



3310 W End Ave, Suite 420 | Nashville, TN 37203
Tel 615.333.7200 | GMCNETWORK.COM

TRANSMITTAL COVER SHEET

DATE: January 6, 2025
TO: ALL PLAN HOLDERS OF RECORD
FROM: LOGAN DICKERSON
PROJECT: METER REPLACEMENT AND AMR SYSTEM IMPROVEMENTS
FOR THE CITY OF DECHERD
ARPA NO.: DW-PDC-1
GMC PROJECT NO. CNAS240011
RE: ADDENDUM NO. 1 AND
ACKNOWLEDGEMENT OF RECEIPT OF ADDENDUM NO. 1

ACKNOWLEDGEMENT OF RECEIPT:

PLEASE PRINT RECIPIENT'S NAME, FIRM, AND DATE RECEIVED.

**THEN E-MAIL BACK TO clara.posala@gmcnetwork.com FOR OUR RECORDS AND
TO ACKNOWLEDGE YOUR RECEIPT OF THIS ADDENDUM.**

NAME *(PLEASE PRINT)*

FIRM *(PLEASE PRINT)*

DATE RECEIVED *(PLEASE PRINT)*

If there are any problems with this transmittal, please contact sender, at the number listed above.



ADDENDUM NUMBER 1

METER REPLACEMENT AND AMR SYSTEM IMPROVEMENTS
FOR THE CITY OF DECHERD
ARPA NO.: DW-PDC-1
GMC PROJECT NO. CNAS240011

1. Revisions to Project Manual

- 1.1 The following revisions are hereby added as Addendum No. 1 to the referenced Project Manual and Plans and shall be considered when preparing bids.
- A. Section 33 1200 – Water Utility Distribution: This section has been updated, clarifying requirement that the contractor adhere to Tennessee Department of Environment and Conservation (TDEC) and Tennessee Department of Transportation (TDOT) rules and regulations.
 - B. Section 33 1200 – Water Utility Distribution: This section was revised to remove positive displacement (PD) meters as an acceptable alternative.

2. Contractor Questions & GMC Answers

- 2.1 **Would a Solid State (SS) meter or a Positive Displacement (PD) meter be acceptable in lieu of an Ultrasonic meter as specified?**
- A. No, all water meters must use solid state measuring technology with no moving parts to ensure accuracy over the lifetime of the meter. The meter should be resistant to wear and impurities in the water. All sensors and electronics should be designed so that they are fully protected against internal and external penetration of fluid. The meters should be hermetically- and vacuum-sealed to prevent humidity from entering the electronics and to avoid condensation between the glass and display.
- 2.2 **What brand and type of meters are being replaced?**
- A. Existing meters are positive displacement (PD) nutating disc meters; the oldest ones are Neptune and the more recent are Badger.
- 2.3 **What are the lay lengths that are currently in the ground?**
- A. Existing lay lengths are uncertain.
- 2.4 **How old is the system that is being replaced (i.e. what are the condition of the water lines & valves)?**
- A. The age and condition of the meters and associated items being replaced in this project is uncertain.
- 2.5 **Does the City know which meter boxes will need replacing?**
- A. It is not known which meter boxes will need replacing. The 300 boxes included in the bid form is an estimate.
- 2.6 **Do any of the boxes and lids need to be traffic rated?**
- A. Traffic-rated meter boxes and lids will not be required for this project.
- 2.7 **Can a meter manufacturer bid as the primary bidder and subcontract the installation?**
- A. Yes, as long as the primary bidder holds the necessary contractor licenses to perform the work.
- 2.8 **What is the total meter count?**
- A. The total meter count for this project is 1,906.
- 2.9 **Are the additive items to be completed within the 120-day duration along with the base bid?**
- A. Yes, base bid and alternates are to be completed within the 120-day duration.
- 2.10 **The warranty duration required in C-800 Supplementary Conditions SC-6.01 (page 191 of electronic PDF) is different from what is required in Specification Section 01 0300 – Special Project Provisions (page 230 of electronic PDF). Please clarify the expectation for the Installation Contractor’s install warranty.**
- A. C-800 Supp. Conditions SC-6.01 shall be revised to 1-year in lieu of 2-years as indicated.
- 2.11 **We would like to clarify if the Warranty Bond is for the Bidder/Supplier or for the subcontracting/ Installation Contractor?**
- A. The contractor shall furnish a warranty bond, per C-800 Supp. Conditions / SC-6.01.



- 2.12 **Does the City have an existing reading system?**
 - A. No, the existing meters are read manually.
- 2.13 **Will there be any excavation required for exposing the service line material?**
 - A. Excavation may be required for exposing service line materials. This excavation is considered part of installation.
- 2.14 **What area of the City is the base bid associated with?**
 - A. See attached map of parcels included in base bid, including note regarding how alternates will be handled.
- 2.15 **What is the Billing Software the city is utilizing?**
 - A. The City of Decherd currently uses PublicQ for billing.
- 2.16 **For the collection of GPS points is 1–5-meter accuracy acceptable?**
 - A. The required accuracy of the GPS data will be 1 foot (if using Trimble, this accuracy correlates to a Catalyst 30 subscription).
- 2.17 **Who will be providing the warehousing for all materials?**
 - A. The City of Decherd will provide warehousing for all materials related to this project.
- 2.18 **What size are the existing meter boxes? What materials are the existing meter boxes and lids? Are there any existing holes in the lids?**
 - A. The existing meter boxes are 10" x 15" x 18". The majority are plastic (70%), while others are concrete (20%) and steel (10%) lids. Some lids have holes.
- 2.19 **What percentage of meter boxes are located in concrete or asphalt?**
 - A. It is estimated that approximately 20% of meter boxes are located in pavement.
- 2.20 **Do existing meters include operable shut off valves before the meters?**
 - A. Approximately 20% have shut off valves, mainly those in newer residential areas.
- 2.21 **Are all valves located within a meter box?**
 - A. No.
- 2.22 **What is the procedure for inoperable or broken valves?**
 - A. See Specification 01 0300 0 – Special Project Provisions, Section 1.1 Y.
- 2.23 **What is the age and primary make-up of service lines? (copper, plastic, galvanized)**
 - A. The majority of the service lines are plastic, but some are copper and galvanized. Service line age is unknown.
- 2.24 **Are the meters in setters, or are they connected with straight meter couplings?**
 - A. The majority of the meters are in setters. Approximately 10% are straight line.
- 2.25 **Regarding Specification Section 01 0300 – Special Project Provisions 1.1 Z: “The Contractor will be responsible for shutting off the water to each meter serviced as well as notifying each customer 24 hours in advance of the water shutoff.” Can this notification be a post card?**
 - A. Yes, per Specification 01 0300 – Special Project Provisions Section 1.1 Z, a postcard notification shall be left at the door.
- 2.26 **Regarding Specification Section 01 0300 – Special Project Provisions 1.1 Z BB “The Contractor will return all changed out meters, meter stubs, cut offs, back flow preventors, pressure reducers, etc.” Is Contractor responsible for replacing all these additional items, if yes how are we compensated?**
 - A. No, this project is for meter replacement only.
- 2.27 **What is meant by “3/4” Meter with Connections Including Laying Length Adjustment”?**
 - A. The intent of the pay item is that, should any additional fittings, couplings, etc. be required by the contractor to install the new meter in place of the old meter, they are the contractor’s responsibility.

3. Acknowledgement of Receipt

- 3.1 Receipt of Addendum No. 1 shall be acknowledged in two ways:
 - 3.1.1 Note on Page 5 of the Bid Form – Bidder acknowledges receipt of “Addendum No. 1.”

AND



3.1.2 EMAIL Goodwyn Mills Cawood, LLC immediately at clara.posala@gmcnetwork.com and confirm that EMAIL has been received.

4. Conclusion

4.1 This is the end of Addendum No. 1, dated Monday, January 6, 2025.

SECTION 33 1200 – WATER UTILITY DISTRIBUTION

PART 1 – GENERAL

1.1 SUMMARY:

A. This Section includes:

1. Pipes, valves, fittings and accessories for water distribution system.

1.2 RELATED DOCUMENTS:

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

1.3 SUBMITTALS:

A. Contractor shall submit to the Engineer for approval:

1. Materials list of items proposed to be provided under this Section.
2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
3. Manufacturer's certifications and laboratory test reports required.
4. Shop drawings, prepared in accordance with pertinent provisions of these specifications.
5. Product warranties

PART 2 – PRODUCTS

2.1 DUCTILE IRON PIPE:

- A. Ductile iron pipe shall be Pressure Class 350 unless otherwise noted in the Bid Proposal, and shall be manufactured and marked in accordance with AWWA C151. Unless otherwise noted in the Proposal, the pipe shall have single gasket push on joints manufactured in accordance with AWWA C111, an interior cement mortar lining manufactured in accordance with AWWA C104, and an exterior asphaltic coating of not less than 1 mil thickness. Flanged pipe shall conform to AWWA C115.

2.2 PVC PIPE:

- A. PVC pipe shall be supplied in 20-foot lengths unless otherwise specified and shall be furnished with integral bell and spigot push-on joints. Gaskets shall be locked in. The pipe and the coupling must both be manufactured by the same company. The pipe shall comply with ASTM D 1784 for PVC compounds, and ASTM D 3139 and ASTM F 477 for Joints

using Flexible Elastomeric Seals. Potable Water Pipe shall also comply with NSF Standard 61 for Drinking Water systems Components – Health Effects.

B. PVC pipe shall be AWWA C900 PVC Pipe, unless otherwise specified.

ASTM D 2241 (IPS)	AWWA C900 (CIOD)	AWWA C905 (IPS/CIOD)
PR 160 psi – SDR 26	PC 165 psi – DR 25	PR 165 psi – DR 25
PR 200 psi – SDR 21	PC 235 psi – DR 18	PR 200 psi – DR 21
PR 250 psi – SDR 17	PC 305 psi – DR 14	PR 235 psi – DR 18
PR 315 psi – SDR 13.5		PR 305 psi – DR 14
Pipe size 1/8” – 36”	Pipe size 4” – 12”	Pipe size 14” – 30”

C. Marker wire shall be installed on all PVC and Polyethylene pipe and service tubing. The wire shall be 10 gage THHN insulated solid copper, installed with electrically continuous joints. The marker wire shall be brought up into all valve and meter boxes so as to be readily accessible to water system operators. All wire splices and connections shall be made with an underground splice with resin, such as 3M Scotchcast Inline Splice Kits, or approved equal.

D. Blue Metallic Marker Tape shall be used for marking all newly installed water main pipe. The Marker Tape shall have a minimum thickness of 5 mil, shall be marked “CAUTION WATER MAIN BURIED BELOW”, and shall be buried 1.5 feet above the crown of the carrier pipe. All costs associated with the Marker Tape shall be included in the total price bid.

2.3 HIGH DENSITY POLYETHYLENE PIPE:

A. General: Materials used for the manufacturing of polyethylene pipe and fittings shall be 4710 High Density Polyethylene (HDPE) meeting the ASTM D3350 cell classification of 445474C.

High Density Polyethylene Pipe (HDPE) and fittings will be used in accordance with the materials specifications. All additional appurtenances such as tees, gaskets, flange adaptors, etc. will meet the material specifications. The Contractor will supply the pipe and fittings and will include its price in the bid. All pipe installed by guided boring will be joined by an approved butt fusion or electrofusion technique according to the manufacturers specifications.

HDPE pipe shall be produced from resins with a material designation PE4710, and a cell classification PE445474C as specified within ASTM D3350, and dimensions and workmanship as specified by ASTM F714. It will also meet the requirements of AWWA ASTM D3350. Pipe will be legibly marked at intervals of no more than five feet with the manufacturer’s name, trademark, pipe size, HDPE cell classification, appropriate legend such as SDR 9, ASTM D3035, AWWA C901 or C906, date of manufacture and point of origin. Pipe not marked as indicated above will be rejected.

The material used in the production of potable water pipe shall be approved by the National Sanitation Foundation (NSF).

B. Pipe Thickness: The material shall have a minimum Hydrostatic Design Basis (HDB) of 1600 psi at 73°F when tested in accordance with PPI TR-3 and shall be listed in the name of the pipe and fitting manufacturer in PPI TR-4.

Polyethylene pipe shall be manufactured in accordance with AWWA C906 for sizes 4”

through 54”.

Permanent identification of piping service shall be provided by co-extruding longitudinal blue stripes into the pipes outside surface. The striping material shall be the same material as the pipe material except for color.

- C. Joints: Butt fusion or Electrofusion welded in accordance with ASTM D3261.
- D. Marking: The net weight, pressure class or nominal thickness, sampling period and manufacturer shall be marked on each pipe.

2.4 FLEXIBLE JOINT PIPE:

- A. Flexible joint pipe shall be cast of 60-42-10 ductile iron and shall conform with ANSI A21.51 Class 8. The joint shall be of the ball and socket type with the sockets either cast or screwed on the pipe and may be either bolted or keyed. If of the bolted type, the bolts and nuts shall be made of either stainless steel or low alloy steel conforming to ANSI 21.11.
- B. The joint shall be capable of a full 15° free turning deflection with no reduction in the flow.

2.5 RESTRAINED JOINTS:

- A. Where restrained joint pipe is required, the pipe shall be single gasket push-on joints as required in Paragraph 1.1 of this section. The joints shall be restrained using a “Gripper” style gasket. All restrained joints shall be suitable for a 350 psig working pressure.
- B. Restrained joints gaskets shall be US Pipe Field Lok 350®, American Fast-Grip®, or other pre-approved equivalent. Mechanical joints with Megalug assemblies, or pre-approved equivalent, will also be approved where restrained joint fittings are required.

2.6 CASING PIPE:

- A. Where water mains are to be installed under railroad tracks and in some cases where they are to be installed under paved highways, they shall be laid inside a casing pipe of the size shown on the plans and listed in the Bid Proposal. As a general rule, the locations and approximate lengths of the encasements are indicated on the plans for the information of bidders, but the precise location, length of the encasement will be specified in the permit issued by the Railroad or Highway Department involved.
- B. The casing pipe shall be new and made of steel in accordance with API 5L standard weight line pipe and be provided with continuous welded joints. The casing pipe shall be jacked through a hole of the proper size that has been previously bored for the purpose, or be installed by excavating and installing liner plates as the hole is advanced. It may also be installed by the continuous boring and jacking method.
- C. The wall thickness of the steel casing pipe shall be 0.25" for all sizes 24" and smaller, 0.375 for sizes 26" through 36" and shall conform to TDOT Section 862 for larger diameter.
- D. The casing pipe shall be complete with stainless steel spacers behind each pipe bell and at 10 foot intervals inside the casing pipe. Spacers shall be provided with ribbed EPDM/PVC/PE lining with a minimum thickness of 0.1” and shall prevent electrical contact between the carrier pipe and the metal spacer.

- E. The ends of each casing pipe shall be sealed with a flexible synthetic rubber seal, PSI Model S or approved equivalent.

2.7 FITTINGS:

- A. Ductile iron fittings with mechanical joint retainer glands shall be provided. Ductile iron fittings 12" and smaller shall be rated for 250 psi working pressure, and fittings larger than 12" shall be rated for 150 psi working pressure. Fittings shall be manufactured in accordance with AWWA C153 and provided with mechanical joints. All fittings shall be provided with a thin cement lining in accordance with AWWA C104.
- B. All fittings shall be wrapped in 6 mil polyethylene encasement extending 6" beyond connection in accordance with AWWA C105.
- C. Thrust restraints shall be 2500 psi concrete poured in place against undisturbed soil unless otherwise approved by the Engineer. In addition to restrained joints and thrust blocks, all fittings shall have a vertical piece of 4" diameter galvanized pipe driven 4ft into the ground behind the fitting for extra support.

2.8 VALVES:

- A. All valves shall be furnished with a valve box and shall be furnished with a concrete collar in accordance with Paragraph 9. The Owner shall also be furnished with (1) adjustable valve wrench for every (5) valves installed.
- B. Valves for use with ductile iron pipe shall have mechanical joint end connections unless otherwise shown. Valves used with PVC pipe shall be equipped with end connections and transition gaskets especially made for this type of pipe.
- C. Gate valves shall be iron body, brass mounted, epoxy coated interior and exterior, and be of the resilient seat type. Gate valves shall have a non-rising stem, "O ring" stem seal, a 2" square operating nut and shall open by turning counterclockwise. Gate valves thru 12" diameter shall be manufactured in accordance with AWWA C509. Gate valves 12" and smaller shall be suitable for a working pressure of 200 psig and shall be tested to 400 psig.
- D. Gate valves larger than 12" diameter shall conform to AWWA C500 and C504. Gate valves larger than 12" shall be suitable for a working pressure of 150 psig and shall be tested to 300 psig.
- E. Butterfly valves shall be manufactured and tested in accordance with AWWA C504, Class 150 B. Butterfly valves shall be provided with operators suitable for underground service that meet all AWWA standards.
- F. Where the contract involves extensions to an existing system the Contractor shall verify the direction of opening of existing valves and if this is opposite to the direction specified herein he shall confer with the Owner and the Engineer regarding the direction of opening to be provided on the valves furnished under this contract.
- G. Tapping valves and sleeves may be of the mechanical joint or hub end type, Mueller H-615 and H-667, or pre-approved equivalent. Tapping valves shall be non-rising stem. Working pressure for 2"-12" valves shall be 200 psi with 400 psi test pressure. For valves greater than 12", the working pressure shall be 150 psi with test pressure of 300 psi. Valves and sleeves shall be cast tapping SCV's and valves shall be air tested for duration of 5 minute and 50 PSI.
- H. Valves shall be manufactured by American, M & H, Mueller, or approved equivalent.

- I. Air Release Valves (ARV) shall be 1" ball type valves to be field located at high points in the water main. The valve shall operate through a compound lever system and shall have a 5/64" orifice with valve sealing faces of an adjustable BUNA-N rubber valve and stainless steel or PVC and shall operate at 150 psig. The valve shall be 1" NPT screwed of ANSI Class (125,250) flanged inlet connection and shall be cast iron body, top and inlet flange (where required), stainless steel float and trim. Valves which use a needle valve to seal the orifice will not be acceptable. The valve shall be CRISPIN Model AR10, Pressure Air Valve, Type N (PVC seat and BUNA-N rubber valve), APCO Model 50, or approved equivalent.

2.9 VALVE BOXES:

- A. Valve boxes shall be made of cast iron and be of the two piece adjustable heavy roadway type. They shall have an inside diameter not less than 5 1/4" and be of the screwed type. They shall be provided with a cast iron cover on which the word "WATER" is embossed and shall be suitable for installation on mains laid at the depths specified elsewhere in these specifications.
- B. Valve boxes shall be set vertically over the valve and centered about the operating nut. The cover shall be flush with the street or ground surface unless otherwise directed by the Engineer. Backfill shall be carefully tamped around the box to prevent it from being moved out of position. The bottom flared edge of the box shall not rest directly on the valves or pipe. A concrete block shall be installed under the box. Where the standard depth valve box is not high enough to make the cover flush with the ground surface the Contractor shall provide and install, without additional compensation, valve box riser sections of the required length to achieve this result.
- C. After the valve box has been set correctly, a square or round concrete collar shall be poured around the top of the valve box. The concrete shall be neatly formed to 18" square or diameter, poured 4" thick with the surface finished parallel to the surrounding ground surfaces. The concrete shall be Class C 2500 pound mix.

2.10 FIRE HYDRANTS:

- A. Fire hydrants shall be manufactured in accordance with AWWA C502. The main valve shall open against the water pressure and all operating threads shall be isolated from the water. Hydrants shall be American Darling B-84-B or Mueller Centurion and shipped in the color according to the owner.
- B. Hydrants shall have a main valve opening of not less than 5-1/4", two 2-1/2" hose connections and one 4-1/2" pumper connection. Hydrants shall be provided with a permanent lubricating device and "O-ring" packing seals. Hydrants shall open by turning counterclockwise. Operating nuts shall be of the National Standard pentagon type, 1-1/2" point to flat. Hydrants shall be provided with a 6" mechanical joint shoe and shall be equipped with a retainer gland follower.
- C. Fire hydrants shall be sized to connect with pipelines laid with a minimum cover of 36". In cases where the standard length of hydrant is not sufficient to leave a distance of at least 18" between the ground surface and the bottom of the lowest connection, the Contractor shall provide and install an extension section of the proper length.
- D. Hose and pumper connections shall be furnished with Underwriters National Standard threads in the case of hydrants to be installed in new systems. Hydrants furnished for extensions to existing systems shall be furnished with threading similar to the existing hydrants except in cases where an effort at standardization of the use of National Standard threading is being made. In these cases, the Contractor and his material supplier are required to investigate the existing conditions and to furnish hydrants equipped with the direction of opening and the

type of threads desired by the Owner. Where the contract covers a new water works system, two operating wrenches and a main valve assembly wrench shall be furnished with the hydrants. These items shall be delivered to the Owner.

- E. Hydrants shall be set perfectly plumb on the precast slab, using a spirit level on two sides of the barrel. The gravel shall be placed around the base to permit drainage from the waste opening.

2.11 BLOW-OFF HYDRANTS:

- A. Blow-off Hydrants shall be Dry Barrel Type Hydrants. The Main valve shall be open against water pressure and all operating threads shall be isolated from the water. Post Type Hydrants shall be M&H Style 33 or an approved equal and Flush Type Hydrants shall be Eclipse #85 or an approved equal.
- B. Blow-off Hydrants shall have a main valve opening of not less than 2-1/4", with one 2-1/2" hose connection. Hydrants shall be provided with a permanent lubricating device and "O-ring" packing seals. Hydrants shall open by turning counterclockwise. Operating nuts shall be of the National Standard pentagon type, 1-1/2" point to flat. Hydrants shall be provided with a 3" mechanical joint shoe and shall be equipped with a retainer gland follower.
- C. Blow-off Hydrants shall be sized to connect with pipelines laid with a minimum cover of 36". In cases where the standard length of Post Type Hydrant is not sufficient to leave a distance of at least 16" between the ground surface and the bottom of the lowest connection, the Contractor shall provide and install an extension section of the proper length. Flush Type Hydrants shall be furnished with a high strength cast iron box and cover. The location of the Flush Type Hydrants shall be marked with a water valve marker.
- D. Hose connections shall be furnished with Underwriters National Standard threads in the case of hydrants to be installed in new systems. Hydrants furnished for extensions to existing systems shall be furnished with threading similar to the existing hydrants except in cases where an effort at standardization of the use of National Standard threading is being made. In these cases, the Contractor and his material supplier are required to investigate the existing conditions and to furnish hydrants equipped with the direction of opening and the type of threads desired by the Owner.
- E. The hydrant lead to post type hydrants shall be made with ductile iron pipe extending from the cast iron anchoring tee installed in the main to the hydrant shoe regardless of the type of pipe used in the construction of the main to which the hydrant is connected.
- F. Mechanical joint shoe on flush type hydrants shall be connected to one section of ductile iron pipe regardless of the type of pipe used in construction of the main to which the hydrant is connected.
- G. Hydrants shall be perfectly plumb on the precast slab, using a spirit level on two sides of the barrel. Gravel shall be placed around the base to permit drainage from the waste opening.

2.12 SERVICE CONNECTIONS:

- A. Corporation stops shall be 3/4" size unless otherwise noted and shall comply with AWWA C800-66, Ford, Mueller, or approved equal. Corporation stops shall be compatible with type of service pipe specified.
- B. Curb stops shall be 3/4" size unless otherwise noted and shall comply with AWWA C800, Ford B-43-332W complete with lock out wing, or other approved equal. A full 3/4" opening curb stop shall be provided.

- C. Service clamps shall be used when connecting to PVC mains, "Mueller Bronze Service Clamp" or approved equal, especially designed for use on PVC pipe and provided with a corporation cock thread.
- ~~D. Meters shall conform to AWWA C700-90, shall be a first line meter and shall have an hermetically sealed and magnetically driven register. All meters shall be manufactured and assembled in the United States, shall be provided with all bronze case, and shall be of the positive displacement type. Each meter shall be provided with a leak detector separate from the sweep hand, and shall be calibrated in gallons unless otherwise noted in the Special Specifications.~~
- E. Backflow preventors shall be 3/4" Ford Model HHS-31-323, Watts No. 7 dual check valve, rated for 150 psig, or other approved equal, as required by the latest TDEC regulations.
- F. Meter boxes shall be approximately 12" x 17" x 12" deep, rectangular in shape, complete with plastic top and metal hinged reading lid. The plastic shall be of the fiber reinforced polyolefin type. The box and cover shall be Carson Brooks, or approved equal.
- G. Water meters shall be located as specified by the Owner.
- H. Service pipe used in making service connections and service transfers will be paid for separately on a unit price basis and is not included in the price of the service connection assembly or the unit price for a service transfer.
- I. When the service pipe is connected to ductile iron pipe 3" and larger, the connection at the main shall consist of a 3/4" tap in the main and a corporation cock. When connected to mains smaller than 3", the connection at the main shall consist of a 3/4" hole drilled in the main, a single strap service clamp and a corporation cock.
- J. Where taps larger than 1" diameter are to be installed on ductile iron pipe, a split tapping sleeve or tapping saddle shall be provided and a disc shall be cut from the pipe wall by a special tapping machine.
- K. When copper or plastic service tubing is used, it may be connected directly to the corporation cock.
- L. The tap or drilled hole in the main shall be made at an angle of not more than 30 degrees to the horizontal in order to keep service pipe adjacent to the main at the required depth.
- M. The curb stop shall be installed inside the meter box immediately adjacent to the inlet side of the meter and under general conditions the box shall be set with the top flush with the ground surface.
- N. Where service taps are installed on ductile iron pipe, the price bid shall include wrapping the brass corporation stop and not less than three feet of connected copper service tubing with two wraps of Tapecoat dielectric insulating tape to prevent corrosion.
- O. When the furnishing of a meter larger than 1" is called for in the Proposal, the price bid shall include a cutoff valve with handwheel of the same size as the meter inlet, and a meter box, Carson Brooks, or equal. The box shall be 15" by 20" and equipped with a rectangular hinged reading lid set in the cover.

2.13 SERVICE PIPE:

- A. The types of service pipe to be used are specified in the Proposal.
- B. Copper tubing shall conform to Federal Specifications WW-T-799, Type K. Unless otherwise noted in the Proposal, service pipe shall be 3/4" in diameter. The cost of fittings shall be included in the price of the pipe.
- C. Plastic service pipe in 3/4" through 2" shall be high density (HDPE) polyethylene SDR 9 Copper Tubing Size suitable for maximum 200 psig working pressure, Charter Plastics 'Blue Ice' or approved equivalent. HDPE tubing shall comply with all applicable requirements of ASTM standards D-1248, D-2239, D-2737, D-3350, AWWA C-901, and shall be extruded from compounds of the Type III Grade PE 34, Class C, PE 3408 very high molecular weight polyethylene plastic material as specified in ASTM D-1248, cell classification 355434C as per ASTM D-3350, and marked in accordance with ASTM D-2737, and shall also be sealed by NSF. Inserts shall be used at all fittings.
- D. Service pipe shall be laid with a cover not less than 24", and the requirements for trenching and backfilling shall be the same as specified for mains. Where the service pipe crosses a paved street or sidewalk it shall be laid by means of pushing or boring. The cutting of pavements or sidewalks will not be permitted. The requirement for a cover of 24" over the pipe shall be maintained under side ditches and at the high point of the curve in the pipe where it connects to the main. On Highway rights-of-way the minimum cover shall be as specified by the Highway Department but in no case less than 30".

2.14 VALVE & PIPELINE MARKERS:

- A. The location of water main pipe and valves shall be marked with concrete marker posts. The marker posts shall be 4" square concrete set to stand approximately 40" above ground. The markers shall be inscribed "WATER VALVE" or "WATER LINE" as appropriate, and include an aluminum disc on top for stamping the distance to the valve (line). Markers shall be installed for all type valves including isolation valves, air release valves, electric control valves, etc. Markers shall also be set at all locations where pipeline crosses streets and highways.

2.15 FLANGES:

- A. Flanges shall conform to the dimensions shown in Table 10.14 of AWWA C110, and shall be adequate for a working pressure of 250 pounds. The bolt circle and bolt holes of these flanges shall match those of the Class 125 flanges shown in ANSI B161. Gaskets shall be of 1/8" thick rubber. Machine bolts shall be of high strength steel and shall have hexagon heads and nuts.

2.16 CONSTRUCTION EQUIPMENT:

- A. The Contractor shall be responsible for any damage done to paved surfaces or lawns, whether at the site of the work or when moving the equipment from one place to another.

2.17 SAFETY PRECAUTIONS:

- A. During the prosecution of this contract the Contractor shall at all time employ all necessary safety precautions to ensure the complete protection of both lives and property of his own forces as well as those of the general public. Flagmen shall be placed along public streets and highways as work is being installed along them and the necessary warning barricades and blinking lights shall be set out each night to clearly mark the areas under construction.

- B. All ditches shall be shored and braced where necessary and the excavated material shall be kept a safe distance away from the ditch. Safety precautions instituted along State Highway rights-of-way shall conform to the requirements of the State Highway Department at all times and such additional flagmen or other precautions as may be deemed necessary will also be provided by the Contractor.
- C. The Contractor, and he alone, shall be solely responsible for the adoption of all necessary safety standards and precautions, and for the implementation institution, maintenance, supervision of and payment for all devices and arrangements required to carry out the requirements of such standards. He shall hold and save harmless the Owner, the Engineer, or any employees thereof against all actions or suits filed in connection with any accidents or damage to property caused by inadequate or insufficient safety precautions being placed in effect by him to ensure the complete safety of all construction, inspection or supervisory forces employed around the project, or of the general public.

2.18 PERMITS AND BONDS:

- A. In the event of the Department of Transportation requires a bond or certified check to guarantee the replacement of highway paving the Contractor shall furnish this security at his own expense.

2.19 MILL CERTIFICATES:

- A. When required by the Owner, mill certificates showing the results of hydrostatic pressure tests made on all types of pipe as required by the manufacturer's specifications shall be furnished.

PART 3 - EXECUTION

3.1 EXCAVATION AND TRENCHING:

- A. All excavation and trenching shall be bid on an unclassified basis.
- B. Trenches for the mains shall be excavated in the locations indicated on the plans or as directed by the Engineer. All trees, telephone and power line poles along the line of the work must be protected, and at night a sufficient number of barricades and lights to prevent accidents shall be provided. Where mains are laid between the curb and sidewalk or in other places where shrubbery and grass lawns are encountered the Contractor shall carefully remove and replace the shrubbery and cut the grass sod in sections, laying it to the side and replacing it after the compacted trench has been backfilled.
- C. In general, the excavated material shall be kept clear of the sidewalks except where unusual conditions prevent this being done. Unless otherwise approved by the Engineer, all pipe shall be installed under driveways by boring and jacking, but where the driveway is cut it shall be backfilled as soon as the pipe is laid. No driveway shall remain inaccessible at the end of the day's work and all street crossings shall be backfilled and opened to traffic before work is stopped for the night.
- D. On paved streets, wherever possible, the mains will be located between the curb and the sidewalk, and in all cases the mains will be located so as to keep cutting and replacing pavement to a minimum.
- E. The width of the trenches shall be in accordance with the manufacturer's recommended installation procedures. The depth of the trenches shall be such that all pipe will have a cover

- of at least 36". When underground obstructions occur on other than State or County highway rights-of-way, the Contractor will be permitted to lay ductile iron pipe over the obstruction if a minimum cover of 24" over the top of the pipe may be obtained after providing a cushion at least 3" thick between the bottom of the pipe and the top of the obstruction. Where this minimum cover cannot be obtained the pipe shall be laid under the obstruction without additional compensation.
- F. Unless approved by the Engineer, all trenches shall be closed at the end of the work day.
 - G. All signs shall be re-erected in a manner satisfactory to the Engineer at the end of each work day. Signs shall be permanently re-installed back to the original condition at the end of the project.
 - H. All travelways shall be kept clean of mud, dust, dirt, or other debris. This requires a daily cleaning of travelways to the extent that dust is not a nuisance and roadways do not become hazardous. The amount of cleaning required is strictly left to the direction of the Engineer. No additional compensation shall be allowed for any cleaning required.

3.2 INSTALLING PIPE:

- A. All pipe shall be laid in accordance with procedures outlined by the Ductile Iron Pipe Research Association or Uni-Bell PVC Pipe Association. A copy of these procedures shall be kept by the Contractor on the job site at all times that pipe laying operations are occurring.
- B. Before the pipe is lowered into place, the bottom of the trench shall be uniformly graded so that the pipe will have a bearing on earth for its full length. Where the excavation is in rock or other hard material, sufficient loose earth shall be shoveled into the trench to form a bed for the pipe. Each section of pipe shall be carefully examined for defects and the inside cleaned with a swab to remove all dirt and mud before it is installed.
- C. At each joint, there shall be an excavated a hole sufficiently large to receive the bell or coupling so that the pipe barrel will rest uniformly in its bed of loose earth. Where pipe equipped with joints of the push on type utilizing a rubber ring is used, the bell shall be wiped clean before the ring is fitted in position, following which the spigot shall be coated with a thin film of lubricant, if so required by the manufacturer, and then pushed home.
- D. On iron pipe equipped with mechanical type joints, before the section of pipe is pushed home the bell into which it fits shall be wiped clean, the end of the pipe being placed shall be wiped with a soapy water solution and the cast iron gland and rubber ring slipped on. After the section of pipe is in its final position, the rubber ring and gland shall be slid up to the joint, bolts inserted and the nuts tightened uniformly so that the bolts, particularly on the underside, shall be provided. In the case of pipe smaller than 4" in diameter being laid in a wet or muddy ditch bottom, the Contractor will be permitted to joint not more than 100 feet together on the ditch bank provided that the pipe is then carefully lowered into position with one man at each joint to preserve the alignment.
- E. Where pipe laying is suspended at the lunch hour, at night, during inclement weather or at any other time, the open end of the pipeline shall be provided with a plug in order to prevent the entrance of dirt, mud and animals.
- F. All fittings installed in the mains and the ends of all dead end lines shall be restrained by pouring a concrete block as shown on the drawings at the point where it will resist the pressure. Thrust blocks will be sized in accordance with the Uni-Bell Handbook of PVC Pipe: Design & Construction, or Thrust Restraint Design for DUCTILE IRON PIPE published by Ductile Iron Pipe Research Association.

3.3 INSTALLING APPURTENANCES:

- A. Valves, fittings, hydrants and other appurtenances shall be placed in the locations shown on the plans or in the manner designated by the Engineer. Any omission of these appurtenances shall be corrected by the Contractor without additional cost to the Owner. All valves and hydrants shall be carefully examined to see that the working parts are in good order and that no grit or dirt is present in the valve seats before they are placed in position.
- B. Over each valve less than 16" in size shall be placed a valve box, and over valves 16" and larger shall be provided a valve box both for the main valve and the bypass valve. Valve boxes shall be set concentrically around the valve operating nut and the top of the box shall be level with the ground surface.

3.4 GRAVEL ROADS:

- A. Surfaces of all gravel roads where water lines are laid shall be brought back to their original condition. If necessary, additional base material as specified by the Tennessee Department of Transportation shall be spread, smoothed and compacted to the satisfaction of the Engineer.

3.5 SERVICE TRANSFERS:

- A. Where an item for service transfer is provided in the Proposal, the Contractor will be required to disconnect the service pipe from the existing main, make a tap in the new main, insert a corporation cock, install sufficient service pipe to reach the existing, new or relocated meter and make the connection. The unit price bid shall include all labor, material and equipment needed with the exception of the service pipe which will be paid for as a separate item.

3.6 SURFACE OBSTRUCTIONS:

- A. Each building, wall, fence, pole, bridge, railroad, driveway or other property or improvement encountered is to be carefully protected from all injury, and in the event that any of the foregoing are damaged or removed during the progress of the work the same shall be repaired or replaced within a reasonable time, and before final acceptance of the work shall be returned to as good condition as before the work started. Special care must be exercised in trenching under or near railroads in order to avoid or minimize delays and the danger of injury resulting therefrom, and the Contractor must use care in all phases of the construction work, for he will be held liable for damages caused by carelessness.

3.7 SUBSURFACE OBSTRUCTIONS:

- A. In excavating, backfilling and laying pipe care must be taken not to remove, disturb or injure any water or sewer pipes or other conduits or structures. If necessary, the Contractor, at his own expense, shall sling, shore up and maintain such structures in operation. Before final acceptance of the work, he shall return all such structures to as good condition as before the work started.
- B. When necessary, the Contractor shall give sufficient notice to the interested utility of his intention to remove or disturb any pipes, conduits, etc., and shall abide by their regulations governing such work. In the event that any subsurface structure becomes broken or damaged in the prosecution of the work, the Contractor shall immediately notify the proper authorities, and shall be responsible for all damage to persons or property caused by such breaks. Failure of the Contractor to promptly notify the affected authorities shall make him liable for any needless loss or for interference with the normal operation of the utility.

- C. When pipes or conduits are broken during the progress of the work, the Contractor shall repair them at once at his own expense, or if required by the utility involved, shall pay the utility the proper charges for having such repairs made by the utility's own forces. Delays, such as would result in buildings being without service overnight or for a needlessly long period during the day, will not be tolerated, and the Owner reserves the right to make repairs at the contractor's expense without prior notice. Should it become necessary to move the position of pipe, conduit or structure it will be done by the Contractor in strict accordance with the instructions given by the Engineer or utility involved.
- D. The Owner or the Engineer will not be liable for any claim made by the Contractor based on underground obstructions being different to that indicated in these contract documents or plans. Where ordered by the Engineer, the Contractor shall uncover subsurface obstructions in advance of construction so that the method of avoiding them may be determined before pipe laying reaches the obstruction. Furthermore, the Contractor shall notify all utility companies involved of his intention to excavate in the locations specified and request that any underground cables be located in advance of construction work.

3.8 DEWATERING:

- A. The Contractor shall, at all times during construction, provide and maintain ample means and devices with which to promptly remove and properly dispose of all water entering the excavation or other parts of the work and shall keep said excavation and work dry until the structures to be built therein are completed, or until the Engineers direct the Contractor to discontinue de-watering operations. Wherever judged necessary by the Engineer, the Contractor shall employ well points to insure a dry excavation. No claims for an amount of money in excess of the bid price for the work will be entertained or allowed on account of the character of the ground in which the trench or other excavations are made.
- B. The trench shall be so drained that workmen can work safely and efficiently therein. The Contractor shall dispose of the water from the work in a suitable manner without damage to adjacent property owners. It is essential that the discharge from trench pumps be led to natural drainage channels.

3.9 ROCK EXCAVATION:

- A. Rock is defined as hard material which cannot be removed by conventional excavating equipment, including a tracked excavator.
- B. Where rock is encountered in trenches, the excavation shall be carried to a depth of 6 inches below the barrel of the pipe; and the excavation shall be backfilled with approved firmly compacted bedding material. In no case shall any rock be left nearer than 6 inches from the outside of the pipe.
- C. Where rock is encountered the Contractor shall "mattress" the trench during blasting operations and shall use all precautions necessary to protect adjacent property against damage resulting from his operations. Rock excavation in proximity to other pipes or structures shall be conducted with the utmost care to prevent damage to the existing structures, and any such damage caused shall be promptly repaired by the Contractor at his expense. Blasting operations shall not be conducted within 24 feet of installed pipe; and rock excavation shall be completed at least 24 feet ahead of pipe laying.
- D. The Contractor shall be fully responsible for the protection of lines and property from any harm or damage as would result from exposure to the construction work. The Contractor shall, in all his acts and work, comply with the safety and health regulations referred to hereinabove and with all local ordinances and regulations pertaining to the work. The area of the work shall be isolated by warning signs and barricades; guards shall be stationed to

prevent entry into the area; and efficient and adequate signal system shall be employed to give warning before blasting; and it shall be the responsibility of the Contract to determine that the area is clear before the signal to fire is given. The handling, storing, loading, and firing of explosives shall be performed only by workmen experienced in blasting work. The Contractor hereby agrees to indemnify and save harmless the Owner and the Engineer against all claims, damages, and expense arising from or caused by, in any manner whatsoever, the handling, storage, or use of explosives on the work, or by any blasting on the work.

- E. No extra payment will be made for removal of rock and other hard material, and all costs for this type of work shall be included in the amounts bid in the Bid Form. The Contractor is required to inspect the area to his satisfaction prior to turning in a Bid.

3.10 BLASTING:

- A. The Contractor or his insurer shall perform pre-blast surveys of all structures within 500 feet of the blasting areas to document and photograph the pre-existing conditions. The cost of this work is incidental and no specific payment will be made.
- B. The Contractor shall employ the services of a registered engineer in the state of Tennessee with a minimum of five years of experience in pipeline construction to design and approve all blasting procedures used in the removal of rock. All primary and secondary blasting shall be monitored by a registered blasting consultant to conduct daily blast noise, vibration and overpressure surveys during the progress of blasting operations. These surveys will be delivered to the Engineer daily. The cost of this work is incidental and no specific payment will be made.
- C. The limit for each charge will be set to limit the effects to air concussion or air blast of 0.03 psi maximum (140 dBL), particle velocities shall be a maximum of 1.00 inch/second measured from locations directed by the blasting consultant.
- D. The Contractor is reminded that he has sole and complete responsibility for the conditions on, in, or near the jobsite, including safety of all persons and property during performance of the work.
- E. The required duty of the engineer to conduct construction review of the contractor's performance does not, and is not intended to, include review of the adequacy of the contractor's safety measures in, on, or near the construction site.
- F. The observation of safety provisions of applicable laws and local building and construction codes shall be the responsibility of the Contractor. The blasting consultant shall be present and supervise all blasting design, loading and shot firing at all times.

3.11 PIPELINES UNDER PAVEMENT:

- A. Where mains are to be laid under paved streets or parking lots, and the installation of casing pipe or the use of cast iron pipe inserted in a bored hole is not required or specified, the Contractor will be permitted to cut and replace this pavement. In the event that subsurface operations result in injury or damage to the pavement, the necessary repairs shall be made by the Contractor at no additional cost to the Owner. In the event of the pavement on either side of the pipeline trench cracking or otherwise becoming disturbed or broken due to the Contractor's operations he shall repair or replace same at his own expense and without additional compensation.
- B. Paving replacement shall conform to the plans. No paving replacement shall be installed without first notifying the Owner at least eight hours in advance so his representative may be present while the work is performed.

- C. All backfill under areas where paving will be replaced shall be mechanically tamped to the following densities as defined by AASHTO T-99 Standard Proctor Density:

Backfill around pipe	- 95%
Remaining Subgrade	- 95%
Select Base Material	- 100%

- D. In the price bid for paving replacement shall be included all costs related to a commercial testing laboratory approved by the engineer to perform all tests of materials, design job mixes, provide batching plant control, and perform tests and inspections of material producing and processing equipment as required by these specifications and in accordance with AHD Section 106.02. Two copies of the results of tests and inspections shall be submitted to the Engineer and the Owner in report form. The testing laboratory shall maintain an office within 100 miles of the construction site.

3.12 PIPELINES UNDER SIDEWALK:

- A. Where pipelines are to be laid underneath paved sidewalks, the Contractor will be required to install them by means of a boring machine, auger or other suitable apparatus wherever possible, and where it becomes necessary to cut and replace the sidewalk it shall be replaced as soon as practicable after the trench has been backfilled and tamped. The replaced surface shall be 12 inches wider than the width of the trench, the excess width being equally distributed on both sides.
- B. The Contractor will receive no additional compensation for laying pipe or fittings under sidewalks.

3.13 CONNECTIONS TO EXISTING MAINS:

- A. Where "cut in" connection is indicated on the plans or directed by the Engineer, the Contractor shall connect the new mains to, and install valves in, the existing mains. These connections will normally be made in the afternoon, but where required to do so the Contractor shall be prepared to make them at night. Before any existing mains are cut the Contractor will work out a plan of procedure with the Owner's superintendent, so that all customers who will be without water during the process will be notified and the valves to be closed will be located and uncovered.
- B. The Contractor will not be permitted to cut the existing main until he has everything ready to make the connection. The Contractor shall be fully and properly equipped to do the work entirely with his own resources and under no conditions shall he place himself in the position of having to borrow any material, equipment or labor from the Owner. Failure to have everything in readiness to the satisfaction of the Owner may result in a postponement of the connection.
- C. Where indicated on the plans, tapping sleeve and valves shall be used to make the connection. Where used, the tapping sleeve and valve shall be subjected to an air pressure test of 240 psi for 29 minutes.

3.14 PRESSURE TESTING:

- A. Refer to Section 01 0300 – Special Project Provisions for testing requirements. If no requirements are given in Section 01 0300, then the requirements below shall apply.
- B. After the mains and appurtenances have been installed, they shall be subjected to a hydrostatic pressure test. The pressure shall be applied by a motor driven test pump and an accurate recording pressure gauge shall be provided at a suitable point on the main. The test

shall be conducted at 150% of the working pressure or a minimum of 100 psi, whichever is greater, but no more than the pressure rating of the pipe. The test pressure shall be applied for not less than three hours on uncovered pipe and for not less than eight hours on covered pipe. The test pressure must be maintained at a constant pressure and continuously recorded by a chart recorder.

- C. The allowable leakage for water mains shall be measured in gallons per hour per one thousand feet of pipe. Allowable leakage shall not exceed the following formula:

$$L = \frac{SD\sqrt{P}}{148,000} \quad \text{when} \quad \begin{array}{l} L = \text{Allowable Leakage, GPH} \\ S = \text{Length of Pipeline Section, LF} \\ D = \text{Diameter of Pipe (Nominal), Inches} \\ P = \text{Average Test Pressure, psig} \end{array}$$

Hydrostatic testing allowance per 1,000 ft of pipeline*:

Avg. Test Pressure <i>psi</i>	Nominal Pipe Diameter – <i>in.</i>							
	3	4	6	8	10	12	14	16
300	0.35	0.47	0.70	0.94	1.17	1.40	1.64	1.87
275	0.34	0.45	0.67	0.90	1.12	1.34	1.57	1.79
250	0.32	0.43	0.64	0.85	1.07	1.28	1.50	1.71
225	0.30	0.41	0.61	0.81	1.01	1.22	1.42	1.62
200	0.29	0.38	0.57	0.76	0.96	1.15	1.34	1.53
175	0.27	0.36	0.54	0.72	0.89	1.07	1.25	1.43
150	0.25	0.33	0.50	0.66	0.83	0.99	1.16	1.32
125	0.23	0.30	0.45	0.60	0.76	0.91	1.06	1.21
100	0.20	0.27	0.41	0.54	0.68	0.81	0.95	1.08

* If the pipeline under test contains sections of various diameters, the testing allowance will be the sum of the testing allowance for each size.

- D. The Contractor shall be responsible for maintaining accurate records of each pressure test. The date, time, length of line tested, a recording of the test pressure, the times and amounts of make-up water required, and a comparison of actual leakage versus allowable shall be compiled in a neat and organized format, certified by the inspector for the Owner, and delivered to the Engineer in triplicate. All pressure testing must be witnessed by the Engineer or the Owner and recorded by a continuous automatic chart recorder.
- D. The Contractor shall leave a hydrant nozzle or other connection open when the pressure is first applied in order to exhaust air from the line. If no connection near the high point of the section being tested is available, he shall tap the main and install a corporation cock through which to exhaust the air.
- E. All breaks, leaks or defects in the main and appurtenances, dripping valve glands and hydrant gaskets shall be repaired, following which the test pressure shall be again applied. If the pressure gauge then remains steady the Contractor will notify the Engineer that the main is ready for inspection. The Contractor shall make the preliminary test and repair all defects before requesting an inspection by the Engineer.
- F. In cases where the Contractor has elected to backfill the main prior to testing, it shall be his responsibility to fulfill the test requirements even if it becomes necessary to uncover any or all of the pipe in order to find the cause of a leak or other defect. Where practicable the mains shall be tested in sections not exceeding 1500 feet in length.

3.15 DISINFECTION:

- A. After the pipelines, valves, fittings and appurtenances have been installed and tested, they shall be disinfected in accordance with the method set forth in the latest edition of AWWA C651, and all applicable TDEC regulations.
- B. This procedure involves a preliminary flushing of the mains at a velocity of at least 2.5 feet per second, pumping a 50 ppm chlorine solution into the main through a corporation cock, filling the main slowly, allowing the chlorinated water to stand for 24 hours and then flushing out the main until the heavily chlorinated water has been discharged and a chlorine residual of 0.2 ppm has been achieved.
- C. The cost of disinfecting the mains shall be included in the price bid, and the Contractor shall provide all required equipment and the chlorinating agent. He shall also make a tap in the main at the beginning of each section to be tested and shall provide the necessary corporation cocks. The responsibility of ensuring satisfactory bacteriological samples shall be the Contractor's and he shall if necessary repeat the disinfection procedure until satisfactory results are obtained.
- D. When cross connections to existing mains have been made, there is a tendency for contaminated water to gather in the main between the cross or tee and the valve on the existing main. When the new main is flushed to remove the heavily chlorinated water the valves on the cross mains shall be partly opened to allow the pressure from the distribution system to force out any contaminated water that might have gathered in these sections of the mains.
- G. Water samples shall be taken by the Contractor in the presence of the Engineer or Owner. All bacterial testing shall be done at an TDEC approved laboratory.

3.16 BACKFILLING AND CLEANUP:

- A. All backfill under areas where paving will be replaced shall be mechanically tamped to the following densities as defined by AASHO T-99 Standard Proctor Density:

Backfill around pipe	- 95%
Remaining Subgrade	- 95%
Clay gravel base 4" thick	- 100%
- B. After the pipe has been installed and tested, the trench shall be immediately backfilled. However, the Contractor may backfill the trenches prior to testing if he so desires but in this case he will comply with the requirements for testing the mains as specified elsewhere. Where pavement or sidewalk has not been cut to lay the pipe the backfill shall be tamped around and over the pipe to a depth of 12 inches over the top of the pipe. The remaining earth may be filled in and neatly mounded over the trench. Where the pavement or sidewalk has been cut to lay the pipe the backfill shall be thoroughly tamped in six inch layers for the full depth of the trench.
- C. Where the trench is excavated in rock or other hard material which remains in lumps or pieces after being excavated, dry earth shall be provided and tamped around and over the pipe to a height of 12" above the top of the pipe. No large chunks or fragments of rock shall be placed into the backfill of the ditch.
- D. In places where the trench has been excavated along the side of a paved street not provided with curb and gutter or where construction operations or the weather have spread the excavated material over the surfaces of unpaved streets, the Contractor shall employ a heavy duty motor grader to clean out the side ditches, shape the shoulders and restore the smoothness of the street surface to as good a condition as existed before the work was started.

- In the event that excavations on the shoulders of streets indicate that washouts or collapse of the shoulder are liable to occur, the backfill shall be carefully tamped and any earth washed out prior to the date of final acceptance shall be replaced. The use of mechanical equipment for this work does not remove from the Contractor the obligation to employ hand labor for the final dressing up.
- E. Before final acceptance of the work all surfaces shall be returned to as good condition as before the work started.
 - F. All excavated material shall be cleared from adjacent street surfaces, gutters, sidewalks, parkways, railroads, grass plots, etc., using hand labor where necessary to achieve a satisfactory result, and the whole left in a tidy and acceptable condition.
 - G. The Contractor shall at all times keep the backfilled trenches, particularly those across streets and driveways, filled to grade, and shall make a daily inspection to see that those needing additional fill are attended to. He shall maintain them in a good and safe condition and will be held responsible for any connection up to the date of final acceptance of the work by the Owner.
 - H. Where mains are laid across State or County highways or City streets and the pavement has been cut to make the installation, the Contractor shall backfill the section under the pavement with an acceptable backfill and tamped in 6" layers for the entire depth of the trench to the densities specified above.

3.17 INSPECTION OF VALVES:

- A. After all work has been completed the Contractor shall make a careful inspection of all valves, either previously existing or new, which have been opened or closed during the course of the work, to make sure that all valves that should be opened are open and vice versa. No valve shall be opened or closed without the consent of the Owner.
- B. At the same time all valve boxes shall be inspected to make sure that they are still plumb, centered over the operating nut, at the correct elevation and the cover in position.

3.18 GRASSING AND SEEDING:

- A. Refer to Section 32 9219 – Seeding and Restoration for grassing and seeding requirements.

3.19 EROSION AND VEGETATION DAMAGE:

- A. Wherever possible, topsoil shall be removed from all areas to be disturbed by construction, and stockpiled. Land exposure shall be minimized in terms of area and time. All exposed areas subject to erosion shall be covered as quickly as possible by the grassing and seeding specified elsewhere or by mulching or vegetation. Natural vegetation shall be retained whenever possible.
- B. The Contractor shall prepare and implement a firm and accurate construction schedule with regard to land clearing and grading for each section of pipeline to be installed. If possible, clearing shall immediately precede construction activity.
- C. The Contractor shall prepare and submit to the Engineer a list containing chronological completion dates for each measure for controlling erosion and sediment, the location, type and purpose for each measure, and dates when these measures will be removed or replaced.

- D. 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.

END OF SECTION 33 1200

