration shall occur as work progresses, and properties shall not be left disturbed for an extended period of time. Stockpiles of excavated material shall not be left along right-of-ways or in residential areas and shall be stored in a central location in a safe manner.

1.4. SUBSTANTIAL COMPLETION

A. The work will not be considered to be fully functional and usable by the Owner for its intended purposes and will not be considered substantially complete until the following items are submitted:

1. Copies of final Operation and Maintenance Manuals in conformance with Section 01 7823, Operating and Maintenance Data.

2. Copies of Equipment Start-up Report and Certification Report forms signed by authorized factory representatives on items of process, mechanical, and control equipment in conformance with Section 01 3200, Schedules and Reports.

3. Delivery of specified spare parts and copies of signed Spare Parts Inventory Report forms in accordance with Section 01 3200, Schedules and Reports.

4. Training of Owner's operators and maintenance personnel as specified in the appropriate specification sections.

5. Delivery of specified keys for all permanent locks.

6. Copies of specified inspection and test reports and certifications on materials.

7. Copies of written warranties on equipment and products in accordance with Section 01 7836, Warranties and Bonds.

B. In addition to the above submissions, the work will not be considered to be fully functional and useful by the Owner for its intended purposes and will not be accepted as substantially complete until all of the following components and/or items have been completed (the requirements listed below shall apply to each Work Order unless noted otherwise):

1. Foundations and structures, including railings and gratings.

2. Process and mechanical equipment pumping systems.

3. Process and mechanical piping and valving, including pressure and leak testing.

4. Alarm, control systems, telemetry, and instrumentation.

5. Electrical panels and equipment.

6. Electrical and control wiring and conduits.

7. Check-out and start-up of equipment and controls, including telemetry, communication, and alarm systems, if provided.

8. Fencing. (Where damaged)

9. Roadways, parking areas, and stone surfaces.

10. Slope protection and riprap.

11. Signage and identification.

12. The following items, unless waived in writing by the Owner due to inclement weather:

    a. Finish grading.
    b. Seeding and mulching.
    c. Pavements. (Where damaged)
    d. Sidewalks. (Where damaged)

1.5. FINAL COMPLETION

A. The work under these Contract Documents will not be considered for final acceptance as complete until all of the following items have been completed or submitted (the requirements listed below shall apply to each Work Order unless noted otherwise):

1. Any items not completed at the time of substantial completion, including all remaining punch list items.

2. Final cleanup.

3. Restoration of all disturbed or damaged properties.

4. Executed project close-out documents included with the Contract Documents (only Certificate of Property Restoration and Certificate of Substantial Completion for each Work Order).

5. Record drawings (not required for each Work Order).

6. As-built surveys, if required by the Specifications (not required for each Work Order).

1.6. ACCEPTANCE AND START-UP OF OPERABLE COMPONENTS

A. Because of the need to maintain operation during construction, it may be necessary to accept as substantially complete and start-up operable components of the project at various times prior to the completion and acceptance of the entire project.

B. An "operable component" of the project, as used herein, shall mean a complete process subsystem capable of independent operation and shall include all associated structures, equipment, piping, controls, etc.

C. Acceptance and start-up of operable components shall not relieve the Contractor of his obligation to substantially complete the project within the Contract Time.

1.7. OWNER'S CONTINUED OCCUPANCY OF EXISTING FACILITIES

A. The Contractor shall perform his obligations as set forth in these Contract Documents in a manner that will not unduly hinder or jeopardize the continued operation or reliability of the Owner's wastewater treatment system in any way.

B. Construction activities or operations for which there is no alternative to a temporary shutdown or hindrance to the operation of the sanitary sewer system shall be carefully coordinated in advance with the wastewater superintendent through or in cooperation with the Engineer.

1.8. TEMPORARY SHUTDOWNS

A. Any leakage or spillage shall be promptly cleaned up by the Contractor.

B. The costs of temporary dewatering, pumping, piping, etc. shall be included in the lump sum price bid for the work. No separate payment will be made.

C. All construction activities requiring a temporary shutdown of system shall be clearly shown on the Contractor's Progress Schedule. The Contractor shall furnish the Engineer with a written description of the work to be accomplished during the proposed shutdown, a written work plan, and an estimate of the duration of the shutdown at least ten (10) working days prior to the scheduled shutdown.

D. Construction activities shall be planned and executed as required to minimize the duration of shutdowns.

E. Procurement. Contractor shall order and obtain all equipment, parts, valves, and materials needed for the work prior to any shutdown.

1.9. VIDEO

A. Prior to construction of each Work Order, Contractor shall color video record the entire project site including the route of any linear construction, all easements and right-of-way, and the route of all service lines where included in the construction. The Contractor shall identify the line designation and station number or mileage, all natural land marks, the street address of the area in view if available, and any other areas, structures, fences, trees, landscaping, etc., subject to potential disturbance. The Contractor shall provide the Owner with one (1) copy of the video on DVD with audio comments.

END OF SECTION

SECTION 01 2113

ALLOWANCES

1. GENERAL

1.1. ALLOWANCES IN CONTRACT SUM

A. Include allowances stated in the Contract Documents in the Contract Sum.

B. Use of the allowances shall be authorized in writing by the Engineer and approved by the Owner.

1.2. ADMINISTRATION OF ALLOWANCES

A. Contractor's duties in selection of products or provision of services under allowances.

1. Assist the Engineer and Owner in determining qualified suppliers or installers.

2. Obtain bids from suppliers and installers when requested by the Engineer.

3. Make appropriate recommendations for consideration of the Engineer.

B. Adjustment of Costs

1. Should the net cost be more or less than the specified amount of the allowance, the Contract Sum will be adjusted accordingly by Change Order.

2. At Contract Close Out, reflect approved changes to the Contract Sum in the final application for payment.

3. The Contractor will be limited to a maximum mark-up for overhead and profit of 15 percent on allowance items.

1.3. SPECIFIED ALLOWANCES

A. Owner specified miscellaneous items not covered in contract documents.

1. Include lump sum allowance of $100,000.

2. This allowance is provided to cover the cost of unspecified and necessary repairs to existing equipment and appurtenances discovered during the work.

END OF SECTION

SECTION 01 2200

MEASUREMENT AND PAYMENT

1. GENERAL

1.1. RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplemental Conditions and other Division 1 specification sections, apply to this section.

1.2. LUMP SUM PRICES

A. Lump sum prices shall include all items of work shown on the Drawings, specified, or otherwise required or necessary for complete, working systems including work, services, fees, equipment or material not specifically listed, overhead, profit, and applicable taxes.

B. A “Schedule of Values” is required to facilitate payment for partial completion of lump sum items as the project progresses.

1.3. UNIT PRICES

A. This section specifies administrative and procedural requirements for unit prices.

1. A unit price is an amount proposed by Bidders and stated in the Bid Schedule as a price per unit of measurement for materials or services that will be added to or deducted from the Contract Sum by Change Order in the event the estimated quantities of work required by the Contract Documents are increased or decreased.

2. Payment will be made only for those items listed in the Bid Schedule. All other items not specifically listed shall be deemed incidental and cost of same shall be included in other items of work.

3. Unit prices include all necessary material, overhead, profit and applicable taxes.

4. Refer to individual specification sections for construction activities requiring the establishment of unit prices. Methods of measurement and payment for unit prices are specified in Part 3 of this section.

B. Specification sections referenced in the Bid Schedule contain requirements for materials and methods described under each unit price.

2. PARTIAL PAYMENT

A. Partial payment may be made for stored material on site, providing:

1. The material meets the specifications outlined elsewhere in these documents.

2. The material is stored according to the recommendations of the Engineer and/or manufacturer.

3. The Contractor submits copies of all shipping invoices for the stored materials delivered to the site.

3. MEASUREMENT AND PAYMENT

3.1. SURFACE RESTORATION

A. Improved surfaces shall be defined as city streets. county roads, state roads, driveways, and parking lots that are paved with concrete, asphalt, or a combination thereof, including any concrete curb and gutter replacement. Not improved surfaces shall be defined as any remaining right-of-way or easement area that has not been equipped with an improved surface and is intended to receive final grading and seeding, sodding, or landscaping services.

3.2. MEASUREMENT AND PAYMENT - LUMP SUM

A. Measurement and payment for all items of work shown on the Drawings, specified, or otherwise required or necessary for complete, working systems shall be made at the lump sum prices listed in the Bid Schedule. No separate payment shall be made for items of work, services, fees, or equipment not specifically listed, but payment for those items shall be included in the payment for items listed.

B. Any bypass pumping that is required as part of the works is incidental, no separate payment allowed.

3.2. MEASUREMENT AND PAYMENT - UNIT PRICE

A. Pipe Bursting

1. HDPE Pipe Bursting, DR17, Gravity Sewer. Includes pipe and installation, connection to existing manholes, and inspection/testing. Linear footage is measured from centerline to centerline of the manholes rounded up to the nearest whole foot increment.

2. Insertion/Receiving Pit **(Improved).** Includes excavation, pipe bedding, backfill, temporary and permanent pavement repair, traffic control, and safety measures. 50% of this pay item will be payable upon completion of installation, cleanup, and disposal. 50% of this pay item will be payable upon completion of permanent pavement repair.

3. Insertion/Receiving Pit **(Not Improved).** Includes excavation, pipe bedding, backfill, and temporary and final grading and seeding.

4. Slipline Removal. Includes removal and disposal of existing HDPE pipe. Linear footage is measured from centerline to centerline of the manholes rounded up to the nearest whole foot increment.

5. Sag Repair **(Improved)**. Includes excavation, pipe bedding, backfill, temporary and permanent pavement repair, traffic control, and safety measures, up to 15 LF in length. 50% of this pay item will be payable upon completion of installation, cleanup, and disposal. 50% of this pay item will be payable upon completion of permanent pavement repair.

6. Sag Repair **(Not Improved)**. Includes excavation, pipe bedding, backfill, and temporary and final grading and seeding, up to 15 LF in length.

B. Cured-in-Place Pipe (CIPP)

1. CIPP Liner, Gravity Sewer. Includes liner and installation, connection to existing manholes, and inspection/testing. Linear footage is measured from centerline to centerline of the manholes rounded up to the nearest whole foot increment.

C. Open Cut

1. PVC, DR35, Gravity Sewer. Includes excavation, dewatering (if necessary), piping, installation, connection to new or existing manholes, modification to manholes, water stop, bedding, backfill, testing, initial grading or temporary surface restoration, and cleanup. Linear footage is measured along the centerline of the installed pipe. 10% of this pay item will be payable upon completion of testing. 15% of this pay item will be payable upon completion of cleanup and disposal. 75% of this pay item will be payable upon completion of all other specified and required elements. This line item is for the replacement of existing pipe within the same alignment and same grades.

2. Point Repair of Sewer **(Improved)**. Includes excavation, dewatering (if necessary), piping and installation, connection to existing piping, pipe bedding, backfill, testing, grading, temporary and permanent pavement repair, traffic control, and safety measures, up to 15 LF in length. 50% of this pay item will be payable upon completion of installation, cleanup, and disposal. 50% of this pay item will be payable upon completion of permanent pavement repair.

3. Point Repair of Sewer **(Not Improved)**. Includes excavation, dewatering (if necessary), piping and installation, connection to existing piping, pipe bedding, backfill, testing, and temporary and final grading and seeding, up to 15 LF in length.

4. ARAP Creek Crossing. Complete installation as indicated on the Drawings and Specifications. Includes excavation, piping, fittings, pipe restraint, concrete encasement, pipe embedment, backfill, surface restoration, pumping equipment, flow diversion, cofferdams, dewatering, sediment traps, silt boom, and all State and Federal agency permit requirements. This is a lump sum pay item.

5. Concrete Water Stop (CWS). Includes concrete, forming, dewatering (if necessary), and all associated work necessary for a complete installation as shown in the Contract Documents.

D. Surface Restoration

1. Pavement Repair. Type, location, and width as indicated on the Drawings and in the Specifications. Includes all Federal, State, and Local DOT permit requirements and traffic control. Linear footage is measured along the centerline of the installed pipe and along the centerline of the street for full width paving. This pavement repair pay item is only associated with open cut LF piping pay items. No separate payment shall be allowed for extending paving into existing paved driveways in order to provide a smooth transition. No separate payment will be allowed for replacing or repairing unpaved, crushed stone, gravel or chert street surfaces, driveways, or parking areas. No separate payment will be allowed for temporary pavement patches.

2. Crushed Stone Gravel Backfill. Includes gravel for backfill, not including pipe embedment, as indicated on the Drawings and in the Specifications. This pay item is only associated with open cut LF piping pay items under improved surfaces.

3. Final Grading and Seeding. Includes surface restoration (in kind), final grading, seeding, and straw in all areas with surfaces that are not improved. Linear footage is measured along the centerline of the installed pipe. This final grading and seeding pay item is only associated with open cut LF piping pay items.

F. Manholes

1. Manhole Replacement - Repair Method 1 **(Improved).** Includes excavation, removal and disposal of existing manhole, bypass pumping as required, dewatering (if necessary), subgrade preparation, precast concrete manhole, frame, cover, backfill, testing, temporary and permanent pavement repair, traffic control, safety measures, and all associated work necessary for a complete installation as shown in the Contract Documents. 50% of this pay item will be payable upon completion of installation, cleanup, and disposal. 50% of this pay item will be payable upon completion of permanent pavement repair.

2. Manhole Replacement - Repair Method 1 **(Not Improved).** Includes excavation, removal and disposal of existing manhole, bypass pumping as required, dewatering (if necessary), subgrade preparation, precast concrete manhole, frame, cover, backfill, testing, temporary and final grading and seeding, and all associated work necessary for a complete installation as shown in the Contract Documents.

3. Extra Depth for Manhole (Depths over 8 feet). Includes additional excavation and precast concrete rings for manhole replacement greater than 8 feet in depth.

4. Install Grout Lining - Repair Method 2. Includes bypass pumping as required, cleaning, acid washing, sealing of leaks, cracks and voids as required, liner material, and installation as shown in the Contract Documents. This item includes up to 600 mL of urethane grout injection to install on active leaks

prior to patching and liner application. A 4-foot diameter manhole is the basis for this item; larger manholes will be paid based on a square foot ratio per VF. This pay item is per Vertical Foot (VF) to be measured from the top of the bench to the top of the chimney.

5. Construct Bench and Channel - Repair Method 3. Includes bypass pumping as required, cleaning, and grouting and forming of manhole invert and bench as shown in the Contract Documents.

6. Install Manhole Insert in Frame - Repair Method 4. Includes installation of a manhole insert as shown in the Contract Documents and as recommended by the manufacturer.

7. Install Chimney Seal - Repair Method 5. Includes bypass pumping as required, cleaning, surface preparation, frame realignment as required, and seal installation as shown in the Contract Documents and as recommended by the manufacturer.

8. Replace Frame and Cover with Watertight Casting - Repair Method 6. Includes removal and disposal of existing frame and cover, precast grade rings as necessary, installation of a watertight manhole frame and cover, and temporary and final grading and seeding as shown in the Contract Documents.

9. Seal Pipe Connection to Manhole - Repair Method 7. Includes bypass pumping as necessary, removal of existing grout around pipe penetration, installation of gasket, and grouting as shown in the Contract Documents.

10. Reset Manhole Frame and Cover - Repair Method 8 **(Improved)**. Includes adjustment of existing manhole frame and cover to match existing grade, precast grade rings, anchoring to manhole, temporary and permanent pavement repair, traffic control, and safety measures as shown in the Contract Documents. 50% of this pay item will be payable upon completion of installation, cleanup, and disposal. 50% of this pay item will be payable upon completion of permanent pavement repair.

11. Reset Manhole Frame and Cover - Repair Method 8 **(Not Improved)**. Includes adjustment of existing manhole frame and cover to match existing grade, precast grade rings, anchoring to manhole, and temporary and final grading and seeding as shown in the Contract Documents.

12. Abandon Pipe Connection. Includes sealing and abandoning existing pipe connection to manhole.

13. Interior or Exterior Manhole Drop. Includes bypass pumping as required, existing manhole modification, drop bowl assembly, brackets, piping and installation, and surface restoration as shown in the Contract Documents.

14. Manhole Abandonment **(Improved)**. Includes excavation, removal and disposal of existing frame and cover, backfill, temporary and permanent pavement repair, traffic control, and safety measures as shown in the

Contract Documents. 50% of this pay item will be payable upon completion of installation, cleanup, and disposal. 50% of this pay item will be payable upon completion of permanent pavement repair.

15. Manhole Abandonment **(Not Improved)**. Includes excavation, removal and disposal of existing frame and cover, backfill, and temporary and final grading and seeding as shown in the Contract Documents.

16. Vent Pipe Assembly. Includes excavation, existing manhole modifications, vent piping, connection to manhole, concrete encasement, backfill, and temporary and final grading and seeding as shown in the Contract Documents.

G. Sewer Service Laterals (To Right-of-Way) – 50% of all pay items in this section will be payable upon completion of installation, cleanup, and disposal. 50% of all pay items in this section will be payable upon completion of surface restoration including final grading and seeding and/or permanent pavement repair.

1. Sewer Service Lateral Main Connection **(Improved)**. Includes reconnection of existing active service lines to replacement sewer main and/or manhole, testing, backfill, temporary and permanent pavement repair, traffic control, and safety measures as shown in the Contract Documents. It is the responsibility of the Contractor to verify all services. Payment will not be made for inactive service line excavations.

2. Sewer Service Lateral Main Connection **(Not Improved)**. Includes reconnection of existing active service lines to replacement sewer main and/or manhole, testing, backfill, and temporary and final grading and seeding as shown in the Contract Documents.

3. Sewer Service Lateral Line **(Improved)**. Includes installation of active service laterals between the sewer main and private service lateral at the ROW/property line, testing, backfill, temporary and permanent pavement repair, traffic control, and safety measures as shown in the Contract Documents. Payment for sewer service lateral lines shall be expressed in linear feet and shall be measured horizontally from the sewer main to the center of the cleanout cap located at the property line. It is the responsibility of the Contractor to verify all services. Payment will not be made for inactive service line excavations. Sewer service lateral line installation in areas with improved surfaces shall utilize trenchless methods. Open cut of any sewer service laterals with improved surfaces requires Engineer approval.

4. Sewer Service Lateral Line **(Not Improved)**. Includes installation of active service laterals between the sewer main and private service lateral at the ROW/property line, testing, backfill, and temporary and final grading and seeding as shown in the Contract Documents. Payment for sewer service lateral lines shall be expressed in linear feet and shall be measured horizontally from the sewer main to the center of the cleanout cap located at the property line. It is the responsibility of the Contractor to verify all services. Payment will not be made for inactive service line excavations.

5. Sewer Service Lateral Cleanout **(Improved)**. Includes installation of a cleanout and box in the service lateral line at the ROW/property line, backfill, temporary and permanent pavement repair, and connection to the existing sewer service lateral as shown in the Contract Documents.

6. Sewer Service Lateral Cleanout **(Not Improved)**. Includes installation of a cleanout and box in the service lateral line at the ROW/property line, backfill, temporary and final grading and seeding, and connection to the existing sewer service lateral as shown in the Contract Documents.

7. Cap and Abandon Service **(Improved)**. Includes installation of a capped cleanout and box in the sewer service lateral line at the ROW/property line, backfill, temporary and permanent pavement repair, and connection to the existing public sewer service lateral as shown in the Contract Documents. The existing private sewer service lateral shall not be reconnected.

8. Cap and Abandon Service **(Not Improved)**. Includes installation of a capped cleanout and box in the sewer service lateral line at the ROW/property line, backfill, temporary and final grading and seeding, and connection to the existing public sewer service lateral as shown in the Contract Documents. The existing private sewer service lateral shall not be reconnected.

H. Clean and CCTV Inspection. Includes all items as specified in Section 33 0130.16. This line item is not associated with any other specified pre or post CCTV requirements in conjunction with pipe bursting, CIPP, or open cut pipe replacement. This line item is to be performed with direction and approval from the Engineer. Payment of this line item will only be made once the required digital files and other specified deliverables are submitted to and approved by the Engineer.

I. Smoke Testing. Includes all items as specified in the NASSCO document "Smoke Testing, Performance Specification Guideline for Sanitary Sewer" dated December 2010. This line item is to be performed with direction and approval from the Engineer. Payment of this line item will only be made once the required digital files and other specified deliverables are submitted to and approved by the Engineer.

END OF SECTION

SECTION 01 2976

APPLICATIONS FOR PAYMENT

1. GENERAL

1.1. REQUIREMENTS INCLUDED

A. Submit Applications for Payment to the Engineer.

1.2. RELATED DOCUMENTS

A. Contract between Owner and Contractor.

B. General Conditions: Progress Payments, Retainages and Final Payment.

C. Section 01 7800, Project Closeout.

1.3. FORMAT AND INFORMATION REQUIRED

A. Review preliminary application with resident project representative.

B. Submit applications typed on forms acceptable to the Owner.

C. Provide itemized data on application:

1. Format, schedules, line items, unit prices, units completed by month and project-to-date, and values.

2. Documentation of employee wages, as requested.

1.4. PREPARATION OF APPLICATION FOR EACH PROGRESS PAYMENT

A. Application Form

1. Fill in required information, including that for Change Orders executed prior to date of submittal of application.

2. Fill in summary of dollar values to agree with respective totals indicated.

3. Fill in summary of dollar values to agree with respective totals indicated.

B. Continuation Sheets

1. Fill in total list of all scheduled component items of work, with item number and scheduled dollar value for each item.

2. Fill in dollar value in each column for each scheduled line item when work has been performed or products stored. Round off values to nearest dollar, or as specified for the Bid Schedule.

3. List each Change Order executed prior to date of submission. List by Change Order number and description, as for an original component item of work.

4. To receive approval for payment on component material stored on site, submit copies of the original paid invoices with the application for payment along with the material location report (see Section 01 3200, Schedules and Reports).

1.5. SUBSTANTIATING DATA FOR PROGRESS PAYMENTS

A. Substantiating Data. When the Owner or the Engineer requires substantiating data, submit suitable information, with a cover letter identifying:

1. Project.

2. Application number and date.

3. Detailed list of enclosures.

4. For stored products:

a. Item number and identification as shown on application.

b. Description of specific material.

B. Submit one copy of data and cover letter for each copy of application.

1.6. PREPARATION OF APPLICATION FOR FINAL PAYMENT

A. Fill in application form as specified for progress payments.

1.7. SUBMITTAL PROCEDURE

A. Submit Applications for Payment to the Engineer at the times stipulated in the Contract.

B. Number: Six copies of each application.

1.8. PROCESSING OF PERIODIC APPLICATIONS FOR PAYMENT

A. No applications for payment for work under this Contract will be processed until the Contractor's Preliminary Construction Schedule, Submittal Tabulation, and Schedule of Values are submitted in accordance with the requirements of Section 01 3200, Schedules and Reports.

B. No further applications for payment will be processed after the due date of the Contractor's Construction Schedule and Submittal Schedule until both schedules are submitted in conformance with the requirements of Section 01 3200, Schedules and Reports.

C. No applications will be processed for stored materials unless the application is accompanied with copies of original paid invoices and the Material Location Report specified in Section 01 3200, Schedules and Reports.

D. No applications for more than 80 percent of the Contract Price will be approved until copies of draft Operation and Maintenance Manuals are submitted in conformance with Section 01 7823, Operating and Maintenance Data.

E. No further applications for payment will be processed after the expiration of the Contract Time, including approved extensions thereof, until the date of Substantial Completion as described in these Contract Documents.

F. On projects that include Davis Bacon wage requirements, certified payrolls shall be submitted to the Engineer and/or Owner on a weekly basis. No applications for payment will be processed without the accompanying certified payrolls.

2. PRODUCTS (Not Used)

3. EXECUTION (Not Used)

END OF SECTION

SECTION 01 3119

PROJECT MEETINGS

1. GENERAL

1.1. SCOPE

A. This section specifies administrative and procedural requirements for project meetings including but not limited to:

1. Preconstruction Conference.
2. Pre-Installation Conferences.
3. Coordination Meetings.
4. Progress Meetings.

B. Construction schedules are specified in another Division 1 section.

1.2. RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplemental Conditions and other Division 1 specification sections, apply to this section.

1.3. PRECONSTRUCTION CONFERENCE

A. Attend and participate in a preconstruction conference and organizational meeting at the project site or other convenient location no later than 15 days after execution of the Agreement and prior to commencement of construction activities. Conduct the meeting to review responsibilities and personnel assignments.

B. Attendees. The Owner, Engineer and their consultants, the contractor and its superintendent, major subcontractors, manufacturers, suppliers and other concerned parties shall each be represented at the conference by persons familiar with and authorized to conclude matters relating to the work.

C. Agenda. Discuss items of significance that could affect progress including such topics as:

1. Tentative construction schedule.
2. Critical work sequencing.
3. Designation of responsible personnel.
4. Procedures for processing field decisions and Change Orders.
5. Procedures for processing Applications for Payment.
6. Distribution of Contract Documents.
7. Submittal of shop drawings, product data and samples.

8. Preparation of record documents.
9. Use of the premises.
10. Office, work and storage areas.
11. Equipment deliveries and priorities.
12. Safety procedures.
13. First aid.
14. Security.
15. Housekeeping.
16. Working hours.

1.4. PRE-INSTALLATION CONFERENCES

A. Conduct a pre-installation conference at the site before each construction activity that requires coordination with other construction. The installer and representatives of manufacturers and fabricators involved in or affected by the installation, and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise the Engineer of scheduled meeting dates.

1. Review the progress of other construction activities and preparations for the particular activity under consideration at each pre-installation conference, including requirements for:

a. Contract documents.
b. Options.
c. Related change orders.
d. Purchases.
e. Deliveries.
f. Shop drawings, product data and quality control samples.
g. Possible conflicts.
h. Compatibility problems.
i. Time schedules.
j. Weather limitations.
k. Manufacturer's recommendations.
l. Compatibility of materials.
m. Acceptability of substrates.
n. Temporary facilities.
o. Space and access limitations.
p. Governing regulations.
q. Safety.
r. Inspection and testing requirements.
s. Required performance results.
t. Recording requirements.
u. Protection.

2. Record significant discussions and agreements and disagreements of each conference, along with the approved schedule. Distribute the record of the meeting to everyone concerned, promptly, including the Owner and Engineer.

3. Do not proceed if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of work and reconvene the conference at the earliest feasible date.

1.5. COORDINATION MEETINGS

A. Conduct project coordination meetings at regularly scheduled times convenient for all parties involved. Project coordination meetings are in addition to specific meetings held for other purposes, such as regular progress meetings and special pre-installation meetings.

B. Request representation at each meeting by every party currently involved in coordination or planning for the construction activities involved.

C. Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

1.6. PROGRESS MEETINGS

A. Conduct progress meetings at the project site at regularly scheduled intervals but not less than monthly. Notify the Owner and Engineer of scheduled meeting dates. Coordinate dates of meetings with preparation of the payment request.

B. Attendees. In addition to representatives of the Owner and Engineer, each subcontractor, supplier or other entity concerned with current progress or involved in planning, coordination or performance of future activities shall be represented at these meetings by persons familiar with the Project and authorized to conclude matters relating to progress.

C. Agenda. Review and correct or approve minutes of the previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to the current status of the project.

1. Contractor's Construction Schedule: Review progress since the last meeting. Determine where each activity is in relation to the Contractor's Construction Schedule, whether on time or ahead or behind schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the contract time.

2. Contractor's Submittal Schedule: Review progress since the last meeting. Determine where each activity is in relation to the Contractor's Submittal Schedule, whether on time or ahead or behind schedule. Determine how submittals behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to

ensure that current and subsequent activities will be completed within the contract time.

3. Review the present and future needs of each entity present, including such items as:

    a. Interface requirements.
    b. Time.
    c. Sequences.
    d. Deliveries.
    e. Off-site fabrication problems.
    f. Access.
    g. Site utilization.
    h. Temporary facilities and services.
    i. Hours of work.
    j. Hazards and risks.
    k. Housekeeping.
    l. Quality and work standards.
    m. Change Orders.
    n. Documentation of information for payment requests.

D. Reporting. No later than 5 days after each progress meeting date, distribute copies of minutes of the meeting to each party present and to other parties who should have been present. Include a brief summary, in narrative form, of progress since the previous meeting and report.

1. Schedule Updating: Revise the construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue the revised schedule concurrently with the report of each meeting.

2. PRODUCTS (Not Applicable)

3. EXECUTION (Not Applicable)

END OF SECTION

SECTION 01 3200

SCHEDULES AND REPORTS

1. GENERAL

1.1. SUMMARY

A. General. This section specifies administrative and procedural requirements for schedules and reports required for proper performance of the work.

B. Coordination. Each prime Contractor shall closely coordinate scheduling and reporting with the scheduling and reporting of other prime Contractors.

C. Schedules required include:

1. Preliminary Construction Schedule, including Submittals Tabulation.
2. Contractor's Construction Schedule.
3. Submittal Schedule.
4. Schedule of Values.

D. Reports required include:

1. Daily Construction Reports.
2. Material Location Reports.
3. Field Correction Reports.
4. Spare Parts Inventory Reports.
5. Equipment Start-up Report and Certifications.

E. Project meeting minutes are included in Section 01 3119, Project Meetings.

F. Inspection and test reports are included in Section 01 4500, Quality Control Services.

1.2. RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplemental Conditions and other Division 1 specification sections, apply to this section.

1.3. PRELIMINARY CONSTRUCTION SCHEDULE

A. Bar Chart Schedule. Submit a preliminary horizontal bar chart type construction schedule within 7 days of the date established for commencement of the work.

B. Bar Chart Schedule. The Contractor for General Construction shall submit a preliminary horizontal bar chart type construction schedule, with a copy to each prime Contractor, within 7 days of the date established for commencement of the work. Within 5 working days of this submittal, each other prime Contractor shall

submit a matching preliminary horizontal bar chart schedule showing their construction operations sequenced and coordinated with general construction.

1. Provide a separate time bar for each significant construction activity. Coordinate each element on the schedule with other construction activities. Schedule each construction activity in proper sequence. Provide a continuous vertical line to identify the first working day of each week.

2. Indicate completion of the work in advance of the date established for substantial completion.

3. If adjustments are necessary for sequencing and coordination of the work, the Contractor for general construction shall arrange a meeting with the other prime Contractors at the earliest possible date. At this meeting each prime Contractor shall negotiate reasonable adjustments to their schedules.

C. Submittal Tabulation. With the submittal of the preliminary construction schedule, include a tabulation by date of submittals required during the first 90 days of construction. List those submittals required to maintain orderly progress of the work, and those required early because of long lead time for manufacture or fabrication.

1. At the Contractor's option, submittal dates may be shown on the schedule, in lieu of being tabulated separately.

1.4. CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Bar Chart Schedule. Prepare a comprehensive, fully developed, horizontal bar chart type Contractor's construction schedule based on the preliminary construction schedule and on whatever updating and feedback was received since the start of the project.

B. Bar Chart Schedule. The Contractor for general construction shall secure time commitments for performing critical construction activities from each of the other prime Contractors and shall prepare a combined construction schedule for the entire project. The Schedule shall be a comprehensive, multi-sheet, integrated, fully developed horizontal bar chart type schedule based on the preliminary construction schedules and reflecting updating and feedback received since the start of the project.

1. Submit the schedule within 30 calendar days of the date established for commencement of the work, unless a longer time has been requested and approved.

2. Provide a separate time bar for each significant construction activity. Provide a continuous vertical line to identify the first working day of each week.

a. If practical, use the same breakdown of units of the work as indicated in the "Schedule of Values."

3. For significant construction activities that require 3 months or longer to complete, indicate an estimated completion percentage in 10 percent increments within the time bar. As work progresses, place a contrasting mark in each bar to indicate actual completion percentage.

4. Prepare the schedule on a sheet, or series of sheets, of stable transparency, or other reproducible media, of sufficient width to show data clearly for the entire construction period.

    a. Show the activities of each prime contract on a separate sheet.

    b. Prepare a simplified summary sheet indicating the combined construction activities of the prime contracts.

5. Secure time commitments for performing critical elements of the work from parties involved. Coordinate each element on the schedule with other portions of the work; include minor elements involved in the overall sequence of the work. Show each construction activity in proper sequence. Indicate graphically sequences necessary for completion of related portions of the work. Show critical path activities or elements.

6. Coordinate the Contractor's construction schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests and other required schedules and reports.

7. Indicate completion of the work in advance of the date established for substantial completion. Indicate substantial completion on the schedule to allow ample time for the Engineer's administrative procedures necessary for certification of substantial completion.

C. Work Stages. Use crosshatched bars to indicate important stages of construction for each major portion of the work.

D. Such stages include, but are not necessarily limited to:

1. Subcontract awards.
2. Purchases.
3. Mockups.
4. Fabrication.
5. Sample testing.
6. Deliveries.
7. Installation.
8. Testing.
9. Adjusting.
10. Curing.
11. Start-up and placement into final use and operation.

E. Distribution. Following the Engineer's response to initial submittal of the Contractor's construction schedule, print and distribute copies to the Engineer,

Owner, separate contractors, subcontractors, suppliers, fabricators, and other parties required to comply with scheduled dates.

1. Post copies of the schedule in the project meeting room and temporary field office.

2. When revisions are made, distribute the updated schedule to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the work and are no longer involved in performance of construction activities.

F. Schedule Updating. Revise the schedule immediately after each meeting or other activity, where revisions have been recognized or made. Issue the updated schedule concurrently with report of each meeting.

1.5. SUBMITTAL SCHEDULE

A. Prepare a complete submittal schedule concurrent with the development of the Contractor's construction schedule. Submit the schedule within 30 calendar days of the date established for commencement of the work, unless a longer period has been requested and approved.

1. Coordinate submittal schedule with the list of subcontracts, Schedule of Values, and the list of products specified in Section 01 6000, Materials and Equipment, as well as the Contractor's construction schedule.

2. Prepare the schedule in chronological order; include submittals listed on the tabulation of submittals required during the first 90 days of construction. Provide the following information on the schedule:

   a. Schedule date for the first submittal.
   b. Related section number.
   c. Submittal category.
   d. Name of subcontractor.
   e. Description of the part of the work covered.
   f. Scheduled date of the Engineer's final release or approval.

3. Scheduled submittal dates shall be staggered.

4. Items of a critical nature shall be prioritized and so noted.

5. Scheduled final release or approval dates shall be coordinated with construction schedule.

B. Distribution. Following the Engineer's response to initial submittal, print and distribute the schedule to the Engineer, Owner, separate Contractors, subcontractors, suppliers, fabricators, and other parties required to comply with submittal dates indicated.

1. Post copies in the project meeting room and temporary field office.

2. When revisions are made, distribute the updated schedule to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned part of the work and are no longer involved in the performance of construction activities.

C. Schedule Updating. Revise the schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue the updated schedule concurrently with report of each meeting.

1.6. SCHEDULE OF VALUES

A. Prepare and submit a schedule of values established in the Agreement within 15 days of the date established for commencement of the work.

1. Refer to Section 01 2200, Measurement and Payment, for a listing of categories of work where unit prices are required.

2. Refer to individual specification sections for portions of the work where the establishment of unit prices is required. Methods of measurement and pricing are specified in these sections.

B. Prepare the schedule in tabular form, including the following items:

1. Name of the part of the work.
2. Related specification section.
3. Name of subcontractor assigned.
4. Unit of measurement.
5. Price per unit.

C. Distribution. Distribute to the Owner, Engineer, and each party involved in performance of the portion of the work, where established unit prices could come into force and effect.

D. Following review by the Owner and Engineer, revise the schedule of values to correct any elements which the Owner and Engineer find unacceptable. After revision, the schedule of values shall be submitted for further review.

1.7. REPORTS

A. Daily Construction Reports. Prepare a daily construction report, recording the following information concerning events at the site; and submit duplicate copies to the Engineer at weekly intervals:

1. List of subcontractors at the site.
2. List of separate contractors at the site.
3. Approximate count of personnel at the site.
4. High and low temperature, general weather conditions.
5. Accidents (refer to accident reports).
6. Meetings and significant decisions.
7. Unusual events (refer to special reports).

8. Stoppages, delays, shortages, losses.
9. Meter readings and similar recordings.
10. Emergency procedures.
11. Orders and requests of governing authorities.
12. Change Orders received, implemented.
13. Services connected, disconnected.
14. Equipment or system tests and start-ups.
15. Partial completions, occupancies.
16. Substantial completions authorized.

B. Material Location Reports. At monthly intervals prepare a comprehensive list of materials delivered to and stored at the site. The list shall be cumulative, showing materials previously reported plus items recently delivered. Include with the list a statement of progress on and delivery dates for all materials or items of equipment being fabricated or stored away from the building site. Submit copies of the list to the Engineer at monthly intervals.

C. Field Correction Report. When the need to take corrective action that requires a departure from the Contract Documents arises, prepare a detailed report including a statement describing the problem and recommended changes. Indicate reasons the Contract Documents cannot be followed. Submit a copy to the Engineer immediately.

D. Spare Parts Inventory Report. Document in writing on forms provided by the Engineer delivery to the Owner of specified spare parts. Include the manufacturer's name, part name, number, and quantity delivered. Reports shall be signed by representatives of the Contractor, Owner, and Engineer. Reports are due prior to substantial completion.

1.8. LOGS

A. RFI Log. Maintain a tabular log of all Requests for Information (RFI). Number RFIs in a sequential manner. Note date of request and date of response for each. Update the RFI log monthly and distribute at the monthly progress meeting.

B. Shop Drawing and Product Data Submittal Log. Maintain a tabular log of all shop drawing and product data submittals. Number submittals in a sequential manner. Note dates of initial submittal, first return, resubmittal, second or final return along with Engineer’s action noted for each submittal. Update the shop drawing submittal log monthly and distribute at the monthly progress meeting.

C. Change Order Request/Proposal Log. Maintain a tabular log of all change order requests/proposals. Number change order requests/proposals in a sequential manner. Note date of submittal, brief description of covered work, proposed price, requested number of days (if applicable), and status (denied/approved/pending). For those that are approved, indicate in which change order they are included. Update the log monthly and distribute at the monthly progress meeting.

D. O & M Manual Log. Maintain a tabular log of all O & M Manual submittals. Number submittals in a sequential manner. Note dates of initial submittal, first return, resubmittal, second or final return along with Engineer's action noted for each submittal. Update the O & M Manual submittal log monthly and distribute at the monthly progress meeting.

1.9. EQUIPMENT START-UP REPORT AND CERTIFICATION

A. An experienced, authorized service representative of the manufacturer of each item of equipment shall visit the site of the work and inspect, check, adjust if necessary, and approve the equipment installation. In each case, the equipment manufacturer's representative shall be present when the equipment is placed in operation and shall revisit the job site as often as necessary until all trouble is corrected and the equipment installation and operation are satisfactory in the opinion of the Engineer.

B. Each equipment manufacturer's representative shall furnish to the Owner, through the Engineer, a written report certifying that the equipment (1) has been properly installed and lubricated; (2) is in accurate alignment; (3) is free from any undue stress imposed by connecting piping or anchor bolts; and (4) has been operated under full load conditions and that it operated satisfactorily. Work will not be accepted as substantially complete until executed Equipment Start-up Report and certification forms have been submitted in accordance with the requirements of this section.

C. Properly coordinate the visits by the manufacturer's representatives, particularly where the operation of an item of equipment is dependent on the operation of other equipment. Prior to calling the manufacturer's representative, ensure that all necessary related equipment, structures, piping, and electrical work is complete. Pay for any revisits to the site by the manufacturer's representative made necessary due to the Contractor's failure to properly coordinate the visits.

D. Secure the services of the manufacturer's representative at the site of the work for as long as is necessary to check the installation and place the equipment in satisfactory operation.

2. PRODUCTS (Not Applicable)

3. EXECUTION

3.1. PAYMENT

A. No requests for payment for work under this Contract will be processed until the Contractor's Preliminary Construction Schedule, Submittals Tabulation, and Schedule of Values are submitted and found acceptable by the Owner and Engineer in conformance with the requirements of this section.

B. No further requests for payment will be processed after the due date of the Contractor's Construction Schedule and Submittal Schedule until both schedules are submitted in conformance with the requirements of this section.

C. If payment is being requested for stored materials, the material location report must be included with the request for payment.

END OF SECTION

SECTION 01 3233

CONSTRUCTION PHOTOGRAPHS

1. GENERAL

1.1. SUMMARY

A. General. This section specifies administrative and procedural requirements for construction photographs.

B. Costs. Costs for photographs and associated items shall be included in the lump sum bid price or unit prices contained for other items of work. No separate payment shall be allowed, with the exception of additional photographs, which is addressed elsewhere in this section.

1.2. RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplemental Conditions or General Provisions and other Division 1 specification sections, apply to this section.

1.3. SUBMITTALS

A. Digitally Stored Photographs. Contractor shall provide digital photographs created and stored in a standard format. Transmittal may be electronic and shall occur no less frequently than monthly. Photographs must be received by the Engineer before partial payment requests can be processed.

1.4. QUALITY ASSURANCE

A. Engage a qualified, experienced photographer to take photographs during construction.

B. Associated Services. Cooperate with the photographer's work. Provide reasonable auxiliary services as requested, including access to and use of temporary facilities including temporary lighting.

2. PRODUCTS

2.1. PHOTOGRAPHIC COPIES

A. The photographs shall be taken with a digital camera capable of being programmed to show the date the photo was taken on the front of the photograph.

B. Identification. Provide date on front of the photo per the previous paragraph. The following information shall be provided with each photograph:

1. Name of the Project.
2. Name and address of the photographer.

3. Name of the Engineer.
4. Name of the Contractor.
5. Provide notation of vantage point marked for location and direction of shot on a key plan of the site.

3. EXECUTION

3.1. PHOTOGRAPHIC REQUIREMENTS

A. Take at least 4 color photographs in accordance with requirements indicated, to best show the status of construction and progress since taking the previous photographs.

1. Frequency: Take photographs daily as the work progresses. Submit to Engineer monthly coinciding with the cutoff date associated with each Application for Payment.

2. Vantage Points: The photographer shall select the vantage points for each shot each month to best show the status of construction and progress since the last photographs were taken.

3. Description: A description of each photograph shall be noted.

B. Additional Photographs. From time to time the Engineer may issue requests for additional photographs, in addition to periodic photographs specified. Additional photographs will be paid for by the Owner or Engineer, and are not included in the contract sum or an allowance.

END OF SECTION

SECTION 01 3323

SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

1. GENERAL

1.1. SUMMARY

A. This section specifies administrative and procedural requirements for submittal of shop drawings, product data, and samples to verify that products, materials, and systems proposed for use comply with provisions of the Contract Documents.

B. Shop drawings are required for all materials, products, and equipment furnished on this project, unless otherwise specified.

C. Standard information prepared without specific reference to the project is not considered to be shop drawings. Where multiple products are included, specific notation to that model or product being proposed for this project shall be clearly noted. Products not being provided shall similarly be marked out.

D. Coordination drawings are a special type of shop drawing that show the relationship and integration of different construction elements that require close and careful coordination during fabrication or during installation to fit in the restricted space provided or to function as intended.

E. Product data include, but are not limited to, the following:

1. Manufacturer's product specifications.
2. Manufacturer's installation instructions.
3. Standard color charts.
4. Catalog cuts.
5. Roughing-in diagrams and templates.
6. Standard wiring diagrams.
7. Printed performance curves.
8. Operational range diagrams.
9. Mill reports.
10. Standard product operating and maintenance manuals.

F. Samples include, but are not limited to, the following:

1. Partial sections of manufactured or fabricated components.
2. Small cuts or containers of materials.
3. Complete units of repetitively used materials.
4. Swatches showing color, texture, and pattern.
5. Color range sets.
6. Components used for independent inspection and testing.

G. Administrative Submittals. Refer to other Division 1 sections and other Contract Documents for requirements for administrative submittals. Such submittals include, but are not limited to:

1. Permits.
2. Applications for payment.
3. Performance and payment bonds.
4. Insurance certificates.
5. Listing of subcontractors.

H. Inspection and Test Reports. Submittal of inspection and test reports is included under Section 01 4000, Quality Control Services.

1.2. RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplemental Conditions and other Division 1 specification sections, apply to this section.

1.3. CONTRACTOR'S RESPONSIBILITY

A. It is the duty of the Contractor to check all drawings, data, and samples prepared by or for him before submitting them to the Engineer for review. Each and every copy of the Drawings and data shall bear Contractor's stamp showing that they have been so checked. Shop drawings submitted to the Engineer without the Contractor's stamp will be returned to the Contractor for conformance with this requirement. Shop drawings shall indicate any deviations in the submittal from requirements of the Contract Documents.

B. The Contractor shall determine and verify:

1. Field measurements.
2. Field construction criteria.
3. Catalog numbers and similar data.
4. Conformance with Specifications.

C. Do not begin any of the work covered by a drawing, data, or a sample returned for correction until a revision or correction thereof has been reviewed and accepted by the Engineer.

D. Submit to the Engineer all drawings and schedules sufficiently in advance of construction requirements to provide no less than 21 calendar days for checking and appropriate action from the time the Engineer receives them.

E. Stagger shop drawing submittals and indicate priority for critical delivery items on the shop drawing submittal schedule.

F. Initial submittals shall be made in PDF format with delivery to the Engineer to be made electronically wherever possible. Submit four, final approved copies for the Engineer plus the number of copies the Contractor requires of descriptive or

product data submittals to complement shop drawings (up to a maximum of eight copies). The Engineer will retain four sets.

G. Contractor shall be responsible for and bear all cost of damages which may result from the ordering of any material or from proceeding with any part of the work prior to the review by Engineer of the necessary shop drawings.

1.4. ENGINEER'S REVIEW OF SHOP DRAWINGS

A. The Engineer's review of drawings, data, and samples submitted by the Contractor is for general conformance with the design concept of the project and for general compliance with the information given in the Contract Documents. The Engineer's review and exception, if any, will not constitute an approval of dimensions, quantities, and details of the material, equipment, device, or item shown.

B. The review of drawings and schedules shall not be construed:

1. As permitting any departure from the Contract requirements;

2. As relieving the Contractor of responsibility for any errors, including details, dimensions, and materials;

3. As approving departures from details furnished by the Engineer, except as otherwise provided herein.

C. If the drawings or schedules as submitted describe variations and show a departure from the Contract requirements which the Engineer finds to be in the interest of the Owner and to be so minor as not to involve a change in contract price or time for performance, the Engineer may return the reviewed drawings without noting an exception.

D. When reviewed by the Engineer, each of the shop drawings will be identified as having received such review, being so stamped and dated. Shop drawings stamped "REVISE AND RESUBMIT" and with required corrections shown will be returned to the Contractor for correction and resubmittal.

E. Resubmittals will be handled in the same manner as first submittals. On resubmittals the Contractor shall direct specific attention, in writing or on resubmitted shop drawings, to revisions other than the corrections requested by the Engineer on previous submissions. Make any corrections required by the Engineer.

F. If the Contractor considers any correction indicated on the Drawings to constitute a change to the Contract Drawings or Specifications, the Contractor shall give written notice thereof to the Engineer.

G. The Engineer will review a submittal/resubmittal a maximum of 3 times, after which the cost of review will be borne by the Contractor. The cost of engineering will be equal to the Engineer's charges to the Owner under the terms of the Engineer's agreement with the Owner.

H. When the shop drawings have been completed to the satisfaction of the Engineer, the Contractor shall carry out the construction in accordance therewith and shall make no further changes therein except upon written instructions from the Engineer.

I. No partial submittals will be reviewed. Submittals not complete will be returned to the Contractor, and will be considered "Rejected" until resubmitted.

J. On projects with American Iron and Steel requirements, submittals will not be returned without the accompanying certification letters as described herein.

1.5. SUBMITTAL PROCEDURES

A. Coordination. Coordinate preparation and processing of submittals with performance of the work. Transmit each submittal to the Engineer sufficiently in advance of scheduled performance of related construction activities to avoid delay.

1. Coordinate each submittal with other submittals and related activities that require sequential activity including:

a. Testing.
b. Purchasing.
c. Fabrication.
d. Delivery.

2. Coordinate transmittal of different types of submittals for the same element of the work and different elements of related parts of the work so that processing will not be delayed by the Engineer's need to review submittals concurrently for coordination.

a. The Engineer reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are forthcoming.

b. No extension of time will be authorized because of the Contractor's failure to transmit submittals to the Engineer sufficiently in advance of the work to permit processing.

B. Submittal Preparation. Prepare and submit shop drawings in accordance with the following:

1. Attach a submittal cover sheet to each copy of a shop drawing. The submittal cover sheet shall contain the following information:

a. Project name and Owner’s name.
b. Contractor’s name and address.
c. Engineer’s name and address.
d. Specification section and title.
e. Drawing reference number.
f. Submittal number.

g. Space to indicate the results of the Contractor's review.
h. Space to indicate any deviations from the Contract Documents or comments by the Contractor.
i. Space approximately 8 inches wide and 4 inches high for the Engineer to indicate the results of his review and any comments.

2. Each shop drawing submittal shall be assigned a sequential number, beginning with the number 1. Resubmittals shall be identified by a number suffix (i.e., 1.1, 1.2, etc.).

C. Submittal Transmittal. Package each submittal appropriately for transmittal and handling. Transmit each submittal from Contractor to Engineer, and to other destinations, as indicated, by use of a transmittal form. Submittals received from sources other than the Contractor will be returned to the sender without action. A separate transmittal shall be used for each shop drawing submittal.

1.6. SHOP DRAWINGS

A. The term "shop drawings," when used in the Contract Documents, shall be considered to mean Contractor's plans for material and equipment which become an integral part of the Project. These drawings shall be complete and detailed. Shop drawings shall consist of fabrication, erection and setting drawings and schedule drawings, manufacturer's scale drawings, and wiring and control diagrams. Cuts, catalogs, pamphlets, descriptive literature, and performance and test data, shall be considered only as support to required shop drawings as defined above.

B. Drawings and schedules shall be checked and coordinated with the work of all trades involved before they are submitted for review by the Engineer. Contractor shall indicate whether the shop drawing complies with or deviates from the requirement of the Contract Documents.

C. If drawings show deviations from Contract requirements because of standard shop practice or for other reasons, the Contractor shall clearly mark and describe such deviation in his letter of transmittal. If the Contractor fails to describe such variations, he shall not be relieved of the responsibility for executing the Work in accordance with the Contract, even though such drawings have been reviewed.

D. Data on materials and equipment include, without limitation, materials and equipment lists, catalog data sheets, cuts, performance curves, diagrams, materials of construction and similar descriptive material. Materials and equipment lists shall give, for each item thereon, the name and location of the supplier or manufacturer, trade name, catalog reference, size, finish and all other pertinent data.

E. Installation List. When requested by the Engineer, manufacturers or equipment suppliers who propose to furnish equipment or products shall submit an installation list to the Engineer along with the required shop drawings. The installation list shall include at least five installations where identical equipment has been installed for similar purposes and similar applications and ownership and has been in operation for a period of at least 1 year.

F. Color. Only the Engineer will utilize the color "red" in marking shop drawing submittals.

G. Before final payment is made, the Contractor shall furnish to Engineer five sets of record drawings, all clearly revised, complete and up-to-date showing the permanent construction as actually made for all reinforcing and structural steel, miscellaneous metals, process and mechanical equipment, yard piping, electrical system and instrument system.

1.7. SAMPLES

A. Furnish, for the approval of the Engineer, samples required by the Contract Documents or requested by the Engineer. Samples shall be delivered to the Engineer as specified or directed. The Contractor shall prepay all shipping charges on samples. Materials or equipment for which samples are required shall not be used in work until approved by the Engineer.

1.8. SPECIFIC SUBMITTAL REQUIREMENTS

A. Submit coordination drawings where required for integration of different construction elements. Show construction sequences and relationships of separate components where necessary to avoid conflicts in utilization of the space available.

B. Highlight, encircle, or otherwise indicate deviations from the Contract Documents on the shop drawings.

C. Do not permit shop drawing copies without an appropriate final stamp or other marking indicating the action taken by the Engineer to be used in connection with construction.

D. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit shop drawings on sheets at least 8½ by 11 inches but no larger than 30 by 40 inches.

1.9. PRODUCT DATA

A. Collect product data into a single submittal for each element of construction or system. Mark each copy to show which choices and options are applicable to the Project.

B. Where product data have been printed to include information on several similar products, some of which are not required for use on the project, or are not included in this submittal, mark copies to clearly indicate which information is applicable.

C. Where product data must be specially prepared for required products, materials, or systems, because standard printed data are not suitable for use, submit as "shop drawings," not "product data."

D. Include the following information in product data:

1. Manufacturer's printed recommendations.
2. Compliance with recognized trade association standards.
3. Compliance with recognized testing agency standards.
4. Application of testing agency labels and seals.
5. Notation of dimensions verified by field measurement.
6. Notation of coordination requirements.

E. Submittals. Submit two copies of each required product data submittal; submit two additional copies where copies are required for maintenance manuals. The Engineer will retain one copy, and will return the other marked with the action taken and corrections or modifications required. Initial submittals shall be made in PDF format and delivered electronically.

F. Distribution. Furnish copies of final product data submittal to manufacturers, subcontractors, suppliers, fabricators, installers, governing authorities and others as required for performance of the construction activities. Show distribution on transmittal forms.

1. Do not proceed with installation of materials, products and systems until a copy of product data applicable to the installation is in the installer's possession.

2. Do not permit use of unmarked copies of project data in connection with construction.

1.10. ENGINEER'S ACTION

A. Action Stamp: The Engineer will stamp each submittal with a uniform, self-explanatory action stamp. The stamp will be appropriately marked, as follows, to indicate the action taken:

1. Final Unrestricted Release: Where submittals are marked "NO EXCEPTIONS," that part of the work covered by the submittal may proceed, provided it complies with requirements of the Contract Documents; final acceptance will depend upon that compliance.

2. Final-But-Restricted Release: When submittals are marked "EXCEPTIONS AS NOTED," that part of the work covered by the submittal may proceed, provided it complies with both the Engineer's notations or corrections on the submittal and requirements of the Contract Documents; final acceptance will depend on that compliance.

3. Returned for Resubmittal: When submittal is marked "REVISE AND RESUBMIT," do not proceed with that part of the work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal in accordance with the Engineer's notations; resubmit without delay. Repeat if necessary to obtain a different action mark.

a. Do not permit submittals marked "REVISE AND RESUBMIT" to be used at the project site, or elsewhere where construction is in progress.

4. Rejected: When submittal is marked "REJECTED," the materials, equipment, and/or methods identified in the submittal do not comply with the Contract requirements and shall not be incorporated into the work. No resubmittal of the same materials, equipment, and/or methods shall be made.

5. Other Action: Where a submittal is primarily for information or record purposes, for special processing or other Contractor activity, the submittal will be returned, marked "Action Not Required."

2. PRODUCTS (Not Applicable)

3. EXECUTION (Not Applicable)

END OF SECTION

SECTION 01 4213

ABBREVIATIONS

1. GENERAL

1.1. GENERAL

A. Wherever in these Specifications and Contract Documents the abbreviations, or pronouns in place of them are used, the intent and meaning shall be interpreted as specified herein.

1.2. ABBREVIATIONS

AA	Aluminum Association
AAMA	Architectural Aluminum Manufacturer's Association
AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
ACPA	American Concrete Pipe Association
AEIC	Association of Edison Illuminating Companies
AFBMA	Anti-Friction Bearing Manufacturers Association
AF&PA	American Forest & Paper Association
AGA	American Gas Association
AGMA	American Gear Manufacturers Association
AIA	American Institute of Architects
AIEE	American Institute of Electrical Engineers
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
ALSC	American Lumber Standard Committee
ANSI	American National Standards Institute
AMCA	Air Moving and Conditioning Association
APA	American Plywood Association
APHA	American Public Health Association
API	American Petroleum Institute
APWA	American Public Works Association
ARC	Appalachian Regional Commission
AREA	American Railroad Engineering Association
ASA	American Standards Association
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigeration, and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWPA	American Wood Preservers' Association

AWS	American Welding Society
AWWA	American Water Works Association
BIA	Brick Institute of America
CFR	Code of Federal Regulations
CRSI	Concrete Reinforcing Steel Institute
CTI	Cooling Tower Institute
DIPRA	Ductile Iron Pipe Research Association
EIA	Electronic Industries Association
EPA	Environmental Protection Agency
EPD	Georgia Environmental Protection Division
FM	Factory Mutual
FmHA	Farmers Home Administration
FS	Federal Specifications
HEI	Heat Exchange Institute
IBC	International Building Code
IEEE	Institute of Electronic and Electrical Engineers
IES	Illuminating Engineering Society
IPCEA	Insulated Power Cable Engineers Association
IPC	Institute of Printed Circuits
ISA	Instrument Society of America
MBMA	Metal Building Manufacturers Association
MSS	Manufacturers Standardization Society of the Valve and Fitting Industry
MUTCD	Manual on Uniform Traffic Control Devices
NAAMM	National Association of Architectural Metal Manufacturers
NACE	National Association of Corrosion Engineers
NAPF	National Association of Piping Fabricators
NBFU	National Board of Fire Underwriters
NBS	National Bureau of Standards
NCMA	National Concrete Masonry Association
NCPI	National Clay Pipe Institute
NEC	National Electric Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NRMA	National Ready-Mix Association
NSF	National Sanitation Foundation
OSHA	Occupational Safety and Health Administration
PCA	Portland Cement Association
PCI	Prestressed Concrete Institute
SBC	Southern Building Code Congress International, Inc.
SJI	Steel Joist Institute
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
SSCRB	Standard Specification Construction of Roads and Bridges, Department of Transportation, State of Georgia
SSPC	SSPC: The Society for Protective Coatings

SSRBC	Standard Specifications for Road and Bridge Construction, Tennessee Department of Transportation
SSRS	Standard Specifications for Roads and Structures, latest edition, North Carolina Department of Transportation, Division of Highways
TCA	Tile Council of America
TDEC	Tennessee Department of Environment and Conservation
TEMA	Tubular Exchangers Manufacturers Association
UBC	Uniform Building Code
UL	Underwriters Laboratories
USDC	United States Department of Commerce
WEF	Water Environment Federation

END OF SECTION

SECTION 01 4219

APPLICABLE CODES AND STANDARDS

1. GENERAL

1.1. GENERAL

A. All materials, equipment, fabrication, and installation practices shall comply with the following applicable codes and standards, unless the Contractor's quality standards establish more stringent quality requirements or as required in drawings and specifications, as determined by the Engineer.

1. Pressure Piping and Tubing

ANSI	American National Standards Institute
API	American Petroleum Institute
ASME	American Society of Mechanical Engineers
AWWA	American Water Works Association
DIPRA	Ductile Iron Pipe Research Association
NAPF	National Association of Piping Fabricators
NSF	NSF International
PPI	Plastic Pipe Institute
Unibell	PVC Pipe Association

2. Materials

AASHTO	American Association of State Highway and Transportation Officials
ANSI	American National Standards Institute
ASTM	American Society for Testing and Materials

3. Painting and Surface Preparation

NACE	National Association of Corrosion Engineers
SSPC	SSPC: The Society for Protective Coatings

4. Gear Reducers and Bearings

AFBMA	Anti-Friction Bearing Manufacturers Association
AGMA	American Gear Manufacturers Association

5. Ventilating Fans

AMCA	Air Moving and Conditioning Association
PFMA	Power Fan Manufacturers Association

6. Electrical and Instrumentation

EIA	Electronic Industries Association
IEEE	Institute of Electrical and Electronic Engineers
IPC	Institute of Printed Circuits
IPCEA	Insulated Power Cable Engineers Association
ISA	Instrument Society of America
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
UL	Underwriter's Laboratories

7. Aluminum Structures

AA	Aluminum Association
AAMA	Architectural Aluminum Manufacturers Association

8. Steel Structures

AISC	American Institute of Steel Construction
API	American Petroleum Institute
AWWA	American Water Works Association
SJI	Steel Joist Institute

9. Concrete Structures

ACI	American Concrete Institute

10. Welding

ASME	American Society of Mechanical Engineers
AWS	American Welding Society

11. Safety

OSHA	Occupational Safety and Health Act

12. General Building Construction

FM	Factory Mutual Fire Insurance Corporation
IBC	International Building Code by the International Code Council
NFPA	National Fire Protection Association

13. Subgrades and Pavement

SSCRB	Standard Specification Construction of Roads and Bridges, Department of Transportation, State of Georgia, 1993 Edition, and Supplemental Specifications
SSRBC	Standard Specifications for Road and Bridge Construction, Tennessee Department of Transportation

SSRS	Standard Specifications for Roads and Structures, latest edition, North Carolina Department of Transportation, Division of Highways.

14. Ductwork and Sheet Metal Work

SMACNA	Sheet Metal and Air Conditioning Contractors National Association

15. Plumbing

AGA	American Gas Association
NSF	NSF International
PDI	Plumbing Drainage Institute
SPC	SBCC Standard Plumbing Code

16. Refrigeration, Heating, and Air Conditioning

ARI	American Refrigeration Institute
ASHRAE	American Society of Heating, Refrigeration, and Air Conditioning Engineers

17. Pressure Vessels

ASME	American Society of Mechanical Engineers

18. Wood

AF&PA	American Forest & Paper Association
AWPA	American Wood Preservers' Association

19. Pumps & Pumping Stations

HI	Hydraulic Institute

20. Railroads

AREMA	American Railway Engineering and Maintenance-of-Way Association

21. Miscellaneous

NASSCO	National Association of Sewer Service Companies

In addition, all work shall comply with the applicable requirements of local codes, utilities, and other authorities having jurisdiction.

B. All material and equipment, for which a UL Standard, an AGA approval, or an ASME requirement is established, shall be so approved and labeled or stamped. Label or stamp shall be conspicuous and not covered, painted, or otherwise obscured from visual inspection.

END OF SECTION

SECTION 01 4500

QUALITY CONTROL SERVICES

1. GENERAL

1.1. SCOPE OF WORK

A. This section specifies administrative and procedural requirements for quality control services.

B. Quality control services include inspections and tests and related actions including reports, performed by independent agencies, governing authorities, and the Contractor. They do not include contract enforcement activities performed by the Engineer.

C. Inspection and testing services are required to verify compliance with requirements specified or indicated. These services do not relieve the Contractor of responsibility for compliance with Contract Document requirements.

1. Specific quality control requirements for individual construction activities are specified in the sections that specify those activities. Those requirements, including inspections and tests, cover production of standard products as well as customized fabrication and installation procedures.

2. Inspections, tests, and related actions specified are not intended to limit the Contractor's quality control procedures that facilitate compliance with Contract Document requirements.

3. Requirements for the Contractor to provide quality control services required by the authorities having jurisdiction are not limited by provisions of this section.

1.2. RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplemental Conditions and other Division 1 specification sections, apply to this section.

1.3. RESPONSIBILITIES

A. Contractor Responsibilities. Provide inspections, tests, and similar quality control services, specified in individual specification sections and required by governing authorities, except where they are specifically indicated to be the Owner's responsibility, or are provided by another identified entity; these services include those specified to be performed by an independent agency and not by the Contractor. Costs for these services shall be included in the contract sum.

1. Employ and pay an independent agency to perform specified quality control services.

2. The Owner will engage and pay for the services of an independent agency to perform inspections and tests specified as the Owner's responsibility.

3. Retesting: The Contractor is responsible for retesting where results of required inspections, tests, or similar services prove unsatisfactory and do not indicate compliance with Contract Document requirements, regardless of whether the original test was the Contractor's responsibility.

    a. Cost of retesting construction revised or replaced by the Contractor is the Contractor's responsibility, where required tests were performed on original construction.

4. Associated Services: Cooperate with agencies performing required inspections, tests, and similar services and provide reasonable auxiliary services as requested. Notify the agency sufficiently in advance of operations to permit assignment of personnel. Auxiliary services required include but are not limited to:

    a. Providing access to the Work and furnishing incidental labor and facilities necessary to facilitate inspections and tests.

    b. Taking adequate quantities of representative samples of materials that require testing or assisting the agency in taking samples.

    c. Providing facilities for storage and curing of test samples, and delivery of samples to testing laboratories.

    d. Providing the agency with a preliminary design mix proposed for use for materials mixes that require control by the testing agency.

    e. Security and protection of samples and test equipment at the project site.

B. Owner Responsibilities. The Owner will employ and pay for the services of an independent agency, testing laboratory, or other qualified firm to perform services which are the Owner's responsibility.

C. Duties of the Testing Agency. The independent testing agency engaged to perform inspections, sampling, and testing of materials and construction specified in individual specification sections shall cooperate with the Engineer and Contractor in performance of its duties, and shall provide qualified personnel to perform required inspections and tests. The testing agency shall be acceptable to and approved by the Engineer.

    1. The agency shall notify the Engineer and Contractor promptly of irregularities or deficiencies observed in the work during performance of its services.

    2. The agency is not authorized to release, revoke, alter, or enlarge requirements of the Contract Documents, or approve or accept any portion of the work.

    3. The agency shall not perform any duties of the Contractor.

D. Coordination. The Contractor and each agency engaged to perform inspections, tests, and similar services shall coordinate the sequence of activities to accommodate required services with a minimum of delay. In addition, the Contractor and each agency shall coordinate activities to avoid the necessity of removing and replacing construction to accommodate inspections and tests.

1. The Contractor is responsible for scheduling times for inspections, tests, taking samples, and similar activities.

1.4. SUBMITTALS

A. The independent testing agency shall submit to the Engineer, in duplicate, a certified written report of each inspection, test, or similar service.

1. Submit additional copies of each written report directly to the governing authority, when the authority so directs.

2. Report Data: Written reports of each inspection, test, or similar service shall include, but not be limited to:

a. Date of issue.
b. Project title and number.
c. Name, address, and telephone number of testing agency.
d. Dates and locations of samples and tests or inspections.
e. Names of individuals making the inspection or test.
f. Designation of the work and test method.
g. Identification of product and specification section.
h. Complete inspection or test data.
i. Test results and an interpretation of test results.
j. Ambient conditions at the time of sample-taking and testing.
k. Comments or professional opinion as to whether inspected or tested work complies with Contract Document requirements.
l. Name and signature of laboratory inspector.
m. Recommendations on retesting.

1.5. QUALITY ASSURANCE

A. Qualification for Service Agencies. Engage inspection and testing service agencies, including independent testing laboratories, which are prequalified as complying with "Recommended Requirements for Independent Laboratory Qualification" by the American Council of Independent Laboratories, and which specialize in the types of inspections and tests to be performed.

1. Each independent inspection and testing agency engaged on the Project shall be authorized by authorities having jurisdiction to operate in the state in which the project is located.

2. PRODUCTS (Not Applicable)

3. EXECUTION

3.1. REPAIR AND PROTECTION

A. General. Upon completion of inspection, testing, sample-taking, and similar services, repair damaged construction and restore substrates and finishes to eliminate deficiencies, including deficiencies in visual qualities of exposed finishes.

B. Protect construction exposed by or for quality control service activities, and protect repaired construction.

C. Repair and protection is the Contractor's responsibility, regardless of the assignment of responsibility for inspection, testing, or similar services.

END OF SECTION

SECTION 01 5000

TEMPORARY FACILITIES AND CONTROLS

1. GENERAL

1.1. DESCRIPTION OF REQUIREMENTS

A. General Contractor shall provide temporary services and facilities for use by all Prime Contractors and the Engineer except as otherwise herein specified. Do not remove temporary facilities until authorized use of permanent facilities.

1.2. USE CHARGES

A. Usage charges for temporary services or facilities shall be paid by the General Contractor.

1.3. WATER FOR TESTING

A. As an exception to the above, necessary amounts of water for initial flushing and testing piping systems will be furnished by the Owner at no cost to the Contractor, subject to requirements which the Owner may impose.

1.4. REGULATIONS AND LIMITATIONS

A. Comply with requirements of local laws and regulations governing construction and local industry standards, in the installation and maintenance of temporary services and facilities.

B. The Contractor shall be limited to work within the property limits of the site and shall be responsible for and take necessary precautions to avoid damage to all adjacent property.

1.5. TEMPORARY UTILITY INSTALLATION

A. Engage the local utility company to install temporary services. As early as possible change to use of permanent service, to enable removal of the temporary utility and eliminate possible interference with completion of the work.

B. Water Service. Provide temporary potable water supply at the plant site for construction purposes. Use of Owner's hydrants is prohibited for this purpose.

C. Electrical Power Service. Provide weather-tight, grounded temporary electrical service entrance and distribution system, with ground-fault circuit interrupters and ground-fault interrupter features of proper types, sizes, electrical ratings and characteristics to fulfill project requirements. Comply with applicable requirements of NEMA, NECA and UL standards and governing regulations. Install temporary lighting of adequate illumination levels to perform the work specified. Temporary electric service for construction purposes shall be for use by all prime contractors.

D. Temporary Heat. Provide temporary heat where needed for performance of work, for curing or drying of recently installed work or for protection of work in place from adverse effects of low temperatures or high humidity. Provide UL or FM tested and labeled heating units known to be safe and without adverse effect upon work in place or being installed. Maintain a minimum temperature of 45°F (7°C) in permanently enclosed portions of the building and areas where finished work has been installed.

Except where use of the permanent heating system is available and authorized, provide properly vented self-contained LP gas or fuel oil heaters with individual space thermostatic control for temporary heat. Do not use open burning or salamander type heating units.

1.6. STAGING AREAS

A. Space available on site for trailers, materials storage, and staging is limited. The staging area may be shown on the plans and will not be expanded.

B. If additional space is required, the Contractors are responsible for leasing or otherwise securing the necessary space, off-site.

1.7. TEMPORARY ROADS AND PAVING

A. Provide temporary graveled roads and graveled parking facilities during the course of the work. Locate in the same locations as permanent facilities.

B. Coordinate temporary drives with grading and compaction of the sub-grade, installation and stabilization of sub-base, and installation of base and finish courses of permanent paving.

C. Construct and maintain temporary roads to support loading and to withstand exposure to traffic. Provide a graded and well compacted, well drained sub-grade, and a gravel paving course of a well graded sub-base material not less than 3 inches thick, roller compacted to a level, smooth surface.

D. Delay installation of the final course of permanent paving in areas exposed to temporary use, until immediately before substantial completion.

E. Completely remove temporary roadways in areas not to receive permanent paving, prior to seeding.

1.8. SANITARY FACILITIES

A. Sanitary facilities include temporary toilets for construction personnel of all prime contractors.

1. Supply toilet tissue, paper towels, paper cups and similar disposable materials as appropriate for each facility. Provide appropriate covered waste containers for used materials.

2. Toilets: Install single occupant self-contained toilet units of the chemical, aerated recirculation or combustion type, properly vented and fully enclosed with glass fiber reinforced polyester shell. Use of pit-type privies will not be permitted.

3. Provide separate toilet facilities for male and female construction personnel at ground level. Use of plant facilities is prohibited.

B. Drinking Water. Provide tap-dispenser bottled-water type drinking water units for personnel of all prime contractors and subcontractors.

1.9. SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Maintain site in a safe, lawful and publicly acceptable manner. Each prime contractor shall be responsible for security of their own office and storage facilities.

1.10. BARRICADES, WARNING SIGNS, AND LIGHTS

A. Comply with recognized standards and code requirements for erection of substantial barricades, where needed to prevent accidents. Paint with appropriate colors, graphics, and warning signs to inform personnel at the site and the public, of the hazard being protected against. Provide lighting where needed, including flashing red lights were appropriate.

1.11. MAINTENANCE

A. Operate and maintain temporary services and facilities in good operating condition and in a safe and efficient manner until removal is authorized. Do not overload services or facilities. Protect from damage by freezing temperatures and similar elements. Do not allow unsanitary conditions, public nuisances or hazardous conditions to develop or persist on the site.

1.12. TERMINATION AND REMOVAL

A. Remove each temporary service and facility promptly when need has ended, or when replaced by use of a permanent facility, but no later than substantial completion. Complete, or, if necessary, restore permanent work delayed because of interference with the temporary service or facility. Repair damaged work, clean exposed surfaces, and replace work which cannot be repaired.

B. At substantial completion, clean and renovate permanent services and facilities that have been used to provide temporary services and facilities during the construction period.

1.13. SAFETY MEASURES

A. In addition to complying with safety requirements set forth in the General Conditions, the Contractor shall:

1. Inform himself of and fully comply with all applicable requirements of OSHA in the performance of work required under this contract.

2. The Contractor shall adhere to the rules, regulations, and interpretations of the Secretary of the Department of Labor relating to safety and health for construction which are hereby incorporated into these requirements.

END OF SECTION

SECTION 01 6000

MATERIALS AND EQUIPMENT

1. GENERAL

1.1. SUMMARY

A. This section specifies administrative and procedural requirements governing the Contractor's selection of products for use in the project.

1. Multiple Prime Contracts: Provisions of this section apply to the construction activities of each prime Contractor.

B. The Contractor's Construction Schedule and the Schedule of Submittals are included under Section 01 3200, Schedules and Reports.

C. Standards. Refer to Section 01 4219, Applicable Codes and Standards, for applicability of industry standards to products specified.

1.2. RELATED DOCUMENTS

A. Drawings and general provision of the Contract, including General and Supplemental Conditions or General Provisions and other Division 1 Specification sections, apply to this section.

1.3. DEFINITIONS

A. Definitions used in this Article are not intended to change the meaning of other terms used in the Contract Documents, such as "specialties," "system," "structure," "finishes," "accessories," and similar terms. Such terms are self-explanatory and have well recognized meanings in the construction industry.

1. "Products" are items purchased for incorporation in the work, whether purchased for the project or taken from previously purchased stock. In all cases, products shall be new and unused. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

a. "Named products" are items identified by manufacturer's product name, including make or model designation, indicated in the manufacturer's published product literature, that is current as of the date of the Contract Documents.

2. "Materials" are products that are substantially shaped, cut, worked, mixed, finished, refined, or otherwise fabricated, processed, or installed to form a part of the work.

3. "Equipment" is a product with operational parts, whether motorized or manually operated, that requires service connections such as wiring or piping.

1.4. QUALITY ASSURANCE

A. Source Limitations. To the fullest extent possible, provide products of the same kind, from a single source.

B. Compatibility of Options. When the Contractor is given the option of selecting between two or more products for use on the project, the product selected shall be compatible with products previously selected, even if previously selected products were also options.

1. Each prime Contractor is responsible for providing products and construction methods that are compatible with products and construction methods of other prime or separate Contractors.

2. Equipment Nameplates: Provide a permanent nameplate of each item of service-connected or power-operated equipment. Locate on an easily accessible surface. The nameplate shall contain the following information and other essential operating data:

a. Name of product and manufacturer.
b. Model and serial number.
c. Capacity.
d. Speed.
e. Ratings.

1.5. PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products in accordance with the manufacturer's recommendations, using means and methods that will prevent damage, deterioration, and loss, including theft.

1. Schedule delivery to minimize long-term storage at the site and to prevent overcrowding of construction spaces.

2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.

3. Deliver products to the site in the manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.

4. Inspect products upon delivery to ensure compliance with the Contract Documents, and to ensure that products are undamaged and properly protected.

5. Store products at the site in a manner that will facilitate inspection and measurement of quantity or counting of units.

6. Store heavy materials away from the project structure in a manner that will not endanger the supporting construction.

7. Store products subject to damage by the elements above ground, under cover in a weathertight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's instructions.

2. PRODUCTS

2.1. PRODUCT SELECTION

A. General Product Requirements. Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, unused at the time of installation.

1. Provide products complete with all accessories, trim, finish, safety guards, and other devices and details needed for a complete installation and for the intended use and effect.

2. Standard Products: Where available, provide standard products of types that have been produced and used successfully in similar situations on other projects.

B. Product Selection Procedures. Product selection is governed by the Contract Documents and governing regulations. Procedures governing product selection include the following:

1. Proprietary Specification Requirements: Where only a single product or manufacturer is named, provide the product indicated. No substitutions will be permitted.

2. Semi-proprietary Specification Requirements: Where two or more products or manufacturers are named, provide one of the products indicated. No substitutions will be permitted.

a. Where products or manufacturers are specified by name, accompanied by the term "or equal" or "or approved equal," comply with the Contract Document provisions concerning "substitutions" and “or-equals” to obtain approval for use of an unnamed product.

3. Non-Proprietary Specifications: When the Specifications list products or manufacturers that are available and may be incorporated in the Work, but do not restrict the Contractor to use of these products only, the Contractor may propose any available product that complies with Contract requirements. Comply with Contract Document provisions concerning "substitutions" and “or-equals” to obtain approval for use of an unnamed product.

4. Descriptive Specification Requirements: Where Specifications describe a product or assembly, listing exact characteristics required, with or without use of a brand or trade name, provide a product or assembly that provides the characteristics and otherwise complies with Contract requirements.

5. Performance Specification Requirements: Where Specifications require compliance with performance requirements, provide products that comply with these requirements, and are recommended by the manufacturer for the application indicated. General overall performance of a product is implied where the product is specified for a specific application.

    a. Manufacturer's recommendations may be contained in published product literature, or by the manufacturer's certification of performance.

6. Compliance with Standards, Codes, and Regulations: Where the Specifications only require compliance with an imposed code, standard, or regulation, select a product that complies with the standards, codes, or regulations specified.

7. Visual Selection: Where specified product requirements include the phrase "...as selected from manufacturer's standard colors, patterns, textures..." or a similar phrase, select a product and manufacturer to comply with other specified requirements. The Engineer will select the color, pattern, and texture from the product line selected.

2.2. SHOP PRIMING AND PAINTING

A. Shop prime and/or shop finish all shop fabricated equipment prior to shipping.

B. Surface preparation, primers, finishes, number of coats, and film thicknesses shall comply with applicable provisions of Section 09 9100, Painting (if included), unless alternative procedures and materials are accepted by the Engineer during shop drawing and product data review.

C. Prepare and finish electrical and mechanical equipment prior to final assembly. Do not sandblast or paint assembled equipment or machined interior surfaces of equipment.

D. Coat interior, inaccessible surfaces of equipment with an epoxy system suitable for the lifetime of the equipment at anticipated operating conditions and temperatures, unless otherwise specified or accepted.

E. Coat exterior and accessible interior surfaces with an appropriate epoxy system, unless otherwise specified or accepted.

3. EXECUTION

3.1. INSTALLATION OF PRODUCTS

A. Comply with manufacturer's instructions and recommendations for installation of products in the applications indicated. Anchor each product securely in place, accurately located and aligned with other work.

1. Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

END OF SECTION

SECTION 01 6500

TRANSPORTATION AND HANDLING

1. GENERAL

1.1. SCOPE

A. Provide transportation of all equipment, materials, and products furnished under these Contract Documents to the site of the work. In addition, provide preparation for shipment and storage, unloading, handling and re-handling, short-term storage, extended storage, storage facilities, maintenance and protection during storage, preparation for installation, and all other work and incidental items necessary or convenient to the Contractor for the satisfactory prosecution and completion of the work.

1.2. TRANSPORTATION

A. Suitably box, crate, or otherwise protect all equipment during transportation.

B. Ship and deliver all equipment in the largest assembled sections practical or permitted by carrier regulations to minimize the number of field connections.

C. Ensure that the equipment is assembled and transported in such a manner so as to clear buildings, power lines, bridges, and similar structures encountered during shipment or delivery to the site of the work.

D. Ensure that the weights of the assembled sections do not exceed the capacity of the cranes or hoisting equipment where equipment will be installed using existing cranes or hoisting equipment.

E. Small items and appurtenances such as gauges, valves, switches, instruments, and probes which could be damaged during shipment shall be removed from the equipment prior to shipment and packaged and shipped separately. All openings shall be plugged or sealed to prevent the entrance of water or dirt.

F. Paint temporary shipping braces and supports orange or yellow for easy identification.

1.3. HANDLING

A. Carefully handle all equipment, materials, and products to prevent damage or excessive deflections during unloading or transportation. All equipment, materials, and products damaged during transportation or handling shall be repaired or replaced by the Contractor at no additional cost to the Owner prior to being incorporated into the work.

B. Strictly follow lifting and handling drawings and instructions furnished by the manufacturer or supplier. Eyebolts or lifting lugs furnished on the equipment shall be used in handling the equipment. Shafts and operating mechanisms shall not be used as lifting points. Spreader bars or lifting beams shall be used when

the distance between lifting points exceeds that permitted by standard industry practice. Slings and chains shall be padded as required to prevent damage to protective coatings and finishes.

C. Under no circumstances shall equipment or products such as pipe, structural steel, casting, reinforcement, lumber, piles, poles, etc., be thrown or rolled off of trucks onto the ground.

D. Handle items such as nonmetallic pipe, nonmetallic conduit, flagpoles, and lighting poles using nonmetallic slings or straps.

END OF SECTION

SECTION 01 6600

STORAGE AND PROTECTION

1. GENERAL

1.1. SCOPE

A. Equipment shall be received, inspected, unloaded, handled, stored, maintained, and protected by the Contractor in a suitable location on or off site, if necessary, until such time as installation is required.

B. Storage and protection of Contractor-furnished equipment shall be in strict conformance with the requirements of the applicable provisions of the General Conditions of these Specifications.

1.2. STORAGE

A. Provide satisfactory storage facilities which are acceptable to the Engineer. In the event that satisfactory facilities cannot be provided on site, satisfactory warehouse, acceptable to the Engineer, will be provided by the Contractor for such time until the equipment, materials, and products can be accommodated at the site.

B. Equipment, materials, and products which are stored in a satisfactory warehouse acceptable to the Engineer will be eligible for progress payments as though they had been delivered to the job site.

C. Maintain and protect all equipment, materials, and products placed in storage and bear all costs of storage, preparation for transportation, transportation, re-handling, and preparation for installation.

D. Equipment and products stored outdoors shall be supported above the ground on suitable wooden blocks or braces arranged to prevent excessive deflection or bending between supports. Items such as pipe, structural steel, and sheet construction products shall be stored with one end elevated to facilitate drainage.

E. Building products and materials such as cement, grout, plaster, gypsum-board, particleboard, resilient flooring, acoustical tile, paneling, finish lumber, insulation, wiring, etc., shall be stored indoors in a dry location, unless otherwise permitted in writing by the Engineer. Building products such as rough lumber, plywood, concrete block, and structural tile may be stored outdoors under a properly secured waterproof covering.

F. Tarps and other coverings shall be supported above the stored equipment or materials on wooden strips to provide ventilation under the cover and minimize condensation. Tarps and covers shall be arranged to prevent ponding of water.

1.3. EXTENDED STORAGE

A. In the event that certain items of major equipment have to be stored for an extended period of time, the Contractor shall provide satisfactory long-term storage facilities which are acceptable to the Engineer. The Contractor shall provide all special packaging, protective coverings, protective coatings, power, nitrogen purge, desiccants, lubricants, and exercising necessary or recommended by the manufacturer to properly maintain and protect the equipment during the period of extended storage.

END OF SECTION

SECTION 01 7329

CUTTING AND PATCHING

1. GENERAL

1.1. DEFINITIONS

A. Cutting and patching includes cutting into existing construction to provide for the installation or performance of other work and subsequent fitting and patching required to restore surfaces to their original condition.

B. Refer to other sections of these specifications for specific cutting and patching requirements and limitations applicable to individual units of work.

1.2. STRUCTURAL WORK

A. Do not cut-and-patch structural work in a manner resulting in a reduction of load-carrying capacity or load/deflection ratio. Submit proposal and request and obtain Engineer's approval before proceeding with cut-and-patch of structural work.

1.3. OPERATIONAL/SAFETY LIMITATIONS

A. Do not cut-and-patch operational elements and safety components in a manner resulting in decreased performance, shortened useful life, or increased maintenance. Submit proposals and requests and obtain Engineer's approvals before proceeding with cut-and-patches.

1.4. VISUAL/QUALITY LIMITATIONS

A. Do not cut-and-patch work exposed to view (exterior and interior) in a manner resulting in noticeable reduction of aesthetic qualities, as judged by Engineer.

B. Engage qualified personnel skilled in cutting, patching, removal, and replacement of specialized equipment and finish surfaces.

1.5. LIMITATIONS ON APPROVALS

A. Engineer's approval to proceed with cutting and patching does not waive right to later require removal/replacement of work found to be cut-and-patched in an unsatisfactory manner, as determined by the Engineer.

2. PRODUCTS

2.1. GENERAL

A. Use materials for cutting and patching that are identical to existing materials. If identical materials are not available or cannot be used, use materials that match existing adjacent surfaces to the fullest extent possible with regard to visual

effect. Use materials for cutting and patching that will result in equal-or-better performance characteristics.

3. EXECUTION

3.1. INSPECTION

A. Before cutting, examine surfaces to be cut and patched and conditions under which the work is to be performed. If unsafe or otherwise unsatisfactory conditions are encountered, take corrective action before proceeding with the work.

3.2. TEMPORARY SUPPORT

A. To prevent failure, provide temporary support of work to be cut.

3.3. PROTECTION

A. Protect other work during cutting and patching to prevent damage. Provide protection from adverse weather conditions for that part of the project that may be exposed during cutting and patching operations.

B. Avoid interference with use of adjoining areas or interruption of free passage to adjoining area.

C. Take precautions not to cut existing pipe, conduit, or duct serving existing building or equipment but scheduled to be relocated until provisions have been made to bypass them.

3.4. CUTTING

A. Use the cutting methods that are least likely to damage work to be retained or adjoining work. Where possible, review proposed procedures with the original installer; comply with original installer's recommendations.

B. Where cutting is required, use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut through concrete and masonry using a cutting machine such as a carborundum saw or core drill. Cut holes and slots neatly to size required with minimum disturbance of adjacent work. To avoid marring existing finished surfaces, cut and drill from the exposed or finished side into concealed surfaces. Temporarily cover openings when not in use.

3.5. PATCHING

A. Patch with seams which are durable and as invisible as possible. Comply with specified tolerances for the work.

B. Restore exposed finish of patched areas, and where necessary extend finish restoration into retained adjoining work in a manner which will eliminate evidence of patching and refinishing.

3.6. REPAIR OF DAMAGE

A. Repair equipment and finish surfaces damaged as the result of the work of this contract to the satisfaction of the Owner or replace with new material at no additional cost to the Owner.

END OF SECTION

SECTION 01 7423

FINAL CLEANING

1. GENERAL

1.1. SUMMARY

A. This section specifies administrative and procedural requirements for final cleaning at Substantial Completion.

1. Special cleaning requirements for specific elements of the work are included in appropriate sections of Divisions 2 through 48.

B. General project closeout requirements are included in Section 01 7800, Project Closeout.

C. Multiple Prime Contracts. Except as otherwise indicated, each prime Contractor is responsible for final cleaning his own work.

D. Environmental Requirements. Conduct cleaning and waste disposal operations in compliance with local laws and ordinances. Comply fully with federal and local environmental and anti-pollution regulations.

1. Do not dispose of volatile wastes such as mineral spirits, oil or paint thinner in storm or sanitary drains.

2. Burning or burying of debris, rubbish or other waste material on the premises will not be permitted without the owner's permission. If allowed, all required permits shall be the responsibility of the Contractor.

1.2. RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplemental Conditions or General Provisions and other Division 1 Specification sections, apply to this section.

2. PRODUCTS

2.1. MATERIALS

A. Cleaning Agents. Use cleaning materials and agents recommended by the manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property, or that might damage finished surfaces.

3. EXECUTION

3.1. FINAL CLEANING

A. General. Provide final cleaning operations when indicated. Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit of work to the condition expected from a commercial building cleaning and maintenance program. Comply with manufacturer's instructions.

B. Complete the following cleaning operations before requesting inspection for Certification of Substantial Completion for the entire project or a portion of the project.

1. Clean the project site, yard and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste materials, litter and foreign substances. Sweep paved areas broom clean. Remove petrochemical spills, stains and other foreign deposits. Rake grounds that are neither planted nor paved, to a smooth even-textured surface.

2. Remove tools, construction equipment, machinery and surplus material from the site.

3. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.

4. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics and similar spaces.

5. Broom clean concrete floors in unoccupied spaces.

6. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.

7. Remove labels that are not permanent labels.

8. Touch-up and otherwise repair and restore marred exposed finishes and surfaces. Replace finishes and surfaces that can not be satisfactorily repaired or restored, or that show evidence of repair or restoration. Do not paint over "UL" and similar labels, including mechanical and electrical name plates.

9. Wipe surfaces of mechanical and electrical equipment, elevator equipment and similar equipment. Remove excess lubrication, paint and mortar droppings and other foreign substances.

10. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.

11. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills. Clean ducts, blowers, and coils if units were operated without filters during construction.

12. Clean light fixtures, lamps, globes and reflectors to function with full efficiency. Replace burned out bulbs, and defective and noisy starters in fluorescent and mercury vapor fixtures.

13. Leave the project clean and ready for occupancy.

C. Compliances. Comply with governing regulations and safety standards for cleaning operations. Remove waste materials from the site and dispose of in a lawful manner.

1. Where extra materials of value remain after completion of associated construction have become the Owner's property, dispose of these materials as directed.

END OF SECTION

SECTION 01 7800

PROJECT CLOSEOUT

1. GENERAL

1.1. SUMMARY

A. This section specifies administrative and procedural requirements for project closeout, including but not limited to:

1. Inspection procedures.
2. Project record document submittal.
3. Operating and maintenance manual submittal.
4. Submittal of warranties.
5. Final cleaning.

B. Closeout requirements for specific construction activities are included in the appropriate sections in Divisions 2 through 49.

1.2. RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplemental Conditions and other Division 1 specification sections, apply to this section.

1.3. SUBSTANTIAL COMPLETION

A. Preliminary Procedures. Before requesting inspection for certification of substantial completion, complete the following. List exceptions in the request. The requirements listed below shall apply to each Work Order unless noted otherwise.

1. Advise Owner of pending insurance change-over requirements.

2. Complete start-up testing of systems, and instruction of the Owner's operating and maintenance personnel. Discontinue or change over and remove temporary facilities from the site, along with construction tools, mock-ups, and similar elements

3. Complete final clean up requirements, including touch-up painting. Touch-up and otherwise repair and restore marred exposed finishes.

B. Inspection Procedures. On receipt of a request for inspection, the Engineer will either proceed with inspection or advise the Contractor of unfulfilled requirements. The Engineer will prepare the Certificate of Substantial Completion following inspection, or advise the Contractor of construction that must be completed or corrected before the certificate will be issued.

1. The Engineer will repeat inspection when requested and assured that the work has been substantially completed.

2. Results of the completed inspection will form the basis of requirements for substantial completion.

C. Reinspection Procedure. The Engineer will reinspect the work upon receipt of notice that the work, including inspection list items from earlier inspections, has been completed, except items whose completion has been delayed because of circumstances acceptable to the Engineer.

1. Upon completion of reinspection, the Engineer will prepare a certificate of final acceptance or advise the Contractor of work that is incomplete or of obligations that have not been fulfilled but are required for final acceptance.

2. If necessary, reinspection will be repeated.

D. Work Orders shall be accepted as substantially complete prior to commencing work on a Work Order not immediately consecutive. For example, work on Work Order #3 shall not commence unless Work Order #1 has been accepted as substantially complete.

1.4. FINAL ACCEPTANCE

A. Preliminary Procedures. Before requesting final inspection for certification of final acceptance and final payment, complete the following. List exceptions in the request. The requirements listed below shall not apply to each Work Order unless noted otherwise.

1. Submit the final payment request with releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.

2. Submit an updated final statement, accounting for final additional changes to the contract sum.

3. Submit a certified copy of the Engineer's final inspection list of items to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance, and the list has been endorsed and dated by the Engineer.

4. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications, and similar documents.

5. Obtain and submit releases enabling the Owner unrestricted use of the work and access to services and utilities; include occupancy permits, operating certificates, and similar releases.

6. Submit record drawings, final project photographs, damage or settlement survey, property survey, and similar final record information.

7. Deliver any specified tools, spare parts, extra stock, and similar items.

8. Make final change-over of permanent locks and transmit keys to the Owner. Advise the Owner's personnel of change-over in security provisions.

9. Submit all project close out forms completed and executed (only Certificate of Property Restoration and Certificate of Substantial Completion for each Work Order).

10. Submit operation and maintenance data.

11. Submit spare parts list.

12. Submit project record drawings (mark-up of plans showing revisions during construction).

13. Submit a final liquidated damages settlement statement, if required (for each Work Order).

14. Submit evidence of final, continuing insurance coverage complying with insurance requirements.

15. Drawings: Provide specially prepared drawings where necessary to supplement manufacturer's printed data to illustrate the relationship of component parts of equipment or systems, or to provide control or flow diagrams. Coordinate these drawings with information contained in project record drawings to ensure correct illustration of the completed installation.

2. PRODUCTS (Not Applicable)

3. EXECUTION

3.1. CLOSEOUT PROCEDURES

A. Requirements listed below shall not apply to each Work Order unless noted otherwise.

B. Operating and Maintenance Instructions. Arrange for each installer of equipment that requires regular maintenance to meet with the Owner's personnel to provide instruction in proper operation and maintenance. If installers are not experienced in procedures, provide instruction by manufacturer's representatives. Include a detailed review of the following items:

1. Maintenance manuals.
2. Record documents.
3. Spare parts and materials.
4. Tools.
5. Lubricants.
6. Fuels.
7. Identification systems.

8. Control sequences.
9. Hazards.
10. Cleaning.
11. Warranties and bonds.
12. Maintenance agreements and similar continuing commitments

B. A list of available instruction dates shall be submitted to the Owner through the Engineer at least two weeks in advance of the earliest proposed date for each instruction program. The Engineer will, within three business days, notify the Contractor of the Owner's preferred date. To the maximum extent possible, instruction of related equipment systems will be conducted concurrently. The final coordination of the instruction is the sole responsibility of the Contractor.

C. Demonstrate the following procedures as part of instruction for operating equipment.

1. Start-up.
2. Shutdown.
3. Emergency operations.
4. Noise and vibration adjustments.
5. Safety procedures.
6. Economy and efficiency adjustments.
7. Effective energy utilization.

3.2. FINAL CLEANING

A. Requirements listed below shall apply to each Work Order unless noted otherwise.

B. General. General cleaning during construction is required by the General Conditions.

C. Cleaning. Employ experienced workers or professional cleaners for final cleaning. Clean all work areas to original condition or to satisfaction of Owner and Engineer.

1. Complete the following cleaning operations before requesting inspection for Certification of Substantial Completion.

2. Clean the site, including landscape development areas, of rubbish, litter, and other foreign substances. Sweep paved areas broom clean; remove stains, spills, and other foreign deposits. Rake grounds that are neither paved nor planted, to a smooth even-textured surface.

C. Removal of Protection. Remove temporary protection and facilities installed for protection of the work during construction.

D. Compliance. Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the Owner's property. Do not discharge volatile, harmful, or

dangerous materials into drainage systems. Remove waste materials from the site and dispose of in a lawful manner.

1. Where extra materials of value remaining after completion of associated work have become the Owner's property, arrange for disposition of these materials as directed.

3.3. FINAL WORK ORDER ACCEPTANCE

A. Work Orders shall not be accepted as complete unless all field work, including installation, testing, final grading and cleanup, seeding, sodding, landscaping, paving, and any other work items are complete to the satisfaction of the Owner and Engineer. Final cleanup and property restoration shall occur as part of the Work Order.

END OF SECTION

SECTION 01 7823

OPERATING AND MAINTENANCE DATA

1. GENERAL

1.1. SUMMARY

A. This section specifies administrative and procedural requirements for operating and maintenance manuals including the following:

1. Preparation and submittal of operating and maintenance manuals for building operating systems or equipment.

2. Preparation and submittal of instruction manuals covering the care, preservation, and maintenance of architectural products and finishes.

3. Instruction of the Owner's operating personnel in operation and maintenance of building systems and equipment.

B. Special operating and maintenance data requirements for specific pieces of equipment or building operating systems are included in the appropriate sections of Divisions 2 through 49.

C. Preparation of shop drawings and product data are included in Section 01 3323, Shop Drawings, Product Data and Samples.

D. General closeout requirements are included in Section 01 7800, Project Closeout.

E. General requirements for submittal of project record documents are included in Section 01 7839, Project Record Documents.

1.2. RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplemental Conditions and other Division 1 specification sections, apply to this section

1.3. QUALITY ASSURANCE

A. Operation and Maintenance Manual Preparation. In preparation of operation and maintenance manuals, use personnel thoroughly trained and experienced in operation and maintenance of the equipment or system involved.

1. Where written instructions are required, use personnel skilled in technical writing to the extent necessary for communication of essential data.

2. Where Drawings or diagrams are required, use drafters capable of preparing Drawings clearly in an understandable format.

B. Instructions for the Owner's Personnel. For instruction of the Owner's operating and maintenance personnel, use experienced instructors thoroughly trained and experienced in the operation and maintenance of the building equipment or system involve

1.4. SUBMITTALS

A. Submittal Schedule. Comply with the following schedule for submittal of operating and maintenance manuals.

1. Prior to the 80 percent completion point on the work, submit two draft copies of each manual to the Engineer for review. Include a complete index or table of contents of each manual. Draft submittal shall be in PDF format, and transmittal shall be electronic.

2. Prior to substantial completion, make corrections or modifications to comply with the Engineer's comments and submit the specified number of copies of each approved manual to the Engineer.

3. Number: Four final copies of each manual.

B. Form of Submittal. Prepare operating and maintenance manuals in the form of an instructional manual for use by the Owner's operating personnel. Organize into suitable sets of manageable size. Where possible, assemble instructions for similar equipment into a single binder.

1. Binders: For each manual, provide heavy-duty, commercial quality, 3-ring, vinyl-covered loose-leaf binders, in thickness necessary to accommodate contents, sized to receive 8½- by 11-inch paper. Provide a clear plastic sleeve on the spine to hold labels describing the contents. Provide pockets in the covers to receive folded sheets.

   a. Where two or more binders are necessary to accommodate data, correlate data in each binder into related groupings in accordance with the project manual Table of Contents. Cross-reference other binders where necessary to provide essential information for proper operation or maintenance of the piece of equipment or system.

   b. Identify each binder on the front and spine, with the typed or printed title "OPERATION AND MAINTENANCE MANUAL," project title or name, and subject matter covered. Indicate the volume number for multiple-volume sets of manuals.

2. Dividers: Provide heavy paper dividers with celluloid covered tabs for each separate section. Mark each tab to indicate contents. Provide a typed description of the product and major parts of equipment included in the section on each divider.

3. Protective Plastic Jackets: Provide protective transparent plastic jackets designed to enclose diagnostic software for computerized electronic equipment.

4. Text Material: Where written material is required as part of the manual, use the manufacturer's standard printed material, or if it is not available, specially prepared data, neatly typewritten, on 8½- by 11-inch, 20-pound white bond paper.

5. Drawings: Where drawings or diagrams are required as part of the manual, provide reinforced, punched binder tabs on the drawings and bind in with the text.

    a. Where oversized drawings are necessary, fold the drawings to the same size as the text pages and use as a fold-out.

    b. If drawings are too large to be used practically as a fold-out, place the drawing, neatly folded, in the front or rear pocket of the binder. Insert a typewritten page indicating the drawing title, description of contents, and drawing location at the appropriate location in the manual.

1.5. MANUAL CONTENT

A. In each manual include information specified in the individual specification section, and the following information for each major component of building equipment and its controls:

1. General system or equipment description.
2. Design factors and assumptions.
3. Copies of applicable shop drawings and product data.
4. System or equipment identification, including:
    a. Name of manufacturer.
    b. Model number.
    c. Serial number of each component.
5. Operating instructions.
6. Emergency instructions.
7. Wiring diagrams.
8. Inspection and test procedures.
9. Maintenance procedures and schedules.
10. Precautions against improper use and maintenance.
11. Copies of warranties.
12. Repair instructions including spare parts listing.
13. Sources of required maintenance materials and related services.
14. Manual index.

B. Organize each manual into separate sections for each piece of related equipment. As a minimum, each manual shall contain a title page, a table of contents, copies of product data supplemented by drawings and written text, and copies of each warranty, bond, and service contract issued.

1. Title Page: Provide a title page in a transparent plastic envelope as the first sheet of each manual. Provide the following information:

a. Subject matter covered by the manual.
b. Name and address of the project.
c. Date of submittal.
d. Name, address, and telephone number of the Contractor.
e. Name and address of the Engineer.
f. Cross reference to related systems in other operating and maintenance manuals.

2. Table of Contents: After the Title Page, include a typewritten table of contents for each volume, arranged systematically according to the project manual format. Include a list of each product included, identified by product name or other appropriate identifying symbol and indexed to the content of the volume.

    a. Where more than one volume is required to accommodate data for a particular system, provide a comprehensive table of contents for all volumes in each volume of the set.

3. General Information: Provide a general information section immediately following the Table of Contents, listing each product included in the manual, identified by product name. Under each product, list the name, address, and telephone number of the subcontractor or installer, and the maintenance contractor. Clearly delineate the extent of responsibility of each of these entities. In addition, list a local source for replacement parts and equipment.

4. Product Data: Where manufacturer's standard printed data is included in the manuals, include only sheets that are pertinent to the part or product installed. Mark each sheet to identify each part or product included in the installation. Where more than one item in a tabular format is included, identify each item, using appropriate references from the Contract Documents. Identify data applicable to the installation and delete references to information that is not applicable.

5. Written Text: Where manufacturer's standard printed data is not available, and information is necessary for proper operation and maintenance of equipment or systems, or it is necessary to provide additional information to supplement data included in the manual, prepare written text to provide necessary information. Organize the text in a consistent format under separate headings for different procedures. Where necessary, provide a logical sequence of instruction for each operating or maintenance procedure.

6. Drawings: Provide specially prepared drawings where necessary to supplement manufacturer's printed data to illustrate the relationship of component parts of equipment or systems, or to provide control or flow diagrams. Coordinate these drawings with information contained in project record drawings to ensure correct illustration of the completed installation.

7. Do not use original record documents as part of the operating and Maintenance Manuals.

8. Warranties, Bonds, and Service Contracts: Provide a copy of each warranty, bond, or service contract in the appropriate manual for the information of the Owner's operating personnel. Provide written data outlining procedures to be followed in the event of product failure. List circumstances and conditions that would affect validity of the warranty or bond.

1.6. INSTRUCTION OF THE OWNER'S PERSONNEL

A. Prior to substantial completion, instruct the Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Provide instruction at mutually agreed upon times.

1. For equipment that requires seasonal operation, provide similar instruction during other seasons.

2. Use operation and maintenance manuals as the basis of instruction for each piece of equipment or system. Review contents in detail to explain all aspects of operation and maintenance.

B. Training shall be conducted by an experienced, authorized service representative of the manufacturer.

2. PRODUCTS (Not Applicable).

3. EXECUTION (Not Applicable).

END OF SECTION

SECTION 01 7836

WARRANTIES AND BONDS

1. GENERAL

1.1. SUMMARY

A. This section specifies general administrative and procedural requirements for warranties and bonds required by the Contract Documents, including manufacturer's standard warranties on products and special warranties.

1. General closeout requirements are included in Section 01 7800, Project Closeout.

2. Specific requirements for warranties for the work and products and installations that are specified to be warranted, are included in the individual sections of Divisions 2 through 49.

B. Disclaimers and Limitations. Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the work that incorporates the products, nor does it relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

C. Separate Prime Contracts: Each Prime Contractor is responsible for warranties related to its own contract.

1.2. RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplemental Conditions and other Division 1 specification sections, apply to this section

1.3. DEFINITIONS

A. Standard product warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.

B. Special warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Owner.

1.4. WARRANTY REQUIREMENTS

A. Standard Warranty: Warrant all equipment, materials, products, and workmanship provided under these Contract Documents for a period of 12 months after the date of substantial completion established by the Engineer.

B. Related Damages and Losses: When correcting warranted work that has failed, remove and replace other work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted work.

C. Reinstatement of Warranty: When work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty.

D. Replacement Cost: Upon determination that work covered by a warranty has failed, replace or rebuild the work to an acceptable condition complying with requirements of Contract Documents. Complete warranty work as soon as possible after receipt of notice from the Owner for a warranty claim. The Contractor is responsible for the cost of replacing or rebuilding defective work regardless of whether the Owner has benefitted from use of the work through a portion of its anticipated useful service life.

E. Owner's Recourse: Written warranties made to the Owner are in addition to implied warranties, and shall not limit the duties, obligations, rights, and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights, or remedies.

1. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Contract Documents.

2. If the required repairs or replacements have not been completed or if positive and good faith efforts have not been made to complete the repairs or replacements within 30 consecutive calendar days after receipt of notice from the Owner of the warranty claim, the Owner shall be authorized to proceed with the repairs or replacements and the cost thereof shall be assessed against the Contractor's Performance Bond. Evidence of positive and good faith efforts shall include, as a minimum, joint visits by the Contractor and affected equipment vendors and manufacturers, and certified copies of purchase orders or invoices.

F. The Owner reserves the right to refuse to accept work for the project where a special warranty, certification, or similar commitment is required on such work or part of the work, until evidence is presented that entities required to countersign such commitments are willing to do so.

G. Multiple Equipment Failures. In the event of multiple equipment failures of major consequence prior to the expiration of the one-year warranty described above, disassemble, inspect, and modify or replace the affected equipment as necessary to prevent further occurrences. As used herein, "multiple equipment failures" shall be interpreted to mean two or more successive failures of the same kind in the same item of equipment or failures of the same kind in two or more items of similar equipment. Major equipment failures may include, but are not limited to, cracked or broken housings, piping, or vessels, excessive deflections, bent or broken shafts or structural members, broken or chipped gear teeth,

overheating, premature bearing failure, excessive wear, or excessive leakage around seals. Should multiple equipment failures occur in a given item or type of equipment, disassemble, inspect, modify or replace, as necessary, all equipment of the same size and type, and re-warrant for 12 months.

1.5. SUBMITTALS

A. Submit written warranties to the Engineer prior to the date certified for substantial completion. If the Engineer's Certificate of Substantial Completion designates a commencement date for warranties other than the date of substantial completion for the work, or a designated portion of the work, submit written warranties upon request

1. When a designated portion of the work is completed and occupied or used by the Owner, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the Engineer within 15 days of completion of that designated portion of the work.

B. When a special warranty is required to be executed by the Contractor, or the Contractor and a subcontractor, supplier, or manufacturer, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the Owner through the Engineer for approval prior to final execution.

1. Refer to individual sections of Divisions 2 through 49 for specific content requirements, and particular requirements for submittal of special warranties.

C. Form of Submittal. At final completion, compile 2 copies of each required warranty and bond properly executed by the Contractor, or by the Contractor, subcontractor, supplier, or manufacturer. Organize the warranty documents into an orderly sequence based on the table of contents of the Contract Documents.

1. When operating and maintenance manuals are required for warranted construction, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

2. PRODUCTS (Not Applicable).

3. EXECUTION (Not Applicable).

END OF SECTION

SECTION 01 7839

PROJECT RECORD DOCUMENTS

1. GENERAL

1.1. SUMMARY

A. This section specifies administrative and procedural requirements for project record documents.

B. Project record documents required include:

1. Marked-up copies of Contract Drawings.
2. Marked-up copies of approved shop drawings.
3. Newly prepared drawings
4. Marked-up copies of Specifications, Addenda, and Change Orders.
5. Marked-up product data submittals.
6. Construction photographs.
7. Field records for variable and concealed conditions.

C. Specific record copy requirements that expand requirements of this section are included in the individual sections of Division 2 through 49.

D. General project closeout requirements are included in Section 01 7800, Project Closeout.

E. Maintenance of Documents and Samples. Store record documents and samples in the field office apart from Contract Documents used for construction. Do not permit project record documents to be used for construction purposes. Maintain record documents in good order, and in a clean, dry, legible condition. Make documents and samples available at all times for inspection by the Engineer.

1.2. RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplemental Conditions and other Division 1 specification sections, apply to this section.

1.3. RECORD DRAWINGS

A. Mark-up Procedure. During the construction period, maintain a set of black-line prints of Contract Drawings and shop drawings for project record document purposes.

1. Mark these Drawings to indicate the actual installation where the installation varies appreciably from the installation shown originally. Give particular attention to information on concealed elements which would be difficult to identify or measure and record later. Items required to be marked include but are not limited to:

a. Dimensional changes to the Drawings.
b. Revisions to details shown on the Drawings
c. Depth of rock.
d. Locations and depths of underground utilities.
e. Revisions to routing of piping and conduits.
f. Revisions to electrical circuitry.
g. Actual equipment locations.
h. Locations of concealed internal utilities.
i. Changes made by Change Order.
j. Details not on original Contract Drawings.

2. Mark completely and accurately record prints of Contract Drawings or shop drawings, whichever is most capable of showing actual physical conditions. Where shop drawings are marked, show cross-reference on Contract Drawings location.

3. Mark record sets with red erasable colored pencil; use other colors to distinguish between changes for different categories of the work at the same location.

4. Mark important additional information which was either shown schematically or omitted from original Drawings.

5. Note construction change directive numbers, alternate numbers, Change Order numbers, and similar identification.

6. Responsibility for Markup: Where feasible, the individual or entity who obtained record data, whether the individual or entity is the installer, subcontractor, or similar entity, is required to prepare the mark-up on record drawings.

   a. Accurately record information in an understandable drawing technique.

   b. Record data as soon as possible after it has been obtained. In the case of concealed installations, record and check the mark-up prior to concealment.

7. At time of final acceptance, submit record drawings to Engineer for Owner's records. Organize into sets, bind, and label sets for Owner's continued use.

1.4. RECORD SPECIFICATIONS

A. Maintain one copy of the project Specifications, including addenda and modifications issued, for project record document purposes during the construction period.

1. Mark the Specifications to indicate the actual installation where the installation varies substantially from that indicated in Specifications and modifications issued. Note related project record drawings information, where applicable. Give particular attention to substitutions, selection of

product options, and information on concealed installations that would be difficult to identify or measure and record later.

1.5. RECORD PRODUCT DATA

A. Maintain one copy of each product data submittal for project record document purposes during the construction period.

1. Mark project data to indicate the actual product installation where the installation varies substantially from that indicated in product data submitted. Include significant changes in the product delivered to the site, and changes in manufacturer's instructions and recommendations for installation.

2. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.

3. Note related Change Orders and mark-up of record drawings, where applicable.

4. Upon completion of mark-up, submit a complete set of record product data to the Engineer for the Owner's records.

5. Where record product data are required as part of maintenance manuals, submit marked-up product data as an insert in the manual, instead of submittal as record product data.

1.6. MISCELLANEOUS RECORD SUBMITTALS

A. Refer to other specification sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Immediately prior to final acceptance, complete miscellaneous records and place in good order, properly identified and bound or filed, ready for use and reference. Submit to the Engineer for the Owner's records.

1. Categories of requirements resulting in miscellaneous records include, but are not limited to the following:

a. Field records on excavations and foundations.
b. Field records on underground construction and similar work.
c. Survey showing locations and elevations of underground lines.
d. Invert elevations of drainage piping.
e. Surveys establishing building lines and levels.
f. Authorized measurements utilizing unit prices or allowances.
g. Inspections and certifications by governing authorities.
h. Leakage and pressure test.
i. Disinfection test results.
j. Final inspection and correction procedures.

2. PRODUCTS (Not Applicable)

3. EXECUTION

3.1. RECORDING

A. Post changes and modifications to the documents as they occur. Contractor shall wait until the end of the project. The Engineer will periodically review record documents to ensure compliance with this requirement.

END OF SECTION

DIVISION 31 - EARTHWORK

SECTION 31 2000

EARTHWORK

1. GENERAL

1.1 SCOPE

A. This section includes earthwork and related operations, including but not limited to clearing and grubbing the construction site; dewatering; excavating all classes of material encountered; pumping, draining, and handling of water encountered in the excavations; handling, storage, transportation, and disposal of all excavated and unsuitable material; construction of fills and embankments; backfilling around structures and pipe; backfilling all trenches and pits; compacting; all sheeting, shoring, and bracing; preparation of subgrades; surfacing and grading; and any other similar, incidental, or appurtenant earthwork operation which may be necessary to properly complete the work.

B. Provide all services, labor, materials, and equipment required for all earthwork and related operations necessary or convenient to the Contractor for furnishing a complete work as shown on the Drawings or specified in these Contract Documents.

1.2 GENERAL

A. The elevations shown on the Drawings as existing are taken from the best available data and are intended to give reasonable, accurate information about the existing elevations. They are not precise, and the Contractor should satisfy himself as to the exact quantities of excavation and fill required.

B. Perform earthwork operations in a safe and proper manner taking appropriate precautions against all hazards.

C. Maintain in good condition at all times all excavated and fill areas for structures, trenches, fills, topsoil areas, embankments, and channels until final acceptance by the Owner. Repair all damage caused by erosion or other construction operations using material of the same type as the damaged materials.

D. If soil borings are available for the area of this work, they will be on file at the Owner's address where they will be made available for review or may be included as an appendix to these Specifications. This information is made available for such use as Contractor may choose to make of it in the preparation of his bid, but the Owner gives no guarantee, either expressed

or implied, that it represents a true or complete cross section of all of the material to be encountered in performing the excavation and earthwork on this project.

E. Earthwork operations within the rights-of-way of the State Department of Transportation, the County Road Department, and the respective cities shall be conducted in accordance with the requirements and provisions of the permits issued by those agencies for the construction within their respective rights-of-way. Such requirements and provisions, where applicable, shall take precedence over and supersede the provisions of these Specifications.

F. Control grading to prevent water running into excavations. Obstruction of surface drainage shall be avoided and a means shall be provided whereby storm water can be uninterrupted in existing gutters, other surface drains, or temporary drains. Material for backfill or for protection of excavation in public roads from surface drainage shall be neatly placed and kept shaped so as to cause the least possible interference with public travel. Free access must be provided to all fire hydrants, valves, meters, and private drives.

G. No classification of excavated materials will be made and no separate payment for rock removal shall be allowed. Excavation and trenching work shall include the removal and subsequent handling of all materials excavated or otherwise removed in performance of the contract work, regardless of the type, character, composition, or condition thereof, no separate payment shall be allowed.

H. Tests for compaction and density shall be conducted through the Contractor by an independent testing laboratory selected by him and acceptable to the Engineer. Costs of compaction tests performed by an independent testing laboratory shall be paid for directly by the Contractor. Make all necessary excavations and supply any samples of materials necessary for conducting compaction and density tests. Pay the cost of all retests made necessary by the failure of materials to conform to the requirements of these Contract Documents.

I. All earthwork operations shall comply with the requirements of OSHA Construction Standards, Part 1926, Subpart P, "Excavations, Trenching, and Shoring," and Subpart O, "Motor Vehicles, Mechanized Equipment, and Marine Operations," and shall be conducted in a manner acceptable to the Engineer.

J. It is understood and agreed that a thorough investigation by the Contractor has been made of the surface and subsurface conditions of the site and any special construction problems which might arise as a result of nearby watercourses and floodplains, particularly in areas where construction activities may encounter water-bearing sands and gravels or limestone solution channels. Provide all services, labor, equipment, and materials necessary or convenient for completing the work.

2. PRODUCTS (Not applicable)

3. EXECUTION

3.1 INITIAL SITE PREPARATION

A. Preparatory to beginning construction operations, remove from the site all vegetative growth, trees, brush, stumps, roots, debris, and any other objectionable matter, including fences, buildings, and other structures shown on the Drawings in the construction areas which are designated for removal or which, if left in place, would interfere with the proper performance or completion of the contemplated work, would impair its subsequent use, or would form obstructions therein.

B. Grub and remove stumps and roots to a depth not less than 5 feet below grade. Fill all holes or cavities which extend below the subgrade elevation of the proposed work with compacted layers of crushed rock or earth backfill conforming to the requirements specified here for backfill. Do not incorporate organic material from clearing operations in excavation backfill or embankment material.

C. Exercise special precautions for the protection and preservation of trees, cultivated shrubs, sod, fences, buildings, and other structures located in the construction area but not within designated clearing limits as shown on the Drawings or within the limits of embankments, excavations, or proposed structures. Repair or replace any of the aforementioned items damaged by Contractor's operation or construction activities.

D. Remove and dispose of any excess material resulting from clearing or site preparation operations. Dispose of such materials in a manner acceptable to the Engineer and at an approved location where such materials can be lawfully placed.

3.2 DEWATERING

A. Provide and maintain at all times during construction ample means and devices with which to promptly remove and properly dispose of all water from any source entering the excavations or other parts of the work. Dewatering shall be accomplished by methods which will ensure a dry excavation and preservation of the final lines and grades of the bottoms of excavations. Methods of dewatering may include sump pumps, well points, deep wells, or other suitable methods which do not damage or weaken structures, foundations, or subgrades. Shallow excavations may be dewatered using open ditches, provided such ditches are kept open and free-draining at all times. The actual dewatering methods used shall be acceptable to the Engineer.

B. Do not place concrete or mortar in water nor allow water to rise over newly placed concrete or mortar for at least 24 hours after placement, unless specifically authorized by the Engineer. No concrete structure shall be exposed to unequal hydrostatic forces until the concrete has reached its specified 28-day strength. Do not allow water to rise above bedding during pipe-laying operations. Exercise care to prevent damage to pipelines or structures resulting from flotation, undermining, or scour. Dewatering operations shall commence when ground or surface water is first encountered and shall be continuous until water can safely be allowed to rise in accordance with the provisions of this section. Protect excavations from the entrance of surface water to the extent possible by the use of dikes and/or covers.

C. Standby pumping equipment shall be on the jobsite. A minimum of 1 standby unit (a minimum of 1 for each 10 in the event well points are used) shall be available for immediate installation should any pumping unit fail. The design and installation of well points or deep wells shall be suitable for the accomplishment of the work. Submit drawings or diagrams on proposed well point or deep well dewatering systems to the Engineer for review.

D. If foundation soils are disturbed or loosened by the upward seepage of water or an uncontrolled flow of water, excavate and replace the affected areas with crushed rock at no cost to the Owner.

E. Dispose of the water from the work in a suitable manner without damage to adjacent property. Conveyance of the water shall not interfere with traffic flow or treatment facilities operation. Do not drain water into work built or under construction without prior consent of the Engineer. The Contractor will be held responsible for the condition of any pipe or conduit which he may use for drainage purposes, and all such pipes or conduits shall be left clean and free of sediment.

F. Provide sedimentation and desilting basins as necessary or when directed by the Engineer to prevent the entrance of excessive or injurious amounts of sand and silt from surface runoff or dewatering operations into storm drains or receiving waters. The system used for desanding or desilting the water shall be a baffled structure and shall provide not less than 5 minutes detention time and shall be designed to have a "flow-through" velocity not exceeding 0.2 foot per second at the anticipated peak flow. The method of desanding or desilting and the point of disposal shall be subject to the approval of the Engineer.

G. Dispose of water safely and in accordance with applicable Environmental Protection Agency, U.S. Army Corps of Engineers, and State Water Quality Control Division standards and permits.

3.3 SHEETING, SHORING, AND BRACING

A. The sides of all excavations shall be sufficiently sheeted, shored, and braced as necessary to prevent slides, cave-ins, settlement, or movement of the banks; to maintain the excavation clear of all obstructions; and to provide safe working conditions. Wood or steel sheeting shall be used in wet, saturated, or flowing ground. All sheeting, shoring, and bracing shall have sufficient strength and rigidity to withstand the pressure exerted and to maintain shape and position under all circumstances.

B. Correctly assessing the need for sheeting, analyzing the stresses induced, and maintaining regulatory compliances shall be totally the responsibility of the Contractor. Since the Engineer does not dictate or determine the Contractor's sequence or limits of excavation, the Engineer assumes no responsibility for sheeting and shoring. The Contractor must employ or otherwise provide for adequate professional structural and geotechnical engineering supervision to assess the need for sheeting and shoring and design same. Results of sheeting and shoring analysis and design shall be submitted to the Engineer on request.

C. Excavations adjacent to existing or proposed buildings and structures, or in paved streets or alleys, shall be sheeted, shored, and braced adequately to prevent undermining beneath or subsequent settlement of such structures or pavements. Underpinning of adjacent structures shall be done when necessary to maintain structures in safe condition. Any damage to structures or pavements occurring through settlements, water or earth pressures, slides, caves, or other causes due to failure or lack of sheeting or bracing, or improper bracing or occurring through negligence or fault of the Contractor in any other manner shall be repaired by the Contractor at his own expense.

D. Sheeting, shoring, or bracing materials shall not be left in place unless otherwise specified or shown on the Drawings or ordered by the Engineer in writing. Such materials shall be removed in such manner that no danger or damage will occur to new or existing structures or property, public or private, and so that cave-ins or slides will not take place. Trench sheeting shall be left in place until backfill has been brought to a level 12 inches above the top of the pipe. It shall then be cut off and the upper portion removed. Sheeting for structures shall be left in place until backfill has been brought to a level 12 inches above the top of the bottom footing. It shall then be cut off and the upper portion removed.

E. All holes and voids left in the work by the removal of sheeting, shoring, or bracing shall be filled and thoroughly compacted.

3.4 EXCAVATION

A. General

1. Excavation shall include the removal of all material from an area necessary for the construction of a pipeline or structure. Excavations shall provide adequate working space and clearances for the work to be performed therein.

2. All material excavated below the bottom of concrete walls, footings, and foundations shall be replaced, by and at the expense of the Contractor, with Class B concrete to the lines and grades shown on the Drawings, except where otherwise shown on the Drawings, specified herein, or authorized by the Engineer.

3. Where quicksand, soft clay, spongy or swampy earth, or other materials unsuitable for subgrade or foundation purposes are encountered below the excavation limits, they shall be removed and disposed of to the level of suitable material. Areas so excavated shall be backfilled with Class B concrete or with compacted layers of crushed rock, sand, or other approved material conforming to the requirements specified herein for backfill to the lines and grades shown on the Drawings.

4. Place barriers at each end of all excavation and at such places as may be necessary along excavations to warn all pedestrian and vehicular traffic of such excavations. Place lights along excavations from sunset each day to sunrise of the next day until the excavations are backfilled. Barricade all excavations in such a manner as to prevent persons from falling or walking into any excavation.

5. Where work shall occur in yards and easements near residences on surfaces that are not improved, the Contractor shall reduce impacts to these areas. Excavated material shall be stockpiled on plywood sheets to minimize disturbance to adjacent areas. Gravel shall be stockpiled in a central location and brought only as needed. Dump trucks shall not be used to bring construction materials or to remove excess excavated materials from these areas. Construction equipment (i.e. front-end loaders, backhoes, skid-steers, etc.) will be used within the easements to transport construction materials. Plywood shall be used to protect construction equipment pathways in locations that are not improved. Cleanup and surface restoration shall occur as work progresses, and properties shall not be left disturbed for an extended period of time. Stockpiles of excavated material shall not be left along right-of-ways or in residential areas and shall be stored in a central location in a safe manner.

B. Rock Excavation

1. Rock encountered in the process of excavation for structures shall be uncovered and stripped of all loose materials over the entire limits of excavation.

2. Rock encountered for removal in a trench section shall be uncovered for a distance of not less than 50 feet.

3. Excavate rock and large boulders in trenches over the horizontal limits of excavation and to depths as shown on the Drawings.

4. Backfill the space below grade for pipelines to the proper grade with compacted layers of crushed rock or sand conforming to the requirements specified herein for backfill. Where pipe sewers are constructed on concrete cradles, excavate rock to the bottom of the cradle as shown on the Drawings.

5. Excavate rock under structures to lines and grades shown on the Drawings. Unless specified otherwise, where rock excavation has been carried below grade, the Contractor shall backfill to grade with Class B concrete at his own expense.

6. Where rock foundation is obtained at grade for over 50 percent of the area of any one structure, the portion of the foundation that is not rock shall be excavated below grade to reach a satisfactory foundation of rock. The portion below grade shall be backfilled with Class B concrete.

7. Where rock foundation is obtained at grade for less than 50 percent of any one structure and satisfactory rock cannot be found over the remaining area by reasonable additional excavation, the rock shall be removed for a depth of 12 inches below grade and the space below grade shall be backfilled to the proper grade with compacted layers of crushed rock conforming to the requirements specified herein for backfill.

8. Drilling and blasting operations, if allowed, shall be conducted with due regard for the safety of persons and property in the vicinity and in strict conformity with requirements of all ordinances, laws, and regulations governing blasting and the use of explosives. Conduct rock excavation near existing pipelines or other structures with the utmost care to avoid damage. Promptly repair injury or damage to other structures and properties to the satisfaction of the Owner by the Contractor at his own expense. The Contractor is advised to hire qualified consultants to perform a "pre-blast survey" in area where damage could occur due to blasting; all expenses for such survey must be borne by the Contractor, and no separate payment for same will be made.

9. Complete rock excavation for all structures and adjacent trenches under this Contract and any other rock excavation directed by the Engineer before construction of any structure is started in the vicinity.

C. Borrow Excavation

1. Wherever the backfill of excavated areas or the placement of embankments or other fills requires specified material not available at the site or material in excess of suitable material available from the authorized excavations, such materials shall be obtained from other

sources. This may require the opening of borrow pits at points not immediately accessible from the work. In such cases make suitable arrangements with the property owner and pay all costs incident to the borrowed material including royalties, if any, for the use of the material. Before a borrow pit is opened, the quality and suitability of the material to be obtained therefrom shall be approved by the Engineer.

2. Borrow pits shall be cleared, grubbed, and finish-graded in accordance with the requirements specified herein.

D. Roadway Excavation. Roadway excavation shall consist of excavation for roadways and parking areas in conformity with lines, grades, cross sections, and dimensions shown on the Drawings. After shaping to line, grade, and cross section, the subgrade shall be rolled until compacted to a depth of at least 6 inches to 100 percent of the maximum density at optimum water content as determined by AASHTO T99, Method A. This operation shall include any reshaping and wetting required to obtain proper compaction. All soft or otherwise unsuitable material shall be removed and replaced with suitable material.

E. Trench Excavation

1. Trench excavation shall consist of the removal of materials necessary for the construction of water, sewer, and other pipelines and all appurtenant facilities including manholes, inlets, outlets, headwalls, collars, concrete saddles, piers, and pipe protection called for on the Drawings.

2. Excavation for pipelines shall be made in open cut unless shown otherwise on the Drawings. Trenches shall be cut true to the lines and grades shown on the Drawings or established by the Engineer on the ground. The banks of trenches shall be cut in vertical, parallel planes equidistant from the pipe centerline. From an elevation 12 inches above the top of the pipe to the bottom of the trench, the horizontal distances between vertical planes for different sizes of pipe shall not exceed those shown on the Drawings. When sheeting is used, the width of the trench shall be considered as the distance between the inside faces of the sheeting. The bottom of the trench shall be cut carefully to the required grade of the pipe except where bedding materials or cradles are shown, in which case the excavation shall extend to the bottom of the bedding or cradles as shown on the Drawings. Minimum pipe cover shall be as shown on the Drawings or specified in these Contract Documents.

3. Unless specified elsewhere herein or shown on the Drawings, the minimum trench width shall be the diameter of the pipe plus 12-inches clear space on each side. Unless specified elsewhere herein or shown on the drawings, the minimum cover over the top of the pipe shall be 30-inches.

4. The use of a motor-powered trenching or sawing machine will be permitted, but full responsibility for the preservation, replacement, and/or repair of damage to any existing utility services and private property shall rest solely with the Contractor.

5. Bell holes for bell and spigot pipe and/or mechanical joint pipe shall be excavated at proper intervals so the barrel of the pipe will rest for its entire length upon the bottom of the trench. Bell holes shall be large enough to permit proper installation of all joints in the pipe. Bell holes shall not be excavated more than 10 joints ahead of pipe laying. No part of any bell or coupling shall be in contact with the trench bottom, trench walls, or granular embedment when the pipe is jointed.

6. Excavation for manholes, outlets, collars, saddles, piers, and other pipeline structures shall conform to the additional requirements specified herein for structural excavation.

7. Pipe trenches shall not be excavated more than 400 feet in advance of pipe laying and all work shall be performed to cause the least possible inconvenience to the public. Adequate temporary bridges or crossings shall be constructed and maintained where required to permit uninterrupted vehicular and pedestrian traffic.

8. Wherever pipe trenches are excavated below the elevation shown on the Drawings, the Contractor, at his own expense, shall fill the void thus made at the proper grade with Class B concrete or with compacted layers of crushed rock or sand conforming to the requirements specified herein for backfill, unless otherwise specified herein or shown on the Drawings.

9. In all cases where materials are deposited along open trenches, they shall be placed so that no damage will result to the work and/or adjacent property in case of rain or other surface wash.

F. Structural Excavation

1. Structural excavation shall consist of the removal of all materials necessary for the construction of structures, including tanks, foundations, footings, wet wells, dry wells, box culverts, flumes, channels, buildings, and other miscellaneous structures.

2. The bottoms of structural excavations shall be true to the lines and grades shown on the Drawings. Faces of excavations shall not be undercut for extended footings. Except as provided herein for excavation of unsuitable material or rock, where the excavation is carried below the subgrade elevation shown on the Drawings, the Contractor shall backfill the void thus made to the proper grade with Class B concrete at his own expense.

3.5 BACKFILLING

A. Materials for backfilling shall conform to the following requirements or as specifically noted on the drawing:

1. Select Earth Backfill: Fine, sound, loose earth containing optimum moisture content for compaction to 90 percent of maximum density, free from all wood, vegetable matter, debris, and other objectionable material, and having scattered clods, stones, or broken concrete less than 1 1/2-inches in maximum dimension except that the maximum particle size shall be 3/4-inch when used with PVC or other flexible thermoplastic pipe.

2. Common Earth Backfill: Sound, loose earth containing optimum moisture content for compaction to 90 percent of maximum density, free from all wood, vegetable matter, debris, and other objectionable material, and having scattered clods, stones, or broken concrete and pavement less than 6 inches in maximum dimension.

3. Sand: Natural or imported sand conforming to ASTM D 1073.

4. Crushed Stone: Washed size 67 stone as noted or specified herein.

5. Class B Concrete: Class B concrete as specified elsewhere in these Specifications or on the Drawings.

B. General

1. Earth backfill shall be compacted to not less than 90 percent of the maximum density as determined by ASTM D 698 at a moisture content within 3 percentage points, unless otherwise specified herein. Crushed stone and sand shall be compacted to not less than 83 percent of the solid volume density as determined from the bulk specific gravity by AASHTO T-84 and T-85 and the dry weight of the aggregate.

2. Material that is too dry for adequate compaction shall receive a prior admix of sufficient water to secure optimum moisture content. Material having excessive water content shall not be placed at any time.

3. Backfill material required to be compacted shall be placed in horizontal layers not to exceed 6 inches in thickness (before compaction) and compacted in place by ramming, tamping, or rolling, unless otherwise specified herein. Compaction shall be accomplished by power-driven tools and machinery wherever possible. Compaction and consolidation of sand and crushed stone backfill shall be accomplished using vibrating equipment in a manner acceptable to the Engineer.

C. Backfilling Trenches

1. The backfilling of sewers, water, and other pipeline trenches shall be started immediately after the construction of same has been inspected, tested, and approved by the Engineer. Select backfill or crushed stone as shown on the Drawings or specified herein shall be placed in the trench under and on each side of the pipe in 6-inch layers for the full width of the trench and thoroughly and uniformly compacted by ramming and/or tamping to a minimum of 90 percent of the maximum density determined as specified herein. Select earth backfilling or crushed stone as shown on the Drawings or specified herein shall start above the pipe bedding. Sufficient select backfill or crushed stone as shown on the Drawings shall be placed around the pipe and compacted to provide a cover of not less than 12 inches over the top of the pipe. Mechanical compactors or tampers shall not be used within 12 inches of pipe. Compaction in this area shall be accomplished by hand methods. Backfilling shall proceed simultaneously on both sides of the pipe to prevent lateral displacement. Final backfill shall be as specified herein or shown on the Drawings.

2. Caution shall be used during backfill operations for PVC or other flexible thermoplastic pipe to prevent pipe deformation. PVC or other flexible thermoplastic pipe shall not be subjected to roller or wheel loads until a minimum of 30 inches of backfill has been placed over the top of the pipe. A hydrohammer shall NOT be used until a minimum depth of 48 inches of backfill has been placed over the top of the pipe.

3. In streets and alleys, across sidewalks and driveways, and at any other improved areas subject to vehicular traffic or other superimposed loads, crushed rock backfill shall be placed and compacted in 12-inch layers from the bottom of the trench upward for the full depth of the trench. Crushed rock backfill shall be compacted by use of a hydrohammer or approved vibratory compactor. The top 6 inches of the finished subgrade shall be equal to not less than 100 percent of the maximum density as determined by ASTM D 698 at a moisture content of within 3 percentage points of optimum. When field tests show failure to meet the density requirement, the subgrade shall be loosened by disking, harrowing, or other approved methods to a depth of not less than 6 inches, then reshaped and re-compacted as indicated in this paragraph.

4. Trenches under concrete slabs and footings of structures shall be completely backfilled with compacted sand or crushed rock or filled with Class B concrete as shown on the Drawings.

5. All backfilling shall be done in such a manner that the pipe or structure over or against which it is being placed will not be disturbed or injured. Any pipe or structure injured, damaged, or moved from its proper line or grade during backfilling operations shall be removed and repaired to the satisfaction of the Engineer and then re-backfilled.

D. Backfilling Around Structures

1. Unless otherwise noted, backfilling around structures shall consist of common earth backfill placed in 6-inch layers and compacted by tamping to a minimum of 90 percent of the maximum density determined as specified herein for the full depth of the excavation from the bottom to the finished grade. No backfill shall be placed against concrete structures until the concrete has reached its specified 28-day compressive strength. Where practical, compaction of structural backfill shall be accomplished by power-driven tamping equipment.

2. Where crushed rock mats under slabs and foundations are called for on the Drawings, excavate below grade to the depth of the crushed rock mat as shown on the Drawings and install a compacted crushed rock bed. This shall be finished to a true line or plane and even with the subgrade of the concrete foundations, piers, footings, or slabs. Before placing any crushed stone, remove all loose earth or debris. This crushed rock mat shall extend 12 inches beyond all slabs and foundations or to edges of sheet piling.

3. Crushed rock mats 12 inches or less in thickness shall be constructed of compacted layers of crushed rock conforming to Section 903.23, Size 7 (½-inch to No. 4), of the SSRBC.

4. Crushed rock mats of thickness greater than 12 inches shall have the top 12 inches constructed of compacted layers of crushed rock as specified above. That portion below the top 12 inches shall be constructed of compacted layers of crushed rock conforming to Section 903.05, Class A, with a modified gradation of 6 inches to dust as received from the crusher.

5. The use of earth backfill to support footings, foundations, and structures shall not be permitted, unless otherwise shown on the Drawings.

3.6 FILLS AND EMBANKMENTS

A. Fills and embankments shall consist of all earth fills except backfills in trenches or around structures. Unless special material is specified or shown on the Drawings, material for fills and embankments shall consist of excavated material from structures or of a mixture of such excavated materials and materials borrowed from other sources by the Contractor. All material used for fills and embankments shall be free from wood, vegetable matter, debris, soft or spongy earth or clay, large rock, or other objectionable material and shall be acceptable to the Engineer.

B. Materials shall be placed in the fill or embankment in successive layers 8 inches or less in thickness before compaction, each layer being approximately horizontal and extending to the full limit of the required cross section, and shall be compacted over the entire surface to not less than 95 percent of the maximum density as determined by ASTM D 698 at a moisture content of within 3 percentage points of optimum. The process

shall be repeated for each layer of material until the fill or embankment conforms to the plan lines, grades, and cross sections. The degree of compaction and moisture content required, the method of tamping, and the equipment used shall be approved by the Engineer.

C. The area over which the fill or embankment is to be constructed shall first be cleared of all vegetation, debris, and other objectionable material and, if the ground is in a loose, uncompacted condition, it shall be compacted to a minimum 95 percent of maximum density determined as specified herein.

D. No material shall be placed beyond the sloping lines of embankment unless so ordered by the Engineer. Material allowed to be placed beyond the lines of embankment shown on the Drawings will be compacted as required above unless otherwise authorized by the Engineer.

E. Material for embankments or roadway fills shall be placed in 6-inch maximum lifts and shall be compacted by rolling with power rollers weighing not less than 10 tons, with sheepsfoot rollers, with vibrating rollers, or with pneumatic tire rollers, as required to accomplish the work. While and as each layer is deposited, water shall be applied in sufficient amount to ensure optimum moisture to secure the compaction specified.

F. The use of trucks, carryalls, scrapers, tractors, or other heavy hauling equipment shall not be considered as rolling in lieu of rollers, but the traffic of such hauling equipment shall be distributed over the fill in such a manner as to make the use of the compaction afforded thereby as an addition to compaction by the use of rollers.

G. Wherever a trench passes through a fill or embankment, the fill or embankment material shall be placed as compacted to an elevation 12 inches above the top of the pipe before the trench is excavated.

H. Subgrades for all roadbeds shall meet the requirements of Subsection 2.5 C.4.

3.7 DISPOSAL OF WASTE AND UNSUITABLE MATERIALS

A. All materials removed by excavation which are suitable for the purpose shall be used to the extent possible for backfilling pipe trenches, foundations, and footings and for making embankment fills or for such other purposes as may be shown on the Drawings. All materials not used for such purposes shall be considered as waste materials and the disposal, thereof shall be made at the Contractors expense in a manner and at locations approved by the Engineer.

B. Waste materials shall be spread in uniform layers and neatly leveled and shaped. Spoil banks shall be provided with sufficient and adequate openings to permit surface drainage of adjacent lands.

C. Unsuitable materials, consisting of wood, vegetable matter, debris, soft or spongy clay, peat, and other objectionable material so designated by the Engineer, shall be removed from the work site and disposed of at the Contractors expense, in a manner and at a location approved by the Engineer.

D. No unsuitable or waste material shall be dumped on private property unless written permission is furnished by the owner of the property and unless a dumping permit is issued from the local jurisdiction.

E. The Contractor is responsible for any and all permits and other requirements, such as sediment runoff control necessitated by the disposal of waste material.

3.8 FINAL GRADING

A. After other earthwork operations have been completed, the sites of all structures, roads, and embankments shall be graded within the limits and to the elevations shown on the Drawings. Grading operations shall be so conducted that materials shall not be removed or loosened beyond the required limits. The finished surfaces shall be left in smooth and uniform planes such as are normally obtainable from the use of hand tools. If Contractor is able to obtain the required degree of evenness by means of mechanical equipment, the use of hand labor methods will not be required. Neatly trim and finish slopes and ditches to slopes shown on the Drawings unless otherwise approved by the Engineer.

B. Grade and dress all finished ground surfaces to present a surface varying not more than plus or minus 0.10 foot as regards local humps or depressions, unless otherwise specified or shown on the Drawings, and shall be acceptable to the Engineer.

C. When specific grading requirements are not shown on the drawings, the contractor shall grade all areas within the limits of construction, or otherwise disturbed by construction, to drain and to match the existing, adjacent ground.

3.9 TOPSOIL

A. All areas to be planted with trees or shrubs, or with sprigged grass as shown on the plans, shall be prepared by grading to a smooth, even surface to a level 4 inches below the elevation of the finished grade shown on the Drawings. It shall then be brought to a neat and finished grade by the addition of 4 inches of approved topsoil.

B. Topsoil removed from the construction area may be stockpiled and reused or topsoil may be obtained from approved borrow areas. If obtained from borrow areas, make suitable arrangements with the property owner and pay all costs incident to the borrowed material including royalties.

3.10 SETTLEMENT

A. The Contractor shall be responsible for all settlement of backfill, fills, and embankments which may occur within 1 year after final acceptance of the work by the Owner.

B. Make, or cause to be made, all repairs or replacements made necessary by settlement within 30 days after receipt of written notice from the Engineer or Owner.

3.11 DUST CONTROL

A. The Contractor shall use all means necessary to control dust on and near the work and all off-site borrow areas.

B. The Contractor shall thoroughly moisten all surfaces as required to prevent dust being a nuisance to the public, neighbors and concurrent performance of work on the site.

END OF SECTION

SECTION 31 2500

SLOPE PROTECTION AND EROSION CONTROL

1. GENERAL

1.1. SCOPE

A. This section shall consist of temporary control measures that may be required during the life of the Contract to control erosion and water pollution through the use of berms, dikes, dams, sediment basins, fiber mats, netting, mulches, grasses, slope drains, temporary silt fences, and other control devices.

B. The erosion control measures discussed in this Section shall be installed per the approved Stormwater Pollution Prevention Plan (SWPPP) for the project and as shown on the design drawings. The Contractor is responsible for implementing the sediment and erosion control aspects of the Work in compliance with requirements of the Tennessee Erosion and Sediment Control Handbook.

2. PRODUCTS

2.1. TEMPORARY BERMS

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

B. These berms are used temporarily at the top of newly constructed slopes to prevent excessive erosion until permanent controls are installed or slopes stabilized.

2.2. TEMPORARY SLOPE DRAINS

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

2.3. SEDIMENT STRUCTURES

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

2.4. CHECK DAMS

A. Check dams are barriers composed of logs and poles, large stones, sand bags, or other materials placed across a natural or constructed drainway.

B. Stone check dams shall not be utilized where the drainage area exceeds 50 acres. Log and pole structures shall not be used where the drainage area exceeds 5 acres.

2.5. TEMPORARY SEEDING AND MULCHING

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

2.6. BRUSH BARRIERS

A. Brush barriers shall consist of brush, tree trimmings, shrubs, plants, and other approved refuse from the clearing and grubbing operation.

B. Brush barriers are placed on natural ground at the bottom of fill slopes, where the most likely erodible areas are located, to restrain sedimentation particles.

2.7. BALED HAY OR STRAW CHECKS

A. Baled hay or straw erosion checks are temporary measures to control erosion and prevent siltation. Bales shall be either hay or straw containing 5 cubic feet or more of material.

B. Baled hay or straw checks shall be used where the existing ground slopes toward or away from the embankment along the toe of slopes, in ditches, or other areas where siltation, erosion, or water run-off is a problem.

2.8. TEMPORARY SILT FENCES

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

2.9. EROSION CONTROL BLANKET

A. Erosion control blanket are utilized on cut and fill slopes to protect the slopes from erosion until a permanent vegetative cover can be established. The material shall consist of Curlex blankets by American Excelsior Company or approved equal. The type will be dependent upon the slopes to be protected.

3. QUALIFICATIONS

3.1. PRECONSTRUCTION CONFERENCE

A. Schedules and Methods of Operation. No work shall be started until the following erosion control schedules and methods of operation have been accepted by the Engineer.

1. Submit for acceptance the schedule for accomplishment of temporary and permanent erosion control work as applicable for clearing and grubbing, slope protection, grading, bridges and other structures at watercourses, construction, and paving.

2. Submit for acceptance the proposed method of erosion control on haul roads and borrow pits and the plan for disposal of waste materials.

3.2. CONSTRUCTION REQUIREMENTS

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

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

C. Where erosion is likely to be a problem, clearing and grubbing operations should be so scheduled and performed that grading operations and permanent erosion control features can follow immediately thereafter if the project conditions permit; otherwise, erosion control measures may be required between successive construction stages. Preconstruction vegetation ground cover shall not be destroyed, removed, or disturbed more than 20 calendar days prior to grading or earth moving unless approval is granted otherwise.

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

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

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

G. The Contractor shall control surface water run-on/runoff by intercepting and diverting stormwater down or cross gradient away from Work areas through the use of dikes, ditches, curb walls, pipes, sumps, slope drains, or other approved means.

H. Where construction vehicles access routes intersect public roads, make provisions to mitigate the transport of mud, soil, or dust onto the public roads.

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

3.3. CONSTRUCTION MANAGEMENT TECHNIQUES

A. Clearing and grubbing must be held to the minimum necessary for grading and equipment operation.

B. Construction must be sequenced to minimize the exposure time of cleared surface area.

C. Construction must be staged or phased for large projects. Areas of one phase must be stabilized before another phase can be initiated. Stabilization shall be accomplished by temporarily or permanently protecting the disturbed soil surface from rainfall impacts and runoff.

D. Erosion and sediment control measures must be in place and functional before earth moving operations begin, and must be constructed and maintained throughout the construction period. Temporary measures may be removed at the beginning of the work day, but must be replaced at the end of the work day.

E. All control measures shall be checked, and repaired as necessary, weekly in dry periods and within 24 hours after any rainfall of 0.5 inch within a 24-hour period. During prolonged rainfall, daily checking and repairing is necessary. The Contractor shall maintain records of checks and repairs.

F. A specific individual shall be designated to be responsible for erosion and sediment controls on each project site.

3.4. CONSTRUCTION OF EROSION CONTROL FEATURES

A. Temporary Berms. A temporary berm shall be constructed of compacted soil, with a minimum width of 24 inches at the top and a minimum height of 12 inches with or without a shallow ditch, constructed at the top of fill slopes or transverse to centerline on fills. Temporary berms shall be graded so as to drain to a compacted outlet at a slope drain. The area adjacent to the temporary berm in the vicinity of the slope drain must be properly graded to enable this inlet to function efficiently and with minimum ponding in this area. All transverse berms required on the downstream side of a slope drain shall extend across the grade to the highest point at approximately a 10 degree angle with a perpendicular to centerline. The top width of these berms may be wider and the side slope flatter on transverse berms to allow equipment to pass over these berms with minimum disruptions. When practical and until final roadway elevations are approached, embankments should be constructed with a gradual slope to one side of the embankment to permit the placement of temporary berms and slope drains on only one side of the embankment.

B. Temporary Slope Drains

1. Temporary slope drains shall consist of stone gutters, fiber mats, plastic sheets, concrete or asphalt gutters, half-round pipe, metal pipe, plastic pipe, flexible rubber, or other materials which can be used as temporary measures to carry water accumulating in the cuts and on the fills down the slopes prior to installation of permanent facilities or growth of adequate ground cover on the slopes.

2. Fiber matting and plastic sheeting shall not be used on slopes steeper than 4:1 except for short distances of 20 feet or less.

3. All temporary slope drains shall be adequately anchored to the slope to prevent disruption by the force of the water flowing in the drains. The base for temporary slope drains shall be compacted and concavely formed to channel the water or hold the slope drain in place. The inlet end shall be properly constructed to channel water into the temporary slope drain. Energy dissipaters, sediment basins, or other approved devices shall be constructed at the outlet end of the slope drains to reduce erosion downstream. An ideal dissipater would be dumped rock or a small sediment basin which would slow the water as well as pick up some sediment. All temporary slope drains shall be removed when no longer necessary and the site restored to match the surroundings.

C. Sediment Structures

1. Sediment structures shall be utilized to control sediment at the foot of embankments where slope drains outlet, at the bottom as well as in the ditch lines atop waste sites, and in the ditch lines or borrow pits. Sediment structures may be used in most drainage situations to prevent excessive siltation of pipe structures. All sediment structures shall be at least twice as long as they are wide.

2. When use of temporary sediment structures is to be discontinued, all sediment accumulation shall be removed, and all excavation backfilled and properly compacted. The existing ground shall be restored to its natural or intended condition.

D. Check Dam

1. Utilize check dams to retard stream flow and catch small sediment loads. Materials utilized to construct check dams are varied and should be clearly illustrated or explained in the Contractor's erosion control plan.

2. Key all check dams into the sides and bottom of the channel a minimum depth of 2 feet. A design is not needed for check dams but some typical designs are shown in the standard plans.

3. Do not use stone check dams where the drainage area exceeds 50 acres. Log and pole structures should generally not be used where the drainage area exceeds five acres.

E. Temporary Seeding and Mulching. Perform seeding and mulching in accordance with Section 32 9219, Seeding.

F. Brush Barriers. Brush barriers shall consist of brush, tree trimmings, shrubs, plants, and other approved refuse from the clearing and grubbing operation. The brush barriers shall be constructed approximately parallel to original ground contour. Each brush barrier shall be compressed to an approximate height of 3 to 5 feet and approximate width of 5 to 10 feet. The embankment shall not be supported by the construction of brush barriers.

G. Baled Hay or Straw Erosion Checks. Hay or straw shall be embedded in the ground 4 to 6 inches to prevent water flowing underneath. The bales shall also be anchored securely to the ground by wooden stakes driven through the bales into the ground. Bales can remain in place until they rot, or be removed after they have served their purpose, as determined by the Engineer. Keep the checks in good condition by replacing broken or damaged bales immediately after damage occurs.

H. Temporary Silt Fences

1. Temporary silt fences shall be placed on the natural ground, at the bottom of fill slopes, in ditches, or other areas where siltation is a problem. Silt fences are constructed of wire mesh fence with a covering of burlap or some other suitable material on the upper grade side of the fence and anchored into the soil.

2. Maintain the silt fence in a satisfactory condition for the duration of the project or until its removal. The silt accumulation at the fence may be left in place and seeded or removed. The silt fence becomes the property of the Contractor whenever the fence is removed.

I. Erosion Contol Blanket

1. Erosion control blankets shall be installed in accordance with manufacturers recommendations to include anchor trenches, bedding, overlapping, and blanket anchoring.

3.5. MAINTENANCE

A. The erosion control features installed by the Contractor shall be acceptably maintained by the Contractor until no longer needed or permanent erosion control methods are installed. Any materials removed shall become the property of the Contractor.

B. In the event that temporary erosion and pollution control measures are required due to the Contractor's negligence, carelessness, or failure to maintain properly, the contractor shall immediately correct the damages that have occurred and install needed measures as required by the Engineer.

3.6. REMOVAL

A. At the conclusion of the Work, remove all erosion and sediment control materials.

B. Remove erosion and sediment control materials in such a way as to minimize ground disturbance and the potential for future erosion and/or sediment transport. Fill, compact, and stabilize all disturbed ground, including trenches associated with the removal of erosion and sediment controls, as directed by Engineer.

3.7. EROSION CONTROL OUTSIDE PROJECT AREA

A. Temporary erosion control shall include construction work outside the project area where such work is necessary as a result of construction such as borrow pit operations, haul roads, and equipment storage sites. Bid price in such cases shall include all necessary clearing and grubbing, construction incidentals, maintenance, and site restoration when no longer needed. All erosion and sediment control shall be performed by the Contractor at his own expense.

END OF SECTION

SECTION 31 4900

UTILITY LINE CROSSINGS OF STREAMS

1. GENERAL

1.1. SCOPE

A. When the activity is located in waters which are not navigable pursuant to Section 10 of the Rivers and Harbors Act of 1899, excavation and fill activities shall be separated from flowing waters. All surface water flowing toward the excavation or fill work shall be diverted, piped, or flumed to the downstream side of the work. This can be accomplished through utilization of cofferdams or constructed berms in conjunction with a pipe or flume. Cofferdams must be constructed of sand bags, clean rock, steel sheeting, or other non-erodible material.

B. Where the activity is located in waters defined as navigable pursuant to Section 10 of the Rivers and Harbors Act of 1899, excavation and fill work may be accomplished within the water column.

C. New utility line crossings shall be located such as to avoid permanent alteration or damage to the integrity of the stream channel. Large trees, steep banks, rock outcroppings, etc., should be avoided.

D. In case of proposed gravity sewer lines and other utility lines which follow the stream gradient or otherwise parallel the stream channel, the number of crossings shall be minimized.

E. The alignment of new utility line crossings shall intersect the stream channel as close to 90 degrees or as perpendicular as possible, and in no case less than a 45 degree angle from the center line of the stream.

F. In case of small streams with a bedrock stream bed which must be blasted to form a trench, provision shall be made to prevent the loss of stream flow to fracturing of the bedrock. These provisions shall include as a minimum sealing the bottom of the trench with concrete and complete concrete encasement of the pipeline.

G. Temporary erosion control measures must be in place before earthmoving operations begin, maintained throughout the construction period and repaired, if necessary, after rainfall. Straw or hay bales and/or silt fence must be installed along the base of all fills and cuts, on the downhill side of stock piled soil, and along stream banks in cleared areas to prevent erosion into streams. They must be installed parallel to the stream channel, entrenched and staked, and extend the width of the area to be cleared. The bales and/or silt fence may be removed at the beginning of the work day, but must be replaced at the end of the workday.

H. Backfill activities must be accomplished in a manner which stabilizes the stream bed and banks to prevent erosion. Backfill materials shall consist of suitable

materials free of contaminants. All contours must be returned to pre-project conditions. The completed work may not disrupt or impound stream flow.

I. Slurry water pumped from work areas and excavations must be held in settling basins or treated by filtration prior to its discharge into surface waters. Water must be held in sediment basins until at least as clear as the receiving waters. Sedimentation basins shall not be located closer than 25 feet from the top bank of a stream. Sediment basins and traps shall be properly designed according to the size of the drainage areas or volume of water to be treated.

J. Checkdams shall be utilized where run-off is concentrated. Clean rock, log, sandbag, or straw bale checkdams shall be properly constructed to detain run-off and trap sediment.

K. Clearing, grubbing, and other disturbance to riparian vegetation shall be limited to the minimum necessary for slope construction and equipment operations. Unnecessary vegetation removal is prohibited. All disturbed areas shall be properly stabilized as soon as practicable.

L. Streams shall not be used as transportation routes for heavy equipment. Crossings must be limited to one point and erosion control measures must be utilized where the stream banks are disturbed. Where the stream bed is not composed of rock, a pad of clean rock must be used at the crossing point. All temporary fill must be completely removed after the work is completed.

M. Construction debris must be kept from entering the stream channel.

N. All spills of petroleum products or other chemical pollutants must be reported to the appropriate emergency management agency and measures shall be taken immediately to prevent the pollution of waters of the State, including groundwater.

O. Upon achievement of final grade, the disturbed streambank shall be stabilized with riprap or other suitable material. All other disturbed soils must be stabilized and re-vegetated within 30 days by sodding or seeding and mulching. Seed to be utilized shall include combination of annual grains and grasses, legumes, and perennial grasses. Lime and fertilizer shall be applied as needed to achieve a vegetative cover.

P. Upon completion of construction, the stream shall be returned as nearly as possible to its original, natural conditions.

1.2. LIABILITY FOR NONCOMPLIANCE

A. The Contractor shall be liable to the Owner for any civil penalties or damages incurred by the Owner resulting from the Contractor's failure to comply with this section.

END OF SECTION

DIVISION 32 - EXTERIOR IMPROVEMENTS

SECTION 32 1000

NEW AND REPLACEMENT PAVING

1. GENERAL

1.1. SUMMARY

A. This section includes provisions for hot-mixed asphalt paving and mineral aggregate subbase over prepared subgrade for trench width, full pavement width paving, and other areas as shown on the Drawings.

B. Prepared subgrade is specified in Section 31 2000, Earthwork.

C. Proof rolling of prepared subgrade is included in this section.

D. Saw-cutting of edges of existing pavement is required to minimize subsidence of the pavement into the trench and to minimize the width of pavement replacement.

1.2. RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplemental Conditions and Division 1 Specification sections, apply to this section.

1.3. SUBMITTALS

A. Submit the following in accordance with Conditions of Contract and Division 1 Specification sections.

1. Material certificates signed by material producer and Contractor, certifying that each material item complies with or exceeds specified requirements.

2. Pavement marking plan indicating lane separations and defined parking spaces. Note dedicated handicapped spaces with international graphics symbol.

1.4. SITE CONDITIONS

A. Weather Limitations. Apply prime and tack coats when ambient temperature is above 50°F (10°C) and when temperature has not been below 35°F (1°C) for 12 hours immediately prior to application. Do not apply when base is wet or contains an excess of moisture.

B. Construct hot-mixed asphalt surface course when atmospheric temperature is above 40°F (4°C) and when base is dry. Base course may be placed when air temperature is above 30°F (-1°C) and rising.

C. Grade Control. Establish and maintain required lines and elevations.

2. PRODUCTS

2.1. MATERIALS

A. General. Use locally available materials and gradations that exhibit a satisfactory record of previous installations.

B. Coarse Aggregate. Sound, angular crushed stone, crushed gravel, or properly cured crushed blast furnace slag, complying with ASTM D 692-00.

C. Fine Aggregate. Sharp-edged natural sand or sand prepared from stone, properly cured blast furnace slag, gravel, or combinations thereof, complying with ASTM D 1073-99.

D. Mineral Filler. Rock or slag dust, hydraulic cement, or other inert material complying with ASTM D 242.

E. Asphalt Cement. ASTM D 3381 for viscosity-graded material; ASTM D 946 for penetration-graded material.

F. Prime Coat. Cut-back asphalt type, ASTM D 2027; MC-30, MC-70, or MC-250.

G. Tack Coat. Emulsified asphalt; ASTM D 977.

H. Mineral Aggregate Subbase. SSRBC, Section 303, Type A (Class A aggregate, Grading D).

I. Geotextile Fabric. 6 oz/sy, woven, polypropylene fabric; Mirafi, Inc., Type 600x, or equal.

J. Lane Marking Paint. Alkyd-resin type, ready-mixed complying with AASHTO M 248, Type I.

1. Color: White.
2. Color: Yellow.

2.2. TYPES OF PAVEMENT

A. Replace all existing pavement in streets, driveways, or parking areas that are removed, destroyed, or damaged by construction of improvements as specified herein, as shown on the Drawings, or as called for in the Bid Schedule. Unless otherwise shown or specified, all paved surfaces shall be replaced in kind or as required by permit. Curbs, sidewalks, etc. removed or damaged by the Contractor shall be replaced to match adjacent surfaces and restore the area to pre-construction conditions. Unless shown or specified otherwise, a minimum of 2” of asphaltic concrete or 4” portland cement shall be utilized over a minimum compacted mineral aggregate base course. Restoration shall extend a minimum of 12” outside the extents of trench width. Materials, equipment, and construction methods used for paving work shall conform to the Specifications applicable to the particular type required for replacement, repair, or new pavements.

B. Where sewerage or water lines and appurtenances are constructed in or across unpaved, chert, or crushed stone surfaced streets, roadways, driveways, or parking areas, repair or replace the surface removed or damaged with a minimum of 6 inches of crushed stone in accordance with Section 401, "Mineral Aggregate Surface," SSRBC.

C. In no case shall paving repair be commenced without prior approval of the Engineer of the type of pavement, the equipment to be used, and the method or procedure to be used.

D. The pavement mixture shall not be spread until the designated surface has been previously cleaned and prepared, is intact, firm, properly cured, dry, and the tack coat has been applied.

3. EXECUTION

3.1. SURFACE PREPARATION

A. Remove loose material from compacted subgrade surface immediately before applying subbase.

B. Roll prepared subgrade surface to check for unstable areas and areas requiring additional compaction.

C. Do not begin paving work until deficient subgrade areas have been corrected and are ready to receive subbase.

D. Place mineral aggregate subbase and compact in accordance with the applicable SSRBC specifications to provide a minimum of 6 inches or as shown on Drawings. Subbase thickness greater than 8 inches shall be placed in two or more layers.

E. Roll prepared subbase surface to check for unstable areas and areas requiring additional compaction.

F. Do not begin paving work until deficient subbase areas have been corrected and are ready to receive paving.

G. Prime Coat. Apply at rate of 0.20 to 0.50 gallon per square yard over compacted subbase. Apply material to penetrate and seal, but not flood, surface. Cure and dry as long as necessary to attain penetration and evaporation of volatile components.

H. Tack Coat. Apply to contact surfaces of previously constructed asphalt or portland cement concrete and surfaces abutting or projecting into hot-mixed asphalt pavement. Distribute at rate of 0.05 to 0.15 gallon per square yard of surface.

I. Allow to dry until at proper condition to receive paving.

J. Exercise care in applying bituminous materials to avoid smearing of adjoining concrete surfaces. Remove and clean damaged surfaces.

3.2. PLACING MIX

A. General. Place hot-mixed asphalt mixture on prepared surface, spread, and strike off. Spread mixture at minimum temperature of 225°F (107°C). Place areas inaccessible to equipment by hand. Place each course to required grade, cross-section, and compacted thickness.

B. Paver Placing. Place in strips not less than 10 feet wide, unless otherwise acceptable to Engineer. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Complete base course for a section before placing surface course.

C. Immediately correct surface irregularities in finish course behind paver. Remove excess material forming high spots with shovel or lute.

D. Joints. Make joints between old and new pavements, or between successive days' work, to ensure continuous bond between adjoining work. Construct joints to have same texture, density, and smoothness as other sections of hot-mixed asphalt course. Clean contact surfaces and apply tack coat.

E. Curbs. Construct curbs over compacted pavement surfaces. Apply a light tack coat unless pavement surface is still tacky and free from dust.

F. Place curb materials to cross-section indicated or, if not indicated, to local standard shapes, by machine or by hand in wood or metal forms. Tamp hand-placed materials and screed to smooth finish. Remove forms as soon as material has cooled.

3.3. ROLLING

A. General. Begin rolling when mixture will bear roller weight without excessive displacement.

B. Compact mixture with hot hand tampers or vibrating plate compactors in areas inaccessible to rollers.

C. Breakdown Rolling. Accomplish breakdown or initial rolling immediately following rolling of joints and outside edge. Check surface after breakdown rolling and repair displaced areas by loosening and filling, if required, with hot material.

D. Second Rolling. Follow breakdown rolling as soon as possible, while mixture is hot. Continue second rolling until mixture has been evenly compacted.

E. Finish Rolling. Perform finish rolling while mixture is still warm enough for removal of roller marks. Continue rolling until roller marks are eliminated and course has attained 95 percent laboratory density.

F. Patching. Remove and replace paving areas mixed with foreign materials and defective areas. Cut out such areas and fill with fresh, hot-mixed asphalt. Compact by rolling to specified surface density and smoothness.

G. Protection. After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.

H. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.4. TRAFFIC AND LANE MARKINGS

A. General. Provide traffic and lane markings in all areas where markings have been damaged due to trench width pavement. On full width pavement, provide markings in all areas were markings were present at beginning of project or where markings are designated to be provided on the Drawings.

B. Cleaning. Sweep and clean surface to eliminate loose material and dust.

C. Striping. Use chlorinated-rubber base traffic lane-marking paint, factory-mixed, quick-drying, and non-bleeding.

D. Do not apply traffic and lane marking paint until layout and placement have been verified with Engineer.

E. Apply paint with mechanical equipment to produce uniform straight edges. Apply at manufacturer's recommended rates to provide minimum 12 to 15 mils dry thickness.

3.5. WHEEL STOPS

A. General. Secure wheel stops to hot-mixed asphalt surface with not less than two ¾-inch-diameter galvanized steel dowels embedded in precast concrete at ⅓ points. Size length of dowel to penetrate at least ½ hot-mixed asphalt depth.

3.6. FIELD QUALITY CONTROL

A. General. Testing in-place hot-mixed asphalt courses for compliance with requirements for thickness and surface smoothness will be done by Owner's testing laboratory. Repair or remove and replace unacceptable paving as directed by Engineer.

B. Thickness. In-place compacted thickness tested in accordance with ASTM D 3549 will not be acceptable if exceeding following allowable variations:

1. Base Course: Plus or minus 1/2 inch.
2. Surface Course: Plus or minus 1/4 inch.

C. Surface Smoothness: Test finished surface of each hot-mixed asphalt course for smoothness, using 10-foot straightedge applied parallel with and at right angles

to centerline of paved area. Surfaces will not be acceptable if exceeding the following tolerances for smoothness:

1. Base Course Surface: 1/4 inch.

2. Wearing Course Surface: 3/16 inch.

3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is ¼ inch.

D. Check surface areas at intervals as directed by Engineer.

E. Paving of streets, TDOT roadways, driveways, parking lots, etc. must be accepted by the city or county utility authority, TDOT regional office, property owner, or other applicable party as a condition of final acceptance by the Engineer.

END OF SECTION

SECTION 32 9219

SEEDING

1. GENERAL

1.1. SCOPE

A. The work covered by this section consists of furnishing all labor, equipment, and material required to place topsoil, seed, commercial fertilizer, agricultural limestone, and mulch material, including seedbed preparation, harrowing, compacting, and other placement operations on graded earthen areas as described herein and/or shown on the Drawings. In general, seeding operations shall be conducted on all newly graded earthen areas not covered by structures, pavement, or sidewalks; all cleared or grubbed areas which are to remain as finish grade surfaces; and on all existing turf areas which are disturbed by construction operations and which are to remain as finish grade surfaces. Areas disturbed by borrow activities shall also be seeded according to these Specifications.

B. Temporary Seeding and Erosion Control

1. This practice is applicable on areas subject to erosion for up to 12 months or until establishment of finished grade or permanent vegetative cover. Temporary vegetative measures shall be coordinated with permanent measures to assure economical and effective stabilization.

2. Temporary seeding shall be applied to exposed soil surfaces that are not to be fine-graded for periods from 15 days to one year. Such areas include denuded areas, soil stockpiles, dikes, dams, sides of sediment basins, temporary roadbanks, backfilled and rough graded utility line trenches, and disturbed areas along utility lines, etc.

3. Temporary seeding shall be in accordance with the temporary seeding schedule and shall meet the same requirements for seed bed preparation and mulching with the exception that lime and fertilizer need not be applied unless the soil is very low fertility and low pH.

1.2. QUALITY ASSURANCE

A. Prior to seeding operations, furnish to the Engineer labels or certified laboratory reports from an accredited commercial seed laboratory or a state seed laboratory showing the analysis and germination of the seed to be furnished. Acceptance of the seed test reports shall not relieve the Contractor of any responsibility or liability for furnishing seed meeting the requirements of this section.

B. Prior to topsoil operations, obtain representative samples and furnish soil test certificates including textural, pH, and organic ignition analysis from the State University Agricultural Extension Services or other certified testing laboratory.

2. PRODUCTS

2.1. TOPSOIL

A. Place a minimum of 4 inches of topsoil over all graded earthen areas and over any other areas to be seeded. Sources of topsoil shall be approved by the Engineer prior to disturbance.

B. Topsoil shall be a friable loam containing a large amount of humus and shall be original surface soil of good, rich, uniform quality, free from any material such as hard clods, stiff clay, hardpan, partially disintegrated stone, pebbles larger than 1/2 inch in diameter, lime, cement, bricks, ashes, cinders, slag, concrete, bitumen or its residue, boards, sticks, chips, or other undesirable material harmful or unnecessary to plant growth. Topsoil shall be reasonably free from perennial weeds and perennial weed seeds, and shall not contain objectionable plant material, toxic amounts of either acid or alkaline elements, or vegetable debris undesirable or harmful to plant life.

C. Topsoil shall be natural topsoil without admixture of subsoil material, and shall be classifiable as loam, silt loam, clay loam, sandy loam, or a combination thereof. The pH shall range from 5.5 to 7.0. Topsoil shall contain not less than 5 percent nor more than 20 percent, by weight, of organic matter as determined by loss on ignition of samples oven-dried to 65°C.

2.2. SEED

A. Deliver seed in new bag or bags that are sound and labeled in accordance with the U.S. Department of Agriculture Federal Seed Act.

B. All seed shall be from the last crop available at time of purchase and shall not be moldy, wet, or otherwise damaged in transit or storage.

C. Seed shall bear the grower's analysis testing to 98 percent for purity and minimum 85 percent for germination. At the discretion of the Engineer, samples of seed may be taken for check against the grower's analysis.

D. Species, rate of seeding, fertilization, and other requirements are shown in the Seeding Requirements Table.

2.3. FERTILIZER AND LIMING MATERIALS

A. Fertilizer and liming materials shall comply with applicable state, local, and federal laws concerned with their production and use.

TEMPORARY SEEDING REQUIREMENTS TABLE

			Rates per 1,000 Square Feet		
Area	Sowing Season	Species	Seed	Fertilizer*	Limestone**
All Areas	4/15 to 8/15	Sudangrass (Sorghum Sudanese)	1.5 lbs.	10 lbs. 10-20-20	100 lbs.
	8/16 to 4/14	Annual Ryegrass (Lolium Temulentum)	1 lb.	10 lbs. 10-20-20	100 lbs.

*Fertilizer is not required on fertile soils. Apply on very low fertility soil.

**Apply limestone on highly acidic soils (pH 5.5 and lower).

PERMANENT SEEDING REQUIREMENTS TABLE

			Rates per 1,000 Square Feet		
Area	Sowing Season	Species	Seed	Fertilizer	Limestone
Flat to rolling terrain with slopes less than 3:1	3/1 to 6/1	Kentucky 31 Fescue Ladino White Clover*	4 lbs. 1/4 lb.	30 lbs. 6-12-12	100 lbs.
	8/1 to 11/1	Kentucky 31 Fescue Ladino White Clover* Annual Ryegrass	4 lbs. 1/4 lb. 2 lbs.	30 lbs. 6-12-12	100 lbs.
Embankments with slopes greater than 3:1	3/1 to 6/1	Hulled Sericea Lespedeza* Kentucky 31 Fescue Weeping Lovegrass	1 lb. 3 lbs. 1/4 lb.	30 lbs. 6-12-12	100 lbs.
	8/1 to 11/1	Unhulled Sericea Lespedeza* Kentucky 31 Fescue Annual Ryegrass	1 lb. 3 lbs. 2 lbs.	30 lbs. 6-12-12	100 lbs.

*Requires inoculation.

B. Commercial fertilizer shall be a ready-mixed material and shall be equivalent to the grade or grades specified in the Seeding Requirements Table. Container bags shall be labeled with the name and address of the manufacturer, brand name, net weight, and chemical composition.

C. Agricultural limestone shall be a pulverized limestone with a calcium carbonate content not less than 85 percent by weight. Agricultural limestone shall be

crushed so that at least 85 percent of the material will pass a No. 10 mesh screen and 50 percent will pass a No. 40 mesh screen.

2.4. MULCH MATERIAL

A. All mulch materials shall be air-dried and reasonably free of noxious weeds and weed seeds or other materials detrimental to plant growth.

B. Mulch shall be composed of wood fiber, straw, or stalks, as specified herein. Mulch shall be suitable for spreading with standard mulch-blowing equipment.

C. Straw mulch shall be partially decomposed stalks of wheat, rye, oats, or other approved grain crops.

D. Stalks shall be the partially decomposed, shredded residue of corn, cane, sorghum, or other approved standing field crops. and liming materials shall comply with applicable state, local, and federal laws

2.5. MULCH BINDER

A. Mulch on slopes exceeding a 3 to 1 ratio shall be held in place by the use of an approved erosion control fabric, such as Curlex I as manufactured by American Excelsior Company, or approved equal. Fabric shall consist of strips of biodegradable paper interwoven with yarn that is subject to degradation by ultraviolet light.

2.6. INOCULANTS FOR LEGUMES

A. All leguminous seed shall be inoculated prior to seeding with a standard culture of nitrogen-fixing bacteria that is adapted to the particular seed involved.

2.7. WATER

A. Water shall be clean, clear, and free from any objectionable or harmful chemical qualities or organisms and shall be furnished by the Contractor.

3. EXECUTION

3.1. GENERAL

A. Where work shall occur in yards and easements near residences, on surfaces that are not improved, the Contractor shall reduce impact to these areas. Excavated material shall be stockpiled on plywood sheets to minimize disturbance to adjacent areas.

B. Dump trucks shall not be used to bring construction materials or to remove excess excavated materials from these not improved areas. Construction equipment (i.e. front-end loaders, backhoes, skid-steers, etc.) will be used within the easements to transport construction materials. Plywood shall be used to protect construction equipment pathways in locations that are not improved.

3.2. SECURING AND PLACING TOPSOIL

A. Topsoil shall be secured from areas where topsoil has not been previously removed, either by erosion or mechanical methods. Topsoil shall not be removed to a depth in excess of the depth approved by the Engineer.

B. The area or areas from which topsoil is secured shall possess such uniformity of soil depth, color, texture, drainage, and other characteristics as to offer assurance that when removed the product will be homogeneous in nature and will conform to the requirements of these Specifications.

C. All areas from which topsoil is to be secured shall be cleaned of all sticks, boards, stones, lime, cement, ashes, cinders, slag, concrete, bitumen or its residue, and any other refuse which will hinder or prevent growth.

D. When securing topsoil from a designated pit or elsewhere, should strata or seams of material occur which do not come under the requirements for topsoil, such material shall be removed from the topsoil or if required by the Engineer, the pit shall be abandoned.

E. Before placing or depositing topsoil upon any area, all improvements within the area shall be completed, unless otherwise approved by the Engineer.

F. The areas in which topsoil is to be placed or incorporated shall be prepared before securing topsoil for use.

3.2. SEEDBED PREPARATION

A. Before fertilizing and seeding, the topsoil surfaces shall be trimmed and worked to true line free from unsightly variations, bumps, ridges, and depressions, and all detrimental material, roots, and stones larger than 3 inches in any dimension shall be removed from the soil.

B. Not earlier than 24 hours before the seed is to be sown, the soil surface to be seeded shall be thoroughly cultivated to a depth of not less than 2 inches with a weighted disc, tiller, pulvimixer, or other equipment, until the surface is smooth and in a condition acceptable to the Engineer.

C. If the prepared surface becomes eroded as a result of rain or for any other reason, or becomes crusted before the seed is sown, the surface shall again be placed in a condition suitable for seeding.

D. Ground preparation operations shall be performed only when the ground is in a tillable and workable condition, as determined by the Engineer.

3.3. FERTILIZATION AND LIMING

A. Following seedbed preparation, fertilizer shall be applied to all areas to be seeded so as to achieve the application rates shown in the Seeding Requirements Table.

B. Fertilizer shall be spread evenly over the seedbed and shall be lightly harrowed, raked, or otherwise incorporated into the soil for a depth of 1/2 inch.

C. Fertilizer need not be incorporated in the soil as specified above when mixed with seed in water and applied with power sprayer equipment. The seed shall not remain in water containing fertilizer for more than 30 minutes when a hydraulic seeder is used.

D. Agricultural limestone shall be thoroughly mixed into the soil according to the rates in the Seeding Requirements Table. The specified rate of application of limestone may be reduced by the Engineer if pH tests indicate this to be desirable. It is the responsibility of the Contractor to obtain such tests and submit the results to the Engineer for adjustment in rates.

3.4. SEEDING

A. Seed of the specified group shall be sown as soon as preparation of the seedbed has been completed. No seed shall be sown during high winds, nor until the surface is suitable for working and is in a proper condition. Seeding shall be performed during the dates shown in the Seeding Requirements Table unless otherwise approved by the Engineer. Seed mixtures may be sown together, provided they are kept in a thoroughly mixed condition during the seeding operation.

B. Seeds shall be uniformly sown by any approved mechanical method to suit the slope and size of the areas to be seeded, preferably with a broadcast type seeder, windmill hand seeder, or approved mechanical power-drawn seed drills. Hydroseeding and hydromulching may be used on steep embankments, provided full coverage is obtained. Care shall be taken to adjust the seeder to the proper rate before seeding operations are started and to maintain the adjustment during seeding. Seed in hoppers shall be agitated to prevent segregation of the various seeds in a seeding mixture.

C. Immediately after sowing, the seeds shall be covered and compacted to a depth of 1/8 to 3/8 inch by a cultipacker or suitable roller.

D. Leguminous seeds shall be inoculated prior to seeding with an approved and compatible nitrogen-fixing inoculant in accordance with the manufacturer's mixing instructions.

3.5. MULCHING

A. All seeded areas shall be uniformly mulched in a continuous blanket immediately after seeding. The mulch shall be applied so as to permit some sunlight to penetrate and air to circulate, and at the same time shade the ground, reduce erosion, and conserve soil moisture. Approximately 25 percent of the ground shall be visible through the mulch blanket.

B. One of the following mulches shall be spread evenly over the seeded areas at the following application rates:

1. Wood Fiber 1,400 lbs/acre
2. Straw 4,000 lbs/acre
3. Stalks 4,000 lbs/acre

These rates may be adjusted at the discretion of the Engineer at no additional cost to the Owner, depending on the texture and condition of the mulch material and the characteristics of the seeded area.

C. Mulch on slopes greater than a 3 to 1 ratio shall be held in place by the use of an approved erosion control fabric. Fabric shall be installed immediately after seeding and fertilizing area (mulch shall not be used under fabric).

D. Erosion control fabric shall be installed and applied in accordance with the manufacturer's recommendations. Any fabric which becomes torn, broken loose from securing staples, or undermined shall be immediately and satisfactorily repaired. Areas where seed is washed out before germination shall be fertilized, reseeded, and restored. Any required restoration work shall be performed without additional compensation.

3.6. WATERING

A. Maintain the proper moisture content of the soil to ensure adequate plant growth until a satisfactory stand is obtained. If necessary, watering shall be performed to maintain an adequate water content in the soil.

B. Watering shall be accomplished by hoses, tank truck, or sprinklers in such a way to prevent erosion, excessive runoff, and overwatered spots.

3.7. MAINTENANCE

A. Upon completion of seeding operations, the Contractor shall clear the area of all equipment, debris, and excess material, and the premises shall be left in a neat and orderly condition.

B. Maintain all seeded areas without additional payment until final acceptance of the work by the Owner. Re-grading, re-fertilizing, re-liming, reseeding, or re-mulching shall be done at Contractor's expense. Seeding work shall be repeated on defective areas until a satisfactory uniform stand is achieved. Damage resulting from erosion, gullies, washouts, or other causes shall be repaired by filling with topsoil, compacting, and repeating the seeding work.

3.8. FIELD QUALITY CONTROL

A. Seeding of easements or private property must be accepted by the easement and property owner as a condition of final acceptance by the Engineer.

END OF SECTION

SECTION 32 9223

SODDING

1. GENERAL

1.1 SUMMARY

A. This section includes provisions for surface restoration, final grading and sodding to restore easement areas to existing condition with Owner approval and direction only.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.3 DEFINITIONS

A. Finish Grade: Elevation of finished surface of planting soil.

B. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. Pesticides include insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. They also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.

C. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. Pests include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

D. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

E. Subgrade: The surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

1.4 SUBMITTALS

A. Qualification Data: For landscape and/or sod Installer.

B. Certification of each seed mixture for turfgrass sod. Include identification of source and name and telephone number of supplier.

C. Product Certificates: For fertilizers, from manufacturer.

D. Pesticides and Herbicides: Product label and manufacturer's application instructions specific to Project.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful turf establishment.

1. Experience: Five years' experience in turf installation.

2. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.

3. Pesticide Applicator (if applicable): State licensed, commercial.

B. Sod Supplier Qualifications: A qualified turfgrass supplier whose work and product has resulted in successful turf establishment.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Turfgrass sod must be harvested and transported when its moisture content is at 20 to 30 percent, measured at depth of harvest.

B. Turfgrass sod shall be harvested, delivered and installed/transplanted within a period of 24 hours, unless a suitable preservation method is approved prior to delivery, including, but not limited to refrigeration at 40 degrees Fahrenheit. Turfgrass sod not transplanted within this period, or preserved by approved methods, shall be inspected and approved by the Engineer prior to its installation.

C. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.

2. Provide erosion-control measures to prevent erosion or displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.

3. Accompany each delivery of bulk materials with appropriate certificates.

1.7 FIELD CONDITIONS

A. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions.

2. PRODUCTS

2.1 TURFGRASS SOD

A. Turfgrass Sod: Commerical Grade. Turfgrass sod shall be machine cut at a uniform soil thickness of 0.5 inch (13 mm), plus or minus 0.2 inch (5 mm), at the time of cutting. Measurement for thickness shall exclude top growth and thatch. Furnish viable sod of uniform density, color, and texture that is strongly rooted and

capable of vigorous growth and development when planted.

B. Before harvesting, the turfgrass shall be mowed uniformly heights as follows:

1. 0.625 to 2 inches (16 to 51 mm) on cool season grasses (i.e., bluegrass, rye and fescue).

2. 0.5 to 1.50 inches (13 to 40 mm) on warm season grasses (i.e., zoysiagrass, bermudagrass, St. Augustinegrass, etc.)

3. 0.125 to 0.25 inch (3 to 6 mm) for Bentgrass.

C. Turfgrass Species: Species of sod installed is to match existing, if known; otherwise, a fescue blend shall be used.

2.2 FERTILIZERS

A. Fertilizer: Granular, pelleted,or liquid/flowable fertilizer:

1. Composition: 20 percent nitrogen, 20 percent phosphorous, 10 percent potassium, and 3 percent iron, by weight.

2.3 PESTICIDES

A. General: Pesticide, registered and approved by the EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

B. Pre-Emergent Herbicide (Selective and Nonselective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer, following label instructions.

C. Post-Emergent Herbicide (Selective and Nonselective): Effective for controlling weed growth that has already germinated.

3.EXECUTION

3.1. GENERAL

A. Sod surface restoration is to be used with Owner direction and approval only.

B. Where work shall occur in yards and easements near residences, on surfaces that are not improved, the Contractor shall reduce impact to these areas. Excavated material shall be stockpiled on plywood sheets to minimize disturbance to adjacent areas.

C. Dump trucks shall not be used to bring construction materials or to remove excess excavated materials from these areas. Construction equipment (i.e. front-end loaders, backhoes, skid-steers, etc.) will be used within the easements to transport

construction materials. Plywood shall be used to protect construction equipment pathways in locations that are not improved.

3.2 EXAMINATION

A. Examine areas to be planted for compliance with requirements and other conditions affecting installation and performance of the Work.

1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.

2. Suspend planting operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.

3. Uniformly moisten excessively dry soil that is not workable or which is dusty.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by the Engineer and replace with new planting soil.

3.3 PREPARATION

A. Protect structures; utilities; sidewalks; pavements; and other facilities, trees, shrubs, and plantings from damage caused by planting operations.

B. Install erosion-control measures as required preventing erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.4 TURF AREA PREPARATION

A. General: Prepare planting area for soil placement and mix planting soil according to supplier's recommendations.

B. Placing Planting Soil: Place and mix planting soil in place over exposed subgrade.

1. Reduce elevation of planting soil to allow for soil thickness of sod.

C. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

D. Before planting, obtain Engineer's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.5 SODDING

A. Lay sod within 24 hours of harvesting unless a suitable preservation method is accepted by the Engineer prior to delivery time. Do not lay sod if dormant or if ground is frozen or muddy.

B. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch or overlap. Stagger sod strips or pads to offset joints in adjacent courses. Avoid damage to soil or sod during installation. After establishment, if necessary to smooth surface, tamp and roll lightly to remove surface undulations. Work sifted soil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.

C. Saturate sod with fine water spray within two hours of planting. During first 20 days after planting, water 3 times daily with short, frequently waterings, as necessary to maintain moist soil to a minimum depth of 1-1/2 inches below sod.

3.6 TURF RENOVATION

A. Renovate existing turf where directed by the Engineer.

B. Renovate turf damaged by Contractor's operations, such as storage of materials or equipment and movement of vehicles.

1. Reestablish turf where settlement or washouts occur or where minor regrading is required.

2. Install new planting soil as required.

C. Remove sod and vegetation from diseased or unsatisfactory turf areas; do not bury in soil.

D. Remove topsoil containing foreign materials, such as oil drippings, fuel spills, stones, gravel, and other construction materials resulting from Contractor's operations, and replace with new planting soil.

E. Remove weeds before seeding. Where weeds are extensive, apply selective herbicides as required. Do not use pre-emergence herbicides.

F. Remove waste and foreign materials, including weeds, soil cores, grass, vegetation, and turf, and legally dispose of them off.

G. Till stripped, bare, and compacted areas thoroughly to a soil depth of 6 inches.

H. Apply initial fertilizer required for establishing new turf and mix thoroughly into top 4 inches of existing soil. Install new planting soil to fill low spots and meet finish grades.

1. Initial Fertilizer: Applied according to manufacturer's recommendations.

I. Apply sod as required for new turf.

J. Water newly planted areas and keep moist until new turf is established.

3.7 TURF MAINTENANCE

A. General: Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, re-grade, and replant bare or eroded areas and re-mulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.

1. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and turf damaged or lost in areas of subsidence.

2. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.

B. Watering:

1. Schedule watering to prevent wilting, ponding, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
2. Water turf with fine spray at a recommended ET rate.

C. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than one-third of grass height. Remove no more than one-third of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain the following grass height:

1. Mow bentgrass to a height of 0.125 to 0.25 inch (3 to 6 mm) or less.

2. Mow bermudagrass to a height of 1.5 inches (38 mm).

3. Mow perennial ryegrass and fescue to a height of 0.625 - 2.0 inches (16-50 mm).

4. Mow Kentucky bluegrass and buffalograss to a height of 0.625 - 2 inches (16-50 mm).

D. Turf Postfertilization: Apply slow-release fertilizer after initial mowing and when grass is dry.

1. Use fertilizer that provides actual nitrogen of at least 1 lb/1000 sq. ft. (0.45 kg/92.9 sq. m) to turf area.

3.8 SATISFACTORY TURF

A. Turf installations shall meet the following criteria as determined by the Engineer:

1. Satisfactory Sodded Turf: At end of maintenance period, a healthy, well-rooted,

even-colored, viable turf has been established, free of weeds, open joints, bare areas, and surface irregularities.

B. Use specified materials to reestablish turf that does not comply with requirements, and continue maintenance until turf is satisfactory.

3.9 PESTICIDE APPLICATION

A. Apply pesticides and other chemical products and biological control agents according to requirements of authorities having jurisdiction and manufacturer's written recommendations.

3.10 CLEANUP AND PROTECTION

A. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

B. Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of them off.

C. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established.

D. Remove non-degradable erosion-control measures after grass establishment period.

3.11 MAINTENANCE SERVICE

A. Turf Maintenance Service: Provide full maintenance by skilled employees. Maintain as required in "Turf Maintenance" section. Begin maintenance immediately after each area is planted and continue until acceptable turf is established, but for not less than the following periods:

1. Sodded Turf: 30 days from date of Substantial Completion.

3.12 FIELD QUALITY CONTROL

A. Sodding of easements or private property must be accepted by the easement or property owner as a condition of final acceptance by the Engineer.

END OF SECTION

DIVISION 33 - UTILITIES

SECTION 33 0130

SEWER FLOW CONTROL

1. GENERAL

1.1 SCOPE

A. Furnish, install and maintain sewer flow control devices required for the construction of the project. The contractor shall use either by-pass pumping units or other methods which have been approved by the Engineer.

2. PRODUCTS (NOT USED)

3. EXECUTION

3.1 PLUGGING OR BLOCKING

A. When using bypass pumping, insert a sewer line plug into the line at the manhole upstream from the proposed relocation. The plug shall be designed so that no sewage flow is released. The plug shall remain in place until the invert construction is complete.

3.2 BYPASS PUMPING

A. Install a bypass pump of sufficient capacity to transport all of the sewers flow around the proposed invert construction. Install sewer plugs as required to isolate the construction area. Pumps shall be installed upstream of the construction area and shall discharge into the sewer downstream of the construction. No flow shall be discharged on the surface or in natural waterways. The bypass pumping shall continue until the construction is complete.

3.3 CONTRACTORS RESPONSIBILITY

A. It shall be the Contractor's responsibility to install, operate, and maintain the bypass pumps during all operations. It shall also be the Contractor's responsibility to have a standby pump of equal size available on-site during the entire pumping operation.

B. The Contractor shall submit to Engineer a bypass pumping plan for review and approval prior to commencement of bypass pumping operations. This plan shall include at a minimum, but not limited to, pump curves, hydraulic calculations, coordination and staffing requirements, and locations of suction and discharge.

C. If full flow-thru sewer plugs are used, no pumps are required to be on site, Engineer approval required.

D. The use of wheel ramps are required for piping where such crosses areas and entrances/exits subject to vehicular traffic. The use of "lay flat" hose shall be used where necessary.

E. The Contractor shall notify the Engineer and/or his representative at least 24 hours in advance of all bypass pumping operations. The Contractor shall obtain approval prior to commencement of bypass pumping operations.

3.4 LIABILITY

A. Damages to private or public property that result from sewer flow control operations are Contractor's responsibility.

B. Any sewage spills shall be cleaned and limed as expeditiously as possible, but in no event more than 4 hours after the occurrence. Immediately notify the Engineer and Owner of all sewage spills.

END OF SECTION

SECTION 33 0130.16

CLEANING AND TELEVISION INSPECTION

1. GENERAL

1.1 SCOPE

A. Cleaning sewer lines to remove solids, roots, soil, sand, pieces of broken pipe, bricks, grease, grit from sewer lines and manholes and other debris, thus improving flow and facilitating television inspection for sewer evaluation. Cleaning includes initial manhole wall washing by high-pressure water jet.

B. Television inspecting the line to obtain quality video and Television Inspection Reports upon which the Engineer/Owner can make decisions regarding needed sewer rehabilitation.

1.2 RELATED WORK

A. The following sections contain requirements that relate to this section:

1. Section 33 0130 Sewer Flow Control
2. Section 33 0516.13 Point Repair and Obstruction Removals
3. Section 33 0523.13 Cured-in-Place Pipe
4. Section 33 0523.31 Replacement of Mainline Sewer by Pipe Bursting
5. Section 33 3113 PVC Pipe for Gravity Sewer

1.3 DEFINITIONS

A. Normal Cleaning Equipment: Cleaning devices such as rods, metal pigs, porcupines, root saws, snakes, scooters, sewer balls, kites, and other approved equipment in conjunction with hand-winching devices and gas or electric rod-propelled devices. Variable-pressure water nozzles (3000 psi) are considered normal cleaning equipment.

B. Mechanical Cleaning Equipment: Buckets, scrapers, scooters, porcupines, kites, heavy- duty brushes, metal pigs and other debris-removing equipment and accessories used in conjunction with approved power winching machines. High-to very-high-pressure water nozzles (10,000 psi) are considered mechanical cleaning equipment.

C. Survey Cleaning and Television Inspection: Video inspection of existing sanitary sewers to evaluate lines and determine whether conditions exist which would require line rehabilitation.

D. Pre-Installation Television Inspection: Video inspection by Contractor of sewer

lines designated for rehabilitation to confirm cleaning, location of service connections and constructability of line rehabilitation according to Drawings and Specifications.

E. Post-Installation Television Inspection: Video inspection to determine whether rehabilitation of a sanitary sewer has been completed according to Drawings and Specifications.

F. Television Inspection Report: A report that is submitted in pdf format for each line segment using NASSCO PACP codes.

G. Siphon or Inverted Siphon: A depressed section of gravity sanitary sewer that allows a graded or sloped sewer to convey flow across a conflicting underground utility or open drainage channel by passing under it.

1.4 PERFORMANCE REQUIREMENTS

A. Clean designated sanitary sewers and manholes using mechanical, hydraulically-propelled or high-velocity sewer cleaning equipment. Select cleaning processes which will remove grease, soil, sand, silt, solids, rags and debris from each sewer segment and associated manholes.

1.5 SUBMITTALS

A. Comply with Section 01 3323 – Shop Drawing Product Data Sample. Submit equipment manufacturer's operational manuals and guidelines to the Engineer for review. Strictly follow such instructions unless otherwise directed by the Owner.

B. Submit a list of lawful disposal sites proposed for dumping debris from cleaning operations.

C. The Contractor shall provide the Engineer and Owner with the sewer video (including audio), a hard copy report and an electronic report in pdf format for the inspections for each line segment. The electronic report and video shall be named by line segment. The sewer video shall be MPEG4 format. The Contractor shall utilize the latest NASSCO PACP codes at the time of the Contract notice to proceed. Prior to commencing the work the NASSCO PACP codes to be utilized shall be submitted. All work on the contract shall follow the same codes. Inspection Software must be NASSCO PACP Certified and proof of certification of Software shall be submitted prior to commencing the work. Contractor shall be current on NASSCO training. All electronic data shall be submitted in MS Access. Any variation from the requirements shall be subject to approval by the Owner. Submittal of the CCTV videos and the reports for review can be submitted through a data storage device, such as a flash drive, or through Contractor's FTP site and will be available for download. An email of the information availability and phone calls to the Inspector, Senior Inspector and/or specific contact shall be made.

D. At the end of the contract, the Contractor shall submit a hard drive including all videos and reports for the entire contract.

E. The digital information shall contain files which store each line segment as a unique digital record.

1.6 QUALITY ASSURANCE

A. Qualifications: Use experienced personnel to operate cleaning equipment and devices.

B. Acceptance of sewer cleaning work is subject to successful completion of the television inspection. If inspection shows solids, sand, grease, grit or other debris remaining in the line, the cleaning is considered unsatisfactory. Repeat cleaning and video inspection of the sewer line until cleaning is acceptable to the Owner.

C. Unable to Penetrate: If the Contractor is unable to penetrate a line during cleaning or CCTV inspection, the Contractor shall notify the Owner.

D. The work shall comply with current NASSCO standards.

2. PRODUCTS

2.1 CLEANING EQUIPMENT

A. Select cleaning equipment and methods based on the condition of the sanitary sewer mains at the time work begins. More than one method or type of equipment may be required on a single project or at a single location.

B. When requested by the Owner, demonstrate at the performance capabilities of cleaning equipment and methods proposed for use on the project. If results obtained by demonstration are not satisfactory, provide other equipment that will clean the sewer line.

C. For high-velocity cleaning use a water jet capable of producing a minimum volume of 50 gpm with a pressure of 1500 psi at the pump. Install a gauge to indicate working pressure on the discharge of high-pressure water pumps. In addition to conventional nozzles, use a nozzle which directs the cleaning force to the bottom of the pipe for sewers 18-inches and larger.

D. When hydraulic or high-velocity cleaning equipment is used, install a suitable sand trap, weir, dam or suction device in the downstream manhole so that solids and debris are trapped for removal.

E. When approved by the Owner, both hydraulic cleaning and mechanical cleaning equipment (including pumps) may be employed to clean a siphon.

2.2 CLEANING ACCESSORIES

A. When water from the public water supply is needed to meet the cleaning requirements of the equipment and the sewer, obtain transient water meters from

the for installation on trucks or at fire hydrants.

B. Obtain approval with the Owner before connecting to any fire hydrants.

C. All cleaning equipment must be equipped with backflow preventers to prevent contamination to the public water supply.

D. If approved by the Owner, pneumatic or hydraulically powered “knockers” or chain flails may be used to remove heavy tuberculation in cast iron pipes.

2.3 VIDEO EQUIPMENT

A. Video Equipment: Select and use video equipment that will produce color videos.

B. Pipe Inspection Camera: Produce a video using a pan-and-tilt radial-viewing pipe inspection camera that pans ± 275 degrees and rotates 360 degrees. Use a camera with an accurate footage counter, which displays on the monitor the exact distance of the camera from the centerline of the starting manhole. Use a camera with a camera height adjustment so that the camera lens is always centered at one-half the inside diameter, or higher in the pipe being inspected. Provide a lighting system that allows the features and condition of the pipe to be clearly seen. A reflector in front of the camera may be required to enhance lighting in dark or large diameter pipe.

3. EXECUTION

3.1 EXAMINATION

A. Do not begin cleaning until both upstream and downstream manholes have been checked for flow monitors and other mechanical devices. Refer to Section 02555 - Manhole Rehabilitation.

3.2 PREPARATION

A. Take precautions to protect sanitary sewer mains and manholes from damage that might be inflicted by the improper selection of cleaning processes or improper use of equipment. When using hydraulically-propelled devices take precautions to ensure that the water pressure created does not cause damage to or flooding of public or private property. Do not surcharge any sanitary sewer to an elevation that could cause overflow of sewage into area waterways, homes or buildings, or onto the surface.

B. Do not use or obstruct fire hydrants when there is a fire in the area. Remove water meters, fittings and piping from fire hydrants at the end of each working day.

C. Exercise care to prevent contamination of the potable water system. Use an appropriately sized backflow preventer when drawing water from a public hydrant.

D. Where possible, use the flow of wastewater present in the sanitary sewer main to provide fluid for hydraulic cleaning devices.

3.3 CLEANING

A. Conserve Water. Do not waste water from the public water supply through poor connections, hydrants left open, or any other cause.

B. Collapsible Dams: Use collapsible dams for hydraulically-propelled devices which require a head of water to operate. Dam shall be easily collapsible to prevent damage to the sewer, public property and private property.

C. High Velocity Cleaning: Operate high-velocity cleaning equipment so that the pressurized nozzle moves continuously. Turn off or reduce the flow to the nozzle to prevent damage to the line any time the nozzle becomes stationary.

D. Mechanical Cleaning: In addition to normal cleaning equipment, perform mechanical cleaning when required and approved using equipment and accessories as defined in this Section.

E. Debris Disposal: Remove sludge, soil, sand, rocks, grease, roots and other solid or semi-solid material resulting from the cleaning operation at the downstream manhole of the section being cleaned. Passing debris from any sewer section to any other sewer section is not allowed. Load debris from the manholes into an enclosed container for liquid waste hauling. Remove solids and semi-solids resulting from cleaning operations from the site and dispose them lawfully at the end of each work day. Do not accumulate debris, liquid waste, or sludge on the site except in totally enclosed containers approved by the Owner.

F. Disposal Sites: Dispose of waste at a lawfully-permitted disposal site.

3.4 TELEVISION INSPECTION

A. Immediately after cleaning, video inspect the sanitary sewer line to document the condition of the line and to locate existing service connections. Notify the Owner 24 hours in advance of any television inspection so that inspections operations may be observed.

B. Perform television inspection of sanitary sewers as follows:

1. Perform a survey television inspection on sanitary sewers within the boundary of the project, as directed by the Owner.
2. Perform pre-installation television inspection immediately after cleaning and before line rehabilitation work. Pre-installation video inspection is not required for sewer lines designated to be removed and replaced (open-cut). Verify that the line is clean and ready to accept the line rehabilitation. Prepare Television Inspection Report forms. Maintain copies of all video reports for reference by the Owner for the duration of the project.
3. Videos shall pan all manholes showing benches, walls, annular spaces, and

debris removal. Camera operator shall slowly pan each service connection, clamped joint and pipe material transition from one material to another. Complete and submit a Television Inspection Report for every sewer segment video submitted to the Owner.

4. Perform post-installation television inspection to confirm completion of rehabilitation work, including removal and replacement. Verify that rehabilitation work conforms to the requirements of the Drawings and Specifications. Provide a video showing the completed work including the condition of restored service connections. Prepare and submit Television Inspection Report forms providing the location of service connections along with the location of any discrepancies. Manhole work, including benches, inverts and pipe penetrations into manhole, should be complete prior to post-installation video work.
5. Contractor shall make actual measurement of pipe inside diameter and record measurement to nearest tenth of one inch as “pipe size” on “Television Inspection Report” and on “Video Header”.

C. Survey television inspection videos shall be continuous for pipe segments between manholes. Do not leave gaps in the video recording of a segment between manholes and do not show a single segment on more than one video, unless specifically allowed by the Owner.

D. Videos shall include audio.

3.5 FLOW CONTROL

A. Perform survey television inspection on one manhole section at a time. Adequately control the flow in the section being inspected. Do not exceed the depth of wastewater flow shown below:

Pipe Diameter (Inches)	Depth of Flow (Percent of Pipe Diameter)
6 – 10	10
12 – 24	15
Over 24	20

If during survey television inspection of a manhole section, the wastewater flow depth exceeds the maximum allowable, reduce the flow depth to an acceptable level by performing the survey television inspection during minimum flow hours, by diversion pumping or by pulling a camera with swab, high-velocity jet nozzle or other acceptable dewatering device. Video inspections made while floating the camera is not acceptable unless approved by the Owner.

B. Minimize flow in the line while performing pre-installation television inspection.

C. No flow is allowed in the line while performing post-installation video inspection.

3.6 PASSAGE OF VIDEO CAMERA

A. Do not pull or propel the video camera through the line at a speed greater than 30 feet per minute.

B. If during survey television inspection of a manhole section, the camera is unable to pass an obstruction even though flow is unobstructed, televise the manhole section from the other direction (reverse setup) in order to obtain a complete video of the line. Whenever such a condition arises, notify the Owner to determine whether an obstruction removal or point repair is necessary. If a point repair is authorized, repair the pipe at the designated location and then re-televise the manhole section to verify completion of the point repair, unless waived by the Owner.

1. When the camera is being pulled from the other direction in order to survey on either side of an obstruction and a second obstruction or repair location is encountered away from the first obstruction, notify the Owner and request a review of the video. The Owner may direct the Contractor to make one or both repairs. No downtime shall be allowed.
2. Once point repairs are completed, re-inspect the manhole section.
3. The Owner makes no guarantee that the sanitary sewer designated for survey television after cleaning is clear for the passage of the camera set-up. Select the appropriate equipment, tools and methods for securing safe passage of the camera.

C. During pre-installation television inspection, camera passage should show the line is ready for rehabilitation. Report to the Owner any variations between previous reported (existing data) conditions and actual conditions encountered.

D. For post-installation television inspection, exercise the full capabilities of the camera equipment to document the completion of the rehabilitation work and the conformance of the work to the Drawings and Specifications. Provide a full 360-degree view of pipe, joints and service connections.

3.7 TELEVISION INSPECTION REPORT

A. Provide a television inspection report in pdf format for each line segment using NASSCO PACP codes. The electronic report shall be named by line segment.

3.8 FIELD QUALITY CONTROL

A. Do not under any circumstances, allow sewage or solids removed in the cleaning process to be released onto streets or into ditches, catch basins, cleanouts, storm drains, or sanitary or storm sewer manholes.

B. Acceptance of sewer cleaning work is subject to successful completion of the television inspection. If the television inspection shows solids, soil, sand, grease, grit, or other debris remaining in the line, cleaning will be considered unsatisfactory. Repeat cleaning and inspection of the line segment until cleaning

is judged satisfactory by the Owner.

3.9 MANHOLE REPAIR

A. Repair manholes dismantled or damaged during the cleaning process, and replace manhole frames and covers damaged during the cleaning process.

END OF SECTION

SECTION 33 0516.35

POINT REPAIRS AND OBSTRUCTION REMOVALS

1. GENERAL

1.1 SCOPE

A. The work covered in this section shall include furnishing all labor, equipment, and materials required to complete the point repairs determined to be necessary. All point repairs shall be completed in strict accordance with this section of the Specifications.

B. The existing flow in the line segment being replaced shall be controlled whenever necessary during replacement. The pipe used for replacement shall be polyvinyl chloride (PVC) pipe, as set forth in the Contractor's bid and as specified below.

C. Pipe and fitting material shall be PVC unless shown otherwise in the proposal or on the plans.

1.2. DESCRIPTION

A. The term "point repair" shall refer to construction required to correct a problem at a specified location in a sewer line. Point repairs shall be performed at locations previously identified during internal sewer inspections. The length of pipe to be replaced at each point repair indicated in the Point Repair Trench Detail is representative only and may not reflect the actual extent of work required. Any pipe required above 15-feet shall be paid for at the unit price for pipe replacement.

1.3. RELATED SECTIONS

A. The following sections contain requirements that relate to this section:

1. Section 31 2000, Earthwork.
2. Section 33 3100, Polyvinyl Chloride (PVC) Pipe for Gravity
3. Section 33 0527, Sewer Flow Control
4. Section 33 0513.11, Manhole Rehabilitation

1.4 PERFORMANCE REQUIREMENTS

A. Point Repair:

1. Locate and replace small lengths of one or more pipe sections where isolated line failure has occurred due to settlement, corrosion, crushing, or separation of joints.

2. The Drawings may identify potential locations for point repair, but the Contractor is responsible for verifying locations. Point repairs to sewer lines are listed in Point Repair Rehabilitation Tables. Point repairs to service lines are listed in Lateral Line Rehabilitation Tables.

3. Determine the location of service line repairs by smoke testing the manhole section in which the failed pipe is located. The Owner will authorize the Contractor to make point repairs based on results of smoke testing.

4. Smoke testing shall not be performed within 24 hours of a rainfall event or if ponded or standing water is present on the ground or in the drainage channels in the area planned for smoke testing.

5. Smoke testing shall be accomplished utilizing two (2) minimum 1,750 CFM blowers designed specifically for smoke testing of sewers. Place blower on the upstream and downstream manhole of the line section to be tested. Place sandbags in the upstream and downstream manholes to isolate the section being tested and prevent the migration of smoke into sections not being tested. Utilize smoke bombs as necessary to ensure a continuous supply of smoke is provided for the entire duration of the test period.

6. Determine the location of point repairs by smoke testing or closed circuit television inspection of the failed pipe location.

B. Obstruction Removal: Remove obstructions by one of the following methods:

1. Obstruction removal by remote device:

a. Protruding taps: Service lines that protrude more than one inch into the sewer.

b. Other obstructions: Hanging gaskets, fixed debris, stabilized sand, hardened mineral deposits, roots, rust scale, tuberculation, etc.

2. Obstruction removal by excavation: Obstructions encountered during liner insertion that are removed by digging and exposing the pipe.

1.5 DEFINITIONS

A. Point Repair: Repair of broken or collapsed gravity sanitary sewer lines on public property, including mains, collectors and service lines, by replacing, at the point of failure, the length of failed pipe with new pipe.

B. Obstruction Removal: Clearing sewer mains of obstructions to allow for rehabilitation.

C. Sewer Lines: Gravity flow pipe lines in the easement or right-of-way which collect sanitary sewer discharges from commercial or residential service lines and discharge into another sewer line (main or collector), or into a lift station or treatment plant.

D. Service Lines: Those gravity flow sewer lines from commercial or residential property that discharge into a sewer line.

1.6 SUBMITTALS

A. Submittals: Comply with Section 01 3323 – Shop Drawing Product Data Sample.

B. Submit product data for each pipe product, fitting and jointing material.

C. Submit Pre and Post inspection videos in accordance with Documents 33 0130.16 - Cleaning and Television Inspection.

1.7 SEQUENCING

A. Before rehabilitating a sewer line section between adjacent manholes, complete point repair and obstruction removal on that section.

B. Clean the line and perform a pre- and post-installation video inspection for each point repair on a sewer line not scheduled for additional rehabilitation.

C. Post-installation video inspection of the service line point repair is not required.

2. PRODUCTS

2.1 PVC PIPE

A. PVC Sewer Pipe and Joints: 4-inch through 24-inch pipe complying with Section 33 3113 – PVC Pipe for Gravity Sewer. If point repair is located at a service connection, use a full-bodied fitting for the service connection. No field fabrication of fittings allowed.

2.2 DUCTILE IRON PIPE

A. Ductile Iron Pipe: 4-inch thorough 48-inch, complying with Section 33 1113.13 – Ductile Iron Pipe and Fittings.

B. Fittings: Push-on end-joint fittings with bell-and-spigot ends, with bells modified for push-on joints, complying with Section 33 1113.13 - Ductile Iron Pipe and Fittings.

C. Interior Coating: Comply with Section 33 1113.13 - Ductile Iron Pipe and Fittings.

2.3 JOINTING MATERIALS

A. Use SS shielded flexible adapters secured with 1/2-inch stainless steel bands, Flexible adapter must comply with ASTM C-1173. Shall be Fernco Strong Back RC, or Engineer approved equal.

3. EXECUTION

3.1 PROTECTION

A. Provide barricades, warning lights and signs for excavations created by point repairs. Comply with Section 01 5000 - Temporary Facilities and Controls.

B. Do not allow soil, sand, debris or runoff to enter sewer system.

3.2 DIVERSION PUMPING

A. Install and operate diversion pumping equipment as required to maintain sewage flow and to prevent backup or overflow. Comply with Section 33 0130 – Sewer Flow Control.

3.3 EXCAVATION

A. Excavate and backfill trenches in accordance with Section 31 2000 - Earthwork.

B. Perform work in accordance with OSHA standards.

C. Install and operate necessary dewatering and surface water control measures as required.

D. Remove and lawfully dispose of excess excavated material and debris from the work site daily.

3.4 TYPICAL SEQUENCE OF POINT REPAIR

A. Perform pre-installation video inspection to verify the location of sewer line point repairs. Perform service testing between manholes to verify location of service line point repairs.

B. After the location of a point repair, excavate the required length for the point repair.

C. Prior to replacing pipe, determine condition of the existing line on both sides of the point repair by lamping the line at least 10 feet in each direction. Determine whether additional lengths of line (beyond "minimum length" criteria) need replacement.

D. Remove the damaged pipe and replace with new pipe, shaping the bottom of the trench and placing the required pipe bedding so that the grade of the replaced pipe matches the grade of the existing line. Establish proper grade for the pipe being replaced.

E. Connect the new pipe to existing pipe using SS shielded flexible adapters.

F. After completion of point repair, but prior to backfill, perform a smoke test to demonstrate the integrity of the repair, in the presence of the Owner.

G. Backfill the excavation as specified in Section 31 2000 – Earthwork.

H. Complete site restoration as specified in Sections 32 1000 – New and Replacement Paving and 32 9219 - Seeding.

I. Perform a post-installation video inspection as specified in Section 33 0130.16 - Cleaning and Television Inspection. Point repairs that show offset joints, non-uniform grade, incorrect alignment, excessive deflection or similar conditions are considered defective work. Replace pipe and bedding as required to correct defective work.

J. Extra length of Pipe Replacement beyond the Point Repair limits may be extended to the entire section either way, even to the next continuous section, as directed by the Owner.

3.5 ABANDONMENT OF POINT REPAIR

A. If a pipe is exposed by excavation and found to be in good condition, not requiring a point repair, the point repair shall be abandoned. Notify the Owner.

B. If pre-installation video inspection reveals that no point repair is required, the Contractor shall notify the Owner and the point repair shall be abandoned.

C. Backfill the excavation, replace pavement or sidewalk, and repair and seed or sod unpaved areas, as specified in Sections 32 1000 – New and Replacement Paving and 32 9219 - Seeding.

3.6 OBSTRUCTION REMOVAL

A. Remote Device: Remove obstructions identified during video inspection of a sanitary sewer line segment which could cause a non-uniform liner pipe installation or obstruction of the liner during installation. Obtain authorization from the Owner for obstruction removal with a remote device before proceeding.

1. Use a power-driven cutting device (robotic cutter) to remove protruding taps. Cut protruding taps so that protrusions are no greater than 3/4 inch. If a protruding tap cannot be removed by the cutting device, then a point repair may be performed.

2. To remove other obstructions, use a remote device. Pull or drive the device from manhole to manhole up to a continuous length of 500 feet using a solid steel mandrel, porcupine, root saw, bucket, robotic cutter or similar device to remove the obstruction. Select a device that is adequately sized to remove the obstruction.

B. Excavation: Use excavation as the method of obstruction removal when installation of the liner in the sanitary sewer is in progress. If during the liner insertion operation, a collapsed sewer, off-set joint or other obstruction is encountered which prevents or blocks the passage or insertion of the liner, uncover and remove the obstruction as follows:

1. Excavate at the point where there is an obstruction. Use a trench safety system as required.

2. Break out the existing sanitary sewer pipe (carrier pipe) as directed by the Owner. Remove only that amount of material which is causing the obstruction. Remove the minimum amount of carrier pipe.

3. Under such conditions, replacement of the carrier pipe is not required. Do not disturb the existing sewer bedding during excavation. However, if embedment is disturbed during the obstruction removal procedure, place cement-stabilized sand or crushed stone beneath the liner.

4. When the liner is completely in place, encase it with crushed stone.

END OF SECTION

SECTION 33 0516.53

MANHOLE REHABILITATION

1. GENERAL

1.1. SCOPE

A. The work under this section includes repairing manholes at the various locations indicated by the Drawings or Contract Documents. The Contractor shall deliver a finished product including all materials, labor, equipment, and services necessary for traffic control, bypass pumping and/or diversion of sewage flows, cleaning equipment, product installation, all quality controls and samples for performance of required material tests, final inspection, testing and warranty work, all as specified in these contract documents and at the quantities of each component contained in the Bid Proposal.

1.2. RELATED WORK and REFERENCES

A. Section 31 2000, Earthwork.

B. Section 33 0130, Sewer Flow Control.

C. Section 33 0516.54, Chimney Seals

D. Section 33 3913, Sewer Manholes and Covers.

E. ASTM F2414-04, Standard Practice for Sealing Sewer Manholes Using Chemical Grouting

F. ASTM F2551-09, Standard Practice for Installing a Protective Cementitious Liner System in Sanitary Sewer Manholes

G. NASSCO, National Association of Sewer Service Companies

1.3. SUBMITTALS

A. Submit complete shop drawings and engineering data on all materials and accessories to the Engineer in accordance with the requirements of Section 01 3323 - Shop Drawings, Product Data, and Samples.

1.4. STORAGE AND PROTECTION

A. Store and protect materials in accordance with the requirements of Section 01 6600 and manufacturer's recommendations.

1.5. QUALITY ASSURANCE

A. Acceptance Testing. Manholes shall be visually inspected after rehabilitation or installation to insure that no voids or leakage points exist. Any manholes failing this test shall be reworked as necessary and retested at no additional cost to the

Owner. Any manholes not passing this visual inspection must, at the Engineer's option, be tested for leakage using the method as specified in Section 33 3913. No separate payment allowed for manhole testing. Regardless of visible leaks or voids, Engineer expressly reserves the right to require vacuum testing in accordance with the requirement of Section 33 3913, no separate payment allowed.

1.6. SAFETY

A. The Contractor shall conform to all work safety requirements of pertinent regulatory agencies, and shall secure the site for working conditions in compliance with the same. The Contractor shall erect such signs and other devices as are necessary for the safety of the work site.

B. The Contractor shall perform all of the Work in accordance with applicable OSHA safety standards. Emphasis shall be placed upon the requirements for entering confined spaces and with the equipment being utilized for manhole rehabilitation components.

C. The Contractor shall have on the job site at all times at a minimum the following safety equipment: Gas monitor capable of testing and detecting for combustible gas, oxygen deficiency and hydrogen sulfide; Confined space access and retrieval winch system; Ventilating fans with large diameter ventilating hose; Supplied air respirator, MSHA/NIOSH approved type; Safety harness and life lines; Other equipment as may be required for a specific project; and all equipment to be available for use, in sufficient quantity, by the Contractor, Engineer and Owner for the duration of the project.

D. All entries into or work within confined spaces shall be conducted in accordance with the U.S. Department of Health and Human Services/National Institute for Occupational Safety and Health [DHHS (NIOSH)] Publication No. 87-113, A Guide to Safety in Confined Spaces.

2. PRODUCTS

2.1. NEW AND REPLACEMENT MANHOLE FRAMES AND COVERS

A. Gray Iron Castings

1. Manhole frames and covers shall be made of Class 35 cast iron conforming to ASTM A 48. All castings shall be of the dimensions required by the Drawings and shall be sound, smooth, clean, and free from blisters or other defects.

    a. Defective castings that have been plugged or otherwise treated to remedy defects shall not be accepted. The contract surfaces of frames and covers shall be machined so that the covers rest securely in the frames without rocking and are in contact with the frame flanges along the entire perimeter of the contract surfaces. All castings shall be thoroughly cleaned after being machined; and before rusting begins, they shall be given a bituminous coating that has a smooth finish and is tough and

tenacious when cold but not tacky or subject to scaling. The actual weight in pounds of each casting shall be either stenciled or printed on the casting in white paint by its manufacturer.

b. Watertight manhole frames and covers shall not only conform to the above specifications but shall also be furnished with an inner cover, locking bar, and bronze-tightening bolt. The upper side of the frame's inner flange shall be grooved to accept an o-ring gasket, which will form a seal between the inner cover and the flange. Watertight manhole frame and cover shall be John Bouchard & Sons 1123, or approved equal.

c. Standard manhole frames and covers conforming to the specifications given above shall be John Bouchard & Sons 1150, or approved equal.

d. Water resistant manhole frame with self-sealing cover: Self-sealing manhole frames and covers conforming to the Specifications given above shall be John Bouchard & Sons 1150, or approved equal. Load rating shall be heavy-duty. Self-sealing gasket in manhole cover shall be 1/4-inch-diameter neoprene gasket.

B. Mortar. Mortar shall be composed (by volumetric measure) of one part portland cement to two parts sand. The sand and cement shall be thoroughly mixed in a tight box, after which clean, fresh water shall be gradually added. The mixing shall continue until the mortar has the proper consistency for use in brick masonry. Only as much mortar as is needed for immediate use shall be prepared at any one time. Mortar that has been mixed for more than 30 minutes, has been re-tempered, or has already set shall not be used.

3. EXECUTION

3.1. REPAIR METHOD 1 - Manhole Replacement

A. Replace existing manhole with new pre-cast concrete manhole and set new frame and cover.

B. Provide in accordance with the Drawings and Specification Section 33 3913, Sewer Manholes and Covers.

3.2. REPAIR METHOD 2 - Install Cementitious Lining

A. Manholes and/or inverts that have cracks or leaks to repair shall be cleaned by high velocity cleaning equipment (i.e. pressure washer) in order to remove all foreign matter from the manhole base and invert. Then apply a solution of muriatic acid (hydrochloric acid) to the work area at a ratio of one part acid to 10 parts water by spraying from above the manhole. After the acid solution is used, it shall be washed completely off and the manhole allowed to dry. The application and removal of the acid solution shall be done in strict accordance with the manufacturer's specifications and recommendations. Strictly adhere to all safety procedures applicable to the handling of these acids.

B. Plug or block flow into the manhole before working in manhole inverts.

C. All pressure leaks shall be sealed to bond both mechanically and chemically to saturated surfaces and shall be “Strong-Plug” as manufactured by The Strong Company, Inc., “Quad-Plug” as manufactured by Quadex, “Mainstay ML-10” as manufactured by Madewell Products Corporation, or Engineer approved equal. This compound should be capable of setting in approximately 30 to 60 seconds. Pressure leaks may also be sealed with an injectable urethane grout, Sealguard II, or Engineer approved equal. All leaks must be completely stopped before application of liner. Injection grout shall be used at the direction of the Engineer and are to be used in conjunction with cementitious materials.

D. Large cracks and voids shall be sealed with a material of finely graded fillers and chemical additives which when combined with water will create a quick-setting, high-strength patching compound. This material shall retain its quick-setting characteristics even under water and will create a concrete that will test to a compression strength of 6,000 psi in 28 days, shall require no forms, and shall be “Strong Seal QSR” as manufactured by The Strong Company, Inc., “Hyperform” by Quadex, “Mainstay ML-10” as manufactured by Madewell Products Corporation, or Engineer approved equal.

E. Cementitious Coating Restoration Materials for manhole walls, channels, corbels, chimneys and benches. The Contractor shall install cementitious restoration materials that shall be specifically designed for the rehabilitation of manholes and other related wastewater structures. Liner materials shall be cement based, poly-fiber reinforced, shrinkage compensated, and enhanced with chemical admixtures and siliceous aggregates. Liner materials shall be mixed with water per manufacturer’s written specifications and applied using equipment specifically designed for, troweling, low-pressure spray or centrifugal spin casting application. All cementitious liners shall be troweled or wiped to densify and smooth out the surfaces. Liner thickness shall be a minimum of 1-inch and shall be field verified. Cementitious liner shall be “High Performance Mix” as manufactured by The Strong Company, “Aluminaliner” by Quadex, “Mainstay ML-CA” as manufactured by Madewell Products Corporation, or Engineer approved equal. Rings shall be installed and set prior to resetting the manhole frame and cover. All leaks must be completely stopped before application of liner.

3.3. REPAIR METHOD 3 - Construct Bench and Channel

A. Plug or block flow into the manhole before working in manhole inverts.

B. Remove any debris from the bench and channel.

C. Remove any existing material that could impede flow through the channel.

D. All pressure leaks shall be sealed to both mechanically and chemically to saturated surfaces and shall be “Strong-Plug” as manufactured by The Strong Company, Inc., “Quad-Plug” as manufactured by Quadex, “Mainstay ML-10” as manufactured by Madewell Products Corporation, or Engineer approved equal. This compound should be capable of setting in approximately 30 to 60 seconds. Pressure leaks may also be sealed with an injectable urethane grout, Sealguard II, or Engineer approved equal. All leaks must be completely stopped before application of liner. Injection grout shall be used at the direction of the Engineer.

E. Large cracks and voids shall be sealed with a material of finely graded fillers and chemical additives which when combined with water will create a quick-setting, high-strength patching compound. This material shall retain its quick-setting characteristics even under water and will create a concrete that will test to a compression strength of 6,000 psi in 28 days, shall require no forms, and shall be "Strong Seal QSR" as manufactured by The Strong Company, Inc., "Hyperform" by Quadex, "Mainstay ML-10" as manufactured by Madewell Products Corporation, or Engineer approved equal.

F. Construct a smooth transition from bench to channel to invert.

3.4. REPAIR METHOD 4 - Install Manhole Insert in Frame

A. Install "Inflow Dish" by Cretex, or Engineer approved equal, where indicated on the drawings. Follow manufacturer's installation instructions.

3.5. REPAIR METHOD 5 - Install Chimney Seal

A. Provide internal chimney seals in accordance with the Drawings and Specification Section 33 0516.54, Chimney Seals.

3.6. REPAIR METHOD 6 - Replace Frame and Cover with Watertight Casting

A. At each location indicated by the Contract Documents and Drawings, remove the existing frame and cover, and replace it with a new watertight manhole frame and cover John Bouchard & Sons 1123, or Engineer approved equal.

B. Existing manhole frames and covers shall be properly disposed or become the property of the Owner. Stockpile salvaged frames and covers at a location designated by the Owner. Exercise reasonable care to prevent unnecessary damage to the salvaged frames and covers. In the event the Owner does not require the salvaged frames and covers it is the responsibility of the Contractor to properly dispose of the materials.

C. New manhole frames and covers shall be installed on the existing manhole with mortar or ready-mix concrete (3000 psi strength) in accordance with Section 33 3913, Sewer Manholes and Covers.

D. Precast grade rings shall be used to adjust ring and covers to finished grade. No more than 12 vertical inches of grade rings will be allowed per manhole. Grade rings shall conform to ASTM C478 and shall be no less than 4 inches in height. Where bricks have been used to raise the existing frames to grade on precast concrete manholes, the bricks shall be removed and replaced with grade rings.

3.7. REPAIR METHOD 7 - Seal Pipe Connection to Manhole

A. The pipe connection to the manhole shall be repaired by removing the existing grout from around the pipe. The existing grout shall be removed from the pipe surface and from the manhole penetration to allow for the installation of a new

gasket. Care should be taken to ensure the existing pipe is not damaged during the grout removal. A Fernco CMA Waterstop Gasket or Engineer approved equal shall then be installed and sealed with non-shrink grout. Injection grout may also be required to form a complete watertight seal. All work shall be done from inside of the manhole.

3.8. REPAIR METHOD 8 - Reset Manhole Frame and Cover

A. The existing manhole frame and cover shall be adjusted using precast grade rings conforming to ASTM C478 no less than 4 inches in height. Where bricks have been used to raise the existing frames to grade on precast concrete manholes, the bricks shall be removed and replaced with grade rings. The frame and cover shall be set in mastic and anchored to the manhole with 5/8" diameter anchor bolts.

3.9. Abandon Pipe Connection

A. Connection to be sealed with a material of finely graded fillers and chemical additives which when combined with water will create a quick-setting, high-strength patching compound.

3.10. Exterior/Interior Manhole Drop

A. Install exterior/interior manhole drop as shown on the Drawings. Drop method must be approved by the Engineer.

3.11. Manhole Abandonment

A. Manhole frame and cover shall be removed and brought down to sufficient grade below surface for necessary surface restoration.

B. Manhole shall be filled with gravel to grade below surface for necessary surface restoration.

C. Existing manhole frames and covers shall be properly disposed or become the property of the Owner. Stockpile salvaged frames and covers at a location designated by the Owner. Exercise reasonable care to prevent unnecessary damage to the salvaged frames and covers. In the event the Owner does not require the salvaged frames and covers it is the responsibility of the Contractor to properly dispose of the materials.

3.12. Vent Pipe Assembly

A. Install vent pipe assembly as shown on the Drawings.

END OF SECTION

SECTION 33 0516.54

CHIMNEY SEALS

1. GENERAL

1.1. SCOPE

A. This specification includes the materials and procedures required for the internal sealing of the frame-chimney joint area of brick and block manholes and the entire chimney area of precast, fiberglass and plastic manholes, as shown on the Drawings or in the Contract Documents.

1.2. WORK REQUIRED

A. An internal manhole frame seal, as specified herein shall be installed in all designated manholes within the areas included in this project. If excavation is required to repair, rebuild, or replace a manhole; or if manhole linings or coatings are required, the seal shall be installed after that work has been completed.

B. Brick or Block Manholes. When frame sealing is required on brick or block manholes, an internal flexible rubber frame seal, meeting the requirements of this specification, shall be used to seal the frame-chimney joint area of the manhole.

C. Precast, Fiberglass or Plastic Manholes. When frame sealing is required on precast, fiberglass or plastic manholes, a internal flexible rubber frame seal and where necessary, a interlocking extension or extensions, meeting the requirements of this section, shall be used to seal the entire chimney of the manhole. The seal and extension or extensions shall extend from the frame down to the top of the cone.

1.3. SUBMITTALS

A. Submit complete shop drawings and engineering data on all piping and accessories to the Engineer in accordance with the requirements of Section 01 3323 - Shop Drawings, Product Data, and Samples.

1.4. STORAGE AND PROTECTION

A. Store and protect materials in accordance with the requirements of Section 01 6600 and manufacturer's recommendations.

1.5. QUALITY ASSURANCE

A. Acceptance Testing. Manhole frame seals shall be visually inspected after installation to insure that the seal is properly positioned, tight against the manhole and frame surfaces, that no voids or leakage points exist and that the bands are securely locked in place. Any seals failing this test shall be reworked as necessary and retested at no additional cost to the owner. Any seals not passing this visual inspection may, at the Contractor's option, be tested for leakage using a method approved by the Engineer.

2. PRODUCTS

2.1. FIELD MEASUREMENTS

A. Rubber Sleeve and Extension. The flexible rubber sleeve and extensions shall be extruded or molded from a high grade rubber compound conforming to the applicable material requirements of ASTM C-923, with a minimum 1500 psi tensile strength, maximum 18% compression set and a hardness (durometer) of 48+5.

The rubber sleeve shall be double, triple or quadruple pleated with a minimum unexpanded vertical height of 8-inches, 10-inches or 13-inches respectively and a minimum thickness of 3/16-inches. The top and bottom section of the sleeve that compresses against the manhole frame casting and the chimney/cone shall have an integrally formed expansion band recess and a series of sealing fins to facilitate a watertight seal. These sealing fins shall have teardrop holes or air pockets to allow the sealing area to conform to minor surface irregularities that may be encountered.

The top section of the extension shall have a minimum thickness of 3/32-inch and shall be shaped to fit into the bottom band recess of the sleeve under the bottom chimney seal band and the remainder of the extension shall have a minimum thickness of 3/16-inch. The bottom section of the extension shall contain an integrally formed expansion band recess and multiple sealing fins matching that of the rubber sleeve.

Any splice used to fabricate the sleeve and extension shall be hot vulcanized and have a strength such that the sleeve shall withstand a 180 degree bend with no visible separation.

B. Expansion Bands. The expansion bands used to compress the sleeve against the manhole shall be integrally formed from 16 gauge stainless steel conforming to the applicable material requirements of ASTM C-923, Type 304, with no welded attachments and shall have a minimum width of 1-3/4-inches.

The bands shall have a minimum adjustment range of 2-1/2 diameter inches and the mechanism used to expand the band shall have the capacity to develop the pressures necessary to make a watertight seal. The band shall be permanently held in place with a positive locking mechanism which secures the band in its expanded position after tightening.

2.2. ACCEPTABLE MANUFACTURERS

A. Cretex Specialty Products
B. Trelleborg Pipe Seals Milford, Inc.
C. Engineer Approved Equal

2.3. EQUIPMENT

A. The contractor shall have a manufacturer's recommended expansion tool and all other equipment/tools necessary to prepare the surfaces of the manhole and install the frame seals.

2.4. REPAIR MORTAR

A. Repair mortar shall be a one component, quick set, high strength, non shrink; polymer modified cementitious patching mortar, which has been formulated for vertical or overhead use meeting the requirements of ASTM C-109 for Compressive Strength, C-348 and C-78 for Flexural Strength and C-882 for Slant Shear Bond Strength. Repair mortar shall not contain any chlorides, gypsums, plasters, iron particles, aluminum powder or gas-forming agents nor shall it promote the corrosion of any steel that it may come in contact with.

2.5. CEMENTITIOUS GROUT

A. Cementitious grout shall be a premixed, non metallic, high strength, non-shrink grout which meets the requirements of ASTM C-191 and C-827 as well as CRD-C-588 and C-621. When mixed to a mortar or "plastic" consistency, it shall have minimum one day and 28 day compressive strength of 6,000 and 9,000 psi, respectively.

3. EXECUTION

3.1. FIELD MEASUREMENTS

A. The Contractor shall field measure the manholes to determine necessary information for ordering. This information is needed to obtain the proper size of bands, the size, shape and which of the rubber sleeve and the need for and size of any extension.

3.2. SURFACE PREPARATION

A. All loose and protruding mortar and brick that would interfere with the seal's performance shall be removed and the appropriate areas of the manhole frame, chimney and or cone/corbel cleaned by wire brushing. All sealing surfaces shall be reasonably smooth and circular, clean and free of any loose material or excessive voids. If an adequate sealing surface does not exist on the masonry, a repair mortar conforming to the requirements of Section 2.4 shall be used to prepare a uniformly vertical 3- to 4-inch wide surface for the sleeve and extensions to seal against.

B. Detailed surface preparation, including providing a vertical surface on a cone when none exists, shall be in accordance with the frame seal manufacturer's instructions.

3.3. REALIGN MANHOLE FRAME

A. All manhole frames that are misaligned from the chimney or cone/corbel by 3-inches or more shall be excavated and realigned. All existing frames shall be thoroughly cleaned before reinstallation. The frames shall be set in a bed of cementitious grout conforming to the requirements of Section 2.4, mixed to a mortar or “plastic” consistency. The frames shall be set so that the tops of the covers are flush with the adjoining pavement or ground surface.

3.4. INSTALLATION OF FRAME SEAL

A. The internal frame seals and extensions shall be installed in accordance with the manufacturer’s instructions.

END OF SECTION

SECTION 33 0523.13

CURED-IN-PLACE PIPE (CIPP)

1. GENERAL

1.1 SCOPE

A. Approved methods and materials for the rehabilitation of deteriorated gravity sewer lines by the Cured-In-Place Pipe (CIPP) method. This specification covers all labor, materials, tools, equipment, and other necessary items to rehabilitate existing sanitary sewer lines at the line, grade, and size shown on the plans by the CIPP method. The CIPP shall extend the full length of the pipe reach being rehabilitated and shall provide a structurally sound, impermeable and watertight, joint-less, and close fitting pipe.

1.2 RELATED WORK

A. Section 31 2000: Earthwork
B. Section 33 0130: Sewer Flow Control
C. Section 33 0130.16: Cleaning and Television Inspection
D. Section 33 3113: Polyvinyl Chloride Pipe for Gravity Sewer
E. Section 33 3913: Sewer Manhole and Covers

1.3 REFERENCES

A. AASHTO Standard Specification for Highway Bridges.

B. ASTM C 581 - Standard Practice for Determining Chemical Resistance of Thermosetting Resins Used in Glass Fiber Reinforced Structures, Intended for Liquid Service.

C. ASTM D 543 - Test Method for Resistance of Plastics to Chemical Reagents.

D. ASTM D 790 - Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.

E. ASTM D 3567 - Standard Practice for Determining Dimensions of Reinforced Thermosetting Resin Pipe (RTRP) and Fittings.

F. ASTM D 3574-11 - Standard Test Methods for Flexible Cellular Materials—Slab, Bonded, and Molded Urethane Foams

G. ASTM D 3681 - Test Method for Chemical Resistance of Reinforced Thermosetting Resin Pipe in a Deflected Condition.

H. ASTM D 5035 - Test Method for Breaking and Elongation of Textile Fabrics (Strip Method).

I. ASTM D 5199 - Standard Method for Measuring Nominal Thickness of Geotextiles and Geomembranes.

J. ASTM D 5813- Standard Specification for Cured-In-Place Thermosetting Resin Sewer Pipe.

K. ASTM E 1252 - Standard Practice for General Techniques for Qualitative Infrared Analysis.

L. ASTM F 1216 - Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube.

M. ASTM F 1743 - Standard Practice for the Rehabilitation of Existing Pipelines and Conduits by the Pulled-In-Place Installation of Cured-In-Place Thermosetting Resin Pipe (CIPP).

N. ASTM F 2019 - Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Pulled in Place Installation of Glass Reinforced Plastic (GRP) Cured-in-Place Thermosetting Resin Pipe (CIPP)

O. ASTM D 638 – Standard Test Method for Tensile Properties of Plastics

P. APS Standard – Water-tightness standard for cured-in-place thermosetting resin pipe, porosity test protocol

Q. NASSCO – National Association of Sewer Service Companies

1.4. QUALITY ASSURANCE

A. The Contractor shall, as part of the bid submittal, provide evidence of its (or its proposed subcontractors) previous experience in successfully utilizing the proposed method of trenchless installation.

B. The Contractor shall submit the following certifications:

1. Certifications of training by the CIPP systems manufacturer stating that the operators have been fully trained in the use of the equipment by an authorized representative of the equipment manufacturer.

2. Certifications from the manufacturer of training in the proper method for handling and installing the liner.

C. The Contractor shall submit to the engineer for review and comment, prior to commencing any work, a detailed statement of the equipment and operating systems.

D. Certifications and manufacturer's literature relevant to the proposed CIPP and other appurtenances shall be submitted to the engineer prior to commencing any work.

E. Contractor (or Subcontractor) shall have a minimum of 5 years of experience in trenchless sewer installation and shall provide a list of 5 job references using the proposed method. The Contractor shall have a minimum of 250,000 LF of documented CIPP experience (felt tube with heat cure) or 200,000 LF CIPP experience (UV cure). The Superintendent, Forman, and all key personnel shall have a minimum of 3 years of documented experience in CIPP trenchless sewer installation.

F. The apparent low bidder shall provide proof of the bidder's ability to complete the proposed work in accordance with the contract documents. Such proof shall, as a minimum, include reference(s) for project(s) of a size and complexity equal to or

greater than the size and complexity of the proposed project. The reference project(s) must have been completed within a five-year period prior to the date of the bid opening. Failure to submit this proof will be cause for the rejection of bid.

1.5 SYSTEM DESCRIPTION

A. Resin-impregnated flexible tubes inserted into existing sewers, expanded against the existing sewer interior surfaces, and cured by circulating heated water, steam, or ultraviolet light throughout the tube from manhole to manhole.

B. CIPP shall cure into a hard, impermeable, corrosion-resistant liner of specified thickness and physical properties, with a uniformly smooth interior surface.

C. CIPP Material and Installation: Comply with the ASTM and other industry standards as modified by this specification. The Engineer reserves the right to approve materials or installation practices which differ from these standards.

1.6 SUBMITTALS

A. Make submittals in accordance with Section 01 3323 – Shop Drawing Product Data Sample.

B. Resin:

1. Submit product data stating physical and chemical properties.

2. Submit results of testing performed by resin manufacturer demonstrating compliance with specified chemical resistance requirements.

3. Submit manufacturer-certified infrared spectrum analysis (chemical fingerprint) of proposed resin system in accordance with ASTM E 1252

C. Flexible Tube:

1. Submit product data stating physical properties meeting ASTM D 5035.

2. Submit tabular summary by sewer segment noting required CIPP thickness specified. Provide certification that liner's "dry" thickness meets or exceeds the required cured laminate thickness. Measure thickness in accordance with ASTM D 5199.

D. Cured-In-Place Pipe:

1. Submit field measurements of cured liner thickness for determining payment.

2. Submit representative sample(s) of the in-situ cured liner required for testing in accordance with ASTM D 790, ASTM D 638, and the porosity test protocol. Samples shall be provided to the Owner or Engineer. Failure to submit samples shall be cause for rejection. The Owner shall be responsible for testing.

3. Submit post-installation television inspection videos as specified in Section 33 0130.16 - Cleaning and Television Inspection.

E. During the course of the Work, make no substitutions of materials, design values or procedures for those specified without the prior written approval of the Engineer.

2. PRODUCTS

2.1 APPROVED MANUFACTURERS

A. Liner shall be ALPHALINER® by Reline America™, Insituform iPlus® Glass by Insituform Technologies Inc., Inliner STX by Inliner Technologies, or Engineer approved equal for UV cured liner

B. Liner shall be Insituform® CIPP by Insituform Technologies Inc., Inliner CIPP by Inliner Technologies, National Liner, Applied Felts, or Engineer approved equal for heat cured liners.

2.2 MATERIALS

A. Flexible Felt Tube:

1. Provide flexible tube manufactured and fabricated under manufacturer's quality-controlled conditions. Use tube sized so as to snugly fit the internal circumference of the existing sewer without wrinkles and produce specified cured thickness and physical properties.

2. Tube Length: Fully and continuously span the distance between manholes, including sufficient material for sealing at manholes and product sampling.

3. Fabric tube minimum tensile strength in both longitudinal and transverse directions, when tested in accordance with ASTM D 5035: 750 psi.

4. Identify all tubes with manufactured thickness when tested in accordance with ASTM D 5199.

B. Fiberglass Tube (Ultraviolet Light Curing Application):

1. The fiberglass material shall be chemically resistant EC-R Glass.

2. The tube shall be homogeneous throughout, uniform in color, free of cracks, holes, foreign materials, blisters and other surface defects.

3. The glass fiber tubing shall include an exterior and interior film that protects and contains the resin in the liner. The exterior film shall be UV resistant.

4. The tube shall be properly sized to be fitted against and in contact with the wall of the host pipe throughout its length or remnants thereof.

5. The tube shall be constructed to withstand stretching during the pull-in process and installation pressures as required by Manufacturer's recommendations.

6. The impregnated tube shall have a uniform thickness, that when compressed at

installation pressures will meet or exceed the required thickness.

7. Use tube sized so as to snugly fit the internal circumference of the existing sewer and produce specified cured thickness and physical properties.

8. The tube shall be sized to fit irregular pipe sections and negotiate bends of up to 20 degrees and shall have sufficient strength to bridge missing pipe sections with the use of preliner.

9. The wall color of the interior pipe surface of CIPP after installation shall be a light reflective color.

10. The pipe shall be seamless in its cured state to insure homogenous physical properties around the circumference of the cured liner.

C. Resin for Tube Saturation: Liquid thermosetting polyester, vinyl ester, or epoxy resin meeting specified requirements.

1. Resin and catalyst must be approved for use with the liner and the liner manufacturers.

2. PET resins are prohibited. Old resins and reworked resins are prohibited, regardless of whether or not they are mixed with new resins.

3. Resins shall be shipped directly to the wet-out facility from the resin manufacturer.

2.3 TESTING REQUIREMENTS

A. Manufacturer's Chemical Resistance Testing: Perform chemical resistance testing of resin in accordance with ASTM C 581, as modified herein. Perform testing to demonstrate chemical resistance to a solution with a pH of 0.5 and a solution with a pH of 10. Use reagents or solutions as required to establish and maintain the minimum and maximum pH values specified for the duration of the testing. Exposure to the minimum and maximum pH values shall produce an average loss of not more than 20 percent in the initial flexural properties for each test interval, and an average loss of not more than 15 percent for a period of one year, as determined according to ASTM D 790. Perform testing at a temperature of 73.4 F (plus or minus 3.6 F). Test specimens shall not have more than 1.5 percent gain or loss in weight over a period of one year. Test frequency and sample preparation: Follow ASTM C 581.

B. Test Results - Submit test results including at least the following:

1. Raw data for each test specimen for each test interval performed

2. Calculated average test results for each test interval

3. Using calculated averages for each test interval, calculate the average test result for the duration of testing.

2.4 PHYSICAL PROPERTIES FOR TRADITIONAL CIPP (FELT TUBE)

A. Minimum CIPP Thickness after Curing: As specified below, based on the liner material

and the maximum sewer invert depth for the segment being rehabilitated. Thickness shall be designed to Class III loading conditions or according to the table below, whichever is greater.

MINIMUM CIPP THICKNESS (IN MILLIMETERS) FELT				
NOMINAL SEWER DIAMETER (INCHES)	MAXIMUM PIPE SEGMENT INVERT DEPTH			
	Up to 10 feet	10 - 15 feet	15 - 20 feet	20-25 feet
6	4.5	4.5	4.5	6.0
8	6.0	6.0	6.0	7.5
10	6.0	6.0	7.5	9.0
12	6.0	7.5	9.0	10.5
15	7.5	9.0	10.5	12.0
18	9.0	12.0	13.5	15.0
20-21	10.5	13.5	15.0	16.5
24	12.0	15.0	16.5	19.5
30	15.0	18.0	21.0	24.0
36	16.5	21.0	24.0	28.5
42	19.5	25.5	31.5	36.0
48	22.5	28.5	34.5	40.5
54	25.5	31.5	39.0	45.0
60	27.0	34.5	42.0	48.0
66	30.0	36.0	45.0	52.5
69-72	33.0	39.0	48.0	58.5

B. CIPP minimum flexural and tensile properties after curing using hot water or steam:

PROPERTY	REFERENCE	MINIMUM
Flexural Strength (Modulus of Rupture)	ASTM D 790	4,500 psi
Tensile Strength (Pressure Applications)	ASTM D 638	3,000 psi
Tangent Modulus of Elasticity	ASTM D 790	250,000 psi

C. If different conditions are encountered in the field, design considerations may change, if required by the Engineer. Required thickness maybe increased or decreased based on specific design. The Contractor shall not be allowed to change any required

thickness unilaterally, or offer credits after the fact as remedy for liners not meeting the required thickness. Engineer approval is required for any changes in CIPP thickness.

2.5 PHYSICAL PROPERTIES FOR UV CIPP (FIBERGLASS TUBE)

A. Minimum CIPP Thickness after Curing: As specified below, based on the liner material and the maximum sewer invert depth for the segment being rehabilitated. Thickness shall be designed to Class III loading conditions or according to the table below, whichever is greater.

MINIMUM CIPP THICKNESS (IN MILLIMETERS) FIBERGLASS				
NOMINAL SEWER DIAMETER (INCHES)	MAXIMUM PIPE SEGMENT INVERT DEPTH			
	Up to 10 feet	10 - 15 feet	15 - 20 feet	20-25 feet
6	2.0	2.0	2.0	2.0
8	2.5	2.5	2.5	3.0
10	3.0	3.0	3.5	3.5
12	3.5	3.5	4.0	4.0
15	4.5	4.5	5.0	5.5
18	5.0	5.5	6.0	6.5
20-21	6.0	6.5	7.0	7.5
24	7.0	7.0	8.0	8.5
30	8.5	9.0	10.0	10.5
36	10.5	11.0	12.0	12.5
42	12.5	13.0	14.0	14.5

B. CIPP minimum flexural and tensile properties after curing using ultraviolet light:

PROPERTY	REFERENCE	MINIMUM
Flexural Strength (Modulus of Rupture)	ASTM D 790	6,500 psi
Tensile Strength (Pressure Applications)	ASTM D 638	9,000 psi
Tangent Modulus of Elasticity	ASTM D 790	725,000 psi

C. If different conditions are encountered in the field, design considerations may change, if required by the Engineer. Required thickness maybe increased or decreased based on specific design. The thickness may be changed in increments of 1.5 mm and payment shall be made or deducted at the rate of 2.50% of the bid item amount for each increment. However, the Contractor shall not be allowed to change any required

thickness unilaterally, or offer credits after the fact as remedy for liners not meeting the required thickness. Engineer approval is required for any changes in CIPP thickness.

3. EXECUTION

3.1 PRE-INSTALLATION CLEANING AND TELEVISION INSPECTION

A. Perform a pre-installation television inspection in accordance with Section 33 0130.16 - Cleaning and Television Inspection. Verify that sewer is clean and pipe conditions are suitable for installation of the CIPP. Notify Engineer if conditions exist which will impact the installation.

3.2 OBSTRUCTION REMOVAL, POINT REPAIR AND SAG ELIMINATION

A. If pre-installation video inspection reveals an obstruction in the line segment (such as heavy solids, dropped joints, protruding service connections or collapsed pipe) that cannot be removed by conventional sewer cleaning equipment and the obstruction will prevent completion of the insertion process, perform point repairs or obstruction removal prior to CIPP installation. Obtain approval of the Engineer before performing work. Follow requirements in Section 33 0516.55 - Point Repairs and Obstruction Removals.

B. If pre-installation video inspection reveals a sag in the sewer that has a vertical displacement greater than one-half the pipe diameter, eliminate the sag by performing a point repair as specified in Section 33 0516.55 - Point Repairs and Obstruction Removals, or by removal and replacement of the sewer segment. Obtain approval of the Engineer before performing work.

3.3 SEWER FLOW CONTROL

A. Install and operate bypass pumping equipment to maintain sewage flow around the segment of pipe being rehabilitated, and to prevent backup or overflow, as specified in Section 33 0130 – Sewer Flow Control.

3.4 INSTALLATION PROCEDURES

A. Notification: Inform the Engineer of work schedules for CIPP installation. Provide 24-hour notice so that the Engineer may witness the “wet-out” procedure and inversion and curing of liner.

B. Conduct operations in accordance with applicable OSHA standards, including safety requirements involving work on elevated platforms and entry into confined spaces. Take suitable precautions to eliminate hazards to personnel near construction activities when pressurized air is being used.

C. Wet-out: Designate a location where the flexible tube will be impregnated with resin. Thoroughly saturate flexible tube prior to installation. Use catalyst systems or additives compatible with resins and flexible tubes complying with manufacturer’s recommendations. Handle resin-impregnated flexible tubes to retard or prevent resin setting until ready for curing. Owner’s representative shall have the right to inspect the proposed wet-out facility.

D. Maintain resin-impregnated tubes in refrigerated truck trailers at the temperature recommended by the manufacturer to prevent premature curing. Prior to beginning inversion, no portion of the resin-impregnated liner shall be subjected to sunlight or ultraviolet radiation. Resin-impregnated tubes with signs of premature curing shall not be used.

E. Insertion: Insert flexible tubes through existing manholes or access structures by inversion, pull-in or other approved procedure in accordance with manufacturer's recommendations.

F. Curing using Hot Water or Steam.

1. Follow manufacturer's recommended cure schedule in curing of liner.

2. After insertion is completed, apply a suitable recirculation system capable of delivering hot water or steam uniformly throughout the section to achieve consistent cure of the resin. Maintain curing temperature as recommended by the resin/catalyst system manufacturer.

3. Provide suitable monitors near the heat source to gauge temperatures of incoming and outgoing water or steam supply. Place additional temperature sensors between the impregnated tube and invert of the original pipe at each manhole to monitor the outside temperature of the liner while curing.

4. Continue uninterrupted heating until the required curing temperature is achieved. Accurately measure temperatures at both ends of the CIPP. Initial cure is considered complete when exposed portions of the flexible tube pipe appear to be cured and the remote temperature sensors have achieved the external temperature recommended by the resin/catalyst system manufacturer.

5. Cool Down: Initiate controlled cool-down of the hardened pipe to a temperature below 100° F, in accordance with the manufacturer's recommended cure schedule. Take care in releasing the water column so that a vacuum does not develop that could damage newly-installed pipe. Do not discharge water hotter than 100° F into the sanitary sewer system

G. Curing using Ultraviolet Light:

1. Curing shall be in accordance with ASTM F2019 and/or manufacturers specifications.

2. The UV light source shall be assembled in accordance with the manufacturer's specification for the liner diameter.

3. The ultraviolet curing lamps shall operate in a sufficient frequency range to insure proper curing of the resin.

4. A camera shall be located on the ultraviolet light assembly to enable the video inspection of the liner and to insure that the liner has been properly inflated and any liner problems can be identified before curing begins.

5. During the curing process, sensors shall be used to record curing data that shall be submitted to the Engineer upon request. The recording shall include rate of travel

of the ultraviolet light assembly, curing speed, internal temperatures and pressures during the curing process.

H. Finished Pipe: Provide a finished CIPP which is continuous and as free as commercially practicable from visual defects such as foreign inclusions, dry spots, and pinholes.

I. If point repair is required after the liner has cured, use a tube segment to splice across the point repair. Overlap on each end shall be twice the diameter, or 12 inches, whichever is greater. Cure the segment using the same process specified for the original liner.

3.5 SERVICE RECONNECTIONS

A. Complete service reconnections within 24 hours after completion of the cured-in-place process.

B. Reconnect services by excavation. Disconnect at joints and existing sewer and remove to expose the liner to the extent necessary. Do not damage liner pipe or allow to normalize to ambient temperature and cool down before 6-inch diameter hole is drilled out. Coat cut in hole in liner with approved resin/epoxy that will cure at the ambient temperature.

C. Install PVC saddle with gasketed PVC connection for the new sewer service lateral over the cut out. Saddle shall be a one-piece saddle attached to the liner with epoxy and equipped with a neoprene gasket to that a complete seal is accomplished when the strap-on saddle is tightened with two stainless steel bands; one on each side. The stub-out attached to the saddle shall protrude into the liner a distance equal to the wall thickness of the liner.

3.6 SEALING AT MANHOLES

A. CIPP shall make a tight fitting seal with existing pipe(s) in manhole. For CIPP that is installed continuous through manhole, the top half of the pipe shall be neatly cut off and not broken or sheared off at least 2 inches away from wall. The channel in the manhole shall be a smooth continuation of the pipe(s) and shall be merged with other pipes or channels, if any. Channel cross-section shall be U-shaped.

B. At each pipe opening into manhole, hydrophilic rubber joint seal shall be bonded with adhesive to the host sewer pipe or to the opening in the manhole barrel to hold it in place during inversion.

C. Seal CIPP and existing pipe in manhole as stated above before proceeding on to next manhole section. Manholes shall be individually inspected for liner cut-offs, benches, and sealing of liner annular space.

3.7 POST-INSTALLATION TELEVISION INSPECTION

A. Make and submit video(s) showing completed work, including condition of restored connections. Refer to Section 33 0130.16 - Cleaning and Television Inspection.

B. All manhole bench/invert work and annular seal shall be completed at time of Post-TV, with Post-TV being verification of completion.

C. All defects in the CIPP liner shall be noted using PACP notations.

3.8 FINAL CLEANUP

A. Upon completion of rehabilitation work and testing, clean and restore project area affected by the Work in accordance with Sections 33 1000 – New and Replacement Paving and 32 9219 - Seeding.

3.9 NON-CONFORMING WORK

A. If the thickness, flexural strength, flexural modulus of elasticity, or tensile strength of the installed CIPP is less than 90% of the specified values, the product is considered unacceptable and shall be replaced. Work required to remedy non-conforming work shall be at no additional cost to the Owner.

B. A 20% unit price reduction shall be incurred with any of the following test results: 95.0% to 99.9% of the minimum flexural strength, 95.0% to 99.9% of the minimum flexural modulus, 95.0% to 99.9% of the minimum tensile strength and 95.0% to 98.0% of the minimum liner thickness.

C. A 40% unit price reduction shall be incurred with any of the following test results: 90.1% to 94.9% of the minimum flexural strength, 90.1% to 94.9% of the minimum flexural modulus, 90.1% to 94.9% of the minimum tensile strength, and 90.1% to 94.9% of the minimum liner thickness.

D. If it is determined that the resin utilized did not match the submitted and approved resin via the Infrared Spectrum Analysis, the product is considered unacceptable and non-conforming. Submit proof that the resin actually utilized meets the requirements of the specification or submit a method for replacement of the sewer segment liner for review and approval by the Engineer. Work required to remedy non-conforming work shall be at no additional cost to the Owner.

E. For all instances where CIPP is deemed unacceptable, other than thickness, flexural strength, and flexural modulus of elasticity, as described in this specification section, submit a proposed method of repair or replacement for review and approval by the Engineer. Work required to remedy non-conforming work shall be at no additional cost to the Owner.

3.10 TESTING

A. Flexible Tube Thickness - Prior to wet-out; provide access to all flexible tubes intended for the use on the project. Clearly identify flexible tubes with their manufactured thickness. Do not use flexible tubes which fail to meet the specified thickness. Testing will be performed in accordance with ASTM D 5199. Thickness shall be measured by an ultrasonic thickness gauge.

B. Infrared Spectrum Analysis (Chemical Fingerprinting) - Provide access to the resin intended for the use on the project for sampling and chemical fingerprint testing. All testing will be performed in accordance with ASTM E 1252. If sample fails test, work is

non-conforming. See paragraph 3.9.

C. Physical Property Testing - Post installation physical property testing of the in situ cured composite tube will be performed in accordance with ASTM D 790 and ASTM D 638. Provide sufficient samples for conducting the testing required under ASTM D 790 and ASTM D 638. If sample fails test, work is non-conforming. See paragraph 3.9. Samples shall be provided to the Owner or Engineer.

D. Porosity testing shall be performed. A result of tight or non-porous must be achieved.

E. The Contractor shall provide samples for testing from the actual installed CIPP liner. Samples shall be provided from one location per 500 linear feet of CIPP installed or per line section, whichever is greater. The sample shall be cut from a section of CIPP that has been inverted or pulled through a like diameter pipe, which has been held in place by a suitable heat sink, such as sandbags. The sample shall be marked with the date the liner was installed, the date the sample was removed, and the upstream and downstream manholes. The cutting of the sample shall be witnessed by the Owner or Engineer. On pipelines greater than 15 inches in diameter, the Owner may, at its discretion, require plate samples cured with the CIPP. All independent laboratory testing shall be performed by Owner at his expense.

E. Leakage testing shall be performed on all segments after liner has been installed in existing sewer pipe and service lateral connections, service lateral lines, and service lateral clean-outs have been completed. Testing shall include service connections up to the property line as well as any private lateral lines replaced. Copies of all test results shall be provided to the Engineer. Testing shall conform to the requirements of TDEC Design Criteria, latest edition. Low pressure air-testing shall be performed per ASTM C-828. The time required for the pressure to drop from the stabilized 3.5 psig to 2.5 psig shall be greater than or equal to the minimum calculated test time per the table below.

Pipe Size (inches)	Time, T (sec/100 ft)	Allowable Air Loss, Q (ft^3/min)
6	.42	.2.0
8	.72	.2.0
10	.90	.2.5
12	.108	.3.0
15	.126	.4.0
18	144	5.0
21	180	5.5
24	216	6.0
27	252	6.5
30	288	7.0

F. No visible leak around liner at manhole connections will be allowed.

END OF SECTION

SECTION 33 0523.31

REPLACEMENT OF MAINLINE SEWER BY PIPE BURSTING

1. GENERAL

1.1. SCOPE

A. This specification covers all labor, materials, tools, equipment and other necessary items to rehabilitate existing sanitary sewer line at the line, grade, and size shown on the plans by the pipe bursting/crushing method. Approvable installation is defined as the re-construction of existing sanitary sewers by the simultaneous insertion (breaking and expanding the old pipe) of liner pipe within the bore of the existing pipe. Also covered in this specification is HDPE pipe, pipe joining, manhole connections, connection and/or replacement of service laterals and stubs, point repairs, obstruction removals, CCTV requirements, and testing requirements. Alternate pipe materials other than those shown on the plans or specified herein may be approved for the proposed trenchless method.

1.2. RELATED WORK

A. Section 31 2000: Earthwork
B. Section 33 0130: Sewer Flow Control
C. Section 33 3113: Polyvinyl Chloride Pipe for Gravity Sewer
D. Section 33 3913: Sewer Manholes and Covers

1.3. REFERENCE STANDARDS

A. ASTM American Society for Testing and Materials

1. F714 Specification for Polyethylene Plastic Pipe
2. ASTM D 1238-99
3. ASTM D 1505-98
4. ASTM D 790-00
5. ASTM D 638-99
6. ASTM D 1693-00
7. ASTM D 3350-99
8. ASTM D 618-99
9. ASTM D 2837-98a
10. ASTM D 575

B. PPI Plastic Pipe Institute

1. PE3408 Specifications for High Density Polyethylene Plastic Pipe

C. IPBA International Pipe Bursting Association

1. Guideline for Pipe Bursting, Latest Edition

1.4. QUALITY ASSURANCE

A. The Contractor shall, as part of the bid submittal, provide evidence of its (or its proposed subcontractors) previous experience in successfully utilizing its proposed method of trenchless installation.

B. The Contractor shall submit the following certifications:

1. Certifications of training by the pipe bursting systems manufacturer stating that the operators have been fully trained in the use of the pipe bursting equipment by an authorized representative of the equipment manufacturer. Alternately the contractor may provide a letter of intent of training, to include course outline, from an authorized representative of the equipment manufacturer.

2. Certifications from the pipe manufacturer of training in the proper method for handling and installing the new pipe.

3. Certifications of training by the pipe fusion equipment manufacturers that the operators have been fully trained in the use of the fusion equipment by an authorized representative of the equipment manufacturer.

C. The Contractor shall submit to the engineer for review and comment, prior to commencing any work, a detailed statement of the equipment and operating systems.

D. Certifications and manufacturer's literature relevant to the proposed HDPE pipe and other appurtenances shall be submitted to the engineer prior to commencing any work.

E. Contractor (or Subcontractor) shall have a minimum of 5 years experience in trenchless sewer installation and shall provide a list of 5 job references using the proposed method. The Contractor shall have a minimum of 150,000 LF of documented pipe bursting experience and a minimum of 25,000 LF experience in sizes 14 inches and greater. The LF experience shall be within the past 5 years.

F. The apparent low bidder shall provide proof of the bidder's ability to complete the proposed work in accordance with the contract documents. Such proof shall, as a minimum, include reference(s) for project(s) of a size and complexity equal to or greater than the size and complexity of the proposed project. The reference

project(s) must have been completed within a two-year period prior to the date of the bid opening. Failure to submit this proof will be cause for the rejection of bid.

G. The Contractor is solely responsible for quality assurance during the length of the project. The contractor is be responsible for any costs associated with corrective measures required to replace or repair items not meeting the quality standards specified.

H. The Contractor shall submit the following:

1. Detailed construction procedures, and layout plans to include sequence of construction.

2. Locations, sizes and construction methods for the service reconnection pits.

3. Methods of construction, reconnection and restoration of existing service laterals.

4. Detailed procedures for the installation and bedding of the new pipe in the launching and receiving pits.

5. Detailed descriptions of the methods of modifying existing manholes.

6. Sewer bypass plans, methods and list of equipment to be utilized.

I. The Contractor shall hold harmless both the Owner and Engineer against any action resulting from patent infringement and the Contractor shall pay all necessary royalties.

1.5. STORAGE AND PROTECTION

A. Store and protect materials in accordance with the requirements of Section 01 6600 and manufacturer's recommendations.

2. PRODUCTS

2.1. STANDARDS

A. Proposed machine for trenchless installation shall be via a proven method.

B. All sewer pipe proposed shall have the minimum diameter indicated on the plans and the structural strength to handle all loads applied by the Contractor's proposed trenchless installation process. Sewer pipe shall have leak-free joints.

C. HDPE - Polyethylene pipe shall conform to the materials designations of PPI/ASTM PE3408, and ASTM F 714 / D 2122. The cell classification of the pipe shall be 345464C. The pipe shall be grey in color. The pipe shall be made of virgin materials.

D. The nominal diameter of HDPE sanitary sewer pipe shall be as shown on the drawings. Acceptable thicknesses of HDPE pipe are DR 17 for depths of twenty

(20) feet or less or DR 11 for depths greater than twenty (20) feet. The pipe shall conform to DIPS dimensions.

E. Pipe Joining: Solid wall pipe shall be produced with plain end construction for heat-joining (butt fusion) conforming to ASTM D 2657. The polyethylene pipe shall be assembled and joined at the site using the thermal butt-fusion method to provide a leak proof and structurally sound joint. Form joints with smooth, uniform double-rolled back beads. Internal beads shall be removed. Threaded or solvent-cement joints and connections are not permitted. All equipment and procedures used shall be used in strict compliance with the manufacturer's recommendations. Fusing shall be accomplished by personnel certified as fusion technicians by a manufacturer of polyethylene pipe and/or fusing equipment. All defective joints shall be cut out and replaced at the Contractor's expense.

3. EXECUTION

3.1. INSTALLATION

A. Trenchless sewer installation shall be in accordance with the manufacturer's recommendations and ASTM F 585.

B. All work shall be done in accordance with OSHA standards.

C. The Contractor shall locate all and expose all sewer service connections prior to pipe insertion to expedite reconnection. It shall be the responsibility of the Contractor to CCTV inspect the main prior to pipe bursting to assure that existing pipe conditions are acceptable for pipe bursting, and to locate all active service line connections. This pre-installation inspection shall be included in the unit price for the pipe installation.

D. The Contractor shall exercise due diligence in excavating the existing pipe sufficiently to allow for uniform circumferential expansion of the existing pipe through the service connection pit. Upon commencement of the bursting process, pipe insertion shall be continuous and without interruption from one entry point to another, except as approved by the Engineer. Upon completion of insertion of the new pipe, the Contractor shall expedite the reconnection of services to minimize any inconvenience to the customers. The Owner shall be notified in the event that a service is not reconnected overnight or over a weekend.

E. Insertion and recovery pits shall be as small as practicable and shall be located by the Contractor. Proposed manholes may be relocated (if approved by the Engineer) to ease the trenchless installation but shall be located no more than 400 feet apart. The contractor shall provide the materials and equipment necessary to provide adequate shoring and dewatering of these excavations. The Contractor shall assume full responsibility for the protection of all utilities, structures and their foundations which may be affected by this work. Where possible, use excavations at point repair locations for insertion pits. Where possible, use manhole locations for recovery pits. For nominal pipe sizes 12" and less, insertion and/or manhole locations shall be used for equipment removal, and no separate payment is allowed for recovery pits without Engineer approval.

F. Lubrication shall be used if in the opinion of Contractor such lubrication is necessary to ensure the successful completion of the job. The Contractor shall use a lubricant approved by the Engineer.

G. The Contractor, after a suitable relaxation period shall reconnect all service connections as approved by the Engineer.

H. The installed pipe shall be allowed the manufacturer's recommended amount of time, but not less than four (4) hours, for cooling and relaxation due to tensile stressing prior to any reconnection of service lines.

I. Service connections shall be reconnected to the pipe by using connectors approved by the pipe manufacturer and in conformance with the specified installation procedure. Service connections shall be wrap type around saddle connections (FERNCO or equivalent), T Connection (Inserta-T or equivalent) or Electro Fusion (Central Plastics, Phillips Driscopipe, Plexco or equivalent). Installation shall be accomplished using procedures and equipment as referenced in manufacturer's written installation instructions. The joining of the service connection and lateral shall be made with water-tight connectors.

J. Connections to the existing service pipe shall be made using stainless steel shielded flexible couplings. All flexible couplings shall conform to ASTM C1173. Joint deflection limits and lateral connections shall meet the maximums indicated in ASTM C1173. Coupling shall be Fernco 5000 series RC or equal.

K. The slope of the existing lateral toward the newly installed sewer main shall be maintained at the existing percent. For reconstructed service laterals, a minimum slope of two percent (2%) is required. Service laterals shown to be replaced shall be constructed of PVC or HDPE installed using open cut or pipe bursting methods, as shown on the Drawings. Double sweep cleanouts with a plastic or iron protective box and lid shall be installed at the ROW boundary as shown on the Drawings. Laterals shall be 4” unless otherwise noted on the drawings.

L. For connections to existing manholes not to be replaced, finish seal at the manhole with Oakum saturated with Avanti 202 or approved equal and covered with a quick setting grout. Alternatively, the connection to the existing manhole may be sealed with a Fernco CMA Water Stop Gasket or approved equal and non-shrink grout from inside the manhole. Pipe shall extend 4 inches into the manhole, make smooth, vertical cuts and slope areas over the top of the exposed liner using non-shrink grout. Reshape and smooth the manhole invert. Form a smooth transition with a reshape invert and a raised manhole bench to eliminate sharp edges of concrete bench, and channeled invert. Build up and smooth invert of manhole to match flow line of new pipe. Connections to new manholes shall be made in accordance with Section 33 3913.

M. Where excavations for pipe insertion are made between two manholes, as approved by the Engineer, cut ends of liner pipe smooth, square to pipe axis. Join pipes with appropriately-sized stainless steel universal clamp couplings. Butt together gaps between ends of liner pipe with space between ends not exceeding one inch. Clamps shall be stainless steel; Type 108, as manufactured by JCM Industries, Smith Blair, or equal. Furnish full circle, universal clamp

couplings with at least 3/16-inch thick neoprene grid-type gaskets. Bolts and nuts shall be corrosion resistant low alloy per ASTM A242/ANSI A21.11/AWWA C111. Clamps shall be a minimum of 24 inches in length for nominal pipe diameters of 8 inches and a minimum of 30 inches in length for nominal pipe diameters 10 inches and greater. Clamps shall be installed in accordance with manufacturers recommendations, include spring washers as required. Alternatively, electrofusion couplings may be used.

N. The Contractor shall provide the means, method, equipment and labor to cut or remove any sliplining to allow for the successful pipe bursting/crushing of the sewer. The means or methods utilized by the Contractor shall not disturb the surrounding soil or host pipe to the degree where it will effect the installation and operation of the new pipe to be installed. Cutting of the liner or removal of the existing liner shall not interfere or damage the connections beyond the extent required to disconnect and reconnect the service laterals to the main line. Liner cutting or removal shall be considered complete when the existing pipe has been cut or removed and the new pipe has been successfully installed and accepted.

O. Unless otherwise noted in the Contract Documents, settlement or heaving of the ground surface during or after construction will not be allowed. The Contractor is solely responsible for the costs for repairing any surface heaving unless specified otherwise in the contract documents.

P. If pre-installation video inspection reveals a sag in the existing sewer that is greater than one-half the diameter of the existing pipe, it shall be the Contractor's responsibility to install the replacement pipe to the result in an acceptable grade without the sag. The Contractor shall take in necessary measures to eliminate these sags, as directed by the Engineer.

Q. In the event that the Contractor during the execution of the work breaks any known or field located utilities causing the disruption of service and/or an eminent hazard, it shall be the responsibility of the Contractor to immediately notify the Owner and the Engineer and immediately undertake measures to repair the damaged utility.

3.2. TESTING

A. After existing sewer is completely replaced, internally inspect with CCTV and record to DVD. The finished DVD shall be continuous over the entire length of the sewer between two manholes and be free from visual defects. The cost of the post-installation CCTV inspection shall be included in the unit price for the pipe.

B. Defects which may affect the integrity, strength, or watertightness of the pipe in the opinion of the Engineer will be repaired or the pipe replaced at the Contractor's expense.

C. Leakage testing shall be performed on all segments to include services up to the property line as well as any private lateral lines replaced. Copies of all test results shall be provided to the Engineer. Testing shall conform to the requirements of TDEC Design Criteria, latest edition. Low pressure air-testing

shall be performed per ASTM C-828. The time required for the pressure to drop from the stabilized 3.5 psig to 2.5 psig shall be greater than or equal to the minimum calculated test time per the table below.

Pipe Size (inches)	Time, T (sec/100 ft)	Allowable Air Loss, Q (ft^3/min)
6	42	2.0
8	72	2.0
10	90	2.5
12	108	3.0
15	126	4.0
18	144	5.0
21	180	5.5
24	216	6.0
27	252	6.5
30	288	7.0

D. Deflection tests shall be performed on all flexible pipes, consult with Engineer before starting. Deflection test requirement may be waived with approval of the Engineer. For pipelines with inside diameters less than 27 inches, a rigid ball or mandrel shall be used to measure deflection. No pipe shall exceed a deflection of five (5) percent. If a pipe should fail to pass the deflection test, the problem shall be corrected and a second test shall be conducted after the final backfill has been in place 30 days. The tests shall be performed without mechanical pulling devices.

END OF SECTION

SECTION 33 1113.13

DUCTILE IRON PIPE AND FITTINGS

1. GENERAL

1.1. SCOPE

A. The work covered by this section includes furnishing all labor, equipment, and materials required to furnish, install, and field pressure test ductile iron piping, including all fittings, wall pipe and sleeves, couplings, tappings, anchor blocks, and accessories, as specified herein and/or shown on the Drawings.

1.2. REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

B. American National Standards Institute/American Water Works Association (ANSI/AWWA) Publications

1.	ANSI/AWWA C104/A21.4	Cement-Mortar Lining for Ductile Iron Pipe
2.	ANSI/AWWA C105/A21.5	Polyethylene Encasement for Ductile-Iron Pipe Systems
3.	ANSI/AWWA C110/A21.10	Ductile Iron and Grey-Iron Fittings, 3-Inch through 48-Inch, for Water and Other Liquids
4.	ANSI/AWWA C111/A21.11	Rubber-Gasket Joints for Ductile Iron Pressure Pipe and Fittings
5.	ANSI/AWWA C115/A21.15	Flanged Ductile Iron Pipe with Ductile Iron or Grey Iron Threaded Flanges
6.	ANSI/AWWA C116/A21.16	Protective Fusion-Bonded Epoxy Coatings for the Interior and Exterior Surfaces
7.	ANSI/AWWA C150/A21.50	Thickness Design of Ductile Iron Pipe
8.	ANSI/AWWA C151/A21.51	Ductile Iron Pipe, Centrifugally Cast, for Water
9.	ANSI/AWWA C153/A21.53	Ductile Iron Compact Fittings, 3-Inch through 24-Inch and 54-Inch through 64-Inch, for Water Service
10.	ANSI/AWWA C600	Installation of Ductile Iron Water Mains and Their Appurtenances

C. American Society of Mechanical Engineers/ American National Standards Institute (ASME/ANSI) Publications

1. ASME/ANSI B16.1-98 Cast Iron Flanges and Flanged Fittings

D. National Association of Pipe Fabricators (NAPF) Publications

1. NAPF 500-03-01 Solvent Cleaning
2. NAPF 500-03-04 Abrasive Blast Cleaning of Ductile Iron Pipe

1.3. QUALITY ASSURANCE

A. Submit to the Engineer written evidence that the pipe furnished under this Specification is in conformance with the material and mechanical requirements specified herein. Certified copies of independent laboratory test results or mill test results from the pipe supplier may be considered evidence of compliance provided such tests are performed in accordance with the appropriate ASTM or AWWA testing standards by experienced, competent personnel. In case of doubt as to the accuracy or adequacy of mill tests, the Engineer may require that the Contractor furnish test reports from an independent testing laboratory on samples of pipe materials.

1.4. SHOP DRAWINGS AND ENGINEERING DATA

A. Submit complete shop drawings and engineering data on all piping and accessories to the Engineer in accordance with the requirements of Section 01 3323 - Shop Drawings, Product Data, and Samples.

B. Shop drawings shall indicate piping layout in plan and elevations as may be required and shall be completely dimensioned. The Drawings shall include a complete schedule of all pipe, fittings, specials, hangers, and supports. Special castings shall be clearly detailed showing all pertinent dimensions.

C. Furnish the Engineer with lists, in duplicate, of all pieces of pipe and fittings in each shipment received. These lists shall give the serial or mark number, weight, class, size, and description of each item received.

1.5. STORAGE AND PROTECTION

A. Equipment and products stored outdoors shall be supported above the ground on suitable wooden blocks or braces arranged to prevent excessive deflection or bending between supports. Items such as pipe, structural steel, and sheet construction products shall be stored with one end elevated to facilitate drainage.

1.6. SHOP PAINTING

A. All ductile iron pipe and fittings shall be cleaned and provided with an asphaltic coating and cement lining applied at the factory, unless otherwise specified herein.

1.7. GUARANTEE

A. Provide a guarantee against defective materials and workmanship in accordance with the requirements of Section 01 7836, Warranties and Bonds.

1.8. ACCEPTABLE MANUFACTURERS

A. Ductile iron pipe and fittings must be the products of member companies of the Ductile Iron Pipe Research Association (DIPRA). Products from manufacturers who are not DIPRA member companies shall not be utilized in the work covered by these Specifications.

2. PRODUCTS

2.1. GENERAL

A. No broken, cracked, deformed, misshapen, imperfectly coated, or otherwise damaged or defective pipe or fittings shall be used. All such material shall be removed from the site of the work.

B. Minimum pipe wall thickness and pressure class of pipe shall be as follows, unless otherwise shown on the Drawings or directed by the Engineer:

2.2. DUCTILE IRON PIPE

Pipe Size	Pressure Class (psi)	Wall Thickness in Inches
3-Inch Ductile Iron	350	0.25
4-Inch Ductile Iron	350	0.25
6-Inch Ductile Iron	350	0.25
8-Inch Ductile Iron	350	0.25
10-Inch Ductile Iron	350	0.26
12-Inch Ductile Iron	350	0.28
14-Inch Ductile Iron	250	0.28
16-Inch Ductile Iron	250	0.3
18-Inch Ductile Iron	250	0.31
20-Inch Ductile Iron	250	0.33
24-Inch Ductile Iron	200	0.33
30-Inch Ductile Iron	150	0.34
36-Inch Ductile Iron	150	0.38

A. Ductile iron pipe shall be designed in accordance with ANSI/AWWA C150/A21.50, "Thickness Design of Ductile Iron Pipe," using 60,000-psi tensile strength, 42,000-psi yield strength, and 10 percent elongation. Additionally, ring bending stress is limited to 48,000 psi to provide a 2.0 safety factor based upon ultimate bending stress.

B. Ductile iron pipe shall be manufactured in accordance with ANSI/AWWA C151/A21.51, "Ductile Iron Pipe Centrifugally Cast for Water," and shall be made of ductile iron having a minimum tensile strength of 60,000 psi, a minimum yield strength of 42,000 psi, and 10 percent minimum elongation.

2.3. DUCTILE IRON FITTINGS

A. All fittings shall conform in every respect to ANSI/AWWA C110/A21.10, "Ductile Iron Compact Fittings for Water Service" or ANSI/AWWA C153/A21.53, "2-Inch through 24-Inch for Water and Other Liquids."

B. All fittings shall be for pressure rating of 250 psi, unless otherwise shown on the Drawings, directed, or specified herein.

C. Flanged fittings, in general, shall be ANSI pattern using long radius elbows except where space limitations prohibit the use of same. Design of all fittings, whether long or short pattern, shall be as indicated or dimensioned on the Drawings. Special fittings, wall pipes, and sleeves shall conform to the dimensions and details shown on the Drawings.

2.4. JOINTS FOR DUCTILE IRON PIPE AND FITTINGS

A. General

1. Joints for ductile iron pipe and fittings shall be mechanical joints, flanged joints, push-on joints, or bell and spigot joints, as shown on the Drawings or specified herein.

2. All ductile iron pipe laid underground shall be joined using mechanical joints or push-on type joints, unless otherwise shown on the Drawings, specified, or directed.

B. Mechanical Joints

1. Mechanical joints shall consist of a bolt joint of the stuffing box type as detailed in ANSI A21.10 and described in ANSI A21.11.

2. Mechanical joints shall be thoroughly bolted in accordance with the manufacturer's recommendations with Tee Head Bolts and bolts of high strength, low-alloy steel having a minimum yield point strength of 40,000 psi and an ultimate tensile strength of 70,000 psi.

3. Gaskets, bolts, and nuts shall conform to ANSI A21.11. Gaskets shall be neoprene, SBR, or rubber of such quality that they will not be damaged by the liquid or gases with which they will come into contact.

4. Glands shall be of high strength ductile iron.

C. Flanged Joints

1. Flanged joints shall conform to ANSI B16.1, Class 125, in accordance with Table 10.23 of ANSI A21.10, unless otherwise indicated.

2. Flanged joints shall be bolted with through stud or tap bolts of required size as directed. Bolts and nuts shall conform in dimensions to the American Standard heavy series. Nuts shall be hexagonal, cold pressed. Bolts and nuts shall be cadmium plated, cold pressed, steel machine bolts, conforming to ASTM A 307, Grade B. Cadmium plating shall be by an approved process and shall be between 0.003 and 0.0005 inch thick. After each joint has been made, all bolts, heads, and nuts shall be coated with two coats of coal tar epoxy (total of 16-mil dry film thickness [DFT]), or approved equal coating.

3. Gaskets shall be full face type, 1/16 inch thick, conforming to the requirements of AWWA C111.

4. Flanges on ductile iron pipe shall be screw type. Pipe threads shall be of such length that with flanges screwed home, the end of the pipe shall project beyond the face line of the flange. Flange and pipe shall then be machined to give a flush finish to the pipe and the flange and surface shall be normal to the axis of the pipe. Ductile iron flanges shall be of such design that the flange neck completely covers the threaded portion of the pipe to protect same against corrosion. All pipe with screw type flanges shall be assembled, faced, and drilled at the point of manufacture, unless otherwise approved by the Engineer.

5. Where tap or stud bolts are required, flanges shall be drilled and tapped accordingly.

D. Push-On Joints

1. Push-on joints shall conform to ANSI A21.11. Details of the joint design shall be in accordance with the manufacturer's standard practice.

2. Gaskets shall be in accordance with ANSI A21.11 and shall be of such quality that they will not be damaged by the liquid or gases with which they will come into contact.

E. Flexible Restrained Joints (for Horizontal Directional Drilling (HDD))

1. Joints used for HDD shall be boltless, flexible restrained, with smooth contoured bells. Joints with bulky glands or flanges that may prevent the smooth flow of drilling fluid/soil slurry over the joint are not acceptable.

2. Joint seals and joint used for HDD, when properly assembled and installed, shall be capable of dependably handling the specified internal pressure and pulling loads, in straight alignment or at maximum rated joint deflection, required for the project.

2.5. PIPE COATING AND LINING

A. All ductile iron pipe and fittings buried underground shall have a standard asphaltic outside coating conforming to ANSI/AWWA C151/A21.51. All exposed or immersed ductile iron pipe and fittings shall have an outside shop prime coat of epoxy coating, Tnemec Series 20 Pota-Pox (or approved equal) at 4 to 6 mils DFT and two additional coats of Tnemec Series 20 at 4 to 6 mils DFT per coat. Total minimum DFT of coating system shall be 12-mils. Total maximum DFT shall not exceed 18-mils.

B. All ductile iron pipe and fittings used for water or wastewater shall have cement mortar lining of standard thickness in accordance with ANSI A21.4.

C. Where a special lining is indicated on the Drawings for resistance to corrosive wastewater, all ductile iron pipe and fittings shall have a ceramic filled, amine-cured, epoxy lining. Coating shall be Series 431 Perma-Shield PL, by TNEMEC, or Engineer approved equal. Coating shall be applied at 40-mil DFT. Follow manufacturer's recommendations for lining bell sockets, spigot ends, flange faces, etc., and for touch up and repair of field cuts.

D. No lining shall be provided for ductile iron piping and fittings used for air.

E. All fittings used in sewage service shall have a ceramic filled, amine cured epoxy lining Equal to Series 431 Perma Shield PL by TNEMEC.

2.6. PIPE COUPLINGS

A. Pipe couplings shall be installed where shown on the Drawings, required for installation, or directed by the Engineer.

B. Pipe couplings shall conform to the requirements of Section 33 1121, Pipe Couplings and Expansion Joints.

2.7. WALL PIPE AND WALL SLEEVES

A. Furnish and install ductile iron wall pipe or wall sleeves where ductile iron piping connects with or passes through concrete walls or floors and in locations where small piping and electric wiring and conduits connect with or pass through concrete walls or floors.

B. Where wall pipes or sleeves are to be installed flush with the wall or slab, the flange or bell shall be tapped for studs. Where the flange or bell will project beyond the wall, the projection shall be sufficient to allow for installation of connecting bolts.

2.8. SPARE PARTS

A. Furnish 4 spare gaskets for each size and type of joint requiring the use of a gasket. Furnish 8 bolts and nuts of each size and type used for ductile iron pipe joints.

3. EXECUTION

3.1. LAYING

A. Proper and suitable tools and appliances for safe and convenient handling and laying of pipe and fittings shall be used. Great care shall be taken to prevent the pipe coating from being damaged, particularly cement linings on the inside of the pipes and fittings. Any damage shall be remedied as directed by the Engineer.

B. Carefully examine all pipe and fittings for defects just before laying and no pipe or fitting shall be laid which is defective. If any defective pipe or fitting is discovered after having been laid, it shall be removed and replaced in a satisfactory manner with a sound pipe or fitting by the Contractor at his own expense.

C. Thoroughly clean all pipes and fittings before they are laid and keep clean until they are used in the completed work. Open ends of pipe shall be kept plugged with a bulkhead during construction.

D. Pipe laid in trenches shall be laid true to line and grade on a firm and even bearing for its full length at depths and grades as shown on the Drawings. Adequate precautions shall be taken to prevent flotation of pipelines prior to backfilling. Installation of ductile iron pipe in underground pressure piping systems shall conform to the requirements of AWWA C600. Excavation of trenches, embedment, and backfilling around pipes shall conform to the requirements of Section 31 2000, Earthwork and as shown on the drawings. Embedment shall be select earth and final backfill shall be common earth for unimproved areas. Embedment and final backfill shall be #67 crushed stone for improved areas. Embedment shall be #67 crushed stone in rock trenches.

E. All ductile iron piping laid underground shall have a minimum of 30-inches of cover above the top of the pipe unless otherwise shown on the Drawings.

F. All elbows, tees, branches, crosses, and reducers in pressure piping systems shall be adequately restrained against thrust. Underground pressure piping shall be restrained by thrust restrained joints (EBAA Meg-A-Lug or Engineer approved equal). Install restraints in accordance with manufacturer's recommendations. Install number of restraints recommended by manufacturer for size of pipe, type of fitting, and type of soil, or as shown on the Drawings.

G. All ductile iron pipes entering buildings or basins shall be adequately supported between the structure and undisturbed earth as shown on the Drawings to prevent breakage resulting from settlement of backfill around the structure.

H. Wall pipe and wall sleeves shall be accurately located and securely fastened in place before concrete is poured. All wall pipe and wall sleeves shall have wall collars properly located to be in the center of the wall where the respective pipes are to be installed.

I. Wall pipe and wall sleeves shall be installed when the wall or slab is constructed. Blocking out or breaking of the wall for later insertion shall not be permitted.

J. Cutting or weakening of structural members to facilitate pipe installation shall not be permitted. All piping shall be installed in place without springing or forcing.

K. Sufficient couplings and flanged joints shall be provided to facilitate equipment installation and removal.

L. Exposed ductile iron piping shall be supported as shown on the Drawings or specified herein.

3.2. CUTTING

A. Whenever pipe requires cutting to fit the lines, the work shall be done in such manner as to leave a smooth end at right angles to the axis of the pipe. When a piece of pipe is cut to fit into the line, no payment will be made for the portion cut off and not used.

B. Whenever existing pipe requires cutting to install new fittings, the work shall be done in such manner as to leave a smooth end at right angles to the axis of the pipe and special care shall be exercised to guard against breaking or splitting the existing piping.

C. All cutting of ductile iron pipe shall be done with a cutting saw. All burrs shall be removed from the inside and outside edges of all cut pipe.

3.3. JOINING

A. Mechanical Joints

1. The successful operation of the mechanical joint specified requires that the spigot be centrally located in the bell and that adequate anchorage be provided where abrupt changes in direction and dead ends occur.

2. The surfaces with which the rubber gasket comes in contact shall be brushed thoroughly with a wire brush just prior to assembly to remove all loose rust or foreign material which may be present and to provide clean surfaces which shall be brushed with a liberal amount of soapy water or other approved lubricant just prior to slipping the gasket over the spigot end and into the bell. Lubricant shall be brushed over the gasket prior to installation to remove loose dirt and lubricate the gasket as it is forced into its retaining space.

3. Joint bolts shall be tightened by the use of approved wrenches and to a tension recommended by the pipe manufacturer. When tightening bolts, it is essential that the gland be brought up toward the pipe flange evenly, maintaining approximately the same distance between the gland and the face of the flange at all points around the socket. This may be done by partially tightening the bottom bolt first, then the top bolt, next the bolts at

either side, and last, the remaining bolts. This cycle shall be repeated until all bolts are within the range of acceptable torques. If effective sealing is not attained at the maximum torque indicated above, the joint shall be disassembled and reassembled after thorough cleaning. Overstressing of bolts to compensate for poor installation shall not be permitted.

4. After installation, bolts and nuts in buried or submerged piping shall be given 2 heavy coats of a bituminous paint.

B. Flanged Joints

1. All flanges shall be true and perpendicular to the axis of the pipe. Flanges shall be cleaned of all burrs, deformations, or other imperfections before joining. Flanged joints shall be installed so as to ensure uniform gasket compression. All bolting shall be pulled up to the specified torque by crossover sequence. Where screwed flanges are used, the finished pipe edge shall not extend beyond the face of the flange, and the flange neck shall completely cover the threaded portion of the pipe.

2. Connections to equipment shall be made in such a way that no strain is placed on the equipment flanges. Connecting flanges must be in proper position and alignment and no external force may be used to bring them together properly.

3. After installation, bolts and nuts in buried or submerged piping shall be given 2 heavy coats of a bituminous paint.

C. Push-On Joints and Flexible Restrained Joints

1. The inside of the bell and the outside of the pipe from the plain end to the guide stripe must be wiped clean immediately before assembling the pipe joint. Then the rubber gasket shall be inserted into a groove or shaped recess in the bell. Both the bell and spigot ends to be joined shall be wiped again to ensure they are thoroughly clean. A liberal coating of special lubricant furnished by the pipe manufacturer shall be applied to the outside of the pipe from the plain end to the yellow guide stripe and to the inside of the gasket. The plain end shall be centered in the bell and the spigot pushed home. Wherever possible the pipe shall be socketed by hand; however, jacking may be required to push the spigot in place on the larger sizes of pipe. The completed joint shall be permanently sealed and watertight.

2. Whenever the pipe is cut in the field, the cut end shall be conditioned so it can be used in making up a joint by filing or grinding the cut end to remove burrs or sharp edges that might damage the gasket.

D. Permissible Deflection of Joints

1. Deflection of ductile iron pipe at joints for long radius curves or for avoiding obstacles shall be permitted only upon approval of the Engineer.

2. Where deflection of Push on or Mechanical joints is permitted, such deflection shall be made in accordance with and shall not exceed 80 percent of the maximum deflection angle provided in Tables 3 and 4 of AWWA C600-05.

3. Where deflection of flexible restrained joints is permitted or necessary for pipe installation during horizontal directional drilling, such deflection shall not exceed 50 percent of the maximum deflection angle provided in Table 3 of AWWA C600.

E. Joints of Dissimilar Metals. When a flanged joint consists of a ductile iron flange mated to a steel or alloy flange, the steel flanges shall be flat-faced and furnished with full-faced gaskets, insulating bushings, and stainless steel bolts.

3.4. SERVICE CONNECTIONS

A. Small service lines and branches shall connect to larger ductile iron mains using ductile iron tees, in general and unless otherwise shown.

B. Service tee branches shall be 6” unless noted otherwise on the drawings.

3.5. CUT-INS TO EXISTING PIPING

A. Cut-ins to existing ductile iron piping for installation of new mechanical joint fittings and valves shall be made using ductile iron cutting-in sleeves, in general and unless otherwise shown.

B. Cutting-in sleeves shall have a pressure rating not less than that of the existing pipeline and shall be furnished with a mechanical joint end on one end and a plain end on the other.

3.6. DRILLING AND TAPPING

A. Wherever required, ductile iron pipe and fittings shall be drilled and tapped to receive drainage or any other piping. All holes shall be drilled accurately at right angles to the axis of any pipe or fitting. Where plugs are drilled, holes shall be at right angles to the face of the plug.

B. Where the size of the pipe to be connected is such as to require bosses for connection and when the pipe wall thickness is too thin to permit the effective length of pipe threads to be utilized as necessary for the size pipe being connected by threads, furnish such pipe with cast-on bosses suitable for drilling, tapping, and connecting such pipe. Alternately, where shown or specified, a tapped saddle clamp may be used in lieu of a cast-on boss. Saddle clamp shall be of the heavy-duty type with O-ring gaskets and 2 heavy U-bolt clamps.

C. All tapping shall be carefully and neatly done by skilled workmen with suitable tools.

D. Where connections are made between new and old piping, the connections shall be made in a thorough and workmanlike manner using proper fittings and specials to suit actual conditions.

E. Cut-ins to existing and operating pipelines shall be done at times agreeable to the Owner upon approval of the Engineer.

F. Existing pipelines that may be cut or damaged during the performance of work under this item shall be repaired, reconnected, and returned to service in equal or better condition in which they were found and in accordance with the requirements of this Specification.

G. No separate payment will be made for drilling, tapping, making connections, cut-ins, repairs to damaged existing pipelines, and reconnections in existing pipelines

3.7. TESTING

A. After sewer is installed, internally inspect with CCTV and record to DVD. The finished DVD shall be continuous over the entire length of the sewer between two manholes and be free from visual defects. The cost of the post-installation CCTV inspection shall be included in the unit price for the pipe.

B. Defects which may affect the integrity, strength, or watertightness of the pipe in the opinion of the Engineer will be repaired or the pipe replaced at the Contractor's expense.

C. Leakage testing shall be performed on all segments to include services up to the property line as well as any private lateral lines replaced. Copies of all test results shall be provided to the Engineer. Testing shall conform to the requirements of TDEC Design Criteria, latest edition. Low pressure air-testing shall be performed per ASTM C-828. The time required for the pressure to drop from the stabilized 3.5 psig to 2.5 psig shall be greater than or equal to the minimum calculated test time per the table below.

Pipe Size (inches)	Time, T (sec/100 ft)	Allowable Air Loss, Q (ft^3/min)
6	42	2.0
8	72	2.0
10	90	2.5
12	108	3.0
15	126	4.0
18	144	5.0
21	180	5.5
24	216	6.0
27	252	6.5
30	288	7.0

D. Deflection tests shall be performed on all flexible pipes. For pipelines with inside diameters less than 27 inches, a rigid ball or mandrel shall be used to measure deflection. No pipe shall exceed a deflection of five (5) percent. If a pipe should fail to pass the deflection test, the problem shall be corrected and a second test shall be conducted after the final backfill has been in place 30 days. The tests shall be performed without mechanical pulling devices.

END OF SECTION

SECTION 33 3113

POLYVINYL CHLORIDE PIPE FOR GRAVITY SEWER

1. GENERAL

1.1. SUMMARY

A. Contractor shall furnish all labor, materials, equipment and incidentals required to install plastic piping as shown on the Drawings and as specified herein.

1.2. RELATED WORK

A. Contractor shall furnish all labor, materials, equipment and incidentals required to install plastic piping as shown on the Drawings and as specified herein.

1.3. DESCRIPTION OF SYSTEM

A. Plastic pipe shall be used for gravity sewer main and service line piping.

B. Piping shall be installed in the locations as shown on the Drawings.

1.4. QUALIFICATIONS

A. All plastic pipe shall be furnished by a single manufacturer who is fully experienced, reputable, and qualified in the manufacture of the items to be furnished. The equipment shall be designed, constructed, and installed in accordance with ASTM and Uni-Bell methods and shall comply with these Specifications.

1.5. SUBMITTAL

A. Shop drawings shall be submitted to the Engineer for approval in accordance with these Specifications and shall include dimensioning and technical specification for all piping to be furnished.

B. Submit to the Engineer, for approval when requested, samples of all materials specified herein.

1.6. PIPE MARKING

A. All PVC pipe shall be marked with the following information:

1. Manufacturer's name or trademark.
2. Nominal pipe size.
3. ASTM material code designation.
4. ASTM specification designation (ASTM D 3034, ASTM F 679).

1.7. RECEIVING, HANDLING, AND STORAGE

A. Receiving, handling, and storage of PVC pipe shall be in accordance with AWWA Manual No. M23, "PVC Pipe Design and Installation," except that all PVC pipe which is stored longer than 1 week shall be covered with an opaque material.

2. PRODUCTS

2.1. MATERIALS

A. Pipe and fittings shall meet the requirements of:

1. ASTM D 3034 "Standard Specification for Type PSM Polyvinyl Chloride (PVC) Sewer Pipe and Fittings," SDR35, in sizes 4"-15".

2. ASTM F 679 "Standard Specification for Polyvinyl Chloride (PVC) Large Diameter Plastic Gravity Sewer Pipe and Fittings" T-1, SDR35, in sizes 18"-27".

B. Gaskets shall meet ASTM F 477, "Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe." Gaskets shall be factory installed and positively retained by means of a stainless steel, polypropylene or PVC ring.

C. Push-on joint shall meet ASTM D 3212, "Standard Specification for Joints for Drain and Sewer Pipes Using Flexible Elastomeric Seals."

D. PVC material shall be 12454-B, 12454-C, or 13343-C as defined in ASTM D 1784, "Standard Specification for Rigid Polyvinyl Chloride (PVC) Compounds and Chlorinated Polyvinyl Chloride (CPC) Compounds."

3. EXECUTION

3.1. EXISTING UTILITIES

A. Carefully protect from damage at all times all existing sewers, water lines, gas lines, underground conduits, telephone lines, sidewalks, curbs, gutters, pavements, electric lines, or other utilities or structures in the vicinity of the work. Where it is necessary for the proper accomplishment of the work to repair, remove and/or replace any such utility, the work shall be done under the provisions set forth in the General Conditions or General Provisions. No separate payment shall be made for removing and replacing and/or repairing damaged existing sewers; water, gas, electric, telephone lines or conduits; or other utilities, culverts, drains, or conduits of similar existing services or structures. Similar repair and replacement of sidewalks, curbs, gutters, and pavements are provided elsewhere in these Specifications.

B. Sewers to be installed parallel to any existing or proposed water main shall be laid at least 10 feet, horizontally, from the water main. If conditions prevent the 10-foot separation, the sewer may be constructed closer to a water main if it is

laid in a separate trench and if the bottom of the water main is at least 18 inches above the top of the sewer.

C. When sewers cross under water mains, the top of the sewer shall be at least 18 inches below the bottom of the water main. If necessary, the water main shall be relocated to provide this separation or reconstructed with mechanical-joint ductile iron pipe for a distance of 10 feet on each side of the sewer. One full length of water main shall be centered over the sewer so that both joints will be as far from the sewer as possible.

D. When it is impossible to obtain proper horizontal and vertical separation as stipulated above, both water main and sewer shall be constructed of mechanical-joint ductile iron pipe and shall be pressure tested to assure water tightness.

E. When sewer lines cross under culverts where the sewer and the culvert are less than 18 inches apart, the sewer line shall be encased in concrete as shown on the Standard Drawings.

3.2. INSTALLATION

A. Alignment and Grade. All pipe shall be laid to, and maintained at, the established lines and grades. The Contractor may set line and grade for the sewer by using a laser beam coaxially through the sewer being laid.

B. Trench Construction

1. Stockpiling Excavated Material: All excavated material shall be stockpiled in a manner that will not endanger the work or obstruct sidewalks and driveways. Hydrants under pressure, valve-pit covers, valve boxes, curb-stop boxes, fire and police call boxes, and other utility controls shall be kept accessible.

2. Dewatering: Where conditions are such that running or standing water occurs in the trench bottom or the soil in the trench bottom displays a "quick" tendency, the water shall be removed by pumps and other suitable means (such as well points or pervious underdrain bedding) until the pipe has been installed and the backfill has been placed to a sufficient height to prevent flotation of pipe. Generally, a depth of backfill over the top of the pipe equal to 1½ pipe diameters is sufficient to prevent flotation.

3. Preparation of Trench Bottom: The trench bottom shall be constructed to provide a firm, stable, and uniform support for the full length of the pipe. Bell holes shall be provided at each joint to permit proper assembly and pipe support. Any part of the trench bottom excavated below grade shall be backfilled to grade and shall be compacted as required to provide firm pipe support. When an unstable subgrade condition is encountered that could provide inadequate pipe support, additional trench depth shall be excavated and refilled with suitable foundation material. Ledge rock, boulders, and large stones shall be removed to provide 6 inches of cushion on all sides of the pipe and accessories.

4. Laying of Pipe: To prevent damage, proper implements, tools, and equipment shall be used for placement of the pipe in the trench. Under no circumstances shall pipe or accessories be dropped into the trench. All foreign matter or dirt shall be removed from the pipe interior. Pipe joints shall be assembled with care. When pipe laying is not in progress, open ends of installed pipe shall be closed to prevent entrance of trench water, dirt, foreign matter, or small animals into the pipeline.

5. Pipe Embedment: PVC pipe shall be installed with washed No. 67 crushed stone or sand bedding providing uniform longitudinal support under the pipe. Backfill material shall be hand-worked under the sides of the pipe to provide satisfactory haunching. Initial backfill material shall be crushed stone and shall be placed to a minimum depth of 12 inches over the top of the pipe as shown on the Drawings. All pipe embedment material shall be selected and placed carefully. Sharp stones and crushed rock larger than ¾ inch which could cause scratching or abrasion of the pipe, shall be excluded from the embedment material. Bedding and initial backfill shall be compacted to a minimum of 90 percent standard Proctor.

6. Final Backfill: After placement and compaction of pipe embedment materials and initial backfill, the balance of backfill materials may be machined placed. The material shall contain no large stones or rocks, frozen material or debris. Proper compaction procedures shall be exercised to provide required 90 percent density, standard Proctor. Final backfill shall conform to the requirements of Section 31 2000, Earthwork and as shown on the drawings.

3.3. TESTING

A. After sewer is installed, internally inspect with CCTV and record to DVD. The finished DVD shall be continuous over the entire length of the sewer between two manholes and be free from visual defects. The cost of the post-installation CCTV inspection shall be included in the unit price for the pipe.

B. Defects which may affect the integrity, strength, or watertightness of the pipe in the opinion of the Engineer will be repaired or the pipe replaced at the Contractor's expense.

C. Leakage testing shall be performed on all segments to include services up to the property line as well as any private lateral lines replaced. Copies of all test results shall be provided to the Engineer. Testing shall conform to the requirements of TDEC Design Criteria, latest edition. Low pressure air-testing shall be performed per ASTM C-828. The time required for the pressure to drop from the stabilized 3.5 psig to 2.5 psig shall be greater than or equal to the minimum calculated test time per the table below.

Pipe Size (inches)	Time, T (sec/100 ft)	Allowable Air Loss, Q (ft^3/min)
6	42	2.0
8	72	2.0
10	90	2.5
12	108	3.0
15	126	4.0
18	144	5.0
21	180	5.5
24	216	6.0
27	252	6.5
30	288	7.0

D. Deflection tests shall be performed on all flexible pipes. For pipelines with inside diameters less than 27 inches, a rigid ball or mandrel shall be used to measure deflection. No pipe shall exceed a deflection of five (5) percent. If a pipe should fail to pass the deflection test, the problem shall be corrected and a second test shall be conducted after the final backfill has been in place 30 days. The tests shall be performed without mechanical pulling devices.

END OF SECTION

SECTION 33 3913

SEWER MANHOLES AND COVERS

1. GENERAL

1.1. SCOPE OF WORK

A. Contractor shall furnish all labor, materials, equipment, and incidentals required to install round precast concrete sewer manhole sections, wetwell, meter vaults, valve vaults, covers, pipe connectors, inverts, and accessories as specified herein.

1.2. REFERENCES

A. Prestressed Concrete Institute. Manual for Quality Control for Plants and Production of Precast and Prestressed Concrete Products.

B. National Precast Concrete Association. Quality Control Manual for Precast Concrete Plants.

C. American Society for Testing and Materials (ASTM)

1. ASTM C478 - Standard Specification for Precast Reinforced Concrete Manhole Sections.

2. ASTM C890 - Standard Practice for Minimum Structural Design Loading for Monolithic or Sectional Precast Concrete Water and Wastewater Structures.

3. ASTM C891 - Standard Practice for Installation of Underground Precast Concrete Utility Structures.

4. ASTM C923 - Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipe and Laterals.

5. ASTM C913 - Standard Specifications for Precast Concrete Water and Wastewater Structures.

D. American Association of State Highway and Transportation Officials Standard Specification for Joints for Circular Concrete Sewer and Culvert Pipe Using Flexible Watertight Gaskets (AASHTO M198).

E. American Concrete Institute Building Code Requirements for Reinforced Concrete (ACI 318).

F. Occupational Safety and Health Administration Standard 1926.704 - Requirements for Precast Concrete.

1.3. SUBMITTALS

A. Copy of certificate or report showing that the precast concrete manufacturer conforms to Article 1.4 - Qualifications.

B. Detail of each precast concrete section to be provided showing or charting the following:

1. Manufacturer's part number or catalog number.
2. Inside diameter.
3. Lay length excluding base slab.
4. Wall thickness and base or top thickness where applicable.
5. Handling weight.
6. Wire size, spacing, and area provided per vertical foot.
7. Reinforcing bar size and spacing.
8. Design load for flat slab or transition tops.
9. Step locations.
10. Concrete mix number and design strength.
11. Height, width, slope, and annular space of the tongue and groove

C. Step detail and material specifications.

D. Pipe connector details and material specifications.

E. Joint material detail, material specifications and calculations showing that the joint material cross section is greater than the joint's annular space times its height.

F. Lifting device and hole detail.

G. Submit the following at the request of the Engineer or Owner:

1. Structural analysis and design calculations for flat slab top and transition top precast components, performed in accordance with applicable codes and standards, showing that allowable stresses will not be exceeded. All calculations must be sealed by a registered professional engineer.

2. Calculations or test results verifying that the lifting device components and holes are designed in accordance with OSHA Standard 1926.704.

3. Concrete 28-day compression strength results for every day production of precast components for the project was performed showing the required strength according to the guidelines established in ACI 318.

4. Reinforcing and cement mill reports for materials used in the manufacture of precast components for this project.

5. The above test reports for similar precast components recently produced, submitted prior to production of precast components for this project.

1.4. QUALIFICATIONS

A. The precast manufacturer shall comply with one of the following requirements:

1. Manufacture precast components for the project in a plant certified in the Prestressed Concrete Institute's (PCI) Plant Certification Program.

2. Manufacture precast components for the project in a plant certified in the Prestressed Concrete Institute's (PCI) Plant Certification Program.

3. Retain an independent testing or consulting engineering firm approved by the Engineer for precast plant inspection. The basis for plant inspection shall be the National Precast Concrete Association Quality Control Manual or the Manual for Quality Control for Plants and Production of Precast and Prestressed Concrete Products. The above firm shall inspect the precast plant 2 weeks prior to and at 1 week intervals during production of materials for this project and issue a report, certified by a registered engineer that materials, methods, products, and quality control meet the requirements of the above quality control manuals.

B. The precast manufacturer shall have a recognized quality improvement process installed at the manufacturing facility.

C. The precast manufacturer shall provide engineering certification as to the structural adequacy of any precast component, if requested.

D. All concrete compressive strength testing shall be performed in a laboratory inspected by the CCRL of the National Bureau of Standards.

2. PRODUCTS

2.1. MATERIALS

A. Concrete shall conform to ASTM C 478 and as follows:

1. Compressive Strength: 4,000 psi minimum at 28 days

2. Air Content: 4 percent minimum.

3. Alkalinity: Adequate to provide a life factor, Az = Calcium carbonate equivalent times cover over reinforcement, no less than 0.35 for bases, risers and cones.

4. Cementitious Materials: Minimum of 564 pounds per cubic yard.

5. Coarse Aggregates: ASTM C 33. Sound, crushed, angular stone only. Smooth or rounded stone shall not be used.

6. Fine Aggregates: ASTM C 33. Free from organic impurities.

7. Chemical Admixtures: ASTM C 494. Calcium chloride or admixtures containing calcium chloride shall not be used.

8. Air Entraining Admixtures: ASTM C 260.

B. Reinforcing steel shall be ASTM A615 Grade 60 deformed bar, ASTM A82 wire or ASTM A185 welded wire fabric.

C. Lifting loops shall be ASTM A416 steel strand. Lifting loops made from deformed bars shall not be allowed.

D. XYPEX C1000R Admixture, 3% by weight of portland cement, shall be added to each manhole or other structures for water proofing.

E. Flexible joint sealants shall be butyl rubber based conforming to Federal Specification SS-S-210A, AASHTO M-198, Type B butyl rubber or as follows: maximum of 1% volatile matter and suitable for application temperatures between 10 and 100°F.

F. Exterior joints shall be butyl wrapped.

G. Epoxy gels used for interior patching of wall penetrations shall be a 2-component, solvent-free, moisture-insensitive, high modulus, high-strength, structural epoxy paste adhesive meeting ASTM C881, Type I and II, Grade 3, Class B and C, Epoxy Resin Adhesive.

2.2. COMPONENTS

A. Precast component fabrication and manufacture shall be as described in this paragraph and as described in the paragraphs for the specific components.

1. Precast components shall be manufactured in conformance with ASTM C478. Wall and inside slab finishes resulting from casting against forms standard for the industry shall be acceptable. Exterior slab surfaces shall have a float finish. Small surface holes, normal color variations, normal form joint marks, minor depressions, chips and spalls will be tolerated. Dimensional tolerances shall be those set forth in the appropriate references and specified below

2. Joint surfaces for joints between bases, risers, and cones shall be manufactured to the joint surface design and tolerance requirements of ASTM C361. The maximum slope of the vertical surface shall be 2 degrees. The maximum annular space at the base of the joint shall be 0.10 inch. The minimum height of the joint shall be 4 inches.

3. Lift holes and inserts used for handling precast components shall be sized for a precision fit with the lift devices, shall not penetrate through the manhole wall, and shall comply with OSHA Standard 1926.704.

4. Step holes shall be cast or drilled in the bases, risers, and cones to provide a uniform step spacing of 16 inches. Cast step holes shall be tapered to match the taper of the steps.

B. Precast base sections shall have the base slab cast monolithically with the walls, or have and approved galvanized or PVC waterstop cast in the cold joint between the base slab and the walls. Where extended base manholes are required, the width of the base extensions shall be no less than the base slab thickness. The bottom step in base sections shall be a maximum of 26 inches from the top of the base slab.

C. The minimum lay length of precast riser sections shall be 16 inches.

D. Precast cone sections shall have an inside diameter at the top of 24 inches. The width of the top ledge shall be no less than the wall thickness required for the cone section.

E. Standard precast flat slab top sections shall have an inside diameter at the top of 24 inches and shall be designed for HS-20 traffic loadings as defined in ASTM C 890. Items to be cast into special flat slab tops shall be sized to fit within the manhole inside diameter and the top and bottom surfaces.

F. Precast grade rings shall be used to adjust ring and covers to finished grade. No more than 12 vertical inches of grade rings will be allowed per manhole. Grade rings shall conform to ASTM C478 and shall be no less than 4 inches in height.

G. Precast inverts shall meet the following requirements:

1. Pipe openings shall provide clearance for pipe projecting a minimum of 2 inches inside the manhole. The height of the transition from the pipe opening to the invert trough shall be equal to ½ of the opening inside diameter minus pipe inside diameter, plus or minus ¼ inch. The crown of small inside diameter pipe shall be no lower than the crown of the outlet pipe. When the fall between the inlet and the outlet holes is greater than 4 inches, the inlet end of the trough shall be below the inlet pipe invert and aligned horizontally within 1 inch.

2. Troughs shall be formed and finished to provide a consistent slope from the pipe outlet to the inlets up to 4-inch fall. The minimum fall shall be 1 inch. The minimum bending radius of the trough centerline is to be 1.5 times the pipe inside diameter. Provide a ½ inch radius at the intersection of two or more channels. The minimum concrete thickness from the bottom of the trough to the bottom of the base shall be 7 inches.

3. Float finish benches to provide a uniform 2½ inch slope, plus or minus 1 inch, from the high point at the manhole wall to the low point at invert trough. Provide a ¼-inch radius at the edge of the bench and trough.

4. Depressions, high spots, voids, chips, or fractures over ¼-inch in diameter or depth shall be filled with a sand cement paste and finished to a texture reasonably consistent with that of the formed surface.

H. Provide steps in bases, risers, cones, transition cones, and transition top sections aligned vertically on 16-inch centers. Secure steps to the wall with a compression fit in tapered holes or cast in place. Steps shall not be vibrated or

driven into freshly cast concrete or grouted in place. The reinforced plastic steps shall be copolymer polypropylene plastic or equal, reinforced with a ½-inch diameter Grade 60 bar and have serrated tread and tall end lugs. Step pullout strength shall be a minimum of 2,000 pounds when tested according to ASTM C497.

I. Pipe to manhole connectors shall conform to ASTM C923. On large diameter flexible pipes, provisions for control of the pipe outside diameter to within the tolerances of the connector shall be made.

J. Joints shall be sealed internally between the tongue and the groove and additionally around the external perimeter of the joint as follows:

1. Internal seals shall consist of a plastic or paper-backed butyl rubber rope no less than 28 feet long and having a cross-sectional area no less than the annular space times the height of the joint.

2. Internal seals may consist of an O-ring gasket conforming to ASTM C443, installed according to the precast manufacturer's recommendation, at the option of the Contractor.

3. External Seals shall consist of a polyethylene backed flat butyl rubber sheet no less than 1/16-inch thick and 6 inches wide applied to the outside perimeter of the joint.

K. Manhole rings and covers shall be equal to those shown on the manhole details. Materials shall be gray cast iron Class 35, suitable for highway traffic loads.

L. Lifting devices complying with OSHA Standard 1926.704 for handling the precast components shall be provided by the precast manufacturer.

2.3. CONFIGURATION

A. Manholes are to be constructed as specified and as shown on the detail drawings.

B. The number of joints shall be minimized. Use no more than two sections for manholes up to 8 feet tall and no more than 1 riser for each additional 4 feet in height.

C. Where service lines enter manholes, locate them above the bench of the invert.

3. EXECUTION

3.1. EXAMINATION

A. Inspect manhole components prior to unloading from the delivery truck.

3.2. DELIVERY, STORAGE, AND HANDLING

A. Coordinate delivery with the manufacturer. Handle and store the manhole components in accordance with ASTM C 891 and the manufacturer's

recommendations using methods that will prevent damage to the components and their joint surfaces.

3.3. PLACING MANHOLE SECTIONS

A. Excavate the required depth and remove materials that are unstable or unsuitable for a good foundation. Prepare a level, compacted foundation extending 6 inches beyond the manhole base.

B. Set base plumb and level, aligning manhole invert with pipe invert.

C. Thoroughly clean bells and spigots to remove dirt and other foreign materials that may prevent sealing. Unroll the butyl sealant rope directly against base of spigot. Leave protective wrapper attached until sealant is entirely unrolled against spigot. Do not stretch. Overlap from side to side, not top to bottom.

D. Set risers and cones so that steps align, taking particular care to clean, prepare and seal joints.

E. After joining manhole sections, apply the butyl sealant sheet around the outside perimeter of the joint.

F. Lift holes leaving less than 2 inches of wall thickness shall be plugged from the outside using a sand cement mortar. Lift holes penetrating the wall shall be additionally sealed with an interior application of an epoxy gel ⅛ inch thick extending 2 inches beyond the penetration.

G. Set the manhole frames to the required elevation using no more than 12 inches of precast concrete grade rings, sealing all joints between cone, adjusting rings, and manhole frame with the butyl sealant rope and sheet.

H. Perform the final finishing to the manhole interior by filling all chips or fractures greater than ½ inch in length, width or depth and depressions more than ½ inch deep in inverts with a high strength grout equal to SikaSet Plug. Do not fill the joints between the precast concrete sections. Clean the interior of the manhole, removing all dirt, spills, or other foreign matter.

3.4. TESTING

A. After completion of manhole construction, wall sealing, or rehabilitation, but prior to backfilling, test manholes for water tightness using hydrostatic or vacuum testing procedures.

B. Plug influent and effluent lines, including service lines, with suitably-sized pneumatic or mechanical plugs. Ensure plugs are properly rated for pressures required for test; follow manufacturer's safety and installation recommendations. Place plugs minimum of 6 inches outside of manhole walls. Brace inverts to prevent lines from being dislodged when lines entering manhole have not been backfilled.

C. Vacuum testing:

1. Install vacuum tester head assembly at top access point of manhole and adjust for proper seal on straight top section of manhole structure. Following manufacturer's instructions and safety precautions, inflate sealing element to recommended maximum inflation pressure; do not over-inflate.

2. Evacuate manhole with vacuum pump to 10 inches mercury (Hg), disconnect pump, and monitor vacuum for time period specified in the Table below, Vacuum Test Time Table.

3. A manhole passes the test if after 2.0 minutes and with all valves closed, the vacuum is at least 9.0 inches of mercury (Hg).

DEPTH IN FEET	TIME IN SECONDS BY PIPE DIAMETER		
	48"	60"	72"
4	10	13	16
8	20	26	32
12	30	39	48
16	40	52	64
20	50	65	80
24	60	78	96
*	5.0	6.5	8.0

*Add T times for each additional 2-foot depth. (The values listed above have been extrapolated from ASTM C 1244

END OF SECTION

APPENDIX A - CITY OF GOODLETTSVILLE UTILITY CUT REPAIR GUIDELINES AND SPECIFICATIONS

CITY OF GOODLETTSVILLE
UTILITY CUT REPAIR GUIDELINES AND SPECIFICATIONS

1 CONSTRUCTION GUIDELINES FOR TRENCH REPAIR

Chapter 13.20 of the Metro Code has been cited as a model by the APWA and referenced in many of the articles studied for this report. Therefore, it is recommended that the current code be modified to include recent improvements in practice being used by other municipalities. The requirement for patch awareness and repair training and a specification for the "T" patch are also submitted for adoption. The recommended modifications are summarized as follows:

1.1 Requirements for Training

Recognizing that education and awareness by the utility companies as to the impact of their cuts on pavement life and the quality of the community is needed, it is suggested that representatives from utility companies and contractors be required to attend a ½-day workshop on patching utility cuts. This workshop would cover the impacts of cuts on street performance and the associated economic burden on the community as well as proper utility cut procedures. The workshop should be based on the Strategic Highway Research Program manuals of practice and include the rating tree procedure. The presence of a workshop graduate would be required to perform a utility cut or utility cut repair.

1.2 T-Patches

T-Patches are pavement cuts made outside the trench boundaries so there is not a continuous vertical shear plane from the edge of the trench to the pavement surface. Research shows that the zone of influence is at least 2 feet from the edge of the trench. To take advantage of the layering effects of a flexible pavement, the compacted base and the surface course should be extended at least 2 feet from the edge of the trench. This design minimizes the reflective cracking due to excessive strains at the bottom of each layer at the edge of the trench and allows better compaction of the base material and new HMAC. Diagrams for typical T-patches are shown below as Figures E.1 through E.4.

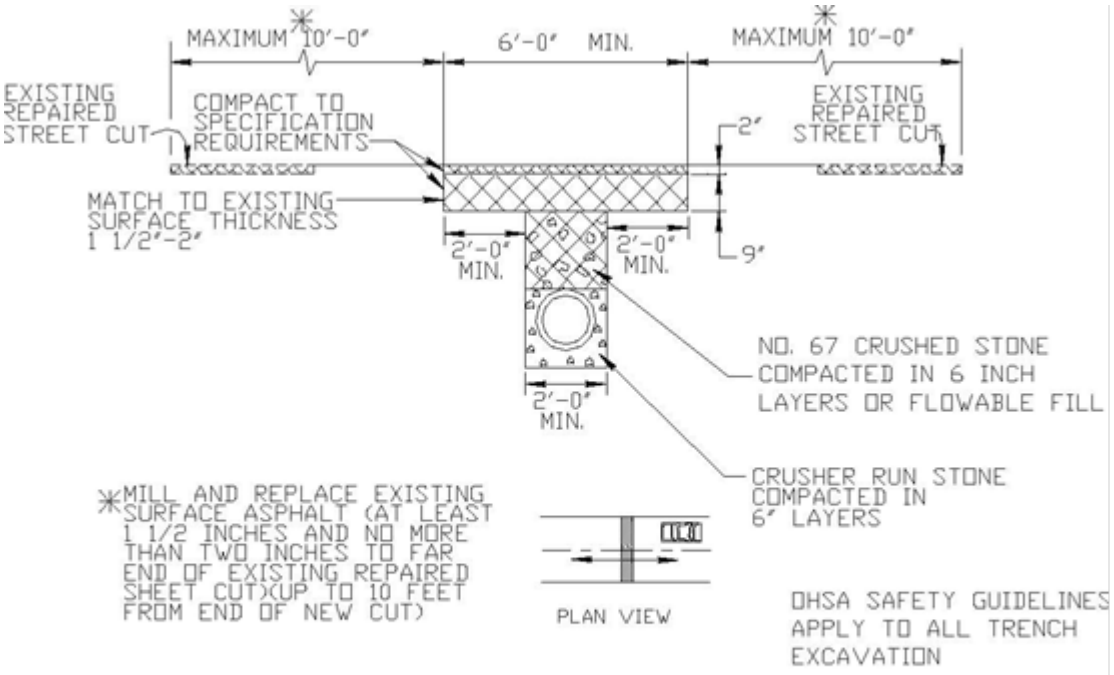


Figure E.1 Transverse section view of a transverse utility cut repair.

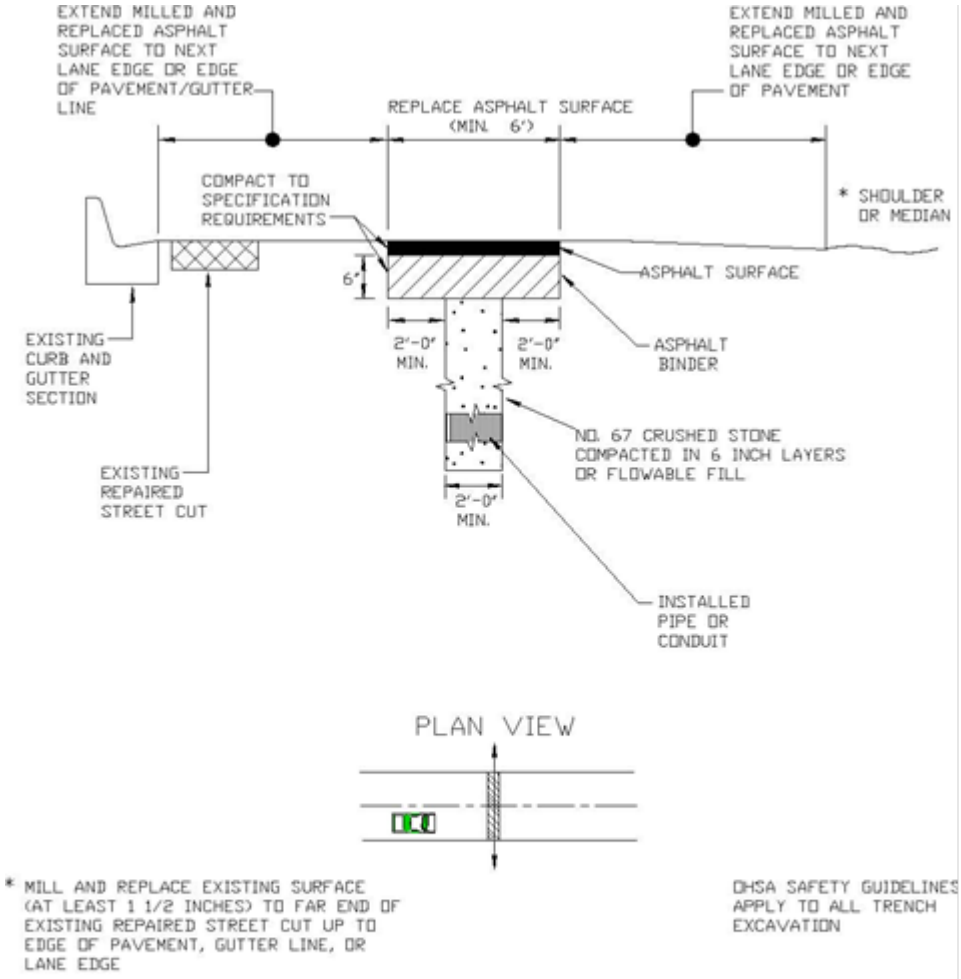


Figure E.2. Longitudinal section view of a transverse utility cut repair.

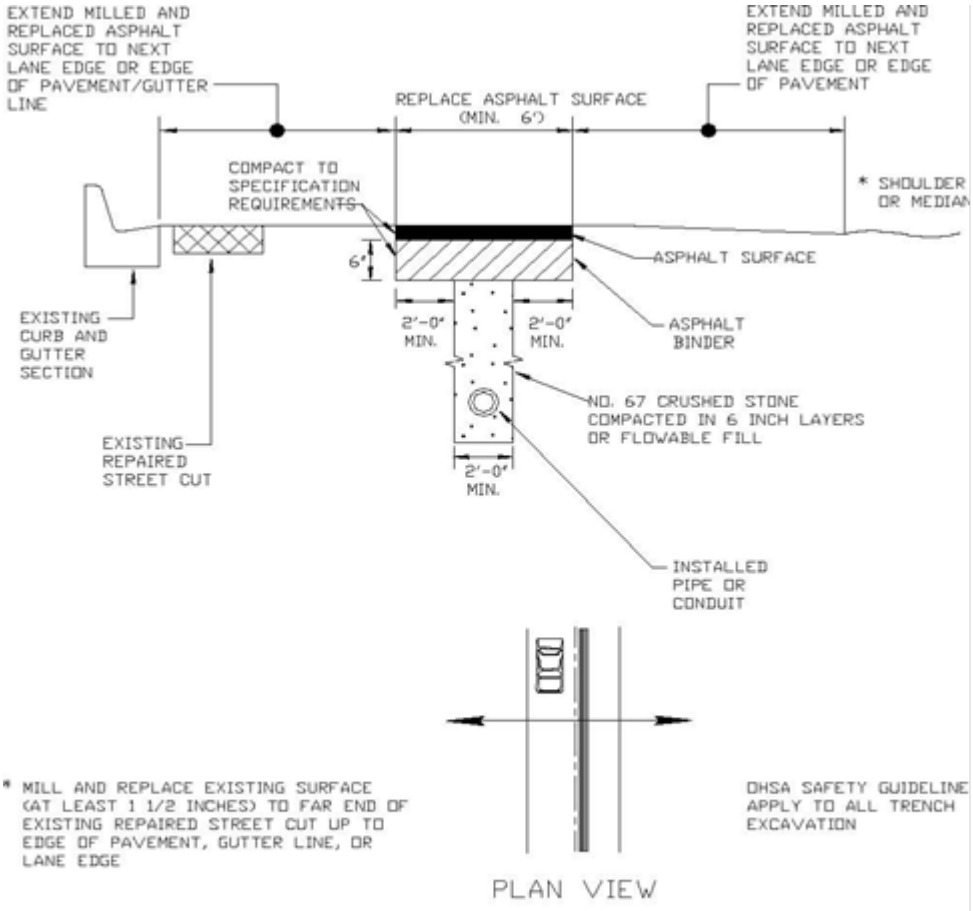


Figure E.3. Transverse section view of parallel utility cut repair.

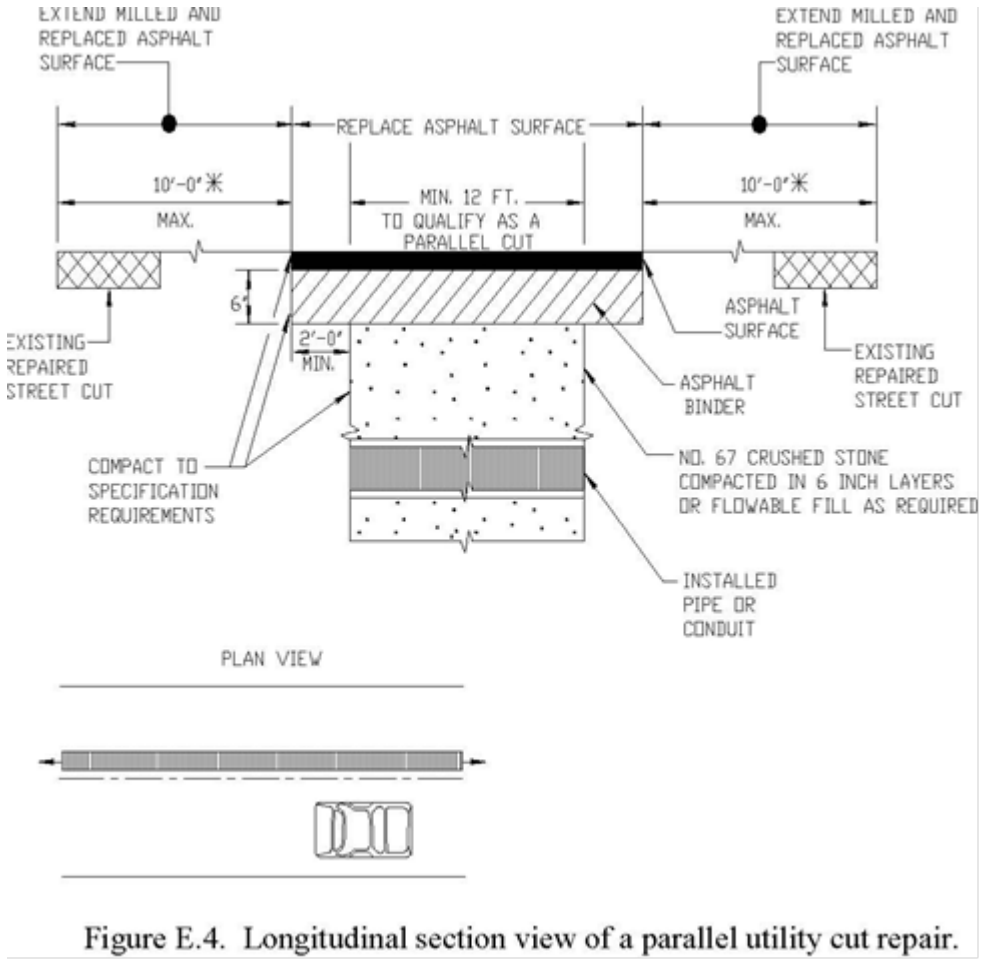


Figure E.4. Longitudinal section view of a parallel utility cut repair.

2 UTILITY CUT GUIDELINES

Guidelines for consideration when updating the existing specification are presented in this section. The recommended practices can be easily converted to specifications and incorporated into the appropriate sections of Chapter 13.20 of the Metro Code.

2.1 General Requirements

All contractors and public utility agencies must obtain a ROW Permit for any work performed within the public rights-of-way of the City of Goodlettsville, Tennessee. The storage of materials and equipment within the public rights-of-way also requires a permit. To preserve the original investment of the street and roadway systems, minimize the disruption and maximize the safety to the traveling public caused by construction, and reduce future maintenance problems, it is the policy of some agencies to require the installation of new utilities across existing streets be done by boring or tunneling. Open cutting of existing streets for the installation of new utilities will be permitted only when it can be proven it is not possible to use boring or tunneling techniques. Applicants for Right-of-Way Permits must plan for adequate time for review and approval by the City of Goodlettsville and any other involved agencies. Generally, the greater the scope of work, the longer the permit review and approval process will take.

Upon obtaining a permit and after making the cut, the applicants are required to repair the streets using a quality approach to preserve the value of the street.

2.2 Quality Requirements

Every street and street repair situation is unique. Design criteria and construction standards cannot address every situation but, in order to maintain some form of consistency, these standards have been developed. In most cases, they provide the minimum acceptable standards for construction or repair. Consequently, when strictly applied, they will provide the minimally acceptable product. Therefore, this criteria has been developed to maintain the same integrity of the street pavement and subsurface condition prior to its being cut for utility installations. The proposed criteria are guidelines to achieve the goal of "Quality" in street repairs. When used in conjunction with good planning and judgment, the repair methods will maintain the street at an acceptable condition with minimal patching failures. Quality assurance measures, recommended further in this chapter, should be enforced to ensure the desired quality level.

2.3 Appearance of Utility Cut Repairs

The final appearance of the street after the repairs are made should be acceptable with an engineered appearance. Street repairs that are satisfactory from a functional point of view may produce a negative reaction from the public if they give the appearance of being poorly planned or executed. The public's perception of street repairs is based primarily on shape, size, and orientation--the geometry of a patch. Following are guidelines for the geometry of a quality patch:

• Street repairs should leave a pavement in a condition at least as good as, if not better than, the condition prior to the repairs. In most cases, and particularly in the cases of extensive excavation and repairs, it is desirable to survey the existing pavement condition with a representative of the Goodlettsville Public Works and / or Engineering Departments prior to the work. After completion of the work, survey the pavement condition again to verify that the pavement condition has been maintained or improved. In the case of minor repairs, these pavement surveys can be made by visual observation.

• In the case of major projects that involve excessive haul of materials or unusually heavy construction equipment or activity, non-destructive testing of the pavement condition before and after construction may be required.

• Excavations and street repairs, even well constructed street repairs, shorten a pavement's life. Several types of street distress, settlement, alligator cracking, and potholes, often show up around patches. Quality street repairs should attempt to reduce the occurrence of these types of distress.

• Avoid weakening or destroying the existing pavement around an excavation with heavy construction equipment, stockpiling, or delivery of materials, etc. When damage does occur, remove the damaged pavement, extending the limits of the street repair, before replacing the pavement. No stockpiling of backfill or road building materials is permitted on the pavement.

2.4 Utility Cut Repair Details

Some examples of repair methods that are not acceptable and the corresponding acceptable method are provided in the following examples. These examples must also apply the requirements given in Figures E.1 through E.4.

Example 1

Existing pavements should be removed to clean, straight lines parallel and perpendicular to the flow of traffic. Do not construct patches with angled sides and irregular shapes. All repairs should be full lane width.

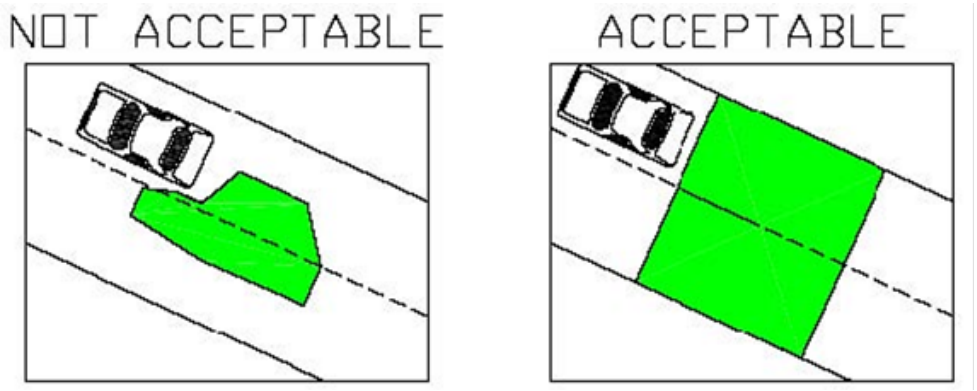


Figure E.5. Example 1: Do not construct patches with angled sides and irregular shapes.

Example 2

Avoid patches within existing patches. If this cannot be avoided, make the boundaries of the patches coincide. All repairs should be full lane width.

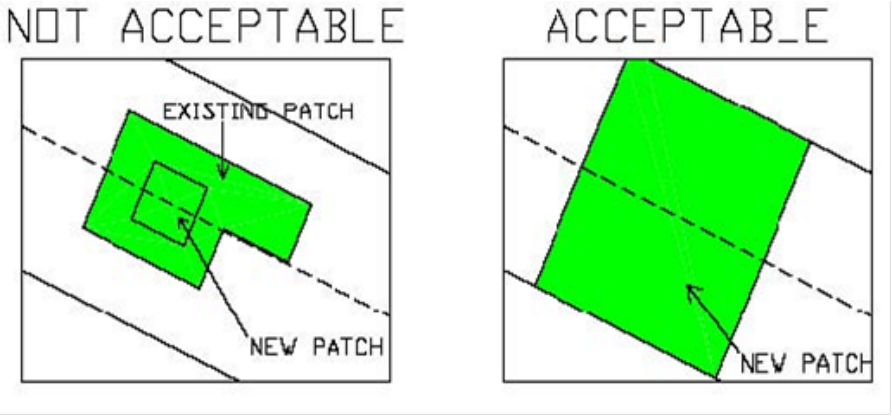


Figure E.6. Example 2: Avoid patches within existing patches.

Example 3

Do not leave strips of pavement less than one-half lane in width from the edge of the new patch to the edge of an existing patch or the lip of the gutter.

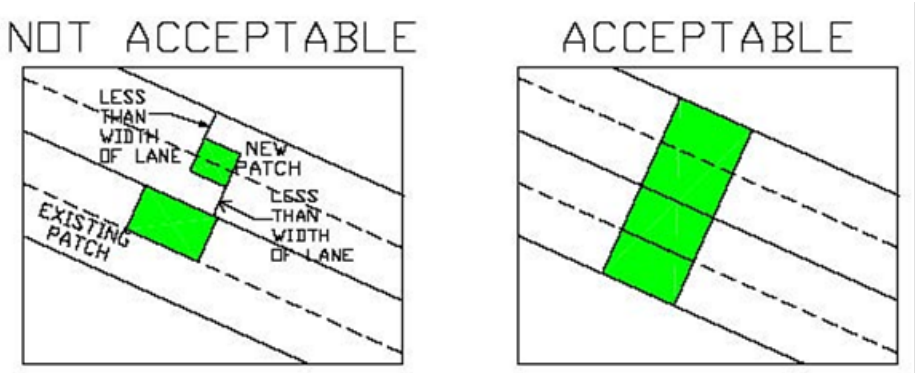


Figure E.7. Example 3: Do not leave strips of pavement less than one-half lane in width.

Example 4

In concrete pavements, remove sections to existing joints, or new saw cut joints at midslab, that are in good repair. In damaged concrete, the limits of removal should be determined in the field by a representative of Goodlettsville Public Works.

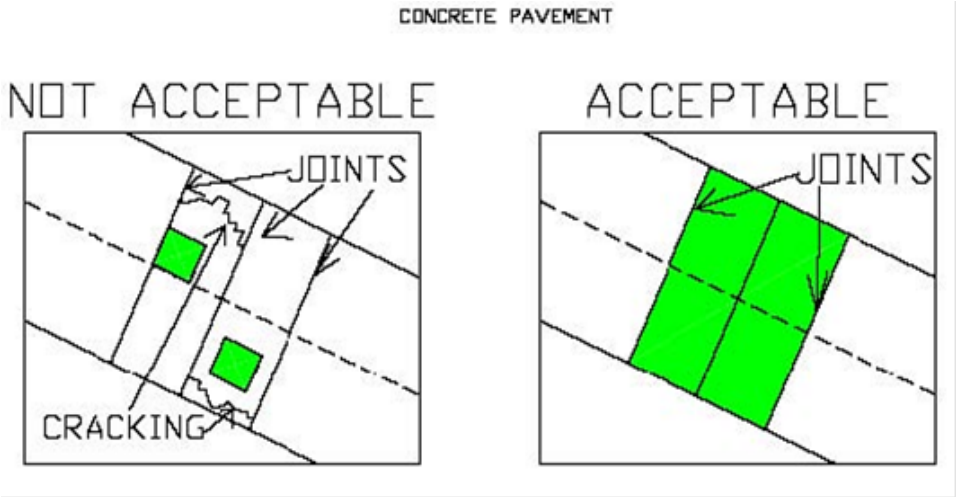


Figure E.8. Example 4: In concrete pavements, remove sections to existing joints.

Example 5

Asphalt and concrete pavements should be removed by saw cutting or grinding. Avoid breaking away the edges of the existing pavement or damaging the remaining pavement with heavy construction equipment.

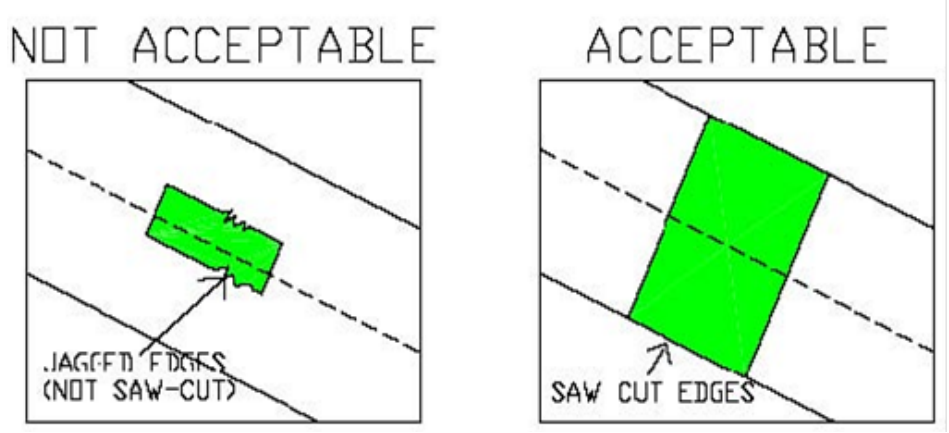
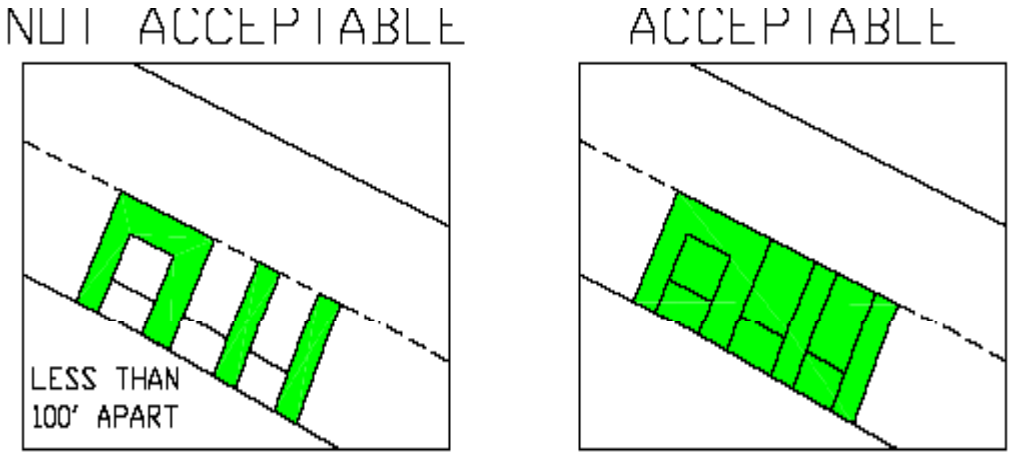


Figure E.9. Example 5: All edges shall be saw cut.

Example 6

In the case of a series of patches or patches for service lines off a main trench, repair the pavement over the patches by grinding and overlay when the spacing between the patches is less than 10 feet. In cases where the existing pavement is in poor condition and may require overlay within the next few years, this requirement may be modified or waived by the Director of Public Works.



LESS THAN

10’ APART

Figure E.10. Example 6: The patched area must include any existing patches within 10 feet.

Example 7

Completed street repairs should have rideability at least as good as, if not better than, the pavement prior to the repairs. A driver may be able to see a street repair, but in the case of a quality repair, should not be able to "feel" it in normal driving. A patch should provide a smooth ride with smooth transitions on and off the repair and all joints should be located outside the wheel path. Overlays should be placed

by first removing the existing pavement to the desired depth by grinding or milling, and then placing the pavement flush with the adjacent surfaces. Overlays with feathered edges are not acceptable.

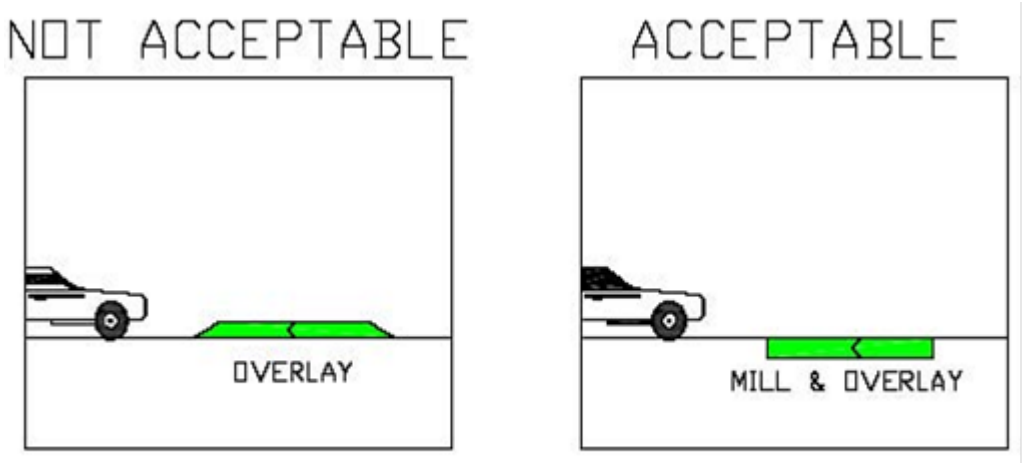


Figure E.11. Example 7: Patches may not decrease rideability.

Example 8

Surface tolerances for street repairs should meet the standard for new construction. That is, the finished surface of the street repair should be tested with a ten- (10-) foot straightedge parallel to the centerline or perpendicular across joints. Variations measured from the testing face of the straightedge to the surface of the street repair should not exceed one-quarter- (¼-) inch.

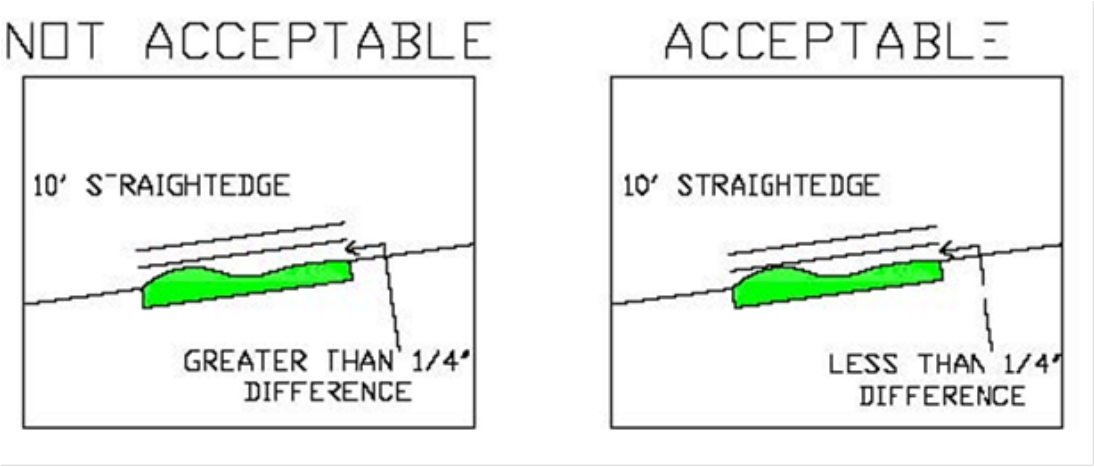


Figure E.12. Example 8: Surface tolerances for street repairs should meet the standard for new construction.

Example 9

Transverse patches on arterial and collector streets shall be overlaid across the entire street width for a distance of two- (2-) feet minimum on all sides of the trench using a T-Patch.

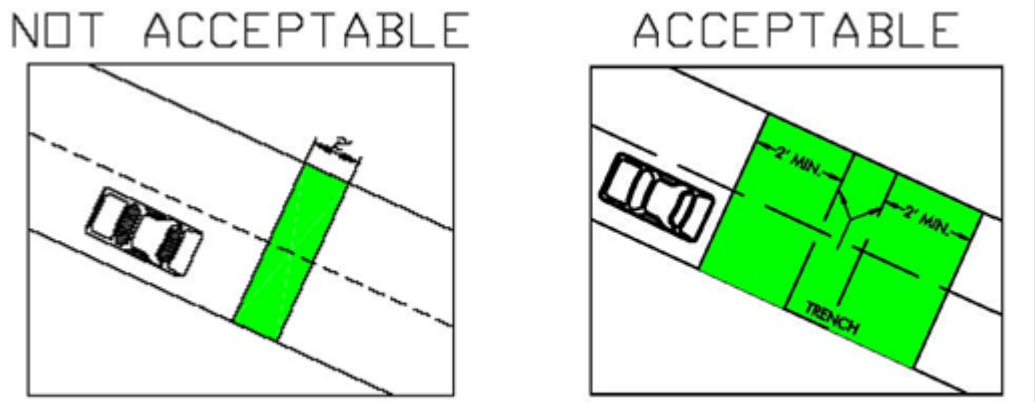


Figure E.13. Example 9: Trenches must be patched using a T-Patch.

Figure E.13. Example 9: Trenches must be patched using a T-Patch.

Example 10

Do not allow the edges of patches to fall in existing wheel paths. The edges of patches parallel to the direction of traffic shall be limited to the boundaries of lanes or to the centerline of travel lanes.

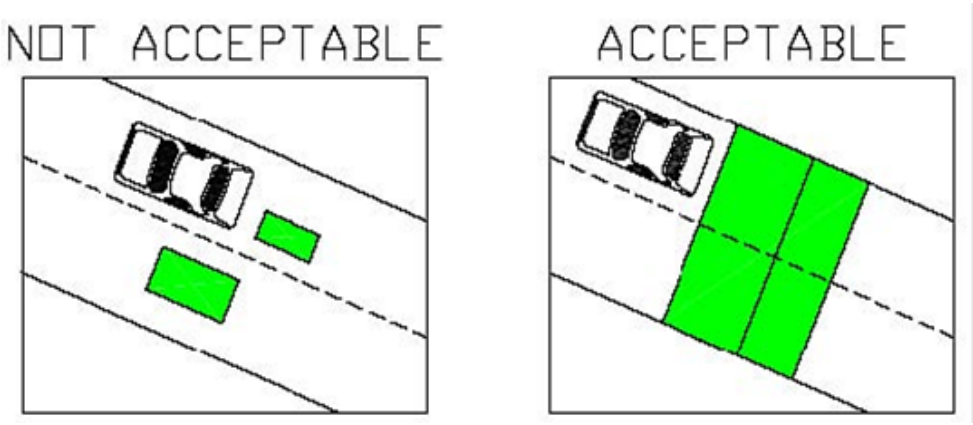


Figure E.14. Example 10: Do not allow the edges of patches to fall in wheel paths.

Example 11

Patches should have a smooth longitudinal grade consistent with the existing roadway. Patches should also have a cross slope or cross section consistent with the design of the existing roadway.

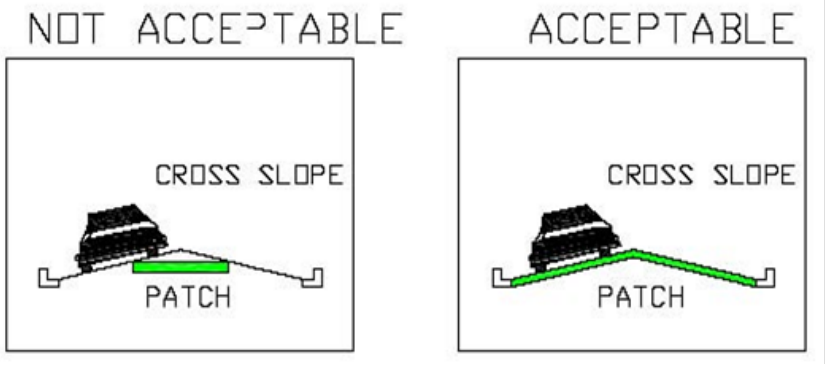


Figure E.15. Example 11. Patch slope and grade must match existing pavement.

Example 12

When the proposed excavation falls within 10 feet of a section of pavement damaged during the utility repair, the failed area shall be removed to sound pavement and patched. Scarring, gouging, or other damaged pavement adjacent to a patch shall be removed and the pavement repaired to the satisfaction of the GOODLETTSVILLE PUBLIC WORKS.

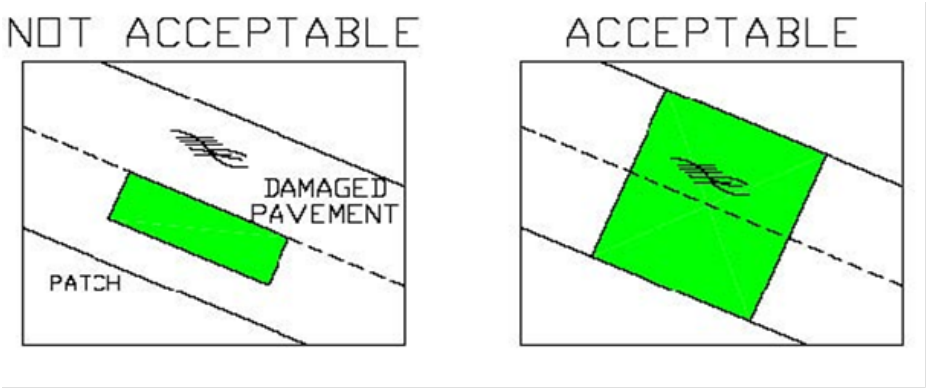


Figure E.16. Example 12: Damaged pavement within 10 feet of a patch must also be patched.

Example 13

For patches in asphalt, a tack coat shall be applied to all edges of the existing asphalt before placing the new pavement. After placing the new asphalt, all seams (joints) between the new and existing pavements shall be sealed with an asphalt tack coat or rubberized crack seal material. Avoid frequent changes in width of patches. For future maintenance, this simplifies removal of adjacent pavement failures.

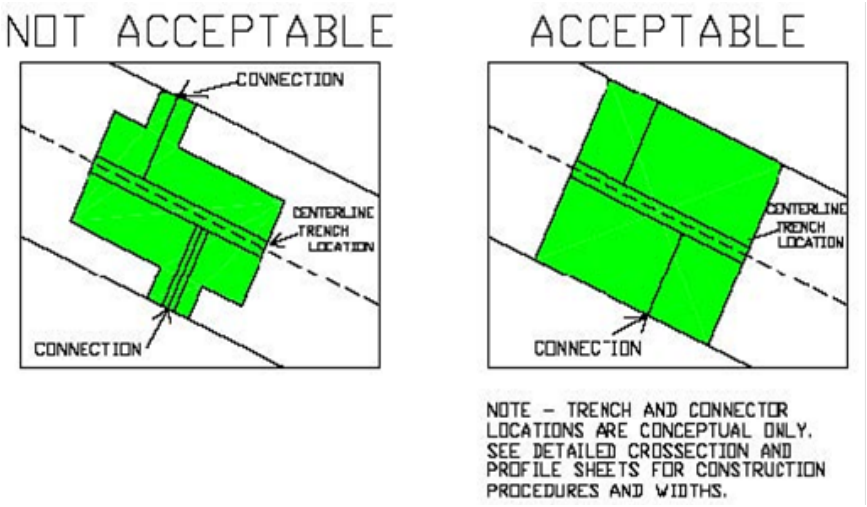


Figure E.17. Example 13: Patches must avoid frequent width changes.

3 TESTING AND INSPECTION

The contractor is required to provide material testing for each phase of the work and at no cost to Goodlettsville Public Works. The testing firm chosen to perform this work for the Contractor must be qualified and identified on the Permit application.

3.1 Testing Requirements

Density and thickness tests may be required to ensure compaction requirements are met and the appropriate compacted thickness of repair material has been placed. The number of tests required will be as directed by Goodlettsville Public Works. The costs of any testing, as required, shall be borne by the contractor. If sections with deficient thickness or density are found, the full section for a reasonable distance on each side of the deficiency shall be refused. All such sections shall be removed and reinstalled to these Guidelines.

3.2 Inspection Requirements

All construction work within the public rights-of-way shall be subject to inspection by Goodlettsville Public Works and certain types of work may have continuous inspection. It shall be the responsibility of the contractor to provide safe access for the inspector to perform the required inspections. It shall be the responsibility of the person performing the work authorized by the Permit to notify Goodlettsville Public Works or an authorized representative that such work is ready for inspection. Every request for inspection is to be received at least twenty-four (24) hours before such inspection is desired. Such requests may be in writing or by telephoning or faxing Goodlettsville Public Works. Goodlettsville Public Works may make or require other inspections of any work as deemed necessary to ascertain compliance with the provisions of these guidelines. Any work performed without the required inspections shall be subject to removal and replacement at the contractor's expense, regardless of the quality of the work. Where large scale projects exceed the ability of the Goodlettsville Public Works to provide inspection, the contractor or utility company will incur the cost of a private inspection firm. This inspection firm will

be mutually agreed upon by the Permit applicant and Goodlettsville Public Works prior to issuance of the Permit.

4 CONSTRUCTION DETAILS

The conditions described below apply to all work done within the public rights-of-way such as utility line installation or repairs performed by any contractor or utility department, public or private.

4.1 Protection of Existing Improvements

The contractor shall at all times take proper precautions and be responsible for the protection of existing street and alley surfaces, driveway culverts, street intersection culverts or aprons, irrigation systems, mail boxes, driveway approaches, curb, gutter and sidewalks and all other identifiable installations that may be encountered during construction. The contractor shall, at all times, take proper precautions for the protection of existing utilities, the presence of which are known or can be determined by field locations of the utility companies. The contractor shall contact the local One Call for utility locations a minimum of two (2) working days prior to the proposed start of work. Existing improvements to adjacent property such as landscaping, fencing, utility services, driveway surfaces, etc.,

that are not to be removed shall be protected from injury or damage resulting from the contractor's operations.

The contractor shall at all times take proper precautions for the protection of property pins/corners and survey control monuments encountered during construction. Any damaged or disturbed survey markers shall be replaced by a registered land surveyor at the contractor's expense.

The repair of any damaged improvements as described above shall be the responsibilityof the permit holder.

The contractor shall make adequate provisions to assure that traffic and adjacent property owners experience a minimum of inconvenience

All work shall be done in an expedient manner. Repairs shall be made as rapidly as is consistent with high quality workmanship and materials. Use of fast setting concrete and similar techniques are encouraged whenever possible without sacrificing the quality of repair. For repairs 12 feet or less in length, completion of the work including replacement of pavement and cleanup shall normally be accomplished within two (2) weeks after the repair work or activity involving the cut is done. For repairs greater than 12 feet in length, the final surface shall not be placed for a minimum of 42 days from the placement of the binder material. Extension of time for completion, including winter and other weather delays, shall be with the written approval of Goodlettsville Public Works. If the repairs are not completed in the allotted time, Goodlettsville Public Works has the right to repair the street at the contractor's expense.

4.2 Temporary Surfaces Required

When the final surface is not immediately installed, it shall be necessary to place a temporary asphalt surface on any street cut opening. The temporary surface installation and maintenance shall be the responsibility of the Permittee until the permanent surface is completed and accepted. It shall be either a hot mix or cold mix asphalt paving material. Temporary surfaces shall be compacted, rolled smooth and sealed to prevent degradation of the repair and existing structures during the temporary period. Permanent patching shall occur within two (2) weeks except as outlined by the Goodlettsville Public Works in the Permit.

4.3 Pavement Patches

All permanent pavement patches and repairs shall be made with "in kind" materials. For example, concrete patches in concrete surfaces, full depth asphalt patches with full depth asphalt, concrete pavement with asphalt overlay patches will be expected in permanent "overlaid" concrete streets, etc. In no case is there to be an asphalt patch in concrete streets or concrete patch in asphalt streets. Any repair not meeting these requirements will be removed and replaced by the contractor at no expense to Goodlettsville Public Works.

4.4 Removal and Replacement of Unsatisfactory Work

Removal and replacement of unsatisfactory work shall be completed within fifteen (15) days of written notification of the deficiency unless deemed an emergency requiring immediate action. In the event the replacement work has not been completed, Goodlettsville Public Works will take action upon the contractor's bond to cover all related costs.

4.5 Warranty for Satisfactory Work

The utility company will be held responsible for a 24-month period for any defects in the patch that may result in a PCI of 85 or less as defined by ASTM D6433 as modified for this study.

5 REMOVALS

5.1 Paved Streets

Bituminous pavement removal areas shall be saw cut to clean, straight lines that are perpendicular or parallel to the flow of traffic.

In existing pavement, all excavations within 36 inches of the edge of the asphalt shall require removal and replacement from the edge of asphalt to the excavation edge.

Concrete pavement, driveways, streets, and alleys shall be removed to neatly sawed edges cut to full depth.

5.2 Gravel Streets

When trenches are excavated in streets or alleys that have only a gravel surface, the contractor shall replace such surfacing on a satisfactory compacted backfill with gravel conforming to Goodlettsville Public Works specification aggregate base course. Gravel replacement shall be one (1) inch greater in depth to that which originally existed, but not less than four (4) inches. The surface shall conform to the original street grade. Where the completed surface settles, additional gravel base shall be placed and compacted by the Contractor within fourteen (14) days after being notified by Goodlettsville Public Works, to restore the roadbed surface to finished grade.

Some streets may have been treated with a special surface treatment to control dust and/or bind the aggregates together. In these cases, the Contractor is responsible for installing the gravel surface in the same manner as what was existing. Such surface treatments shall be of the same chemical composition as what existed prior to the excavation work. Goodlettsville Public Works shall note on the permit the surface treatment that will be required.

5.3 Concrete Curb, Gutter and Sidewalk

Concrete shall be removed to neatly sawed edges to full depth for sidewalks and curb and gutter and shall be saw cut in straight lines either parallel to the curb or perpendicular to the alignment of the sidewalk or curb. Any removal shall be done to the nearest joint. Replaced sections may require doweling connections if required by Goodlettsville Public Works.

6 BACKFILL

6.1 Flowable-Fill

Flowable-fill may be used as utility trench backfill for all trenches unless otherwise specified by Goodlettsville Public Works. This requirement applies to all pavement and gravel locations. Compaction will be as specified by Goodlettsville Public Works.

The recommended mix for flowable-fill is shown below. Concrete backfill will not be allowed within the public right-of-way. Flash-fill may be used if approved by Goodlettsville Public Works. Refer to the appropriate Goodlettsville Public Works specification.

Table E.1. Recommended flowable-fill mix design.

INGREDIENTS	POUNDS/CUBIC YARD
Cement	42 (0.47 sack)
Water	235 (39 gallons or as needed)
Coarse Aggregate (Size No. 57)	1700
Sand (ASTM C-33)	1845

The maximum desired 28-day strength is 60 psi. The above combination of material, or an equivalent, may be used to obtain the desired "flowable-fill".

Flowable-fill or flash-fill shall be prohibited as a temporary or permanent street surface.

Trenches shall initially be backfilled to the level of the original surface. After the flowable-fill has cured, the top surface of the flowable-fill shall be removed and the temporary or permanent surface shall be placed.

Bridging and cutback requirements as described in these standards may still be required if the street failures indicate a clear need.

Repair of failed trenches will be the responsibility of the party requiring the trench.

6.2 Conventional Backfill (Other Than Flowable-Fill)

When "non flowable-fill" backfill material has been pre-approved by Goodlettsville Public Works, backfill in existing or proposed streets, curbs, gutters, sidewalks and alleys is divided into three (3) categories: initial, intermediate and final lifts as defined below:

• The INITIAL LIFT, comprised of washed, clean gravel material**,** consists of the section from the bottom of the excavation to a point six to twelve (6 - 12) inches above the top of the installation. Placement and compaction of the initial layer shall be as specified by the utility company to protect their installation.

• The INTERMEDIATE LIFT, generally comprised of #67 crushed stone, consists of the section above the initial layer to a point within six (6) inches of the ground level or the bottom of the pavement section, whichever is greater.

• The FINAL LIFT includes both road base and asphalt surfacing. Road base material shall meet Goodlettsville Public Works specification for aggregate base course or as specified by Goodlettsville Public Works. Maximum dry density of all soil types used will be determined in accordance with AASHTO T 99 or AASHTO T 180. These densities will be determined prior to placement of backfill.

7 RESTORATION

7.1 Bore Holes - Vertical and Horizontal

For openings less than or equal to 6 inches in diameter, bore holes shall be filled with patching material (cold mix is not acceptable) to prevent entry of moisture. Patching material used shall be in all cases compatible with the existing surface. Subgrade shall be replaced with flowable fill to provide necessary support to the surface. The sealing of bore holes is the responsibility of the contractor or persons making the bore. For openings greater than 6 inches in diameter, the limits of repair shall be identified in the permit. The completed job shall be flush with the surrounding pavement and have no indentations, pockets, or recesses that may trap and hold water.

7.2 Subgrade

The subgrade for the pavement structure shall be graded to conform to the cross sections and profile required by the construction plans. Prior to the placement of aggregate base course or sub-course, the subgrade should be properly prepared. The subgrade should be scarified to a minimum depth of six (6) inches, moisture adjusted as necessary, and recompacted.

Prior to approval to place the base or sub-base course, all utility main and service trenches shall be compacted. The density requirement also applies to all utility trenches within the public rights-of-way from a point four (4) feet beyond the edge of asphalt and descending at 1:1 outward.

7.3 Asphalt Surfacing

Any damage, even superficial, to the existing asphalt surface in the vicinity of the work shall be repaired at the expense of the Contractor, including but not limited to gouges, scrapes, outrigger marks, backhoe bucket marks, etc. A slurry seal type covering will be considered the minimum repair. Patching may be required, at the discretion of the City of Goodlettsville.

The depth of asphalt patches in asphalt streets shall typically be the depth of the existing asphalt surface plus 1 inch or as specified by the Engineer.

The asphalt patch area for street excavations that fall within the wheel path of the vehicular travel lane shall be increased in size to the center of the lane or adjacent lane. In no circumstance will the edge of a patch area be allowed to fall within the wheel path.