

LOCATION: C:\2023\W230784 - ST\Engineering\Design\Drawn\W230784S1 - C900 - spec.dwg  
DATE/TIME: December 31, 2024 - 5:01pm  
PLOT/D: BT - sanitary

SANITARY SEWAGE SPECIFICATIONS

- PART 1 - GENERAL
1. SUMMARY
- 1.A. SECTION INCLUDES:
- 1.A.1. SANITARY SEWER DRAINAGE PIPING, FITTINGS, ACCESSORIES, CLEANOUTS, AND BEDDING.
- 1.A.2. CONNECTION OF SITE SANITARY SEWER SYSTEM TO MUNICIPAL SANITARY SEWER SYSTEMS.
- 1.B. RELATED REQUIREMENTS:
- 1.A.1. EARTHWORK: TRENCHING, BACKFILL, AND COMPACTION FOR UTILITIES
- 1.A.2. SEWER MANHOLES, FRAMES, AND COVERS
- 1.A.3. CAST-IN-PLACE STRUCTURAL CONCRETE
2. REFERENCES
- 2.A. THE PUBLICATIONS LISTED BELOW FORM A PART OF THIS SPECIFICATION TO THE EXTENT REFERENCED. PUBLICATIONS ARE REFERENCED WITHIN THE TEXT BY THE BASIC DESIGNATION ONLY.
- 2.B. ASTM INTERNATIONAL (ASTM)
- 2.B.1. ASTM A74 - CAST IRON SOIL PIPE AND FITTINGS
- 2.B.2. ASTM A746 - DUCTILE IRON GRAVITY SEWER PIPE
- 2.B.3. ASTM C425 - COMPRESSION JOINTS FOR VITRIFIED CLAY PIPE AND FITTINGS
- 2.B.4. ASTM C564 - RUBBER GASKETS FOR CAST IRON SOIL PIPE AND FITTINGS
- 2.B.5. ASTM C700 - VITRIFIED CLAY PIPE, EXTRA STRENGTH, STANDARD STRENGTH, AND PERFORATED
- 2.B.6. ASTM D2241 - POLY (VINYL CHLORIDE) (PVC) PRESSURE-RATED PIPE (SDR SERIES)
- 2.B.7. ASTM D2657 - HEAT-JOINING POLYOLEFIN PIPE AND FITTINGS
- 2.B.8. ASTM D3034 - TYPE PSM POLY (VINYL CHLORIDE) (PVC) SEWER PIPE AND FITTINGS
- 2.B.9. ASTM D3035 - POLYETHYLENE (PE) PLASTIC PIPE USING FLEXIBLE ELASTOMERIC SEALS
- 2.B.10. ASTM D3139 - JOINTS FOR PLASTIC PRESSURE PIPE USING FLEXIBLE ELASTOMERIC SEALS
- 2.B.11. ASTM D3261 - BUTT HEAT FUSION POLYETHYLENE (PE) PLASTIC FITTINGS FOR POLYETHYLENE PLASTIC PIPE AND TUBING
- 2.B.12. ASTM F477 - ELASTOMERIC SEALS (GASKETS) FOR JOINING PLASTIC PIPE
- 2.B.13. ASTM F1417 - STANDARD TEST METHOD FOR INSTALLATION ACCEPTANCE OF PLASTIC GRAVITY SEWER LINES USING LOW-PRESSURE AIR
- 2.C. AMERICAN WATER WORKS ASSOCIATION (AWWA):
- 2.C.1. AWWA C111 - RUBBER GASKET JOINTS FOR DUCTILE IRON PRESSURE PIPE AND FITTINGS
- 2.C.2. AWWA C600 - DUCTILE-IRON WATER MAINS AND THEIR APPURTENANCES
- 2.C.3. AWWA C900 - POLYVINYL CHLORIDE (PVC) PRESSURE PIPE, 4 IN. THROUGH 12 IN. FOR WATER DISTRIBUTION
- 2.C.4. AWWA C901 - POLYETHYLENE (PE) PRESSURE PIPE, TUBING AND FITTINGS 1/2 INCH THROUGH 3 INCHES, FOR WATER DISTRIBUTION
- 2.C.5. AWWA C906 - POLYETHYLENE (PE) PRESSURE PIPE AND FITTINGS, 4 INCH THROUGH 63 INCH, FOR WATER DISTRIBUTION
3. SUBMITTALS
- 3.A. PROJECT RECORD DOCUMENTS:
- 3.A.1. ACCURATELY RECORD ACTUAL LOCATIONS OF PIPE RUNS, CONNECTIONS, CLEANOUTS, AND INVERT ELEVATIONS.
- 3.A.2. IDENTIFY AND DESCRIBE UNEXPECTED VARIATIONS TO SUBSOIL CONDITIONS AND LOCATION OF UNCHARTED UTILITIES.
4. PROJECT CONDITIONS
- 4.A. COORDINATE WORK WITH TERMINATION OF SANITARY SEWER CONNECTION OUTSIDE BUILDING AND CONNECTION TO MUNICIPAL SEWER UTILITY SERVICE.
- PART 2 - PRODUCTS
1. SEWER PIPE, FITTINGS, AND JOINTS
- 1.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.A.1. PIPE JOINTS: INTEGRALLY MOLDED BELL ENDS, ASTM D 3034, TABLE 2, WITH FACTORY SUPPLIED ELASTOMERIC GASKETS AND LUBRICANT.
- 1.B. VITRIFIED CLAY PIPE (VCP): ASTM C700. USE ONLY IF REQUIRED BY LOCAL JURISDICTION.
- 1.B.1. FITTINGS: ASTM C700
- 1.B.2. JOINTS: ASTM C425
- 1.B.3. GASKETS: ASTM C425. GASKETS SHALL BE MANUFACTURED FROM HIGH GRADE, PROPERLY VULCANIZED ELASTOMERIC COMPOUND CONSISTING OF EITHER BASIC NATURAL OR SYNTHETIC RUBBER. GASKET MANUFACTURING TOLERANCES SHALL COMPLY WITH RUBBER MANUFACTURER'S ASSOCIATION TOLERANCES FOR GASKETS.
- 1.B.4. LUBRICANT: SUITABLE FOR LUBRICATING JOINT COMPONENTS; NO DETERIORATING EFFECTS ON GASKET OR PIPE MATERIAL, WILL NOT SUPPORT GROWTH OF FUNGI OR BACTERIA, AND SHALL BE OF TYPE RECOMMENDED BY GASKET MANUFACTURER.
- 1.C. FORCE MAIN:
- 1.C.1. HIGH-DENSITY POLYETHYLENE PIPE (HDPE): AWWA C901 AND C906, ASTM D3035, SDR 11 FOR 150 PSI PRESSURE RATING.
- 1.C.1.1. FITTINGS: MOLDED, AWWA C901 OR C906.
- 1.C.1.2. JOINTS: BUTT FUSION, ASTM D2657, FLANGED GASKET JOINTS AT INTERFACE
- 1.C.2. POLYVINYL CHLORIDE PIPE (PVC): FOR LESS THAN 4 INCHES IN DIAMETER, ASTM D2241 FOR PUSH-ON OR SOLVENT WELD JOINTS, AND FOR PIPE 4 INCHES IN DIAMETER AND LARGER, AWWA C900, CLASS 150 WITH PUSH-ON JOINTS.
- 1.C.2.1. JOINTS/FITTINGS: PUSH-ON, ASTM D3139 WITH ASTM F477 GASKETS.
- 1.C.2.2. SOLVENT CEMENT: ASTM D2654
- 1.C.3. DUCTILE IRON PIPE (DIP): ASTM A746, CLASS 50, INSIDE NOMINAL DIAMETER AS SHOWN ON THE DRAWINGS, BELL AND SPIGOT END.
- 1.C.4. DUCTILE IRON PIPE JOINT DEVICE: AWWA C111, RUBBER GASKET JOINT DEVICES
2. PIPE ACCESSORIES
- 2.A. PIPE JOINTS: MECHANICAL CLAMP RING TYPE, STAINLESS STEEL EXPANDING AND CONTRACTING SLEEVE, NEOPRENE-RIBBED GASKET FOR POSITIVE SEAL.
- 2.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.
3. CLEANOUTS AND MANHOLES
- 3.A. MANHOLES SHALL CONFORM TO SECTION 02536.
- 3.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.
- 3.C. SHAFT CONSTRUCTION: CAST IRON SHAFT OF INTERNAL DIAMETER AS SPECIFIED ON CONSTRUCTION DRAWINGS WITH 2500 PSI CONCRETE COLLAR FOR CLEANOUTS.
4. APPURTENANCES
- 4.A. TRACE WIRE: MAGNETIC DETECTABLE CONDUCTOR (#12 COPPER), BRIGHTLY COLORED PLASTIC COVERING, IMPRINTED WITH 'SANITARY SEWER SERVICE' IN LARGE LETTERS

- PART 3 - EXECUTION
1. EXAMINATION
- 1.A. VERIFY THAT TRENCH CUT AND EXCAVATION IS READY TO RECEIVE WORK AND EXCAVATIONS, DIMENSIONS, AND ELEVATIONS ARE AS INDICATED ON CONSTRUCTION DRAWINGS.
2. PREPARATION
- 2.A. HAND TRIM EXCAVATIONS TO REQUIRED ELEVATIONS. CORRECT OVER EXCAVATION WITH BEDDING MATERIAL.
- 2.B. REMOVE LARGE STONES OR OTHER HARD MATTER THAT COULD DAMAGE PIPE OR IMPEDE CONSISTENT BACKFILLING OR COMPACTION.
3. BEDDING
- 3.A. EXCAVATE TRENCH AND PLACE BEDDING MATERIAL IN ACCORDANCE WITH THE EARTHWORK SPECIFICATIONS.
4. INSTALLATION - PIPE
- 4.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 PIPE THAT HAS HAD ITS GRADE DISTURBED AFTER LAYING SHALL BE TAKEN UP AND REPLACED. COMMENCE INSTALLATION AT LOWEST POINT WITH THE BELL END UPGRADE.
- 4.B. NO PIPE SHALL BE LAID IN WATER OR WHEN TRENCH CONDITIONS ARE UNSUITABLE FOR WORK.
- 4.C. PIPE CONNECTING TO MANHOLES OR OTHER STRUCTURES SHALL TERMINATE FLUSH INSIDE OF THE STRUCTURE WALL.
- 4.D. JOINTS FOR PVC AND CISP 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.
- 4.E. MAINTAIN SEPARATION OF POTABLE WATER MAIN FROM SEWER PIPING AT CROSSINGS A MINIMUM OF 10 FEET HORIZONTAL AND 18 INCHES VERTICAL.
- 4.F. INSTALL HOPE PIPING AND FITTINGS TO AWWA C901 AND C906. BUTT FUSION WELDED PER ASTM D3261.
- 4.G. ROUTE PIPE IN STRAIGHT LINE PARALLEL TO ROADS, BUILDINGS AND ADJACENT UTILITIES AND AS SHOWN ON THE DRAWINGS.
- 4.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.
- 4.I. FORM AND PLACE CONCRETE FOR THRUST BLOCKS AT EACH ELBOW OF PIPE FORCE MAIN. SEE CONSTRUCTION DRAWING FOR DETAILS OF CONSTRUCTION.
- 4.J. BACKFILL TRENCH IN ACCORDANCE WITH SECTION 02300.
- 4.K. INSTALL TRACE WIRE CONTINUOUS OVER TOP OF NON-METAL PIPE. BURY 6 INCHES MINIMUM BELOW FINISH GRADE, ABOVE PIPELINE.
5. INSTALLATION - CLEANOUTS AND MANHOLES
- 5.A. FORM BOTTOM OF EXCAVATION CLEAN AND SMOOTH TO CORRECT ELEVATION.
- 5.B. FOR CLEANOUTS, FORM AND PLACE CAST-IN-PLACE CONCRETE BASE PAD WITH PROVISION FOR SANITARY SEWER PIPE TO BE INSTALLED TO PROPER ELEVATIONS.
- 5.C. FOR MANHOLES, CONSTRUCT INVERTS ACCORDING TO THE FOLLOWING GUIDELINES:
- 5.C.1. INVERT CHANNEL SHALL BE SMOOTH AND ACCURATELY SHAPED TO A SEMICIRCULAR BOTTOM TO MATCH WITH THE INSIDE OF THE ADJACENT SEWER SECTION.
- 5.C.2. INVERT CHANNELS AND STRUCTURE BOTTOMS SHALL BE SHAPED WITH MORTAR AND LEAN CONCRETE.
- 5.C.3. CHANGES IN SIZE AND GRADE OF INVERT SHALL BE MADE GRADUALLY AND EVENLY.
- 5.C.4. 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.
- 5.D. FOR MANHOLES, PROVIDE MANHOLE RINGS, FRAME, AND COVER AS SHOWN ON THE CONSTRUCTION DRAWINGS.
6. FIELD QUALITY CONTROL
- 6.A. FIELD QUALITY CONTROL SHALL BE CONDUCTED BY THE CONTRACTOR IN ACCORDANCE WITH SECTION 01452.
- 6.B. PIPES AND JOINTS SHALL NOT BE COMPLETELY BACKFILLED UNTIL AFTER INSPECTION, TESTING, AND APPROVAL BY THE OWNER AND LOCAL JURISDICTION.
- 6.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.
- 6.D. EXFILTRATION TEST
- 6.D.1. EACH SECTION OF SEWER LINE BETWEEN SUCCESSIVE MANHOLES SHALL BE TESTED BY CLOSING THE LOWER END OF THE SEWER TO BE TESTED AND THE INLET SEWER OF THE UPPER MANHOLE, USING STOPPERS.
- 6.D.2. FILL THE MANHOLE AND PIPE WITH WATER TO A POINT WHICH PRODUCES A MAXIMUM OF 3 FEET OF HEAD ABOVE THE INVERT OF THE SEWER AT THE CENTER OF THE UPPER MANHOLE, OR IF GROUNDWATER IS PRESENT, 3 FEET OF HEAD ABOVE THE AVERAGE ADJACENT GROUNDWATER LEVEL.
- 6.D.3. THE ALLOWABLE LEAKAGE SHALL BE 200 GAL/INCH OF PIPE DIAMETER/MILE/DAY
- 6.E. INFILTRATION TEST
- 6.E.1. IF EXCESSIVE GROUND WATER IS ENCOUNTERED IN THE CONSTRUCTION OF A SECTION OF THE SEWER, THE EXFILTRATION TEST SHALL NOT BE USED.
- 6.E.2. THE UPPER AND LOWER ENDS OF THE SEWER TO BE TESTED SHALL BE CLOSED SUFFICIENTLY TO PREVENT THE ENTRANCE OF WATER.
- 6.E.3. PUMPING OF GROUND WATER SHALL BE DISCONTINUED FOR AT LEAST 3 DAYS; THEN INFILTRATION SHALL BE TESTED.
- 6.E.4. INFILTRATION INTO EACH SECTION OF SEWER BETWEEN ADJOINING MANHOLES SHALL NOT EXCEED THAT ALLOWED FOR THE EXFILTRATION TEST, EXCEPT THAT HEAD CONDITIONS SHALL BE A MAXIMUM OF 6 FEET.
- 6.F. THE EXFILTRATION 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.
- 6.G. AIR TEST: GRAVITY SYSTEMS SHALL BE AIR TESTED BETWEEN MANHOLES AT 3.5 PSI FOR 5 MINUTES PER ASTM F1417 FOR PLASTIC PIPES.
- 6.H. ALL MANHOLES SHALL BE AIR TESTED IN ACCORDANCE WITH ASTM C1243-93 (STANDARD TEST METHOD FOR CONCRETE SEWER MANHOLES BY NEGATIVE AIR PRESSURE (VACUUM) TEST).
- 6.I. DEFLECTION TEST
- 6.I.1. DEFLECTION TESTS SHALL BE CONDUCTED ON ALL PLASTIC PIPE USING A MANDREL WITH A DIAMETER EQUAL TO 95 PERCENT OF THE INSIDE DIAMETER OF THE PIPE. THE TEST SHALL BE PERFORMED WITHOUT MECHANICAL PULLING DEVICES.
- 6.I.2. ALLOWABLE DEFLECTION: MAXIMUM ALLOWABLE PIPE DEFLECTION SHALL NOT EXCEED 5 PERCENT OF NOMINAL INSIDE DIAMETER.
- 6.I.3. MANDREL: MANDREL, GO-NO-GO, DEVICE SHALL BE CYLINDRICAL IN SHAPE AND CONSTRUCTED WITH EITHER 8 OR 16 EVENLY SPACED ARMS OR PRONGS. MANDRELS WITH FEWER ARMS WILL BE REJECTED AS NOT SUFFICIENTLY ACCURATE. CONTACT LENGTH OF MANDREL'S ARMS SHALL EQUAL OR EXCEED NOMINAL INSIDE DIAMETER OF SEWER TO BE INSPECTED. CRITICAL MANDREL DIMENSIONS SHALL CARRY TOLERANCE OF 0.01-INCH MAXIMUM. CONTRACTOR SHALL PROVIDE MANDREL AND NECESSARY EQUIPMENT FOR MANDREL TEST.
- 6.I.4. 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 REBEDDED, REROUNDED, OR REPLACED TO SATISFACTION OF OWNER OR GOVERNING AGENCY. REPAIRED SECTION SHALL BE RETESTED.
- 6.J. HYDROSTATIC TEST: FORCE MAIN PIPING SHALL BE HYDROSTATICALLY TESTED AT 150 PSI IN ACCORDANCE WITH AWWA C 600.
- 6.K. PROVIDE MEASURING DEVICES, METERS, WATER, MATERIALS, AND LABOR FOR MAKING THE REQUIRED TESTS.
- 6.L. TESTS SHALL BE CONDUCTED IN THE PRESENCE OF THE CONSTRUCTION MANAGER OR HIS DESIGNEE. TEST DATA SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW AND APPROVAL.
- END OF SECTION

NOTE: THE ENGINEER AND/OR OWNER DISCLAIM ANY  
ROLE IN THE CONSTRUCTION MEANS AND METHODS  
ASSOCIATED WITH THE PROJECT AS SET FORTH IN  
THESE PLANS.



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PER MISSOURI STATE LAW ADVANCE NOTICE: 2 WORKING  
DAYS (MISSOURI REVISED STATUTES, CHAPTER 319,  
GENERAL SAFETY REQUIREMENTS - SECTION 319.010)  
THROUGHOUT 319.020 SHALL BE KNOWN AS THE  
'UNDERGROUND FACILITY SAFETY AND DAMAGE PREVENTION  
(ACT)'

PROJECT NO.:	W23.0784
DRAWN BY:	BS
CHECKED BY:	JS
DATE:	08/28/2024
ISSUED FOR CLIENT REVIEW	08/13/2024
ISSUED FOR CITY OF OFALLON COMMENTS	08/28/2024
ISSUED FOR CITY OF OFALLON COMMENTS	10/18/2024
12/31/2024	
DAVID P. DOROKOWSKI E-22828 12/31/2024 CDA 2016054881	

PREPARED FOR:  
**HOTEL - CALEDONIA**  
LOT 4 AND 5, CALEDONIA CENTER, OFALLON, MO  
63368  
**SPECIFICATIONS**  
PART OF SECTION 13, TOWNSHIP-6 NORTH, RANGE 2 EAST, ST. CHARLES COUNTY, MO.  
SHEET NO.  
**C901**  
PROJECT NO.  
**W23.0784**

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