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A		SECTION 02370 - EROSION & SEDIMENTATION CONTROL (CONT'D)					Pressure Class 250 (14-16")					1. Sanitary sewer drainage piping, fittings, accessories, cleanouts, and bedding.					3.6 FIELD QUALITY CONTROL					2. Prior to setting subsequent manhole barrel sections, apply primer to tongue and groove ends and allow to set in accordance with manufacturer's recommendations. Place joint sealant on tongue end. Lower next section into position, and remove excess material from interior of structure. Add additional material on exterior of joint, if necessary, for completely watertight joint.					A. Excavate pipe trench and place bedding material in accordance with Section 02300.					Joints: Connect joints as described herein and in accordance with manufacturer's installation instructions. Provide pipe joint type for only watertight joint performance in actual as shown on the drawings. The table applies only to the extent as applicable to the pipe and joint type and the joint performance as shown or specified.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
		PART 3 - EXECUTION					a. Fittings: Either mechanical joint or push-on joint, AWWA C153, and shall be coated with a 6-8 mil nominal thickness fusion bonded epoxy conforming to the requirements of AWWA C550 and C116, or cement mortar lined in accordance with AWWA C104.					B. Related Requirements:					B. Pipes and joints shall not be completely backfilled until after inspection, testing, and approval by the Owner and local jurisdiction.					3.3 INSTALLATION - GENERAL					A. Perform installation in accordance with local utility company requirements in conjunction with requirements herein. Utility requirements shall take precedence when differences occur.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
B		3.1 PREPARATION					A. Review the drawings and Storm Water Pollution Prevention Plan.					2. Section 0236 - Sewer Manholes, Frames, and Covers					C. Prior to testing for leakage, the pipe trench shall be backfilled to at least the spring line of the pipe. If required to prevent pipe movement during testing, additional backfill shall be added leaving the pipe joints uncovered to permit inspection.					3.2 CAST-IN-PLACE MANHOLE CONSTRUCTION					A. Maintain a minimum of 12 inches separation of gas line from sewer, water, or storm water piping in accordance with state or local code.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
		B. Reverse SWPPP as necessary to address potential pollution from site identified after issuance of the SWPPP at no additional cost to the owner.					2. Polyvinyl Chloride (PVC) Water Pipe: Pipe, AWWA C900, rated DR 18 (Class 150), continually marked as required.					1. Section 02300 - Earthwork: Trenching, backfill, and compaction for utilities					2. Section 0236 - Sewer Manholes, Frames, and Covers					B. Place base pad to proper elevation and location and pour monolithically with invert. Base shall support pipe to first joint.					B. Install piping to conserve space and not interfere with use of site space.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
		C. Conduct storm water pre-construction meeting with Site Contractor, all ground-disturbing Sub-contractors, site engineer of record, and state or local agency personnel.					a. Elastic gaskets and lubricant: ASTM F477 for smaller pipes.					2. REFERENCES					D. Erosion Test: The pipe trench shall be backfilled to at least the spring line of the pipe. If required to prevent pipe movement during testing, additional backfill shall be added leaving the pipe joints uncovered to permit inspection.					3. Set cover frames and lids level without tipping, to correct elevations. Utilize pre-cast rings or brick and mortar to achieve final rim elevation. Maximum limit, 4 courses.					C. Deposit concrete in evenly distributed layers of about 18 inches, with each layer vibrated to bond to preceding layer.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
C		3.2 EROSION AND SEDIMENTATION CONTROL AND SLOPE PROTECTION IMPLEMENTATION					2.2 VALVES					A. Ball Valves, 2-Inches and Smaller:					1. Manufacturer and Model: Mueller Oriseal or approved equal.					E. Infiltration Test					D. Place gasket between all joints and paint exterior of manhole within 5 inches of the joint with mastic waterproofing.						E. Establish elevations of buried piping in accordance with Section 02300.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
		A. Place erosion and sediment control systems in accordance with the drawings and Storm Water Pollution Prevention Plan or as may be dictated by site conditions in order to maintain the intent of the specifications and permits.					1. Manufacturer and Model: Mueller Oriseal or approved equal.					2. Brass body, full threaded brass ball, rubber seats and stem seals, T-seal stem pre-drilled for control rod, AWWA compression inlet end, compression outlet with electrical ground connector, with control rod, extension box and valve key.					4. Infiltration into each section of sewer between adjoining manholes shall not exceed that allowed for the infiltration test, except that head conditions shall be a maximum of 6 feet.					F. The infiltration test may be limited to the manholes only when the authority having jurisdiction does not require the test and the construction manager waives the test. The infiltration test will always be required when excessive ground water is encountered in addition to the air test.					F. Wrap couplings and fittings of steel pipe with polyethylene tape and heat shrink over pipe in accordance with AWWA C105.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
		D. Deficiencies or changes on the drawings or Storm Water Pollution Prevention Plan shall be corrected or implemented as site conditions change. Changes during construction shall be noted in the Storm Water Pollution Prevention Plan and posted on the drawings.					2.3 FIRE HYDRANTS					A. Fire Hydrants: Type as required by utility company/Local Fire Department and as shown on Construction Drawings.					10. ASTM D3319 - Joints for Plastic Pressure Pipe Using Flexible Elastomeric Seals					H. Backfill trench in accordance with Section 02300.					I. Center and plumb valve box over valve. Set box cover flush with finished ground surface. Prevent shock or stress from being transmitted through valve box to valve.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
D		C. Owner has authority to limit surface area of erodible earth material exposed by clearing and grubbing, excavation, borrow and embankment operations and to direct Contractor to provide immediate permanent or temporary pollution control measures.					B. Hydrant Extensions: Fabricate in multiples of 6-inches with rod and coupling to increase barrel length.					12. ASTM F477 - Elastic Gaskets (Gaskets) for Joining Plastic Pipe					13. ASTM F1417 - Standard Test Method for Installation Acceptance of Plastic Gravity Sewer Lines Using Low-Pressure Air					J. Wrap valve and valve box with polyethylene tape and heat shrink or paint valves and valve boxes with red anti-rust primer and 1 coat of epoxy paint.					3.5 SERVICE CONNECTIONS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
		D. Maintain temporary erosion and sedimentation control systems as dictated by site conditions, indicated in the construction documents, or as directed by governing authorities or Owner to control sediment until final stabilization. Contractor shall respond to maintenance or additional work ordered by Owner or governing authorities immediately, but in any case, within not more than 48 hours if required at no additional cost to the Owner.					C. Hose and Steamer Connections: Match sizes with utility company, with two hose nozzles, one pump/nozzle.					D. Finish: Apply primer and 2 coats of enamel or special coating to color as required by utility company.					2.4 ACCESSORIES					A. Provide sleeve in foundation wall for gas service main. Caulk enlarged sleeve watertight.					B. Anchor service main to interior surface of foundation wall.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
		E. Contractor shall incorporate permanent erosion control features, paving, permanent slope stabilization, and vegetation into project at earliest practical time to minimize need for temporary controls.					A. Thrust Blocking: Place 2500 psi concrete to provide sufficient bearing area to transmit unbalanced thrust from bends, tees, caps, or plugs to undisturbed soil without loading undisturbed soil in excess of 2,500 pounds per square foot when water main pressure is 100 psi.					1. Section Includes: Project Record Documents:					1. Accurately record actual locations of pipe mains, valves, connections, and top of pipe elevations.					1.4 DELIVERY, STORAGE, AND HANDLING					A. Place tank legs on concrete pad, level within tolerance of 2 inches maximum.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
		F. Permanently seep and much cut slopes as excavation proceeds to extent considered desirable and practical.					MINIMUM THRUST BLOCKING BEARING AREAS (in square feet)					A. Coordinate work with termination of sanitary sewer connection outside building and connection to municipal sewer utility service.					2. Procedure: Mandrel shall be hand-pulled through flexible pipe sewer lines no earlier than 30 days after trench has been completely backfilled. Sections of sewer not passing mandrel shall be uncovered and regraded, reworked, or replaced to satisfaction of Owner or governing agency. Repaired section shall be retested.					3. SUBMITTALS					B. Deliver and store valves in shipping containers with labeling in place.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
		END OF SECTION 02370					<table><tr><th>Pipe Diameter</th><th>Tee's</th><th>90 Bend</th><th>45 Bend</th><th>22.5 Bend</th><th>Cap or Plug</th></tr><tr><td>3"</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1.5</td></tr><tr><td>4"</td><td>1</td><td>1</td><td>1</td><td>1</td><td>2</td></tr><tr><td>6"</td><td>1.5</td><td>2</td><td>1</td><td>1</td><td>3</td></tr><tr><td>8"</td><td>2.5</td><td>3.5</td><td>1.8</td><td>1</td><td>4</td></tr><tr><td>10"</td><td>4</td><td>5.5</td><td>2.8</td><td>1.5</td><td>6</td></tr><tr><td>12"</td><td>6</td><td>8</td><td>4</td><td>2</td><td>8.5</td></tr><tr><td>14"</td><td>8</td><td>11</td><td>5.5</td><td>3</td><td>12</td></tr><tr><td>16"</td><td>10</td><td>14.2</td><td>7</td><td>4</td><td>15</td></tr><tr><td>18"</td><td>21</td><td>21</td><td>12</td><td>6</td><td>24</td></tr></table>					Pipe Diameter	Tee's	90 Bend	45 Bend	22.5 Bend	Cap or Plug	3"	1	1	1	1	1.5	4"	1	1	1	1	2	6"	1.5	2	1	1	3	8"	2.5	3.5	1.8	1	4	10"	4	5.5	2.8	1.5	6	12"	6	8	4	2	8.5	14"	8	11	5.5	3	12	16"	10	14.2	7	4	15	18"	21	21	12	6	24	B. Locked mechanical joint fittings shall be installed where vertical changes in direction are required and, if approved by Owner and governing authority, can be installed in lieu of above thrust blocking requirements.					C. Polyethylene Encasement: Single layer of two ply cross-laminated high density polyethylene encasement per AWWA C105, Section 4.1.2, Type III, Class C (Black), Grade 33, tensile strength 5,000 psi minimum, elongation 100 percent, thickness nominal 0.004 inch (4 mil).					D. Trace Wire: Magnetic detectable conductor, (#12 Copper) brightly colored plastic covering imprinted with "Water Service" in large letters.					PART 2 - PRODUCTS					B. Prepare and grade an area outside the tank perimeter, for distance of 6 feet. Grade, place, and compact gravel fill to compacted depth of 3 inches minimum. Compact in accordance with Section 02300.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
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		SECTION 02375 - STONE PROTECTION					A. Verify that building service connection and municipal utility water main size, location, and depth are as indicated on Construction Drawings.					3.2 INSTALLATION - GENERAL					A. Connections with Existing Pipelines: Where connections are made between new work and existing piping, make connection using suitable fittings for conditions encountered. Make each connection with existing pipe at time and under conditions with least interference with operation of existing pipeline and in compliance with local utility company.					3.3 EXAMINATION					A. Place tank legs on concrete pad, level within tolerance of 2 inches maximum.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
		PART 1 - GENERAL					A. Section Includes: Rip-rap, bedding, and filter fabric for stone slope protection.					B. Related Sections: Section 02300 - Earthwork: Geotextile fabric					2.1 MATERIALS					A. Rip-Rap: Stone for rip-rap shall consist of field stone or rough unhewn quarry stone as nearly uniform in section as is practical. Stones shall be dense, resistant to action of air and water, and suitable for purpose intended. Unless otherwise specified, stones shall weigh between 50 and 150 pounds each, and at least 60 percent of stones shall weigh more than 100 pounds each.					B. Place rip-rap in areas where indicated on Construction Drawings.					D. Place stones so that greater portion of weight is carried by earth and not by adjacent stones. Place stones in single layer with close joints. Upright areas of stone shall make angle of approximately 90 degrees with embankment slope. Place courses from bottom of embankment upward, with larger stones being placed in lower courses. Fill open joints with spalls. Embed stones in embankment as necessary to present uniform top surface such that variation between tops of adjacent stones shall not exceed 3 inches.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
		END OF SECTION 02375					A. Verify that building service connection and municipal utility water main size, location, and depth are as indicated on Construction Drawings.					3.2 INSTALLATION - GENERAL					A. Connections with Existing Pipelines: Where connections are made between new work and existing piping, make connection using suitable fittings for conditions encountered. Make each connection with existing pipe at time and under conditions with least interference with operation of existing pipeline and in compliance with local utility company.					3.3 EXAMINATION					D. Place stones so that greater portion of weight is carried by earth and not by adjacent stones. Place stones in single layer with close joints. Upright areas of stone shall make angle of approximately 90 degrees with embankment slope. Place courses from bottom of embankment upward, with larger stones being placed in lower courses. Fill open joints with spalls. Embed stones in embankment as necessary to present uniform top surface such that variation between tops of adjacent stones shall not exceed 3 inches.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
		SECTION 02510 - WATER DISTRIBUTION					A. Verify that building service connection and municipal utility water main size, location, and depth are as indicated on Construction Drawings.					3.2 INSTALLATION - GENERAL					A. Connections with Existing Pipelines: Where connections are made between new work and existing piping, make connection using suitable fittings for conditions encountered. Make each connection with existing pipe at time and under conditions with least interference with operation of existing pipeline and in compliance with local utility company.					3.3 EXAMINATION					D. Place stones so that greater portion of weight is carried by earth and not by adjacent stones. Place stones in single layer with close joints. Upright areas of stone shall make angle of approximately 90 degrees with embankment slope. Place courses from bottom of embankment upward, with larger stones being placed in lower courses. Fill open joints with spalls. Embed stones in embankment as necessary to present uniform top surface such that variation between tops of adjacent stones shall not exceed 3 inches.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
		PART 1 - GENERAL					A. Section Includes: Project Record Documents:					1. Accurately record actual locations of pipe mains, valves, connections, and top of pipe elevations.					1.4 DELIVERY, STORAGE, AND HANDLING					A. Place tank legs on concrete pad, level within tolerance of 2 inches maximum.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
		1. SUMMARY					A. Section Includes:					1. Site water piping and fittings including domestic potable waterline and fire protection system supply waterlines, valves, and fire hydrants.					2. SUBMITTALS					A. Furnish 1 copy of results of meter test and hydrostatic pressure test to Owner, Owners Civil Engineering Consultant (CEC), and utility company upon completion of water distribution backfilling operations.					B. Project Record Documents:					1. Disinfection report: Record the following: a. Type and form of disinfectant used. b. Date and time disinfectant injection start and time of completion. c. Test locations. d. Initial and 24-hour disinfectant residuals (quantity in treated water) in ppm for each outlet tested. e. Date and time of flushing start and completion. f. Disinfectant residual after flushing in ppm for each outlet tested.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
		2.1 PIPE					A. Pipe sizes 3-inches and smaller for installation below grade and outside building shall comply with one or combination of following:					1. Seamless Copper Tubing: Type "K" soft copper, ASTM B88. a. Fittings: Wrought copper (95-5 Tin Antimony solder joint), ASME B16.22.					2. Polyvinyl Chloride (PVC) Water Pipe: Pipe, ASTM D 2241, with SDR 21 rating, continually marked with manufacturer's name, pipe size, cell classification, SDR rating, and ASTM D1784 material classification.					A. Pipe joints: Integrally molded bell ends, ASTM D2672. B. Cement primer: ASTM F656. c. Solvent cement: ASTM D2564.					3.5 SERVICE CONNECTIONS						A. Provide water service connection in compliance with utility company requirements including reduced pressure backflow prevention (if required) and water meter with by-pass valves and sand strainer.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
		3.6 FIELD QUALITY CONTROL					A. Test water distribution system pipe installed below grade and outside building in accordance with the following procedures:					1. Perform testing of pipe materials, joints, and other materials incorporated into construction of water mains and force mains to determine leakage and water tightness. In the event state or local code requires more stringent test, more stringent test shall take precedence.					2. Conduct piping tests before joints are covered and after concrete thrust blocks have hardened sufficiently. Fill pipeline 24 hours before testing and apply test pressure to stabilize system. Use only potable water. Test at not less than one-and-one-half times working pressure for two hours. Increase pressure in 50-psi increments and inspect each joint between increments. Hold at test pressure for 1 hour; decrease to 10 psi. Slowly increase again to test pressure and hold for 1 more hour. Maximum allowable leakage shall be 2 quarts per hour per 100 joints. Remake leaking joints with new materials and repeat test until leakage is within allowed limits.					B. Prepare reports of testing activities.					3. END SECTION																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
		SECTION 02535 - SANITARY SEWAGE SYSTEMS					PART 1 - GENERAL					1.1 SUMMARY					A. Section Includes:					1. Disinfection report: Record the following: a. Date issued, project name, testing laboratory name, address, and telephone number. b. Time and date of water sample collection. c. Name of person collecting samples. d. Test locations. e. Initial and 24-hour disinfectant residuals in ppm for each outlet tested. f. Coliform bacteria test results for each outlet tested. g. Certification that water conforms, or fails to conform, to bacterial standards. h. Bacteriologist's signature and authority.					2.2 VALVES					A. Ball Valves, 2-Inches and Smaller:					1. Manufacturer and Model: Mueller Oriseal or approved equal.					2. Brass body, full threaded brass ball, rubber seats and stem seals, T-seal stem pre-drilled for control rod, AWWA compression inlet end, compression outlet with electrical ground connector, with control rod, extension box and valve key.					2.3 FIRE HYDRANTS					A. Fire Hydrants: Type as required by utility company/Local Fire Department and as shown on Construction Drawings.					B. Hydrant Extensions: Fabricate in multiples of 6-inches with rod and coupling to increase barrel length.					C. Hose and Steamer Connections: Match sizes with utility company, with two hose nozzles, one pump/nozzle.					D. Finish: Apply primer and 2 coats of enamel or special coating to color as required by utility company.					2.4 ACCESSORIES					A. Thrust Blocking: Place 2500 psi concrete to provide sufficient bearing area to transmit unbalanced thrust from bends, tees, caps, or plugs to undisturbed soil without loading undisturbed soil in excess of 2,500 pounds per square foot when water main pressure is 100 psi.					MINIMUM THRUST BLOCKING BEARING AREAS (in square feet)					A. Coordinate work with termination of sanitary sewer connection outside building and connection to municipal sewer utility service.					2. Procedure: Mandrel shall be hand-pulled through flexible pipe sewer lines no earlier than 30 days after trench has been completely backfilled. Sections of sewer not passing mandrel shall be uncovered and regraded, reworked, or replaced to satisfaction of Owner or governing agency. Repaired section shall be retested.					3. SUBMITTALS					A. Project Record Documents:					1. Accurately record actual locations of pipe runs, connections, and invert elevations.					2. Identify and describe unexpected variations to subsoil conditions and location of uncharted utilities.					1.4 PROJECT CONDITIONS					A. Coordinate work with termination of sanitary sewer connection outside building and connection to municipal sewer utility service.					PART 2 - PRODUCTS					2.1 SEWER PIPE, FITTINGS, AND JOINTS					A. Polyvinyl Chloride Pipe (PVC): ASTM D 3034, rated SDR 35 unless otherwise specified by the utility company. Pipe shall be continually marked with manufacturer's name, pipe size, cell classification, SDR rating, and ASTM D 3034 classification.					1. Pipe joints: Integrally molded bell ends, ASTM D 3034, Table 2, with factory supplied elastomeric gaskets and lubricant.					2.2 PIPE ACCESSORIES					A. Pipe Joints: Mechanical clamp ring type, stainless steel expanding and contracting gasket for non-leaking seal.					B. Fittings: Same material as pipe molded or formed to suit pipe size and end design, in required tee, bends, elbows, cleanouts, reducers, traps, etc.					2.3 CLEANOUTS AND MANHOLES					A. Manholes shall conform to Section 02536.					B. Lid and Frame: Provide in accordance with Section 02536. Provide traffic grade and rated covers and frames where cleanouts and manholes are within pavement, with the letters "SSCO" or "SANITARY SEWER" respectively cast into the cover.					C. Shaft Construction: Cast iron shaft of internal diameter as specified on Construction Drawings with 2500 psi concrete collar for cleanouts.					2.4 APPURTENANCES					A. Trace Wire: Magnetic detectable conductor (#12 copper), brightly colored plastic covering, imprinted with "Sanitary Sewer Service" in large letters.					PART 3 - EXECUTION					3.1 EXAMINATION					A. Verify that trench cut and excavation is ready to receive work and excavations, dimensions, and elevations are as indicated on Construction Drawings.					3.2 PREPARATION					A. Hand trim excavations to required elevations. Correct over excavation with bedding material.					B. Remove large stones or other hard matter that could damage pipe or impede consistent backfilling or compaction.					3.3 BEDDING					A. Excavate trench and place bedding material in accordance with Section 02300.					3.4 INSTALLATION - PIPE					A. Install type and class of pipe as shown on the drawings. Pipes shall be laid and maintained to the required line and grade with necessary fittings, bends, manhole risers, cleanouts and other appurtenances placed at the required locations. The pipe shall be installed with uniform bearing under the full length of the barrel of the pipe. The pipe shall be inspected for defects and cracks before being lowered into the trench. Defective, damaged or unsound pipe, or that has had its grading disturbed after laying shall be taken up and replaced. Commence installation at lowest point with the bell end upgrade.					B. No pipe shall be laid in water or when trench conditions are unsuitable for work.					C. Pipe connecting to manholes or other structures shall terminate flush inside of the structure wall.					D. Joints for PVC and CSFP shall be thoroughly lubricated with an approved lubricant before pipe sections are slipped together. Open ends shall be fully protected with a stopper to prevent earth or other material from entering the pipe during construction. Carefully free interior of the pipe from dirt, cement and other deleterious material as the work progresses.					E. Maintain separation of potable water main from sewer piping at crossings a minimum of 10 feet horizontal and 18 inches vertical.					F. Install HDPE piping and fittings to AWWA C901 and C906. Butt fusion welded per ASTM D3361.					G. Route pipe in straight line parallel to roads, buildings and adjacent utilities and as shown on the drawings.					H. Establish elevations of buried piping with sufficient cover as recommended by pipe manufacturer to ensure not less than 3 feet of cover, except as noted on drawings.					I. Form and place concrete for thrust blocks at each elbow of pipe force main. See construction drawing for details of thrust block construction.					J. Backfill trench in accordance with Section 02300.					K. Install trace wire continuous over top of non-metal pipe. Bury 6 inches minimum below finish grade, above pipeline.					L. Make connections to existing piping and underground manholes.					1. Use commercially manufactured vye fittings for piping branch connections. Remove section of existing pipe; install vye fitting into existing piping, and excavate piping and underground manhole. (150 mm) overlap, with not less than 8 inches (150 mm) of concrete with 28-day compressive strength of 3000 psi (20.7 MPa).					2. Make branch connections from side into existing piping, NPS 4 to NPS 20 (DN 100 to DN 500). Remove section of existing pipe, leaving vye fitting into existing piping, and excavate piping and underground manhole. (150 mm) of concrete with 28-day compressive strength of 3000 psi (20.7 MPa).					3. Make branch connections from side into existing piping, NPS 21 (DN 525) or larger, or to underground manholes and structures by cutting into existing unit and creating an opening large enough to allow 3 inches (75 mm) of concrete to be packed around existing connection. Cut end of connection pipe passing through pipe or structure wall to conform to shape of and be flush with inside wall unless otherwise indicated. On outside of pipe, manhole, or structure wall, encase entering connection in 6 inches (150 mm) of concrete for minimum depth of 12 inches (300 mm) to provide additional support of collar from connection to undisturbed ground.					a. Use concrete that will attain a minimum 28-day compressive strength of 3000 psi (20.7 MPa) unless otherwise indicated.					b. Use epoxy-bonding compound as interface between new and existing concrete and piping materials.					4. Protect existing piping, manholes, and structures to prevent concrete or debris from entering while making lap connections. Remove debris or other extraneous material that may accumulate.					3.5 INSTALLATION - CLEANOUTS AND MANHOLES					A. Form bottom of excavation clean and smooth to correct elevation.					B. For cleanouts, form and place cast-in-place concrete base pad with provision for sanitary sewer pipe to be installed to proper elevations.					C. For manholes, construct inverts according to the following guidelines: 1. Invert channel shall be smooth and accurately shaped to a semicircular bottom to match with the inside of the adjacent sewer section.					D. Invert channels and structure bottoms shall be shaped with mortar and lean concrete.					E. Changes in size and grade of invert shall be made gradually and evenly.					F. Changes in the direction of the sewer entering branch or branches shall have a true curve of as large a radius as the manhole will permit.					D. For manholes, provide manhole rings, frame, and cover as shown on the construction drawings.					3.1 PRECAST MANHOLE CONSTRUCTION					A. Place base pad to proper elevation and location and trowel top surface level for placement of manhole barrel.					B. Place manhole barrel plumb and level to correct elevations and anchor to base pad.					1. After completion of slab foundation, lower first joint of manhole barrel into position, groove first, and set level and plumb on concrete base. Align and adjust to proper grade prior to placing and forming invert. Pour invert immediately after setting of first section of manhole barrel.					3.2 BEDDING					A. Magnetic detectable conductor, brightly colored plastic covering, imprinted with "Natural Gas Service" in large letters.					3.3 PREPARATION					1. Compressive Strength: 3500 psi at 28 days.					2. Reinforcement: ASTM A 615, grade 60 deformed reinforcing bars, and ASTM A 185 for wire fabric.					PART 3 - EXECUTION					3.1 INSTALLATION - PIPE					A. Install pipe in accordance with manufacturer's written recommendations.					B. HDPE-WT Pipe: Install pipe in accordance with pipe manufacturer's installation Guidelines for Culvert Storm Drainage Applications and as indicated on the drawings.					C. Lay concrete installation at the lowest point for each segment of the route. Lay RCP with the groove or bell end upstream.					3.2 BEDDING					A. Magnetic detectable conductor, brightly colored plastic covering, imprinted with "Natural Gas Service" in large letters.					3.3 PREPARATION					1. Compressive Strength: 3500 psi at 28 days.					2. Reinforcement: ASTM A 615, grade 60 deformed reinforcing bars, and ASTM A 185 for wire fabric.					PART 3 - EXECUTION					3.1 INSTALLATION - PIPE					A. Install pipe in accordance with manufacturer's written recommendations.					B. 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