

**ADDENDUM NO. 1
Contract 3-2015
September 1, 2016**

**CONTRACT AND SPECIFICATIONS
POPENOE RUN INTERCEPTOR
SYSTEM IMPROVEMENTS PROJECT**

**CONTRACT 3-2015
MORGANTOWN UTILITY BOARD
MORGANTOWN, WV**

This Addendum to the Contract and Specifications is issued to modify, explain, or correct the original Contract and Specifications and is hereby made part of the Contract Documents. Insert the date and number of this Addendum in the blank space provided in Bid Envelope 1, Page B-11 and Bid Envelope No. 2, Page B-15.

Note: Change in bid date.

Bids will be received until 1:30 PM, local time, **September 27, 2016**.

A. ADVERTISEMENT TO BID

1. Page AB-1

CHANGE "September 13, 2016" to "September 27, 2016" in the first paragraph.

B. BID

1. Page B-15

CHANGE "September 13, 2016" to "September 27, 2016" in the heading.

C. SECTION 02722 -- SANITARY SEWER SYSTEM

1. **REPLACE** Section 02722 with the attached **Revised** Section 02722.

**ADDENDUM NO. 1
Contract 3-2015
September 1, 2016**

**BIDDERS MUST ACKNOWLEDGE RECEIPT OF THIS ADDENDUM IN THE SPACES
PROVIDED IN THE BID FORM.**

Dated at Morgantown, WV
September 1, 2016

Morgantown Utility Board
P.O. Box 852
Morgantown, WV 26507-0852

By: 

J. Scott Wright

DIVISION 2 -- SITE WORK

SECTION 02722 -- SANITARY SEWER SYSTEM

PART 1.0 -- GENERAL

1.01 DESCRIPTION

- A. This Section covers the furnishing and installation of buried piped sanitary sewers and manholes as shown on the Drawings and as specified herein.

1.02 QUALITY ASSURANCE

A. Design Criteria

- 1. Use only one type and class of pipe in any continuous line of sewer between structures, unless otherwise indicated on the Drawings.
- 2. Design pipe and fittings to withstand trench loadings and conditions imposed by the various locations.

B. Source Quality Control -- Pipe

- 1. Shop Tests -- In accordance with Section 01400, Quality Control, factory test pipe materials listed in the following. Each pipe manufacturer must have facilities to perform listed tests. The Engineer reserves the right to require the manufacturer to perform such additional number of tests as the Engineer may deem necessary to establish the quality of the material offered for use.

Material	Test Method	Number of Tests
Polyvinyl Chloride Pipe	ASTM D 3034	As specified in Test Method.
Polyvinyl Chloride Pipe	ASTM F 679	As specified in Test Method.
Polyethylene Plastic Pipe	ASTM D 3035	As specified in Test Method.
Ductile Iron Pipe	AWWA C151/ A21.51	As specified in Test Method.
Fittings: Gray Iron and Ductile Iron	AWWA C110/ A21.10	As specified in Test Method.

C. Source Quality Control -- Manholes

1. Maintain uniform quality of products and component compatibility by using the products of one manufacturer in the case of precast reinforced concrete manholes.
2. Obtain certificate of construction compliance with ASTM C 478 from the precast reinforced concrete manhole manufacturer. Submit same certificate as part of required submittals.
3. Obtain certificate of material compliance with ASTM A 48, Class 30, tensile strength from the manhole frame and cover manufacturer. Furnish certification that tensile test bars were from the same pour as castings. Submit same certificates as part of required submittals.
4. Shop and Laboratory Tests -- In accordance with Section 01400, Submittals, materials stated herein require periodic testing according to methods referenced, or as required by the Engineer.
 - a. Shop Tests
 - Manhole component manufacturers must be equipped to and shall perform the number of tests the Engineer may deem necessary to establish quality of manhole components offered for use.
 - Manufacturers shall furnish to the Engineer certified test records or reports with sworn statement of tests made as specified.
 - Precast Reinforced Concrete Manholes -- Conduct tests as specified in ASTM C 478.
 - Manhole Frames and Covers -- Test for AASHTO H-20, Highway Loading.
 - b. The Engineer reserves the right to accept certified test records or reports of previously conducted tests.

D. Reference Standards

1. American Society for Testing and Materials
 - a. ASTM A 48, Gray Iron Castings, Spec. For.
 - b. ASTM A 746, Stainless and Heat-Resisting Steel Bars and Shapes, Spec. For.
 - c. ASTM A 307, Carbon Steel Externally Threaded Standard Fasteners, Spec. For.

02722-2

- d. ASTM C 32, Sewer and Manhole Brick (Made from Clay or Shale), Spec. For.
- e. ASTM C 270, Mortar for Unit Masonry, Spec. For.
- f. ASTM C 361, Reinforced Concrete Low-Head Pressure Pipe, Spec. For.
- g. ASTM C 478, Precast Reinforced Concrete Manhole Sections, Spec. For.
- h. ASTM C 923, Resilient Connectors Between Reinforced Concrete Manhole Structures and Pipes.
- i. ASTM D 2146, Propylene Plastic Molding and Extrusion Materials, Spec. For.
- j. ASTM D 2152, Quality of Extruded Poly (Vinyl Chloride) (PVC) Pipe by Acetone Immersion, Test For.
- k. ASTM D 2321, Underground Installation of Flexible Thermoplastic Sewer Pipe, Rec. Practice For.
- l. ASTM D 2412, External Loading Properties of Plastic Pipe by Parallel-Plate Loading, Test For.
- m. ASTM D 2444, Impact Resistance of Thermoplastic Pipe and Fittings by Means of a Tup (Falling Weight), Test For.
- n. ASTM D 2513, Thermoplastic Gas Pressure Pipe, Tubing, and Fittings, Spec.
- o. ASTM D 2657, Standard Practice For Heat Fusion Joining of Polyolefin Pipe and Fittings
- p. ASTM D 3034, Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings, Spec.
- q. ASTM D 3035, Polyethylene (PE) Plastic Pipe Based on Controlled Outside Diameter, Spec.
- r. ASTM D 3212, Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals, Spec. For.
- s. ASTM D 3261, Butt Heat Fusion Polyethylene (PE) Plastic Fittings For Polyethylene (PE) Plastic Pipe and Tubing, Spec.
- t. ASTM D 3350, Polyethylene Plastics Pipe and Fittings Materials, Spec.

02722-3

- u. ASTM F 477, Elastomeric Seals (Gaskets) for Joining Plastic Pipe, Spec. For.
 - v. ASTM F 679, Poly (Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings.
2. American Association of State Highway and Transportation Officials (AASHTO) Standards as referenced throughout these Specifications.
3. American Water Works Association
- a. AWWA C301, AWWA Standard for Prestressed Concrete Pressure Pipe, Steel Cylinder Type, for Water and Other Liquids.
 - b. AWWA C302, AWWA Standard for Reinforced Concrete Water Pipe-Noncylinder Type, Not Prestressed.
 - c. AWWA C104, Cement-Mortar Lining for Ductile-Iron and Gray-Iron Pipe and Fittings for Water.
 - d. AWWA C105, Polyethylene Encasement of Ductile-Iron Piping for Water and Other Liquids.
 - e. AWWA C110/A21.10, Gray-Iron and Ductile-Iron Fittings, 3-Inch Through 48-Inch, for Water and Other Liquids.
 - f. AWWA C111/A21.11, Rubber-Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings.
 - g. AWWA C150/A21.50, Thickness Design of Ductile-Iron Pipe.
 - h. AWWA C151/A21.51, Ductile-Iron Pipe Centrifugally Cast in Metal Molds or Sand-Lined Molds for Water or Other Liquids.
 - i. AWWA C153/A21.53, Ductile-Iron Compact Fittings, 3-Inch Through 16-Inch, for Water and Other Liquids.
 - j. AWWA C600, Installation of Gray and Ductile Cast-Iron Water Mains and Appurtenances.
4. Federal Specification SS-S-210A, Sealing Compound, Preformed Plastic, for Expansion Joints and Pipe Joints (Type 1 Rope Form).
5. West Virginia Department of Highways, Standard Specifications, Roads and Bridges, Adopted 1986.
- a. WV DOH Section 201, Clearing and Grubbing.
 - b. WV DOH Section 314, Aggregate Sub-Base.

- c. WV DOH Section 601, Structural Concrete.
- d. WV DOH Section 675, Sanitary Sewers.
- e. WV DOH Section 703, Coarse Aggregate.

1.03 SUBMITTALS

- A. Shop Drawings and Product Data
 - 1. Manufacturer's published detail drawings, modified to suit design conditions, if required, and Contractor-prepared drawings, as applicable.
 - 2. Manufacturer's descriptive literature and specifications covering the product specified. Include installation information.
- B. Certificates
 - 1. Certified records or reports of results of shop tests, such records or reports to contain a sworn statement that shop tests have been made as specified.
 - 2. Manufacturer's sworn certification that pipe and manhole components and products will be manufactured in accordance with specified reference standards for each pipe type and manhole components and products.

1.04 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Transport and handle pipe materials, precast reinforced concrete manhole components, and other products specified herein in a manner recommended by the respective manufacturers of such to prevent damage and defects.
- B. Store pipe materials and precast reinforced concrete manhole components in accordance with manufacturer's recommendations to prevent joint damage and contamination. Exercise such care in storage of other specified products as recommended by the respective manufacturers.

1.05 JOB CONDITIONS

- A. Inspection -- All items of material furnished by the Contractor under this Section shall be inspected prior to installation.
- B. Environmental Requirements
 - 1. Keep trenches dewatered while installing pipe until all required pipe joints have been made, concrete cradle and encasement, if any, have cured, and trench backfilled above water table.
 - 2. Under no circumstances, lay pipe in water or on bedding containing frost.
 - 3. Do not lay pipe when weather conditions are unsuitable, as determined by

02722-5

the Engineer, for pipe laying work.

4. In no instance, set or construct manhole bases on subgrade containing frost.

PART 2.0 – PRODUCTS

2.01 SEWER PIPE AND FITTINGS -- POLYVINYL CHLORIDE (PVC)

A. Polyvinyl Chloride Pipe (PVC)

1. Pipe -- Type PSM SDR-35, ASTM D 3034, ASTM F 679.
2. Fittings -- Conforming to same applicable ASTM Specification requirements for pipe.
3. Joints -- Push-on elastomeric ring gasket, ASTM D 3212; and ASTM F 477 for material specifications.
4. Cleanouts -- Conforming to same applicable ASTM Specification requirements for pipe.
 - a. NEENAH Foundry Company. – Frame & Lid – R-1975-A2
 - b. Or Equal.

B. For pipe joints, use rubber gaskets suitable for conveying domestic sewage.

2.02 SEWER PIPE AND FITTINGS – HIGH DENSITY POLYETHYLENE (HDPE)

A. High Density Polyethylene Pipe (HDPE)

1. Pipe -- Type SDR-26, ASTM D 3350
2. Fittings -- All fittings shall be manufactured in accordance with ASTM D 2513 and ASTM D 3261.
3. Joints -- HDPE joints shall be thermally joined in conformance with ASTM D 2657.

2.03 SEWER PIPE AND FITTINGS -- DUCTILE IRON PIPE (DIP)

A. Ductile Iron Pipe (DIP)

1. Pipe -- Manufactured to conform to AWWA C151, latest edition.
2. Wall Thickness -- Wall thickness determined in accordance with AWWA C150, latest edition. The minimum wall thickness shall be in accordance with the following.

02722-6

Pipe Diameter Inches	Thickness Class Designation	Wall Thickness Inches
6	50	0.25
8	50	0.27
12	50	0.31
16	52	0.40
20	52	0.42
24	52	0.44
36	52	0.53
42	52	0.59

3. Joints

a. Use push-on or restrained joints for pipe installed underground. Restrained joints will be indicated on the Drawing.

b. Push-on joints to conform with all applicable provisions of AWWA C111.

4. Pipe Lining -- Cement mortar lined in accordance with AWWA C104, double thickness, and bituminous seal coated in accordance with Section 4-14, Seal Coat, of AWWA C104.

5. Pipe Coatings -- Standard bituminous coating in accordance with Section 51-8, Coatings and Linings, AWWA C151.

6. Certification -- Submit in quintuplicate, a certification from the manufacturer that the pipe furnished complies with all applicable requirements of AWWA A21.51.

B. Fittings

1. Fittings to be gray iron or ductile iron conforming with all applicable provisions of AWWA C110. Working pressure rated at 350 psi.

2. Fittings to be mechanical or restrained joint conforming with all applicable provisions of AWWA C111.

3. Fitting Lining -- Cement mortar lined in accordance with AWWA C104, double thickness, and bituminous seal coated in accordance with Section 4-14, Seal Coat, of AWWA C104.

4. Fitting Coatings -- Standard bituminous coating in accordance with Section 51-8, Coatings and Lining, AWWA C151.

5. Certification -- Submit, in quintuplicate, a certification from the manufacturer that the fitting furnished complies with all applicable requirements of AWWA A21.51.

02722-7

C. Joint Material

1. Push-On Joints (Ductile Iron Pipe) -- Conform to requirements of AWWA C111.
2. Mechanical Joints (Ductile Iron Pipe and Fittings) -- Conform to requirements of AWWA C111.
3. Mechanical Couplings (Ductile Iron Pipe and Fittings) -- Use mechanical joint solid sleeves conforming to requirements of AWWA C110/AWWA C111.

2.04 MANHOLES -- BASIC MATERIALS

A. Cast-In-Place Concrete Products -- Form Work, Reinforcement, and Cast-In-Place Concrete per requirements of Division 3 - Concrete.

B. Waterproofed Mortar -- Material composition meeting requirements of ASTM C 270, Type M with waterproofing admixture included.

1. Medusa Cement Company, "MEDUSA WATERPROOFING PASTE OR POWDER".
2. Grace Construction Materials, "HYDRATITE".
3. Chem-Master Corporation, "HYDROLOX".
4. Or Equal.

C. Epoxy Bonding Compound -- Use product such as W.R. Grace "EPOXITITE BINDER"; Sika Chemical, "COLMA-FIX"; or equal.

D. Manhole Steps

1. Aluminum Step -- Aluminum Alloy AA Designation 6061-T6. Coat that portion of aluminum step being embedded in concrete with heavy bodied bituminous paint.
2. Cast Iron Step -- Gray iron casting meeting requirements of ASTM A 48, Class No. 30.
3. Reinforced Plastic Step -- Composed of a 3/8-inch Grade 60, ASTM A 615 deformed steel reinforcing bar completely encapsulated in Grade 49108, ASTM D 2146 polypropylene co-polymer compound, Type II; M.A. Industries, Inc., Type PS4, or equal.

E. Manhole Frame and Cover -- Gray iron castings conforming to ASTM A 48, Class No. 30, designed for AASHTO Highway Loading Class HS-20. Provide castings of uniform quality, free from blow holes, porosity, hard spots, shrinkage distortion, or other defects.

02722-8

1. Finish -- Bearing surfaces machined to prevent rocking and rattling under traffic. Casting surfaces shot-blast cleaned and coated with asphalt paint, non-tacky drying.
 2. Identification -- Cast the word SEWER integrally on cover in 2-inch size raised letters.
 3. Frame Hold-Down Bolts -- ASTM A 307.
 4. Tensile Test Bar -- Size B, cast separately, but poured from same iron as castings they represent.
 5. Ring and cover by NEENAH Foundry Company, R1670, unless otherwise approved by the Engineer.
- F. Preformed Plastic Sealing Compound -- Federal Specification SS-S-210A, Type 1, Rope Form, of either bitumastic base compound or butyl rubber base compound, and shipped protected in a removable two-piece wrapper. Size cross section of rope form to provide squeeze-out of material around entire interior and exterior circumference when joint is completed.
1. K.T. Snyder Company, Inc., "RAM-NEK".
 2. K.T. Snyder Company, Inc., "RUB'R-NEK".
 3. Hamilton Kent Manufacturing Company, "KENT-SEAL NO. 2".
 4. Or Equal.
- G. Rubber Compression Gasket -- Composition conforming to ASTM C 361 or ASTM C 443.
- H. PVC Waterstop -- Gasket-type waterstop composed of virgin polyvinyl chloride (PVC) such as manufactured by Fernco Joint Sealer Company; CMA Concrete Manhole Adapter. (CMA Waterstop distributed by the General Engineering Company, Frederick, Maryland.)

2.05 PRECAST REINFORCED CONCRETE MANHOLE COMPONENTS

- A. Materials and Construction -- Conforming to requirements specified in ASTM C 478 except as follows.
1. Concrete -- Composition and compressive strength conforming to ASTM C 478 except use Type II or Type III cement in manhole components and increase compressive strength to 4,500 psi (at 28 days) in precast bases.
 2. Casting and Curing -- Wet cast and steam curing process in accordance with Sections 3.6.11 and 3.7.2 of AWWA C302.

02722-9

3. **Lifting Holes and Lugs --** Thru-wall holes are not permitted in manhole component construction. Factory install lifting keys or lugs integrally in manhole components.
 4. **Manhole Steps --** Factory installed in manhole components, pre-aligned vertically, spaced on equal centers, and located the minimum distance from ends of risers and top sections as indicated on Drawings.
 5. **Manhole Component Seals --** Manhole component joints factory formed for self-centering concrete to concrete bearing employing either a rubber compression gasket or preformed plastic sealing compound.
 6. **Manhole Component Design --** Base, riser section, and top section dimensions and diameters, not consistent with ASTM C 478, are as indicated on Drawings.
- B. Precast Bases and Riser Sections --** Design, materials, and construction as specified previously.
- C. Precast Top Sections --** Designs as required by Drawings of materials and construction as specified previously, except additional and differing requirements as follows.
1. **Flat Slab Tops --** Tops factory formed to properly accept and support required manhole frame and cover and formed to join riser section in a matching joint.
 2. **Hold Down Bolt Inserts --** Factory cast in top section no less than two 3/4-inch threaded inserts or slotted inserts to accommodate manhole frame hold down bolts. Threaded inserts of 3 inches depth. Both insert types designed for an ultimate load in tension of 12,500 pounds. Inserts factory plugged for shipping. Coordinate insert location with manhole component manufacturer to assure proper location in top sections.
- D. Precast Grade Rings --** Leveling and adjusting units of 6-inch or 4-inch thickness of materials and construction conforming to ASTM C 139. Factory cast grade rings with hold down bolt holes matching location of same in manhole frame. **SPLIT RINGS NOT PERMITTED.** Design must provide for full bearing of manhole frame.
- E. Resilient Pipe-to-Manhole Connection --** Composition Conforming to ASTM C 923
1. Dura-Tech, "DURA-SEAL".
 2. A-Lok Products, Inc., "A-LOK".
- F. Crushed Stone Sub-Base --** Number 57 size, Type C Aggregate in conformance with WV DOH Section 703.2.

02722-10

PART 3.0 -- EXECUTION

3.01 RESPONSIBILITY FOR MATERIAL

- A. Carefully examine all materials for defects, and do not install material which is known to be defective.
- B. Inspect precast reinforced concrete manhole components in accordance with requirements of ASTM C 478 regarding repairable defects and defects subject to rejection by the Engineer.
- C. Replace all material found defective in manufacture or damaged in transit or handling at the Contractor's expense. Defective material provided by Owner shall be replaced by Owner.
- D. Remove all defective material from the job site.

3.02 DEFECTIVE PIPE

- A. The Engineer reserves the right to reject all defective pipe shipped to the job site or stored on the site. The Engineer shall examine the pipe and determine if the pipe is damaged prior to the installation of the pipe in the trench. Failure of the Engineer to detect damaged pipe shall not relieve the Contractor from his total responsibility for the pipe if it leaks or breaks after installation. Lay all defective pipe and/or fittings aside for final inspection by the Engineer to determine if corrective repairs may be made, or if the piece is to be rejected. The Engineer shall determine the extent of the repairs. Classify defective pipe as follows.
 - 1. Damage to interior and/or exterior paint seal coats.
 - 2. Damage to interior cement-mortar lining.
 - 3. Insufficient cement-mortar lining thickness.
 - 4. Poor quality interior paint seal coat.
 - 5. Pipe out of round.
 - 6. Damage pipe barrel area to a point where pipe class thickness is reduced.
 - 7. Denting or gouges in plain end of pipe.

3.03 HANDLING OF MATERIAL

- A. Handling of Pipe and Fittings
 - 1. Unload, handle, and store all pipe, fittings, valves, and appurtenances in accordance with AWWA C600. If damage or coating abrasion occurs and is deemed repairable, repair as directed by the Engineer, in accordance with the manufacturers recommendations. If the damage is not repairable

02722-11

in the opinion of the Engineer, such pipe, fittings, valves, or appurtenances will be rejected and removed from the project site and replaced at the Contractor's expense.

2. Keep fittings and valves drained and stored before installation in a manner protecting them from damage due to freezing of trapped water.

3.04 PREPARATION

A. General

1. Clean and remove all foreign matter from each pipe, fitting, and manhole before placing in the trench and following the pipe laying operation.
2. Remove all pipe and fittings whose interior has been contaminated with oil, gasoline, kerosene, or other material which damages the bituminous seal coat or cement-mortar lining and replace at no cost to the Owner. Should foreign material or contaminants be observed in previously installed pipe, cease work until foreign material or contaminated pipe is decontaminated or removed.
3. Keep open ends of piping and pipe attachment openings capped with a watertight plug at all times until actual connection or actual pipe testing.
4. Excavate trenches in rock at least 25 feet in advance of pipe laying. Protect pipe ends from blasting.

B. Earthwork -- Perform earthwork for sewer and manhole installation as previously specified in Trenching, Backfill, and Compacting, Section 02221, and according to the following.

1. Classification of Excavation -- As specified in Section 02221, Trenching, Backfilling, and Compacting.
2. Herein specified limits based on allowable payment quantities in the Project.
3. Make excavations for manholes to a nearly vertical plane beginning at bottom of excavation 1 foot beyond manhole base outside diameter (6 inches each side) to 2 feet beyond manhole base outside diameter dimension for top of excavation limit (1 foot each side).
4. If rock excavation is required, take rock out to limits specified previously.
5. If surface pavement of any type is encountered (vehicle or pedestrian ways), cut such pavement to a rectangular shape as opposed to circular shape of manhole. Make limits of cut not to exceed 1 foot beyond "top of excavation limit" as specified previously.
6. No additional compensation allowed should excavation limits or surface

02722-12

pavement cut limit be exceeded. Additionally, should "bottom of excavation limit" be exceeded, provide, without additional compensation, concrete cradle or encasement for pipes entering or leaving manhole.

7. Backfill spaces outside manhole using backfill material as specified in Section 02221, Trenching, Backfill, and Compacting. See Standard Detail SPEC 007.

3.05 SEWER CONSTRUCTION METHOD

A. General Requirements -- Use proper and suitable tools and appliances for the proper and safe handling, lowering into trench, and laying of pipes.

1. Do not lay pipe in a wet trench, on subgrade containing frost, and when trench conditions are unsuitable for such work. If all efforts fail to obtain a stable dry trench bottom and the Engineer determines that the trench bottom is unsuitable for trench foundation, he will order in writing the kind of stabilization to be constructed.
2. Lay pipe proceeding upgrade true to line and grades given. Lay bell and spigot pipe with bell end upgrade. Lay tongue and groove pipe with groove end upgrade. Lay pipe on uniform slope as shown in drawings or as directed by the Engineer.
3. Thoroughly clean the pipes and fittings before they are installed. Pipe shall be kept clean until the acceptance of the completed work.
4. Exercise care to ensure that each length abuts against the next in such a manner that no shoulder or unevenness of any kind occurs in the pipe line.
5. No wedging or blocking permitted in laying pipe unless by written order of the Engineer.
6. Before joints are made, bed each section of pipe full length of barrel with recesses excavated so pipe invert forms continuous grade with invert of pipe previously laid. Do not bring succeeding pipe into position until the preceding length is embedded and securely in place.
7. Dig bell holes sufficiently large to permit proper joint making and to ensure pipe is firmly bedded full length of its barrel.
8. Walking or working on completed pipe line, except as necessary in tamping and backfilling, is not permitted until trench is backfilled 1 foot deep over top of pipes.
9. Take up and relay pipe that is out of alignment or grade, or pipe having disturbed joints after laying.
10. Take up and replace with new, such in-place pipe sections found to be defective. Replacement work at Contractor's expense.

02722-13

11. Take necessary precautions to prevent the floating of the pipe line by the accumulation of water in the trench, or the collapse of the pipe line from any cause. Should floating or collapse occur, restoration shall be at the Contractor's expense.
12. Bedding materials for pipe as specified previously in Section 02221, Trenching, Backfill, and Compacting.
13. Take every precaution to prevent foreign material from entering the pipe while it is being placed in the line. During laying operations, do not place debris, tools, clothing, or other materials in the pipe. Where cleaning after laying is difficult because of small pipe size, use a suitable swab or drag in the pipe and pull forward past each joint immediately after the jointing has been completed.
14. When the work is not in progress, and at the end of each work day, securely plug open ends of pipe and fittings to prevent trench water, earth, or other substances from entering the pipes or fittings.
15. Place enough backfill over the center sections of the pipe to prevent floating.
16. Carry out the cutting of pipe only with equipment specifically designed for that purpose such as an abrasive wheel, rotary wheel, cutter, a guillotine pipe saw, or a milling wheel saw. The use of chisels or hand saws will not be permitted. Cut ends and rough edges shall be ground smooth for push-on connections. The cut end shall be beveled slightly.
17. HDPE sewers installed at variable grades shall be provided with a minimum depth cover of 3 feet. Bending of pipe will be permitted provided that the bending radius conforms with the manufacturer's recommendations.
18. Clay dikes shall be installed along the length of installed pipe at a maximum spacing of 150' per run of installed piping between manholes at no additional cost to the Owner. The minimum spacing shall be determined by the Engineer during construction activities and may vary along the project length depending on the material and groundwater elevation encountered along the project. If material suitable for the construction of the clay dikes, as determined by the Engineer, is not available on-site, it shall be the Contractor's responsibility to find an acceptable borrow site and to provide the material at no additional cost to the Owner. The clay dikes shall have the dimensions shown on Standard Detail Spec 042.

B. Joints -- Exercise care when making each joint and make in accordance with the pipe supplier's specifications and in accordance with the following instructions.

1. Make joints absolutely watertight and repair immediately any detected leaks and defects. Method of repair subject to Engineer's approval.

02722-14

2. Push-On Joints -- Join pipe in accordance with AWWA C600, ASTM D 2321, and the following.
 - a. Assemble push-on joint to provide tight, flexible joints that safely permit movement caused by expansion and contraction due to temperature changes and by ground movement. Use lubricant recommended by the pipe or fitting manufacturer for making joints. If unusual joining resistance is encountered or if the pipe cannot be fully inserted into the bell, disassemble joint, inspect for damage, reclean joint components, and re-assemble joint.
 - b. Thoroughly clean the inside of the bell and the outside of the spigot end to remove oil, grit, excess coating, and other foreign matter. Flex the circular rubber gasket inward and insert in the gasket recess of the bell socket. Apply a thin film of gasket lubricant to either the inside surface of the gasket or the spigot end of the pipe or both. Gasket lubricant to be supplied by the pipe manufacturer and approved by the Engineer prior to its use.
 - c. Enter the spigot end of the pipe into the socket using care to keep the joint from contacting the ground. Complete the joint by forcing the plain end to the bottom of the socket with a forked tool or jack-type tool or other device as may be approved by the Engineer. Mark pipe that is not furnished with a depth mark before assembly to assure that the spigot end is inserted to the full depth of the joint. File or ground field-cut pipe lengths to resemble the spigot end of such pipe as manufactured. Complete assembly instructions are available from the pipe manufacturer.

3. HDPE Joints – Assemble thermally joined pipes in accordance with the manufacturer's recommendations and ASTM D 2657. Provide verification that the personnel involved with the thermal joining process are certified in accordance with CFR Title 49, part 192.285.

4. Mechanical Joint -- Required to furnish a sworn statement that the inspection and all of the tests on all parts of this type joint have been made and met as specified. Joining in accordance with AWWA C600 and the following.
 - a. Centrally locate the spigot in the bell. Thoroughly brush the surfaces with which the rubber gasket seal comes in contact with a wire brush just prior to assembly. All loose rust or foreign material must be removed to provide a clean surface which shall be brushed with soapy water just prior to slipping the gasket over the spigot end and into the bell. The normal range of bolt torques to be applied to standard cast iron bolts in the joint are as follows.

Size Inches	Range of Torque Ft – Lb
5/8	40-60
3/4	60-90
1	70-100

02722-15

- b. The above torque loads may be applied with torque measuring or indicating wrenches. Torque wrenches may be used to check the application of approximate torque loads applied by men trained to give an average pull on a definite length of regular socket wrench.

The following lengths of wrenches should satisfactorily produce the above range of torques when used by the average man.

Size Inches	Length of Wrench Inches
5/8	8
3/4	10
1	12
1-1/4	14

- c. When tightening bolts, it is essential that the gland be brought up toward the pipe flange evenly, maintaining approximately the same distance between the gland and the face of the flange at all points around the socket. This may be done by partially tightening the bottom bolt first, then the top bolt, next the bolts at either side, and last, the remaining bolts. Repeat this cycle until all bolts are within the above range of torques. If effective sealing is not attained at the maximum torque indicated above, disassemble and re-assemble the joint after thorough cleaning. Avoid over stressing of bolts to compensate for poor installation practice.
5. Restrained Mechanical Joints -- Install restrained mechanical joints in the same manner as the mechanical joints, except after the joint bolts are tightened, tighten the restraining screws in the retaining gland. The required torque range for the retaining screws specified by the retaining gland manufacturer.
6. Restrained Joints -- Install in the manner provided for under mechanical joints except tighten bolts as specified by the manufacturer. See Standard Detail SPEC 006.

3.06 CONNECTIONS TO EXISTING SEWER SYSTEM

- A. It shall be the responsibility of the contractor to not in any way impair the normal treatment efficiency of the facilities, regardless of the work underway. No bypassing of raw or partially treated sewage to the ground surface or surface waters shall occur at any time as a result of construction. In general, this requires that new facilities be complete and ready for service, or that temporary facilities be provided, prior to removing existing units from service for modification or repair. The Contractor shall provide all temporary piping, temporary electrical power,

02722-16

temporary pumping or trucking of wastewater, and temporary construction required to complete the work. Contractor agrees to indemnify and hold harmless the Engineering and/or Owner for all citations, fines, and/or civil and/or criminal penalties resulting from violations due to Contractor's failure to abide by this requirement.

- B. Install wye branches at locations designated by the Engineer concurrent with pipe laying operations. Use standard fittings of the same material and joint type as the pipeline into which they are installed.
- C. Construct laterals from the wye branch to the termination point as specified in Paragraph 3.05 and in accordance with the Drawings. See Standard Detail SPEC 006.
- D. The determination as to the slope and depth of the lateral will be made by the Engineer in the field unless otherwise specified by the Plans.
- E. Install an approved watertight plug, braced to withstand pipeline test pressure thrust, at the termination of the lateral. Install a temporary marker stake extending from the end of the lateral to 1 foot above finished grade.
- F. PVC sewer pipe shall extend through a steel casing when passing under heavily loaded areas which do not have at least 3 feet of cover.
- G. Cleanouts shall be installed at property lines, or other locations as directed by the Engineer, in accordance with Paragraph 3.05 and the Drawings. See Standard Detail SPEC 016.
- H. Any existing service lines which are damaged by the Contractor shall be repaired or replaced as specified by the Engineer.
- I. Conversion of Services
 - 1. General Connections
 - a. Connections of new and/or existing sewers shall be located as shown on the Drawing or as directed by the Engineer.
 - b. Provisions satisfactory to the Engineer shall be made to handle the flow of existing sewage. In general, this will require the blocking or plugging of the existing sewer at an adjacent manhole and the re-routing or pumping of sewage to some point of disposal that will not affect the construction work or present a health hazard.
 - c. Construction techniques and materials used in making the actual connection shall be the same as for construction of the new sewer.
 - d. In all cases involving major street sewers, a plan and schedule of operation showing the exact procedure to be followed in each case shall be submitted to the Engineer in writing.

02722-17

2. House Connections

- a. Shall be located as shown on the Drawings or as directed by the Engineer.
- b. Connection shall consist of excavation at end of the lateral, connection of lateral to existing or proposed sewer line, installation of clean out and all necessary fittings, handling of sewage flow as described in Paragraph 3.06 above, and backfill.
- c. Any additional length of lateral line shall be installed as is needed to complete the connection.
- d. Construction techniques and materials used in making the connection shall be the same as for construction of the new sewer.
- e. Surface restoration shall be under the appropriate item.

3.07 MANHOLE CONSTRUCTION METHODS

- A. Precast Manholes -- Provide precast reinforced concrete bases, straight risers, and top sections necessary to construct complete manholes. Fit the different manhole components together to permit watertight jointing and true vertical alignment of manhole steps. See Standard Detail SPEC 007.
 1. A minimum of 6 inches of aggregate sub-base shall be placed under the base of the manhole. Aggregate backfill is as specified in Section 02221, Trenching, Backfill, and Compacting.
 2. If rubber compression gaskets are used between sections, install gaskets and join sections in accordance with written instructions of manhole component manufacturer.
 3. If preformed plastic sealing compound is used between sections, install sealing compound in accordance with manufacturer's recommendations, and join sections also in accordance with written instructions of manhole component manufacturer.
 - a. Prime joint surfaces, if required, by preformed sealing compound manufacturer.
 - b. If sealing compound is installed in advance of section joining, leave exposed half of two-piece protective wrapper in place until just prior to section joining.
 - c. Use preformed sealing compound as the sole element utilized in sealing section joints from internal and external hydrostatic pressure.

- d. Following manhole section installation, trowel sealing compound surface smooth and flush with interior face of manhole.
 - e. Make pipe connections into manhole walls as specified hereinafter for pipes connecting into manhole bases.
 - f. Construct the manhole inverts using concrete as specified in Section 03300, Reinforced Cast-in- Place Concrete, and as shown on Standard Detail SPEC 009.
- B. Precast Drop Manholes -- Construct precast drop manholes as specified in Paragraph 3.07, A, of this Section and as shown on Standard Detail SPEC 008.
- C. Frame and Cover Installation -- Where required, make final adjustment of frame to elevation using materials selected in Contractor's options. Do not adjust elevation more than 1 foot with masonry or precast grade ring.
- 1. Set precast grade rings on rope form sealant, and top grade ring with same. Provide rope form sealant in sufficient number of layers to accomplish final elevation adjustment for manhole frame.
 - 2. Bolt manhole frames in place on manhole top section, or on leveling units if required, after installing preformed plastic rope form sealant compound on bearing surface of manhole frame. Remove excess sealing compound squeeze-out after manhole frame is bolted in place.
 - 3. Use bolts of sufficient length to properly pass through leveling units (if any), engage full depth of manhole top section inserts, and allowing enough threaded end to pass through manhole to properly tighten nut and washer. Tighten manhole frame bolts.
- D. Pipe Connections -- Make pipe connections to manholes by using a PVC or asbestos cement manhole adapter. Do not permit the pipe to project more than 2 inches into the manhole.

3.08 FIELD QUALITY CONTROL

- A. Testing -- Conduct testing of the sewer system, including connections and laterals, and manholes as specified in Section 01667, Testing of Sewer Mains and Manholes.

END OF THIS SECTION

02722-19

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02722-20