E. Gate Valves:
1. When full open, the gate valves shall have a clear waterway opening equal to the nominal diameter of the pipe. Operating nut or wheel shall have an arrow cast in the metal indicating the direction of opening. Each valve shall have the manufacturer's distinctive marking, pressure rating and year of the manufacture cast on the body. Prior to shipment from the factory, each valve shall be tested by applying it to a hydraulic pressure equal to twice the specified working pressure.
a. Hydrostatic and leakage tests shall be conducted in strict accordance with AWWA C500 Section 28.

2. Gate Valves 2 1/2 inch and smaller: shall be all bronze valves and shall conform to the Fed. Spec. WW-V-54C, Class A, Type 1, and rated at 200 psi for water. Valves shall be handwheel operated with a union bonnet, solid wedge disc, threaded ends and a non-rising stem. The minimum weight of the valves shall be as follows:

Valve Size (inches)	Valve Weight (pounds)
1/2	1.2
3/4	1.7
1	2.7
1 1/4	3.9
1 1/2	5.2
2	9.0
2 1/2	13.8

3. Valve Joints: All gate valve joints shall have mechanical joint ends, flanged ends, or threaded ends to fit the pipe run in which they are to be used, except valve joints installed on slip joint pipe shall have mechanical joint ends unless otherwise specified.

F. Curb Stops: Curb Stops 3/4" and 1" in size shall be Mueller H-15200, Hays 5045, or Ford B21. Curb Stops 1 1/2" or 2" in size shall be Mueller H-15174, Hays 4005, or Ford B21.

G. Corporation Stops: Shall be Mueller H-15000 or Ford FB600.

H. Accessories:
1. Anchorages: Provide anchorages for tees, wyes, crosses, plugs, caps, bends, valves and hydrants. After installation, apply full coat of asphalt or other acceptable corrosion-retarding material to surfaces of ferrous anchorages.
a. Clamps, Straps, and Washers: Steel, ASTM A 197.
b. Rods: Steel, ASTM A 575.
c. Rod Couplings: Malleable-iron, ASTM A 197.
d. Bolts: Steel, ASTM A 307.
e. Cast-Iron Washers: Gray-iron, ASTM A 126.

PART 3 – EXECUTION

3.01 TRENCHING, BACKFILLING AND COMPACTION

A. Trenching, backfilling and compacting: In accordance with applicable requirements of Division Two Section 02200 – Earthwork.

3.02 INSTALLATION

A. The Contractor will tap existing lines and install meters.

B. Contractor to arrange and pay for Item A above.

C. Vertical clearance between sewer and water lines: Eighteen (18) inches minimum.

D. Installation of Valves:
1. Prior to installation, valves shall be inspected for direction of opening, freedom of operation, tightness of pressure containing bolting, cleanliness of valve ports and especially seating surfaces, handling damage, and cracks. Defective valves shall be replaced.
2. Valves, fittings and plugs shall comply with AWWA C500.
3. Install valves as indicated with stems pointing up.
4. Provide valve box over underground valves.

F. Thrust Blocks: Concrete, 3,000 psi. Provide on all tees, wyes and bends.

G. Valve Boxes: Provide as indicated, constructed of poured-in-place concrete, precast concrete, or Gray cast iron meeting the requirements of ASTM A48 for class 30 iron.

H. Flush and disinfect water system in accordance with AWWA C601.

3.03 TESTING

A. Upon completion of waterline construction, notify City of LaGrange Water Department and arrange for testing the system. The maximum allowable leakage shall be ten(10) gallons per inch of pipe diameter per mile of pipe per day.

B. Contractor to apply and pay for all fees and testing associated with installation.

END OF SECTION

SECTION 02700
SEWERAGE & DRAINAGE SYSTEM

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. General Conditions and Supplementary Conditions apply to this Section.

1.02 WORK INCLUDED

A. Sanitary Sewerage System.
B. Storm Sewer System.
C. Payment of all fees for service.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Erosion Control: Section 02100.

B. Trenching for Utility Systems: Section 02200.

1.04 QUALITY ASSURANCE

A. Applicable requirements of the following standards and codes:
1. Standard Plumbing Code with local amendments.
2. GDOT's "Standard Specifications for Construction of Roads and Bridges", Section 550 and 668.
3. American Society for Testing and Materials (ASTM):
C 828-80Low Air Pressure Testing for Wastewater Piping Systems
D 2321 Installation of Poly Vinyl Chloride (PVC) Plastic Pipe and Fittings
D 3034-89 Type PSM Poly Vinyl Chloride (PVC) Sewer Pipe and Fittings
D 1248-84 (1989) Specification for Polyethylene Plastics Molding and Extrusion Materials
D 2729-89 Poly Vinyl Chloride (PVC) Sewer Pipe and Fittings
F 405-89 Corrugated Polyethylene (PE) Tubing and Fittings

1.05 SUBMITTALS

A. Contractor or Applicator qualifications.

1.06 JOB CONDITIONS

A. Coordinate installation of sanitary sewer with City of LaGrange.

PART 2 – MATERIALS

2.01

General: Wye tees, reducing tees, wye couplings, increasers, crosses, transitions and endcaps of same type and class of material as piping unless otherwise noted.

C. Plastic Pipe: ASTM 2241, SDR 26; with elastomeric sealed joints in accordance with ASTM D3139

C. Sanitary Sewer Pipe: Shall be PVC with bedding type C as specified above.
1. Sanitary sewer services shall be PVC, Schedule 40 solvent welded pipe. All bends shall be long radius bends.
2. Suitable adaptors shall be provided to connect solvent welded pipe to bell and spigot wye at connection to main.

D. Storm Sewer:
a. Reinforced Concrete Pipe shall be Class III, complying with the requirements of Georgia DOT. Class of pipe shall be in accordance with "Standard Specifications," Section 843 and determined by the proposed height of fill above the pipe as shown on the drawings.
b. High Density Polyethylene Pipe (HDPE) shall be smooth lined, outside corrugated pipe conforming to the requirements of AASHTO M-294 TYPE "S" with molded bell/bell couplers.

E. Concrete Pipe Joints: Concrete pipe joints may be sealed through the use of O-Ring gaskets or preform plastic gaskets. Gaskets shall be installed in accordance with the manufacturer's recommendation.

F. Miscellaneous Drainage Structures: Miscellaneous drainage structures shall include, but not be limited to sanitary sewer manholes, storm sewer manholes, catch basins, drop inlets, yard inlets, and junction boxes. These structures may be precast concrete, poured-in-place or brick masonry.
1. Precast Concrete: All precast structures shall be cast at an Georgia DOT approved casting yard. Each unit shall bear the name or trademark of the manufacturer and the date it was cast, stenciled or otherwise placed thereon in such a manner as to be clearly legible at time of delivery. Each precast unit shall bear the stamp of an approved testing laboratory, or the Georgia DOT, as manufacturer. Precast units shall comply with the requirements of Georgia DOT.
2. Poured-in-Place: Poured-in-place structures shall comply with the requirements of Georgia DOT.
3. Brick: Brick shall comply with the requirements of Georgia DOT.
4. All covers, frames, grates, and steps shall be furnished in accordance with the details shown on the drawings.
5. Sanitary sewer invert channels shall be shaped to lines and grades shown on drawings, and the channel shall be smooth.

G. Mortar and Grout: Mortar and grout shall comply with the requirements of GDOT's "Standard Specifications," Section 834.03, except that where used with sanitary sewer manholes the mortar shall consist of one part cement to two parts mortar sand and the use of hydrated lime shall not be permitted.

H. Pipe Bedding: GDOT, "Standard Specifications," Section 207.

PART 3 – EXECUTION

3.01 TRENCHING, BACKFILLING, AND COMPACTION

A. Generally, excavate to the line and grade shown. The excavations shall not be carried closer than to within two inches of final grade until the pipe is ready to be installed. The remaining two inches shall be removed by fine graders just ahead of the pipe laying operation.

B. Backfilling from bottom of trench to a point at least one foot over the top of pipe barrel shall be placed by hand in six inch layers and thoroughly tamped into place around the pipe. Extreme care shall be exercised to the level one foot above pipe barrel to insure that no damage is caused to the pipe or that its alignment or grade is not disturbed in any way. Only clean materials may be used in this operation, clean earth (no rocks) sand or rock dust.

3.02 LAYING PIPE

A. Reinforced Concrete Pipe:
1. Reinforced concrete pipe shall be installed in accordance with the requirements of GDOT's "Standard Specifications," Sections 550. All pipe shall be laid to the line and grade called for on the plans. Each pipe shall be checked by the Contractor to insure that this result is obtained. The finished work shall be straight and shall be sighted through between manholes.
2. Each pipe shall be inspected for defect prior to being lowered into the trench and inside of pipe and outside of spigot shall be cleaned of any dirt or foreign matter.
3. Construction shall begin at the outlet end and proceed with spigot ends pointing in the direction of flow.
4. Completion of the pipe bedding and backfilling the remainder of the trench shall follow closely behind the laying of the pipe.

3.03 CONSTRUCTION OF DRAINAGE STRUCTURES

A. Construction of Drainage Structures: Drainage structures shall be constructed in accordance with the requirements of GDOT's "Standard Specifications," Sections 668 for precast or pour-in-place structures. Brick masonry structures shall comply with the requirements of Section 668. Structures shall be constructed to the sizes and shapes as shown on the Drawings. Frames and tops shall be set to the elevations as indicated on the Drawings.

3.04 INSTALLATION OF SEWERS

A. Install sewer lines in straight line and on uniform rate of grade between points where changes in alignment or grade are shown. Bed barrel of pipe firmly at required line and grade. Keep stopper in mouth of pipe when pipe-laying is not in progress. Set bell of pipe upstream. Support barrels of pipe continuously and scoop out space for proper clearance of bell.

B. After installed piping has been tested and inspected, backfill excavations with approved material tamped compactly in place per City of LaGrange requirements. Tamp carefully around pipe and above top of pipe in layers not exceeding six inches. Take care in backfilling not to disturb pipe.

C. Provide granular bedding on all PVC pipe. Provide granular bedding and deterring materials and methods necessary to facilitate installation.

3.05 CLEANING PIPES AND STRUCTURES

A. Clear interior of piping and structures of dirt and other superfluous material as job progresses. Maintain swab or drag in line and pull past each joint as it is completed.

B. In large, accessible piping, brushes and brooms may be used for cleaning.

C. Flush lines between manholes, if required, to remove collected debris.

3.06 TESTING

A. All sanitary sewer shall be tested by the Contractor and at his expense for deflection using a GO-NO-GO type mandrel or other approved method. The mandrel shall have an outside diameter of not less than 95% of the base inside diameter of the pipe. The maximum allowable deflection shall be 5%. Pipes with a deflection greater than 5% shall be replaced at the Contractor's expense.

B. All PVC sanitary sewers and services shall be marked with a continuous tracer tape, consisting of 6 piles of Copolymer Film bonded without adhesives, bearing a continuous message "Caution Sewer Line Buried Below". The tape shall be laid 6 inches above the installed pipe to facilitate location of the main.

C. Air Testing

1) General: On all Sanitary sewer mains and services, the Contractor shall conduct a line acceptance test using low pressure air. The air test shall be conducted after the pipe has been backfilled and the cost of air testing shall be included in other items of work. Equipment to be used in making the test shall be specifically designed for this purpose and shall be Cherne Air-Loc Equipment or approved equal. The Engineer shall be advised at least 48 hours before tests are conducted.

2) Procedure: All pneumatic plugs shall be seal tested before being used in the actual test installation. One length of pipe shall be laid on the ground and sealed at both ends with the pneumatic plug to be checked. Air shall be introduced into the plug to 25 psig. The sealed pipe shall be pressurized to 5 psig. The plugs shall hold against the pressure without bracing and without movement of the plugs out of the pipe.

After a manhole to manhole reach of pipe has been backfilled and cleaned, the plugs shall be placed in the line at each manhole and inflated to 25 psig. Low pressure air shall be introduced into this sealed line until the internal air pressure reaches 4 psig greater than the average back pressure of any groundwater that may be over the pipe. At least two minutes shall be allowed for the air pressure to stabilize. After the air pressure has stabilized to a minimum of 3.5 psig greater than the average back pressure from any groundwater over the pipe, the air hose from the control panel to the air supply shall be disconnected. The test shall be deemed "Acceptable" if the time required in minutes for the pressure to decrease from 3.5 to 2.5 psig (greater than the average back pressure of any groundwater over the pipe) shall not be less than the time shown for the given diameters in the following table:

Pipe Diameter in Inches	Minimum Time in Minutes
4	2.0
6	3.0
8	4.0
10	5.0
12	5.5
15	7.5
18	8.5
21	10.0
24	11.5

In areas where groundwater is known to exist, the Contractor shall install a one-half inch diameter capped pipe nipple, approximately 10-inches long through the manhole wall on top of one of the sewer lines entering the manhole. This shall be done at the time the line is installed. Immediately prior to the performance of the Line Acceptance Test, the groundwater shall be determined by removing the pipe cap, blowing air through the pipe nipple into the ground so as to clear it, and then connecting a clear plastic tube to the nipple. The tube shall be held vertically and a measurement of the height in feet of water over the invert of the sewer pipe shall be taken after the water has stopped rising in the tube. The measurement in feet shall be converted to psig by dividing it by 2.30. For example, if the height of water is 11.5 feet, then the added pressure will be 11.5/2.3=5 psig. This increases the test pressure from 3.5 psig to 8.5 psig and the minimum allowable residual pressure from 2.5 psig to 7.5 psig.

Should the line fail the pressure test, the Contractor shall, at his own expense, determine the source of leakage and make repairs as necessary. After repairs are made, the line shall be re-tested until deemed "Acceptable".

D. All PVC sanitary sewer services shall be installed in such a manner as to permit the passage of a television camera from the termination of the service to its connection with the sewer main. The contractor shall televise and record all sewer lines and services prior to acceptance.

END OF SECTION

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ENGINEER'S STAMP

GEORGIA REGISTERED No. 15300 PROFESSIONAL ENGINEER JAMES RANDALL STOTHARD

SIGNATURE REQUIRED

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REVISIONS

⚠	DATE	DESCRIPTION

PROJECT:

VERNON ROAD FIRE STATION

VERNON ROAD
LAGRANGE, GEORGIA

TITLE:

INDEX SHEET

MODIFIED DATE:

ISSUED DATE:
FOR BID AND PERMIT
20 APRIL 2018

JOB NO:
1731

SHEET:
C-14