

**EXHIBIT D**  
**TECHNICAL SPECIFICATIONS**  
**IFB 80-17**  
**PART 1 - GENERAL REQUIREMENTS**

**1.01 PROJECT DESCRIPTION AND SEQUENCE OF WORK**

A condition assessment of the existing 48-inch steel influent pipeline and the 66-inch steel effluent pipeline at Haskell R. Street Wastewater Treatment Plant headworks will be conducted by Pipeline Inspection and Condition Analysis Company (PICA) through Brown and Caldwell. The work to be done in this contract will support the condition assessment by PICA.

The project consists of exposing two sections of the 48-inch pipeline, and two sections of the 66-inch pipeline at the locations shown in the drawings attached at the end of this document. In addition, both the 48-inch and 66-inch pipelines will be exposed adjacent to the headworks building to cut the pipe bonding connected between the building and the pipelines. The drawings consist of the original shop drawings prepared by the pipe supplier (North American Pipe, Inc.) and a plan view of the work locations on the record drawings. The contractor shall use nondestructive measures to locate the pipe. The contractor shall then pothole the pipe in each exposure area. Each exposure will consist of the pipe joint with two (2) feet and 10 feet of pipe exposed on either side of the joint. The top half of the pipe and 2-inches to 4-inches below the spring line must be exposed for the entire length of the exposure. The contractor shall provide a 1 foot minimum bench on the sides of the pipes for access by PICA. The contractor shall clean off any dirt, debris and oil from the pipeline protective tape coating. The contractor shall carefully expose the pipe without damaging the protective tape coating. Any damage to the protective tape coating shall be repaired at no additional cost. All excavated material shall be stockpiled at the site. The contractor shall provide and maintain a safe means of access to the pipe by the Engineer and PICA.

The work includes traffic control, pre- and post-construction videotaping of the project area, potholing to locate the pipe at the exposure locations; trench excavation and safety including installation of trench boxes as required and safe and secure access to the pipe; replacement of removed or damaged existing pipe tape wrap; furnishing, placing and compaction of existing pipe embedment and backfill material; disposal of all excess excavated materials, installation and removal of barricades, and site restoration. The Condition Assessment Contractor will conduct their work the week after the pipelines have been exposed. The pipelines will then be backfilled after the condition assessment is completed at the direction of the Engineer.

The Owner anticipates that there will be items of work which cannot be identified now, but may be necessary in support of the project. The Contractor will furnish and install these items only as directed by the Owner or Engineer.

The work to be performed under this contract shall consist of furnishing all tools, equipment, materials, supplies, and manufacturer's articles and for furnishing all transportation and services, including fuel, power, water, and essential communication, for the performance of all labor work, or other operations required for the fulfillment of the Contract in strict accordance with the statement of work, construction drawings and specifications and other contract documents as herein defined, all of which are made a part hereof.

The key personnel for this project are the Project Manager and Project Superintendent.

**1.02 SAFETY AND HEALTH**

The Contractor shall comply with Safety and Health Regulations for Construction, promulgated by the Secretary of Labor in accordance with the Contract Work Hours and Safety Standards Act as set forth

in CFR29. Copies of these regulations may be obtained from Labor Building, 14<sup>th</sup> and Constitution Avenue N.W., Washington, DC 20013 or <https://www.dol.gov/>.

The Contractor shall also comply with the provisions of the Federal Occupational Safety and Health Act, as amended. The Contractor shall also comply with 29 CFR 1910, Occupational Safety and Health Standards Safety and Health Regulations for Construction.

### 1.03 EXISTING UTILITIES

As-built drawings depict existing utilities at the time of construction. Modifications, additions, deletions or changes since installation have not been notated, located or determined. Therefore, it is expected that there may be discrepancies and omissions in the locations and quantities of utilities and structures shown. Those shown are for the convenience of the Contractor only, and no responsibility is assumed by either the Owner or the Engineer for their accuracy or completeness.

Neither the Owner nor his officers or agents shall be responsible to the Contractor for damages because of the Contractor's failure to protect utilities encountered in the work.

The Contractor shall at all times provide unobstructed access to existing utilities.

**The Contractor shall not disturb El Paso Water underground utilities for any reason. The Contractor shall notify the Owner and Engineer in the event of a conflict, relocation, or repair of any utility.** Where the Contractor's operations could cause damage, which might result in material expense, loss, and inconvenience when his operations are adjacent to or near telephone, television, power, oil, gas, water, sewer, irrigation, or other systems, no operations shall be commenced until the Contractor has made all arrangements necessary for the protection of these utilities and services.

### 1.04 PROPOSED SCHEDULE AND MILESTONES

Week #	Milestone No.	Activity/Milestone	Calendar Days
1-2		Approval of Submittals (trench safety and traffic control)	10 days from NTP
3		Mobilization	14 days from NTP
4	1	Complete Exposures	21 days from NTP
5	2	Complete Backfill - Substantial Completion	35 days from NTP
6	3	Final Completion	42 days from NTP

The definition of **Complete Exposures (Milestone 1)** for this project is the time at which the work has progressed to the point where, in the opinion of the Engineer, the only remaining work is that necessary to return the sites to pre-construction condition. The definition of **Substantial Completion (Milestone 2)** for this project is the time at which all sites are restored to pre-construction condition. The definition of **Final Completion (Milestone 3)** for this project is the time at which all closeout paperwork has been submitted including final invoicing.

### 1.05 LIQUIDATED DAMAGES

Owner and Contractor recognize that time is of the essence of this Agreement and that Owner will suffer financial loss and public inconvenience if the work is not completed and the submittals are not submitted within the times specified in paragraph 1.04 above, plus any extensions allowed. They also recognize the delays, expense and difficulties involved in proving in a legal proceeding the actual loss suffered by Owner if the work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty) Contractor shall pay Owner an amount dictated here for each Calendar Day that expires after the time specified for Substantial Completion until the work is

substantially complete. After Substantial Completion, if Contractor shall neglect, refuse or fail to complete the remaining work within the Contract Time or any proper extension thereof granted by Owner, Contractor shall pay Owner an amount dictated for each Calendar Day that expires after the time specified for completion and readiness for final payment.

<b>Milestone No.</b>	<b>Calendar Days</b>
1	\$1,100 per calendar day
2	\$1,100 per calendar day
3	\$490 per calendar day

#### 1.06 WORKING HOURS

Normal working hours shall be from 7:00 a.m. to 6:00 p.m., weekdays. No hours outside normal working hours will be allowed without the consent of the Engineer and Owner. Any hours after an 8-hour day shall be considered overtime. Overtime hours for the inspector shall be paid by the Contractor at the hourly rate of \$100 per hour.

#### 1.07 CONTRACTOR'S SUPERINTENDENCE

The Contractor shall keep on the project, at all times during its progress, a qualified competent Resident Superintendent, satisfactory to the Engineer. The Resident Superintendent shall speak English fluently and be capable of communicating with the Public, the Engineer, and the Owner. The Superintendent shall be cooperative, and authorized to receive orders and to act for the Contractor. In the event a competent Superintendent is not available, the Owner may suspend work until one is available. Changes of Superintendent must be approved by the Engineer and the Owner.

#### 1.08 MEASUREMENT AND PAYMENT

This section includes the method of payment for each line item addressed in the bid form. General scope of work under each bid item includes all labor, equipment and materials required as shown on the Drawings and in these Specifications.

All estimated quantities for unit price bid items stipulated in the bid proposal are approximate and are to be used only (a) as a basis for estimating the probable cost of the work and (b) for the purpose of comparing the bids submitted for the work. The actual amount of work done and materials furnished under unit price items may differ from the estimated quantities. The basis of payment for unit price work and materials will be the actual amount of work done and materials furnished as measured by the Engineer.

All measurements and payments will be based on completed and accepted work performed in strict accordance with the Drawings and Specifications and in accordance with contract-unit prices and schedule of values. Incidental work and items not listed in the contract-unit price schedule will not be paid for separately, but will be included in the payment for the listed item or items and shall be full compensation for all labor, equipment, materials, testing and incidentals necessary to perform the work in accordance with these contract documents.

Cost of work or materials shown on the Drawings, called for in the Specifications and for which no separate payment is made, shall be included in the bid price on the various bid items for which they are associated. A claim by the Contractor for extra compensation for an item not shown on the Drawings or described in the Specifications will not be considered for any reason including a claim that it does not fall within the scope of one of the Bid items.

A. BID ITEM 1 – INSURANCE, BONDS AND MOBILIZATION EXPENSES

Measurement shall be made in the stated lump sum for mobilization expenses.

Payment shall include all costs for Contractor's 50 percent mobilization and 50 percent demobilization, insurance and bond, construction permits and fees, job trailers, site administration expenses, stand pipe and temporary meter service, and utilities to the job trailers including power, telephone, construction water needs, safety training and PPE, etc. for the entire project. This shall include all costs for contract closeout, site cleanup, and all costs associated with Contractor's demobilization from the site. Mobilization/Demobilization shall be limited to five (5) percent of the total bid price for Items 2 to 5.

B. BID ITEM 2 – PRE-CONSTRUCTION AND POST-CONSTRUCTION VIDEO RECORDING

Measurement shall be made in the stated lump sum for the pre-construction and post-construction video recording of the project limits to document existing and final conditions of the project.

Payment shall be for audio/video recording of the area where the entire work is to take place, prior to construction and after construction and shall include duplication, dating and labeling of two recordings of the pre-construction and two recordings of the post-construction videos. Recordings shall be turned over to the Engineer prior to commencing construction. Post-construction recordings shall be turned over to the Engineer within 7 days after achieving completion.

C. BID ITEM 3 – TRAFFIC CONTROL AND BARRICADES

Measurement for this item shall be made on a lump sum basis for traffic control and other barricades necessary around open trenches. Barricades around open trenches shall consist of as a minimum, reflective barrels with barricade lights, and orange safety fencing installed to prevent unauthorized entry.

Payment for this item shall be made at the stated lump sum price and shall include all labor, equipment, and any incidentals necessary to perform the work complete in place and shall cover:

- J Preparation of traffic control plans or sketch.
- J Obtaining approval of traffic control plans/sketch and any required revisions.
- J Maintenance of traffic control equipment, flaggers, signs, etc.
- J Installation, maintenance and removal of barricades around open trenches.

D. BID ITEM 4 – EXCAVATION AND BACKFILL OF EXPOSURE LOCATIONS

Measurement for this item shall be made on a lump sum basis to include excavation and backfilling each exposure location.

Payment for this item shall be made at the stated lump sum price and shall include all labor, equipment, and any incidentals necessary to perform the work complete in place and shall cover:

- J Excavation, equipment, materials, labor, tools, and incidentals.
- J Construction survey staking, construction facilities, coordination.
- J Protection of adjacent utilities and pertinent structures and support systems for existing utilities.
- J Repair of damages or distress to existing structures, properties and utilities caused by these operations.
- J Material testing.
- J Installing exiting bedding material and compacting pipe embedment.
- J Disposal of all surplus excavated material and associated fees.
- J Restoration of the sites to pre-construction conditions.

- J Coordination with Condition Assessment Contractor.
- J Dust control.
- J Water for Construction.
- J Disconnect bonding on 48- and 66-inch pipes adjacent to existing Head Works structure.
- J Furnishing and installing pipe tape coating to replace tape removed or damaged.
- J The contractor shall use nondestructive measures to locate the pipes prior to exposing such as the use of a vacuum truck or other accepted practice to initially pothole the location.

E. BID ITEM 5 – TRENCH SAFETY

Measurement for this items shall be made on a lump sum basis and shall be based on the complete trench safety support system required to complete the excavation.

Payment for this item shall be made at the stated lump sum price and shall include any design, testing, inspection or additional excavation and backfill required, for furnishing and removal of temporary excavation support systems, shoring, bracing; and all labor, equipment, and any incidentals necessary to perform the work complete in place.

1.09 TRAFFIC CONTROL & BARRIERS

Provisions shall be made by the Contractor to insure that any vehicles entering or exiting the site do not create a traffic hazard. Control devices and personnel shall be provided during these operations to properly direct traffic flow along the private roads and dirt roads within the plant site. A traffic control plan prepared by the barricade company or Contractor shall be provided by the Contractor for review by the Owner and Engineer. Signs and other traffic control devices damaged or lost by the Contractor shall be replaced or repaired by the Contractor at no cost to the Owner.

No entrances or roadways shall be blocked at any time during construction. The Contractor shall be responsible for providing, erecting and maintaining temporary barriers, reflective barrels with barricade lights, orange safety fencing signs, flaggers, lights, road surfaces, detours and other safeguards necessary to protect life, health and safety of the public during performance of the work as called for in the traffic control plans.

The Contractor shall provide flagmen that are experienced and trained in the use of signs and flagging and properly equipped.

In addition, the Contractor shall be responsible for providing, erecting and maintaining temporary barriers around the open trenches which includes, but not limited to, reflective barrels with barricade lights, orange safety fencing, signs, flaggers, lights, road surfaces, detours and other safeguards necessary to protect life, health and safety of plant personnel.

1.10 VIDEO RECORDING

Contractor shall provide a preconstruction and post construction audio/video of the work limits and staging area prior to commencement of work. The video shall cover the existing conditions of the construction limits and staging area including parkways, pavement, curbs, structures, fences, rockwalls, above ground utilities, landscaping, trees, signage, etc. The video recording will be done in the presence of the inspector. The recording shall be in color and shall indicate time and date of the taping. A narrative dialogue of route shall be part of the recording. No work will commence until the Engineer reviews the recording. Contractor shall provide one copy to the Engineer and one copy to the Owner through the Engineer. Image resolution shall be sufficient for clear, high-resolution video. Minimum resolution shall be 1080i or 720p high definition or standard definition. Two post construction DVDs covering the conditions of the areas above after

construction has been completed shall be submitted to the Engineer at project close-out.

### 1.11 TESTING LABORATORY SERVICES

The Owner shall provide an independent geotechnical testing laboratory and all labor, equipment and apparatus necessary for testing of compaction to demonstrate compliance with the drawings and any applicable permits and codes. The Owner's geotechnical testing laboratory will take samples and perform moisture content, gradation, compaction, and density tests during placement of backfill materials to check compliance with these specifications.

All testing, labor, equipment, apparatus required, and testing performed for the convenience of the Contractor, shall be paid by the contractor. Re-tests and re-inspections for all testing required due to defective work and testing, will be the responsibility of the Contractor. The Contractor shall be responsible for the following:

- J Provide samples of materials to be tested to Owner's testing firm, in the required quantities, to the laboratory representative at the Contractor's expense.
- J Monitor quality control over site conditions and workmanship to produce work of specified quality.
- J Comply fully with manufacturers' instructions, including performing each step in sequence.
- J Should manufacturers' instructions conflict with Contract Documents, request clarification from Engineer before proceeding.
- J Perform work by persons qualified to produce workmanship of specified quality.

Contractor will furnish labor and facilities for access to work to be tested; to obtain and handle test samples at the site; to facilitate inspections and tests; for laboratory's exclusive use for storage and curing of test samples until removed to the laboratory; and to repair any test holes in order to match original conditions.

The minimum general testing frequency is as follows.

DESIGNATION	TEST	ASTM STANDARD	SAMPLING FREQUENCY
<b>BACKFILL</b>	Liquid Limit	ASTM D4318	1 test on each material supplied or notable change in material supplied
	Plasticity Index		
	Gradation	ASTM C136	1 test on each material supplied or notable change in material supplied
	Moisture-density relationships	ASTM D1557	1 test on each material supplied or notable change in material supplied
	Density in-place	ASTM D2922 or ASTM D1556	1 test per 8-inch lift at each excavation location

Testing shall not be cause for claims for delay by the Contractor, and all expenses accruing therefrom shall be deemed to be incidental to the Contract.

## 1.12 PROJECT MEETINGS

### A. PRECONSTRUCTION MEETING:

- J Prior to beginning of construction, Contractor's key personnel and subcontractor's and their key personnel will attend a preconstruction meeting at the wastewater treatment plant site with representatives of the Owner and Engineer. Contractor shall present a complete final list of its Subcontractors at this meeting.
- J Engineer will discuss Contractor's work schedule. Contractor shall include coordination of all items which may cause disruption of any existing service. The work schedule shall show, in sequences, all activities which are essential to the Contractor's progress and completion of the project in the time specified. Schedule shall be finalized before work begins.

### B. COORDINATION MEETINGS:

Owner will hold meetings with Contractor and its Subcontractors at least weekly or at any time during progress of contract as required to ensure that the schedule is being met. It will be the Contractor's responsibility to attend these meetings and provide the Engineer the information requested of it. Resident Project Representative (RPR) shall take, publish, and distribute to all attendees, minutes of each such meeting. Distribution shall occur within five (5) working days of each meeting.

## 1.13 SUBMITTALS

Unless otherwise specified, submittals regarding material and equipment shall be accompanied by Transmittal Form 01300-A (attached at the end of this section). A separate form shall be used for each specific item, class of material, equipment, and items specified in separate, discrete sections, for which the submittal is required. Submittal documents common to more than one piece of equipment shall be identified with all the appropriate equipment numbers. Submittals for various items shall be made with a single form when the items taken together constitute a manufacturer's package or are so functionally related that expediency indicates checking or review of the group or package as a whole.

A unique number, sequentially assigned, shall be noted on the transmittal form accompanying each item submitted. Original submittal numbers shall have the following format: "XXX"; where "XXX" is the sequential number assigned by the Contractor. Resubmittals shall have the following format: "XXX-Y"; where "XXX" is the originally assigned submittal number and "Y" is a sequential letter assigned for resubmittals, i.e., A, B, or C being the 1st, 2nd, and 3rd resubmittals, respectively. Submittal 25B, for example, is the second resubmittal of submittal 25.

**Within five (5) days of award, the Contractor shall furnish the Engineer all submittals for items critical to this project, including but not limited to, schedule, schedule of values, pre-construction video, trench safety, and traffic control. Any other submittals shall be submitted for review prior to the work being performed.**

Direct submittals to the Construction Manager at the following address, unless specified otherwise: Brown and Caldwell, Attention: Fernie Silva, P.E., 1200 Golden Key Circle, Suite 430, El Paso, Texas 79925 (FSilva@brwnald.com).

Three (3) copies of all submitted information plus one reproducible original of all information shall be transmitted with submittals for review and comment (digital copies are acceptable). Within 5 calendar days after receipt of a submittal for review and comment, the Engineer shall review the submittal and return one (1) copy of the submittal. The returned submittal shall indicate one of the following actions:

1. If the review indicates that the material, equipment or work method complies with the project manual, submittal copies will be marked "NO EXCEPTIONS TAKEN." In this event, the Contractor may begin to implement the work method or incorporate the material or equipment covered by the submittal.
2. If the review indicates limited corrections are required, copies will be marked "MAKE CORRECTIONS NOTED." The Contractor may begin implementing the work method or incorporating the material and equipment covered by the submittal in accordance with the noted corrections. Where submittal information will be incorporated in O&M data, a corrected copy shall be provided.
3. If the review reveals that the submittal is insufficient or contains incorrect data, copies will be marked "AMEND AND RESUBMIT." Except at his own risk, the Contractor shall not undertake work covered by this submittal until it has been revised, resubmitted and returned marked either "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED."
4. If the review indicates that the material, equipment, or work method does not comply with the project manual, copies of the submittal will be marked "REJECTED - SEE REMARKS." Submittals with deviations which have not been identified clearly may be rejected. Except at his own risk, the Contractor shall not undertake the work covered by such submittals until a new submittal is made and returned marked either "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED."

Review of contract drawings, methods of work, or information regarding materials or equipment the Contractor proposes to provide, shall not relieve the Contractor of his responsibility for errors therein and shall not be regarded as an assumption of risks or liability by the Construction Manager or the Owner, or by any officer or employee thereof, and the Contractor shall have no claim under the contract on account of the failure, or partial failure, of the method of work, material, or equipment so reviewed. A mark of "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED" shall mean that the Owner has no objection to the Contractor, upon his own responsibility, using the plan or method of work proposed, or providing the materials or equipment proposed.

#### SUBMITTAL TRANSMITTAL FORM

The Contractor shall use form 01300-A for transmittal of submittals to the Engineer.



**SUBMITTAL TRANSMITTAL**

Submittal Description: \_\_\_\_\_ Submittal No:1 \_\_\_\_\_

Spec Section: \_\_\_\_\_

	Routing	Sent	Received
OWNER:	Contractor/CM		
PROJECT:	CM/Engineer		
	Engineer/CM		
CONTRACTOR:	CM/Contractor		

We are sending you  Attached  Under separate cover via \_\_\_\_\_.  
 Submittals for review and comment  
 Product data for information only

Remarks: \_\_\_\_\_

Item	Copies	Date	Section No.	Description	Review action <sup>a</sup>	Reviewer initials	Review comments attached

**Note: NET = No exceptions taken; MCN = Make corrections noted; A&R = Amend and resubmit; R = Rejected** Attach additional sheets if necessary.

**Contractor**

Certify either A or B:

- A. We have verified that the material or equipment contained in this submittal meets all the requirements, including coordination with all related work, specified (no exceptions).
- B. We have verified that the material or equipment contained in this submittal meets all the requirements specified except for the attached deviations.

<u>No.</u>	<u>Article I. Deviation</u>
_____	_____
_____	_____
_____	_____

Certified by: \_\_\_\_\_

Contractor's Signature

**\*\*END OF PART 1\*\***

## PART 2 – SITE WORK

### PART 1 – GENERAL

#### 1.01 REFERENCES

The work shall comply with the most recent standards or tentative standards as published at the date of the contract and as listed in this specification using the abbreviation shown.

American Society for Testing and Materials (ASTM):

- |     |        |  |
|-----|--------|--|
| 1)  | D 698  | Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft)   |
| 2)  | D 1556 | Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method  |
| 3)  | D 1557 | Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft <sup>3</sup> )(2,700 kN-m/m <sup>3</sup> ) |
| 4)  | D 2167 | Standard Test Method for Density and Unit Weight of Soil In Place by the Rubber Balloon Method   |
| 5)  | D 2216 | Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass   |
| 6)  | D 2487 | Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System)   |
| 7)  | D 2922 | Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)  |
| 8)  | D 2937 | Standard Test Methods for Density of Soil in Place by the Drive-Cylinder Method  |
| 9)  | D 3017 | Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)  |
| 10) | D 4318 | Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils  |

#### 1.02 TRAFFIC AND ACCESS

Special attention by the Contractor shall be directed to maintaining safe and convenient access at all times to and through the existing facilities by Owner. At no time, shall the access be blocked by stored materials, parked vehicles, or other obstacles.

#### 1.03 DUST CONTROL

The amount of dust resulting from the excavations shall be controlled to prevent the spread of dust to occupied portions of the construction site and to avoid creation of a nuisance in the surrounding area. Use of water will not be permitted when it will result in, or create, hazardous or objectionable conditions such as ice, flooding and pollution.

## 1.04 EARTHWORK

The Contractor will test for compaction as specified in Section 1.11 TESTING LABORATORY SERVICES .

- J "Relative compaction" is the ratio, expressed as a percentage; of the in place dry density to the laboratory maximum dry density.
- J Compaction shall be deemed to comply with the specifications when no more than one test of any three consecutive tests falls below the specified relative compaction. The one test shall be no more than three percentage points below the specified compaction or the compaction will be deemed out of compliance. The Owner will, from time to time at their expense, perform quality control spot checks by accomplishing their own compliance testing. The Contractor shall pay the costs of any quality control compliance retesting of work which the Owner finds not conforming to the specifications.

Excess site excavated or wasted material shall be disposed of offsite by the Contractor at his expense. No prearranged disposal site or related permits have been determined or secured by the Owner.

Water for compaction shall be free of organic materials and shall have a pH of 7.0 to 9.0, a maximum chloride concentration of 500 mg/l, and a maximum sulfate concentration of 500 mg/l. Provide all water needed for earthwork.

## 1.05 PLACING AND COMPACTING EARTH BACKFILL AND PIPE EMBEDMENT MATERIAL

During the compacting operations, maintain optimum practicable moisture content required for compaction purposes in each lift of the backfill material. Maintain moisture content uniform throughout the lift. Insofar as practicable, add water to the material at the site of excavation. Supplement by sprinkling the backfill material. At the time of compaction, the water content of the material shall be at optimum water content or within 3 percentage points above optimum. Aerate material containing excessive moisture by blading, disking, or harrowing to hasten the drying process.

A minimum 12-inches of compacted embedment material shall be placed above the pipe to fully encompass the exposed pipe. Place in maximum 8-inch lifts and compact each lift to 95% relative compaction per ASTM D-1557.

Fill material shall be placed in horizontal layers and compacted with power-operated tampers, rollers, or idlers. Material type, maximum layer depth, relative compaction, and general application are specified in Table A. Unless otherwise specified, fill classes shall be used where specified in Table A under general application.

1.06 FIELD QUALITY CONTROL

Testing Frequency: See Part 1 Section 1.1

PART 2 - PRODUCTS

2.01 MATERIALS

**EXISTING BEDDING AND BACKFILL MATERIAL SHALL BE USED FOR THE PROJECT. IF THE TESTING LAB AND ENGINEER FIND THAT THE MATERIAL IS NOT ACCEPTABLE A CHANGE ORDER SHALL BE ISSUED FOR IMPORTING OF THE FOLLOWING MATERIALS. PART 3 OF THIS SECTION IS STILL APPLICABLE.**

A. TYPE A:

Material for embendment shall be Type A material. Type A material shall be a clean gravel-sand mixture free from organic matter and shall conform to the following gradation:

U.S. standard sieve size	Percent by weight passing
3/4 inch	100
3/8 inch	70-100
No. 4	55-100
No. 10	35-95
No. 20	20-80
No. 40	0-55
No. 100	0-2

B. TYPE B:

Type B material shall be a select granular material free from organic matter and of such size and gradation that the specified compaction can be readily attained. Material shall have a sand equivalent value determined in accordance with ASTM D2419 of not less than 20 and shall conform to the following gradation:

U.S. standard sieve size	Percent by weight passing
3 inch	100
No. 4	35-100
No. 30	20-100

The coefficient of uniformity shall be 3 or greater.

The material may be an imported quarry waste, clean natural sand or gravel, select trench excavation or a mixture thereof.

### C. TYPE C:

Type C material shall be unclassified material which is free from peat, wood, roots, bark, debris, garbage, rubbish or other extraneous material. The maximum size of stone shall not exceed 2 inches. If the material excavated from the site meets these requirements, it may be classified as Type C.

## PART 3 - EXECUTION

### 3.01 EXCAVATION

Excavation shall be performed to the depths to expose the pipe as required by the contract. Excavated material shall be stockpiled for reuse. Excavation and filling shall be performed in a manner and sequence that will provide drainage at all times. Excavations shall be kept free from water while construction therein is in progress. If the CONTRACTOR fails to provide adequate drainage and any material becomes soft or otherwise unsuitable as a result, such material shall be removed and replaced with satisfactory on-site material or borrow material from approved sources, or shall be dried and recompacted as directed by the Geotechnical Engineer at no additional cost to the OWNER.

### 3.02 COMPACTION

Each layer of the pipe embedment and backfill shall be compacted as specified in Table A. Moisture content shall be within +/-2 percent points of optimum as determined by ASTM D 2216.

### 3.03 FINISHED GRADES

All areas excavated and filled sections and adjacent transition areas, shall be uniformly smooth-graded. The finished surface shall be reasonably smooth, compacted, free from irregular surface changes and blend in to the unexcavated surfaces. The degree of finish shall be that ordinarily obtainable from blade-grader operations, except as otherwise specified.

### 3.04 PROTECTION

The CONTRACTOR shall protect newly graded areas from traffic and from erosion, and any settlement or washing away that may occur from any cause, prior to acceptance, shall be repaired and grades reestablished to the required elevations and slopes.

### 3.05 CLASSIFICATION OF FILL

Fill material shall be placed in horizontal layers and compacted with power-operated tampers, rollers, or idlers. Material type, maximum layer depth, relative compaction, and general application are specified in Table A. Unless otherwise specified, fill classes shall be used where specified in Table A under general application.

**Table A, Fill Classifications**

Fill class*	Material type*	Maximum uncompressed layer depth, inches	Minimum relative compaction, percent	General application
B or C	B or C	8	90	Backfill shall be material used to backfill from 12" above exposed pipe to finished grade. Per ASTM D1557 modified proctor.
A	A	8	95	Pipeline Embedment Zone shall be material use to backfill width of exposed pipe to 12" above pipe. Per ASTM D1557 modified proctor

\* Existing Bedding And Backfill Material Shall Be Used For The Project. If The Testing Lab And Engineer Find That The Material Is Not Acceptable A Change Order Shall Be Issued For The Following Materials.

\*\*END OF PART 2\*\*

## PART 3– PIPE TAPE COATING

### PART 1 – GENERAL

#### 1.01 REFERENCES

The work shall comply with the most recent standards or tentative standards as published at the date of the contract and as listed in this specification using the abbreviation shown.

Reference	Title
AWWA C214	Tape Coating Systems for the Exterior of Steel Water Pipelines

### PART 2 - PRODUCTS

#### 2.01 MATERIALS

##### A. POLYETHYLENE TAPE:

The existing pipe and fittings are coated and wrapped with prefabricated multilayer cold applied polyethylene tape coating in accordance with AWWA C214. Tape conforming to AWWA C209 or heat applied repair patch material meeting the requirements of AWWA C216 may be used for both inner and outer layer tape repairs. The total coating thickness shall be not less than 80 mils for both pipelines.

### PART 3 - EXECUTION

#### 3.01 EXECUTION

##### A. COATING REPAIR IN FIELD:

The damaged coating shall be repaired by the contractor in the field. The damaged tape coating shall be peeled back and removed from the affected area. The repair area shall be brushed with a primer, and the length of the tape shall be installed over the damaged area. The minimum lap at the damaged area shall be 4 inches all around. An inner and outer layer shall be placed in the repair area.

The repaired area shall be tested with a holiday tester.

**\*\*END OF PART 3\*\***