Helms & ASSOCIATES
CIVIL ENGINEERS & LAND SURVEYORS

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September 1, 2020

Re: Roscoe Water & Wastewater System Improvements
Roscoe, South Dakota
A-6767

Bid Opening: September 3, 2020
11:00 am Local Time

ADDENDUM NUMBER 1

The following modifications become a part of the original plans and specifications, taking precedence over the items that may conflict. The bidder shall note receipt and make acknowledgement of the addendum on his bid form, incorporating its provisions in his bid.

CONTRACT DOCUMENTS AND TECHNICAL SPECIFICATIONS

1. If dewatering is necessary on the project, it will not be paid for as a separate bid item. This shall be incorporated into cost of the project.

2. PART 1, Bidding And Contract Documents, Bidding Documents, Section 00 42 43, *replace the bid form, page 36-38, with the attached pages in this addendum.*

3. PART 2, Division 33 00 00: *Add the attached specifications.*

4. PART 2- Construction Requirements, Division 33 00 00, Section 33 01 30.71: Part 3.04.A-4, *Strike out the last sentence*

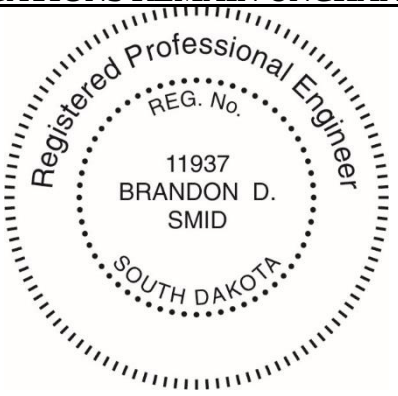
5. PART 2- Construction Requirements, Division 33 00 00, Section 33 05 26; Part 2.05.; Transition Couplings (Gravity Piping); Revision:

Add F. SADDLE WYES

1. Manufactured to meet the requirements of ASTM D 5926
2. Only implemented on sanitary sewer pipe to have CIPP Liner installed
3. Pre-approved equal Fernco Flexible Tap Saddle TSW-4 or TSW-6
    a. Installed according to Manufacturer's recommendations with accompanying TSPK-46 Tap Saddle Pressure Kit

6. PART 2- Construction Requirements, Division 33 00 00, Section 33 12 16: Part 4.02.B, *Shall be revised to read*: Valve exerciser will be incidental to Bid Item- 6" Watermain in the Bid Form

ALL OTHER ITEMS OF THE PLANS AND SPECIFICATIONS REMAIN UNCHANGED



By: _____

Brandon D. Smid, P.E.

PROJECT ENGINEER – HELMS & ASSOCIATES

Acknowledge receipt of the Addendum by inserting its number on the Bid Form. Failure to do so may subject bidder to disqualification. This Addendum forms a part of the Contract Documents. It modifies them as above.

Water & Wastewater System Improvements
Helms Project No. A-6767

BID FORM					
Item #	**Item Description**	**Quantity**	**Unit**	**Unit Price**	**Total Price**
1	Mobilization	1	L.S.	Lump Sum	$
2	Remove & Dispose Sewer Manhole	50	Each	$	$
3	Remove & Salvage of Existing Fire Hydrant	17	Each	$	$
4	Remove & Replace Concrete Curb & Gutter	1,813	Ft.	$	$
5	Remove & Replace Concrete Valley Gutter	1,612	Sq.Ft.	$	$
6	Remove & Replace Concrete Sidewalk	3,726	Sq.Ft.	$	$
7	Remove & Replace 6" Concrete Driveway	2,574	Sq.Ft.	$	$
8	Remove & Replace Sign	2	Each	$	$
9	Remove & Dispose Asphalt Surfacing	57,890	S.Y.	$	$
10	Remove & Dispose Concrete Highway	680	S.Y.	$	$
11	Storm Sewer Culvert Repair	360	Ft.	$	$
12	6" CIPP Sewermain	186	Ft.	$	$
13	8" Sewermain	14,767	Ft.	$	$
14	8" CIPP Sewermain	2,078	Ft.	$	$
15	10" Sewermain	3,610	Ft.	$	$
16	Gravity Sewer Line Displacement and Deflection Pipeline Testing	18,237	Ft.	$	$
17	Gravity Sewer Televising & Report	20,315	Ft.	$	$
18	4" Sewer Service Pipe	8,383	Ft.	$	$
19	6" Sewer Service Pipe	73	Ft.	$	$
20	Connect to Existing Sewer Main	6	Each	$	$
21	Connect to Existing Sewer Service	243	Each	$	$
22	4" Sewer Cleanout	242	Each	$	$
23	8" X 4" Sewer Wye	187	Each	$	$
24	10" X 4" Sewer Wye	38	Each	$	$
25	10" X 6" Sewer Wye	1	Each	$	$
26	Reistablish Sanitary Sewer Service	19	Each	$	$
27	Lateral Connection Repair	19	Each	$	$
28	Line Existing Sanitary Sewer Service	870	Ft.	$	$
29	48" Sanitary Sewer Manhole (0' to 8')	52	Each	$	$
30	Extra Depth 48" Sanitary Sewer Manhole	161	Ft.	$	$
31	Manhole Exfiltration / Vacuum Testing	52	Each	$	$
32	Wastewater Casing or Watermain Quality Pipe	340	Ft.	$	$
33	Pond Depth Indicators	2	Each	$	$

BID FORM (Continued)					
Item #	**Item Description**	**Quantity**	**Unit**	**Unit Price**	**Total Price**
34	V Notch Weir	1	Each	$	$
35	6" Watermain	12,230	Ft.	$	$
36	Directional Bore	140	Ft.	$	$
37	12" Casing Pipe	140	Ft.	$	$
38	Connect to Existing Watermain	26	Each	$	$
39	6" MJ Gate Valve w/ Box	63	Each	$	$
40	6" MJ DI Tee	35	Each	$	$
41	6" MJ DI Cross	3	Each	$	$
42	6" 90° MJ DI Bend	9	Each	$	$
43	6"x4" MJ DI Reducer	3	Each	$	$
44	Fire Hydrant w/ Steamer	17	Each	$	$
45	6" PVC Hydrant Lead	247	Ft.	$	$
46	6" Saddle w/ 1" Corp	74	Each	$	$
47	1" Service Pipe	2,834	Ft.	$	$
48	1" Curb Stop w/ Box	74	Each	$	$
49	Connect to Existing Water Service	74	Each	$	$
50	Furnish & Install 3/4" Meter	160	Each	$	$
51	Furnish & Install 1" Meter	14	Each	$	$
52	Furnish & Install 2" Meter	4	Each	$	$
53	Furnish & Install 4" Electromagnetic Water Meter (Well)	1	Each	$	$
54	Expansion Tank	125	Each	$	$
55	Meter Re-plumb	50	Each	$	$
56	Mobile Read System	1	L.S.	Lump Sum	$
57	Training on Meter System	1	L.S.	Lump Sum	$
58	Well Cleaning & Inspection	1	L.S.	Lump Sum	$
59	West Tower Vault Concrete Floor w/ Sump Pit	1	L.S.	Lump Sum	$
60	West Tower Stand Pipe Insulation Installation	1	L.S.	Lump Sum	$
61	West Tower Interior Stand Pipe Sand Blast and Recoat	1	L.S.	Lump Sum	$
62	East Tower Exterior Recoating	1	L.S.	Lump Sum	$
63	Asphalt Surfacing	10,480	Tons	$	$
64	Gravel Surfacing Repair (3" Nominal Depth)	391	Tons	$	$
65	Granular Base Course (9' Nominal Depth)	26,491	Tons	$	$
66	Pipe Bedding	7,135	Tons	$	$
67	Rock Bedding	1,000	Tons	$	$
68	Sewer Bypass Pumping	1	L.S.	Lump Sum	$
69	Temporary Water	1	L.S.	Lump Sum	$

BID FORM (Continued)					
Item #	**Item Description**	**Quantity**	**Unit**	**Unit Price**	**Total Price**
70	Clearing & Grubbing	1	L.S.	Lump Sum	$
71	Contaminated Soil Removal and Disposal	100	C.Y.	$	$
72	Exploratory Excavation	30	Hours	$	$
73	Traffic Control	1	L.S.	Lump Sum	
74	Storm Water Pollution Prevention Plan (Including Culvert & Inlet Protection)	1	L.S.	Lump Sum	$
75	Seeding, Fertilizing, and Mulching (Lawn)	3	Acres	$	$
76	Railroad Protective Insurance	1	L.S.	Lump Sum	$
Total Base Bid				**$**	
Written					**Dollars**

ALL ITEMS FURNISHED AND INSTALLED

ALTERNATE BID FORM					
Item #	**Item Description**	**Quantity**	**Unit**	**Unit Price**	**Total Price**
A1	Mobilization	1	L.S.	Lump Sum	
A2	Traffic Control	1	L.S.	Lump Sum	
A3	Remove & Salvage of Existing Fire Hydrant	4	Each	$	$
A4	Remove & Replace Concrete Curb & Gutter	1,629	Ft.	$	$
A5	Remove & Replace Concrete Sidewalk	316	Sq.Ft.	$	$
A6	Remove & Replace 6" Concrete Driveway	368	Sq.Ft.	$	$
A7	6" Watermain	1,498	Ft.	$	$
A8	Connect to Existing Watermain	4	Each	$	$
A9	6" MJ Gate Valve w/ Box	12	Each	$	$
A10	6" MJ DI Tee	8	Each	$	$
A11	Fire Hydrant w/ Steamer	4	Each	$	$
A12	6" PVC Hydrant Lead	40	Ft.	$	$
A13	6" Saddle w/ 1" Corp	10	Each	$	$
A14	1" Service Pipe	488	Ft.	$	$
A15	1" Curb Stop w/ Box	10	Each	$	$
A16	Connect to Existing Water Service	10	Each	$	$
A17	Asphalt Surfacing (6")	966	Tons	$	$
A18	Granular Base Course (9" Nominal Depth)	1,312	Tons	$	$
Total Alternate Bid				**$**	
Written					**Dollars**

ALL ITEMS FURNISHED AND INSTALLED

SECTION 33 05 23.13 – PIPE BURSTING TRENCHLESS INSTALLATION

PART 1 GENERAL

1.01 DESCRIPTION

A. Section includes requirements to replace existing watermains using a pipe bursting system. This includes removal and replacement of service lateral connections and placing replacement pipelines into service.

1.02 DEFINITIONS

A. Pipe Bursting: Process of splitting or fracturing the host watermain and forcing the fragments into the surrounding soil, for the purpose of inserting a new pipe of equal or larger diameter.

   1. Accomplished by use of pneumatic, static or hydraulic bursting head, with pipe splitters as cutting wheels as needed.
   2. Mole or bursting head is directionally guided by host watermain and towed under tension by winch, chain or rod assembly.
   3. New pipe towed or jacked in immediately behind mole or bursting head.

B. Host Sewer Main: Existing pipeline subject to pipe bursting system, made of vitrified clay, asbestos cement, polyvinyl chloride (PVC), cast iron, concrete, steel or lined pipe.

C. Replacement Pipe: Pipe inserted into host sewer main by pipe bursting system.

D. Continuous Pipe: Pipe, such as High Density Polyethylene (HDPE) pipe or fuseable PVC (FPVC) with welded joints, assembled and inserted to form continuous section between access pits.

1.03 QUALITY ASSURANCE

A. Follow ASTM standards.

B. Pipe Bursting System commercially proven: Minimum of 50,000 linear feet watermain line and 3,500 linear feet of service laterals of successful watermains

C. Personnel performing pipe bursting:

   1. Certified by manufacturer of pipe bursting system having successfully completed training in:
      a. Operating bursting head.
      b. Installing proposed replacement pipe.
      c. Operation and maintenance of all equipment to be used.

D. Personnel performing fusing of HDPE/FPVC pipe and fittings:

   1. Certified by manufacturer of fusing equipment having successfully completed training in:
      a. Handling replacement pipe materials.
      b. Butt fusion of pipe joints, saddle fusion of fittings for service laterals.

c. Operation and maintenance of all equipment to be used.

E. Provide information regarding production, delivery, handling, and storage aspects of replacement pipe.

F. Contractor: Internally inspect pre-bursting and post-bursting work.

1.04 SUBMITTALS

A. Pipe bursting plan including at minimum:

1. Description of process to be used.
2. Replacement pipe and fitting selection and composition.
3. Recommended manufacturer's installation procedures.
4. ASTM references.
5. Layout, storage and pipe handling area requirements for maintenance of pedestrian and vehicle traffic for each project site.

B. Plan for locating, exposing and re-connecting service laterals and restoring connections.

a. Manhole connection to include pipe restraint.

C. Proposed point repair method to remove sags, offset joints and constrictions or obstructions prior to bursting.

D. Maintain a copy of emergency plan on site for duration of project.

E. Certification backup equipment is available and can be delivered to project sites within 24 hours.

F. Certificates of Compliance for raw materials, pipe, joints, fittings, and service connections.

G. Certificates of Training for processes to be used, including joint fusion, if applicable.

1. Include installer's name, date of issuance and process for which certified.

H. Design calculations resulting in wall thickness for appropriate sized SDR for each trenchless technology installation.

1. Use soil depth of seven feet.
2. Assume ground water table height of five feet below grade unless ground water monitoring data indicates different height.
3. List values of key parameters used in calculations, including but not limited to; density of soil, depth of burial, live loads, safety factors, pipe modulus of elasticity, soil modulus and total calculated pressure on the pipe.
4. Documentation of source of equations and methodologies used in calculations.
5. Allowable tensile stress during pulling of pipe.
6. Calculated pipe deflection versus allowable pipe deflection for selected pipe.
7. Critical buckling pressure.
8. Slip trench or entry pit dimensions for pipe insertion (as applicable).

I. Pre-bursting and post-bursting television inspection reports following Section 02956. Complete post-bursting inspection after bursting process, reconnection of laterals and renewals are completed.

J. Weiring Logs: pre- and post-bursting weir readings.

1. Mark submittals with host sewer main's sewer pipe Identification Number, Work Order number, contract number, beginning date, times, and readings, and final date, times, and readings.

K. Pulling log to include Allowable Tensile Load (ATL) and duration of pull of the replacement pipe.

L. Field testing results.

M. Packing list, invoice, or delivery ticket with every shipment, to contain Contract number, type and class of pipe, length, and other pertinent information.

1.05 DELIVERY AND STORAGE

A. Transport, handle, and store pipes and fittings as recommended by manufacturer.

B. Replace pipe or fittings damaged before or during installation at no additional cost to the Owner.

PART 2 PRODUCTS

2.01 HDPE PIPE

A. The pipe material shall meet the requirements of Section 33 31 05.

2.02 FPVC

A. The pipe material shall meet the requirements of Section 33 31 05

2.03 PIPE BURSTING SYSTEMS

A. Pipe Insertion Method (PIM).

B. TT Technology method.

C. Tenbusch method.

D. TRS System method.

E. TTS300 methods.

F. XPANDIT method.

G. Vermeer Hammerhead mole method.

H. Nowak Pipe Reaming InneReam method.

I. Or Equal.

2.04 MATERIALS

A. Molded fittings.

1. Manufactured, sized and marked following ASTM D3261.

B. Field fabricated fittings.

1. Stock manufactured, sized and marked following ASTM F714.

C. Joint connection minimum requirements:

1. Continuous pipe.

a. Assemble pipe lengths in field with butt-fused joints following ASTM D2657 and approved submittals or with electrofused joints following approved submittals.

1) In case of conflicts between ASTM D2657 and approved submittals or if the ASTM reference is nonspecific, follow approved submittals.

2. Joint strength: Equal to or greater than pipe strength.

2.05 MAINLINE PREPARATION

A. Pre-bursting inspections.

1. Confirm host pipe is ready for bursting.

2. Demonstrate on CCTV recording:

3. Removed obstructions, offset joints, missing or collapsed pipe that could interfere with bursting process.

B. Notify Engineer if bursting is not viable with pre-inspection CCTV recording to support assertion.

C. Maintaining invert and slope.

1. Ascertain elevations of upstream and downstream manhole invert of host sewer main to be burst as well as intermediate point on mainline for verification that line and grade is maintained.

2.06 TRACER WIRE

A. Tracer wire shale be installed with new pipe and verified continuity by testing. Tracer wire shall be suitable for the application and installed per manufacturer's recommendations.

PART 3 EXECUTION

3.01 MANHOLE PREPARATION

A. Enlarge manhole pipe openings to size sufficient to allow bursting head to pass without damaging manhole.

3.02 BURSTING AND PIPE INSTALLATION

A. Provide access pits as required to facilitate pipe bursting insertion process.

1. Locate pits where interference to vehicular traffic and inconvenience to public is minimized.
2. Use changes in sewer line and grade, and sags as access pit locations, and provide access to sewer from both directions.
3. Prevent damage to adjacent areas during bursting process.

B. Do not exceed approved submittal insertion rate or force at any time. Maintain logs verifying rate and force did not exceed submitted calculations.

C. Use approved lubricant to ease installation friction.
   1. Match lubricants to soil and insertion conditions.
D. Remove irregular internal bead projections that are not uniform and rolled-back from butt-fused joints.
E. Extend DIP joints to remove slack in locking restrained joints.
F. Remove and replace improperly burst sewer mains at no additional cost to the Commission.

3.03 RELAX PERIOD

A. Allow inserted HDPE pipes to rest for a period of 4 hours before cutting and trimming replacement pipe or making any manhole connections.

B. If replacement pipe exhibits retraction, at end of relax period and after flexible manhole connectors' grout has set, anchor HDPE pipe at manholes following approved submittals.

C. After relax period, cut and trim replacement pipe 3 inches inside upstream and downstream manholes.

3.04 MANHOLE RECONNECTION

A. Reconnect to manhole following approved submittals.
   1. Restrain and seal pipe at manhole wall.
   2. Use flexible gasket connector, fuse-on water stop or hydrophobic grout-soaked oakum collar embedded in concrete poured or parged across manhole wall opening.
B. Flexible gasket connector.
   1. Preferred restraint and seal for precast manholes.
   2. Embed flexible connector in place in manhole wall, filling all voids, front and back, for full thickness of manhole wall following Standard Details.
   3. If flexible connector is not water tight, perform pipe seal with chemical grout following Section 02957.

3.05 FIELD TESTING

A. Air test pipe following Section 02530 prior to reconnection of lateral connections.

   1. Stabilize test pressures for replacement pipe at 4.0 PSIG with a minimum holding time of two minutes and maximum 0.5 PSIG pressure drop.

   2. Repair or replace pipelines that fail air tests and re-test at no additional cost to the Commission.

B. Perform post-bursting televising inspection.

PART 4 MEASUREMENT AND PAYMENT

4.01 METHOD OF MEASUREMENT

A. Measurement shall be per linear feet of replacement pipe detailed in the plans or as adjusted in the field by the Engineer.

B. Manhole Connections, fittings, bends, or receiving pits shall be incidental to the work and not measured for payment.

C. Street Repair will be measured at the contract unit price utilizing the appropriate bid items to repair.

4.02 BASIS OF PAYMENT

A. Payment shall be at the contract unit price per linear foot.

B. Manhole Connections, fittings, bends, or receiving pits shall incidental to the work with no additional payment.

C. Street Repair shall be paid for at the Contract unit price as shown on the Bid Form and described within these specifications.

* * * END OF SECTION * * *

SECTION 33 31 05 – FUSED PIPING AND FITTINGS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. The general provisions of the Contract, including General and Supplementary Conditions shall apply to the Work covered in this section.

1.02 DESCRIPTION OF WORK

A. The work covered under these specifications shall include the furnishing of all labor, material, tools, and equipment necessary to furnish and install, complete in place, all piping and fittings as shown on the drawings and as specified herein.

1.03 SUBMITTALS

A. The Contractor shall submit for review copies of shop drawings for materials specified herein in accordance with the requirements of Section 01 33 23 and the requirements as hereinafter specified.

B. Certificates from the manufacturer that the materials meet or exceed specified requirements.

C. The manufacturer's installation recommendations, including types and amounts of gasket lubricant, where applicable, and welding specifications for butt fusion of HDPE/FPVC piping and fittings.

D. For HDPE/FPVC piping and fittings, the Contractor shall submit the stock density, melt flow, flexural modulus, tensile strength, coloration, resin type, and cell classification.

E. Certification of the qualifications of personnel providing field-welding services for HDPE piping.

1.04 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. All materials shall be packed, loaded, transported, unloaded, and handled in such a manner so as to prevent damage to the materials.

B. All material shall be loaded and unloaded by lifting with slings or hoists or skidding so as to avoid shock or damage. Dropping or rolling will not be permitted. The use of end hooks to install or move piping will not be allowed.

C. All materials shall be stored on the site in accordance with the manufacturer's recommendations. Do not store materials directly on the ground.

D. All materials shall be kept clean and dry. The insides of all piping and fittings shall be kept free of dirt and debris.

PART 2 PRODUCTS

2.01 HDPE PIPING

A. The pipe shall be high performance, high molecular weight, high-density polyethylene pipe (HDPE SDR 11) with a Type 3408 resin as classified by ASTM D1248 for Type III, Class C, Category 5, grade P34 piping. The pipe shall have a minimum cell classification value 345434C as determined by ASTM D3350.

B. The piping shall be marked at intervals of 5 feet or less with the following information:

1. Manufacturer's name or trademark.
2. Nominal pipe size.
3. HDPE classification ASTM D3350.
4. Standard dimension ratio SDR 11.
5. ASTM D2513
6. Extrusion date, period of manufacture or lot, or batch number.

C. The pipe shall be sized as indicated on the plans with standard dimensions and tolerances conforming to ASTM D2513.

D. The physical properties of the pipe resin are as follows:

1. Density: ASTM D1505, not less than 0.941 - 0.955 gms/cu.cm.
2. Melt Flow: ASTM D1238, Condition E, not greater than 0.4 gms/10 min.
3. Flexural Modulus: ASTM D790, 110,000 to less than 160,000 psi.
4. Tensile Strength at Yield: ASTM D638, 3,000 to less than 3,500 psi.
5. Environmental Stress Crack Resistance (ESCR):
6. ASTM D1693, Condition C, shall be in excess of 5,000 hrs with zero failures.
7. Hydrostatic Design Basis: ASTM D2837, 1600 psi at 23° C.

2.02 HDPE FITTINGS

A. Fittings shall be from a polyethylene compound having cell classification equal to or exceeding compound used in pipe to ensure compatibility of polyethylene resins.

B. The Contractor shall furnish molded fittings rather than factory fittings in available diameters.

C. The fittings shall be of the same manufacturer as pipe being provided. Engineer may allow substitution for approved material with use of flanged joint sections.

D. The fittings shall be welded in the field as per Part 3.03. If necessary the Contractor may use flange fittings that are in conformance to the following:

1. 15 lb. stainless steel or convoluted epoxy coated ductile iron backup flanges as recommended by manufacturer.
2. Stainless steel bolts and nuts.
3. Flanges and bolt patterns consistent with ANSI B16.5, AWWA C207, ASTM A536, and as recommended by manufacturer.
4. Surface weld joints to seal edges.
5. Seal riser joints within 60 mil boot which is welded and clamped to riser.
6. Stainless steel boot clamps.

E. Fitting dimensions shall conform to standard dimensions in accordance with ASTM D3261.

F. All fittings shall be marked with the following:

1. Manufacturer's name or trademark.
2. Nominal size.

3. Type of plastic, material designation HDPE.
4. ASTM D2513.

2.03 FPVC PIPING (wastewater)

A. Fusible PVC pipe shall conform to AWWA C900, ASTM D2241 or ASTM D1785 for standard dimensionality, as applicable. Testing shall be in accordance with the referenced AWWA standard.

B. Fusible PVC pipe shall be extruded with plain ends. The ends shall be square to the pipe and free of any bevel or chamfer. There shall be no bell or spigot of any kind incorporated into the pipe.

C. Fusible PVC pipe shall be manufactured in a standard 40' nominal length, or custom lengths as specified.

D. Fusible PVC pipe shall be green in color for wastewater use.

2.04 FPVC PIPING (water)

A. Fusible PVC pipe shall conform to AWWA C900, AWWA C905, ASTM D2241 or ASTM D1785 for standard dimensions, as applicable. Testing shall be in accordance with the referenced AWWA standards for all pipe types.

B. Pipe shall be manufactured with 100% virgin resin. Pipe shall also have 0% recycled plastics content, and shall not consist of any rework compound, even that obtained from the manufacturer's own production using the same formulation.

C. Fusible PVC pipe shall be extruded with plain ends. The ends shall be square to the pipe and free of any bevel or chamfer. There shall be no bell or gasket of any kind incorporated into the pipe.

D. Fusible PVC pipe shall be manufactured in a standard 40' nominal length, or custom lengths as specified in the plans.

E. Fusible PVC pipe shall be blue in color for potable water use.

2.05 FPVC FITTINGS

A. Acceptable fittings for use with fusible PVC pipe shall include standard ductile iron fittings conforming to AWWA/ANSI C110/A21.10, or AWWA/ANSI C153/A21.53 and AWWA/ANSI C111/A21.11.

B. Connections to fusible PVC pipe may be made using a restrained or non-restrained retainer gland product for PVC pipe, as well as for MJ or flanged fittings.

C. Bends, tees and other ductile iron fittings shall be restrained with the use of thrust blocking or other means as indicated in the construction documents.

D. Ductile iron fittings and glands must be installed per the manufacturer's guidelines.

E. Sleeve-Type Couplings

1. Sleeve-type mechanical couplings shall be manufactured for use with PVC pressure pipe, and may be restrained or unrestrained as necessary.
2. Sleeve-type couplings shall be rated at the same or greater pressure carrying capacity as the pipe itself.

F. Expansion and Flexible Couplings

1. Expansion-type mechanical couplings shall be manufactured for use with PVC pipe, and may be restrained or unrestrained as necessary.
2. Expansion-type mechanical couplings shall be rated at the same or greater pressure carrying capacity as the pipe itself.

G. Connection Hardware

1. Bolts and nuts for buried service shall be made of non-corrosive, high-strength, low-alloy steel having the characteristics specified in ANSI/AWWA C111/A21.11, regardless of any other protective coating.

2.06 TRANSITION COUPLINGS

A. The couplings used for transitions between piping of different materials shall be a wide-range flexible coupler with a sleeve type design meeting the requirements of AWWA C219.

B. The coupling body shall be a center sleeve fabricated of high strength carbon steel tubing equivalent to ANSI/AWWA C200. The transition couplers will be readily available in nominal diameter ranges from 1.5 to 24 inches on all pipe classes.

C. Compression End Rings: One gasket compression end ring per coupling end. End rings to be of either one or two bolt design, fabricated of carbon steel equivalent to ASTM A576. (One bolt per end in Nominal Size ranges of 2 to 12 inches and two bolts per end on the 16 to 24 inch nominal diameter coupling.)

D. Hydraulic Wide Range Gasket: Chloramine Resistant NSF-61 approved EPDM gasket designed with a multi-layered wide range removable outer layer. Gasket hydraulically actuated with a pressure-equalizing dam, pressure cavity and sealing lip for working pressure of 260 psi (1.5 to 16 inches) and 232 psi (18 to 24 inch nominal diameter coupling).

E. Fasteners shall be grade 304 (A2) or 316 (A4) stainless steel with yield strengths that conform to all nationally recognized standards. Bolts to be coated with an anti-seize type coating to prevent galling.

F. The interior and exterior coatings shall NSF-61 approved fusion bonded epoxy coating conforming to AWWA C213.

G. When properly installed the coupling will provide a minimum deflection of 8 degrees, up to 260 psi working pressure and 3/8 inch longitudinal pipe movement without leakage. (Flanged adapters will provide half the longitudinal movement and deflection.)

H. All products will be proof tested to a minimum of 1.5 times working pressure.

I. Flanged couplers shall consist of one compression end and gasket, coupling center sleeve, and AWWA Class "D" Flange (per AWWA C207).

J. Approved transition couplers are Hymax-2000 Series wide range coupling and Hymax-2100 Series wide range flanged coupling adapter or approved equivalent.

2.07 BEDDING MATERIAL

A. Bedding material shall consist of pit run gravel with a 100% passing the three (3) inch sieve and no more than 15% passing the #200 sieve. The gravel for bedding shall be approved by the Engineer prior to its use.

2.08 FASTENERS

A. All fasteners in buried locations shall be Grade 304 (A2) or Grade 316 (A4) stainless steel.

Anti-Seize shall be applied to all threads prior to installation.

2.09 TRACER WIRE

A. See Section 33 11 00 Part 2.11

PART 3 EXECUTION

3.01 GENERAL

A. The areas to receive piping shall be examined for defects that may adversely affect the execution and quality of Work. Prior to the start of piping installation, all measurements shall be checked for deviations from allowable tolerances for piping.

3.02 BURIED PIPING INSTALLATION

A. All piping and fittings shall be laid true to line and grade in the leachate collection trenches or as shown on the plans. Each section of pipe shall be so laid and fitted together that when complete the piping will have a smooth uniform flow line. The inside of all pipe shall be cleaned before installation and kept thoroughly clean during and after the laying. Pipe ends shall be cleaned inside and outside.

B. All pipe and fitting shall be examined for defects before being lowered into the trench. The interior and exterior protective coating shall be inspected and field repaired, if required.

C. The pipe shall be handled and installed in accordance with manufacturer's recommendations.

D. When pipe laying is not in progress, including the noon hours, the open ends of pipe shall be closed. No trench water, animals, or foreign material shall be permitted to enter the pipe.

E. Bedding shall be used with all piping unless otherwise specified in the plans. The bedding material shall conform to the requirements of 2.04 above. General requirements for placement are shown on the project plans. Care will be taken to provide maximum support in the haunch area of the pipe. This area extends from the bedding material to the center of the pipe. All material for bedding of the pipe shall be compacted to 95% maximum dry density as determined by ASTM D698.

F. After each pipe has been graded, aligned, and placed in final position on the bedding material, sufficient pipe embedment material shall be deposited and compacted under and around each side of the pipe and back of the bell or end thereof to hold the pipe in proper position and alignment during subsequent pipe joining and embedment operations.

G. The pipe shall be laid upon properly placed bedding material so that the barrel of the pipe will have a bearing for its full length. No blocking will be allowed to bring the piping up to grade. Depressions for joints shall be excavated after the bedding has been graded to provide uniform support for the entire pipe.

H. The Contractor shall provide and maintain all necessary means and devices at all times to remove and dispose of all water entering the trench during the process of pipe laying. The trench shall be kept dry until the pipe laying and jointing are completed.

3.03 HEAT FUSION OF HDPE PIPE/FPVC

A. Pipe shall be welded in accordance to manufacturer’s recommendation for butt fusion methods. The Contractor shall provide qualified fusion operators and shall submit qualifications to Engineer prior to fusion of all pipes.

B. The butt fusion equipment for joining procedures shall be capable of meeting conditions

recommended by pipe manufacturer including, but not limited to, temperature requirements, alignment, and fusion pressures.

C. Solutions such as detergents and solvents, for cleaning pipe ends where required, shall be used in accordance with manufacturer's recommendations.

D. The Contractor shall not subject pipe to strains that will over stress or buckle piping or impose excessive stress on joints.

E. Branch saddle fusions shall be joined in accordance with manufacturer's recommendations and procedures. Branch saddle fusion equipment shall be of size to facilitate saddle fusion within trench.

F. Before butt fusion of pipe, the Contractor shall inspect each length for presence of debris or animals. All debris and/or animals shall be removed from pipe prior to fusion of pipe.

G. The Contractor shall use compatible fusion techniques when polyethylenes of different melt indexes are used together. The Contractor shall refer to manufacturer's specifications for compatible fusion.

3.04 EXPOSED PIPING INSTALLATION

A. Each item or system shall be furnished complete and installed as shown on the plans and in accordance with the manufacturer's recommendations, instructions, and directions. All installed equipment and systems shall be properly protected during subsequent construction operation.

B. The Contractor shall inspect all material or equipment as it is received to determine damage and/or missing parts. It shall be his responsibility to repair or replace damaged items in accordance with the manufacturer's instructions.

C. The Contractor shall provide all scaffolding required for the proper installation of this work in conformance with the standards of any local and state safety codes applying to scaffolding.

D. All pipes shall be set such that the vertical and horizontal centerlines are properly aligned. Installation of piping by means of springing, forcing or stressing the pipe or adjacent fittings, valves or equipment will not be allowed.

3.05 TRACER WIRE INSTALLATION

A. See Section 33 11 00 Part 2.11

3.06 FLANGE JOINTING

A. The Contractor shall connect slip-on stainless steel backup flanges with stainless steel nuts and bolts. Convoluted ductile iron backup rings may be substituted for joining HDPE piping as per manufacturer's recommendations.

B. The Contractor shall butt fuse fabricated flange adapters to pipe.

C. The Contractor shall observe the following precautions in connection of flange joints:

1. Align flange connections to provide tight seal. **Nitrile-butadiene gaskets will be required.**

2. Place US standard washers as may be required on flanges in accordance with manufacturer's recommendations. Lubricate bolts as required in accordance with manufacturer's recommendations.

3. Tighten flange bolts in sequence and in accordance with manufacturer's recommendations

and prevent over-torque of bolts.

D. The Contractor shall tighten bolts down by degrees to uniform torque in accordance with manufacturer's recommendations.

E. Bolts and nuts placed below grade shall be protected with Tapecoat mastic and tape or by other approved method.

3.07 CLEANING AND TESTING

A. All piping shall be cleaned and flushed in accordance with the requirements of Section 33 01 30.41.

B. All piping shall be tested in accordance with the requirements of Section 33 34 02.

PART 4 MEASUREMENT AND PAYMENT

4.01 METHOD OF MEASUREMENT

A. Piping of the different types and classes as called for on the Bid Form shall be measured on a lineal foot in-place basis to the nearest whole foot.

B. Bedding material will be coarse aggregate or granular drainage material measured to the nearest 0.1 ton as verified by scale tickets.

C. Incidental items associated with the piping materials for which no separate measurement made include but are not limited to:

1. Gaskets
2. Lubricants
3. Protective Coatings
4. Special sections
5. Linings
6. Connectors

D. All fittings shall, unless specifically called for on the Bid Form, be considered incidental with no separate measurement. When included in the Bid Form, fittings will be measured on per each basis for each fitting installed.

4.02 BASIS OF PAYMENT

A. Piping of the different types and classes as called for on the Bid Form shall be paid for on a lineal foot in-place basis at the contract unit price listed in the Bid Form.

B. Bedding material will be coarse aggregate or granular drainage material that will be paid for at the contract unit price per 0.1 ton listed in the Bid Form.

C. All fittings shall, unless specifically called for on the Bid Form, be considered incidental with no separate payment made. When included in the Bid Form, fittings will be paid at the contract unit price for each fitting listed in the Bid Form.

* * * END OF SECTION * * *