

CITY OF CAMERON

UTILITIES

WATER /SEWER

DESIGN GUIDELINES



April, 2006 (revised 5-29-07)

205 N. Main St.

Cameron, MO 64429

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Goals: This document is to provide guidance on the general requirements for water and sewer infrastructure. The purpose is to provide adequate fire protection (which lowers insurance costs), ample water quantity, quality and to achieve regulatory compliance, adequate sewer capacity and minimized sewer system inflow for Cameron residents.

These guidelines are not intended to cover every possible aspect of system design and construction. They are additional to requirements of the Missouri Department of Natural Resources Design Guide for Community Water Systems and the Clean Water Commission Chapter 8 Design Guide, and APWA Sections 2500 and 2900. It is the responsibility of the builder to obtain a competent, licensed engineer for the design and preparation of construction specifications and drawings and the required DNR permits. No construction is to take place prior to the developer/contractor securing all required permits, attendance at any required pre-construction meetings and receiving a notice to proceed from the City.

- 1) All mains must be looped, except for temporary dead-ends for future extension of the subdivision (extension must take place within two years of the construction of the dead-end line), or cul-de-sacs, where it can be shown by the developer's engineer that enough flow will exist to maintain water quality and adequate fire protection at the dead-end hydrant. All flow readings must be taken by the developer's engineer with prior approval of the water distribution supervisor and inspection by the Building Inspector. The water distribution supervisor may assist with taking flow readings, but the results must be field-verified by the engineer for design purposes.

A). The minimum fire flow for one-and two-family dwellings having a fire flow calculation area which does not exceed 3,600 square feet shall be 1,000 gallons per minute with a residual pressure of 20 psi.. Fire flow and flow duration for dwellings having a fire flow calculation area in excess of 3,600 square feet shall not be less than that specified in Table B105.1 of the most current edition of the International Fire Code.

B) All other developments: 2,000 gpm or more with 20 psi residual pressure as determined by the most current edition of the International Fire Code.

A hydrant must be placed on all dead-ends for flushing. Water mains must meet ASTM D-2241 200 Class, or AWWA specifications C- 900 DR 18, (4"-12") and

- C-905 for 14" and larger pipe, and have a minimum pressure class rating of 150 psi and a DR of 18 unless otherwise specified by the design engineer and approved by the City. The outside diameter shall be equivalent to cast iron pipe. Tracer wire required, installed with a minimum cover of 42 inches. All mains must be disinfected prior to being placed in service, according to AWWA specification for disinfection. A certification from the manufacturer that the pipe meets the above requirements shall be required.
- 2) All water and sewer mains extensions must extend to the farthest end of the lot being serviced. Service laterals may not extend across abutting properties, unless unusual circumstances require such installation. Prior approval must be received from the City.
 - 3) Tapping saddles are required on all PVC pipe. Contractor will set water service lines at a point in the project where the service line, stop box or meter boxes and all other appurtenances will not be accidentally moved or damaged by construction or other means. Bores may be necessary, as no new pavement will be cut for service line tie-ins.
 - 4) Contractor will provide and install the meter box, lid and loop, purchased from the City. The City will provide the water meter. Service lines are provided by the contractor and shall be Type K copper from the main to the meter loop.
 - 5) Distribution mains supplying residential areas shall form a grid iron pattern of mains at least 6" in diameter. Where lengths of main exceed 600 feet, 8" or larger intersecting mains shall be used. The minimum main size is 8" for commercial areas and 12" for industrial areas and will be required, unless it can be shown that a main of smaller size can produce adequate flow and fire protection for the commercial/industrial area. Residential cul-de-sacs with less than 6 homes require minimum main size of 6" and cul-de-sacs with 6 or more homes require minimum main size of 8".
 - 6) Cul-de-sacs longer than 150 feet from the curb line of the intersected street to the end of the right-of-way in the cul-de-sac shall have at least two fire hydrants, one at the intersecting street and one at the end of the water main in the cul-de-sac. A cul-de-sac less than 150 feet needs only a fire hydrant at the end of the main. Cul-de-sacs cannot be longer than 450 feet if they contain a dead-end main. See Figures W-1 and W-2.
 - 7) If there is no connecting City main that will supply enough water to meet the required fire flow in the new development, the developer will have the option of upsizing the City main to a point sufficient to supply the required flow, or providing sprinkler systems in accordance with the current published Fire Code. The developer may also request cost participation with the City for water main extensions, but this would be evaluated on a case-by-case basis and subject to fund availability.

- 8) The system must be equipped with a sufficient number of valves located so that a break does not affect 800' of mains in all districts except commercial, where the distance is ¼ mile of arterial mains affected.
- 9) Valves shall be Mueller or Kennedy brand gate valves unless otherwise specified by the City and meet the requirements of AWWA C550, AWWA C509, which shall be epoxy coated, iron body, resilient seated, non-rising stem valves. All valves shall have ends of standard mechanical joints, be assembled with stainless steel bolts and be mounted in vertical position. They shall be provided with double O-rings for sealing of the valve stem. They shall be equipped with two-inch square operating nuts and close on clockwise rotation. Valve boxes shall be cast iron, two-piece, screw-type with five and one-fourth (5 ¼) inch shaft for roadway service. The cover shall have the word "WATER" cast on its top. A certification from the manufacturer stating that all fittings and valves used in the installation meet these requirements shall be required. As an alternative, 6" PVC can be used out of the roadway, with Clay and Bailey 2194 valve box top. All valves shall be designed for operation and a working pressure of not less than two hundred pounds per square inch.
- 10) Mechanical Joint (MJ) fittings must be Tyler fittings.
- 11) Fire hydrants shall Mueller Centurion (painted red) and meet the requirements of AWWA C502. They shall be six-inch diameter hydrants with five and one-fourth (5 ¼) inch main valve openings, unless otherwise specified in writing by the City. They shall be equipped with dual two and one-half (2 ½) inch hose nozzles and one (1) size four and one-half (4 ½) inch pumper nozzle. They shall have a mechanical joint connection. All fasteners used below grade shall be stainless steel. Hydrants shall be of such length so that nozzles are at least fourteen (14) inches above ground and shall have replaceable "breakable" sections. Hydrant drainage shall be provided by placing around the hydrant, and below the top of the hydrant supply pipe, not less than 7 cubic feet of a mixture of two parts gravel retained on a three-fourths inch screen to one part coarse sand.
- 12) Fire hydrants are required every 500 feet maximum spacing in all single family and duplex developments and at the farthest end of any dead-end main.

SANITARY

Sewer system shall be in conformance with APWA Section 2500, and any additional requirements listed herein. In addition, see the attached standard details.

Manhole frame and lid shall be Clay & Bailey (#2007) or equivalent, minimum class 35, with lids marked "Crossroads of the Nation" on the top section, and "Cameron, Missouri" on the lower section, with the city logo in the center.

1. Manholes shall be pre-cast concrete, ASTM C-478, unless other material is approved by the City.
2. Manhole joints shall be rubber ring gasketed and have an inside diameter of at least 48 inches.
3. Sanitary manholes shall be designed without steps or holes for steps.
4. The maximum distance allowed between manholes is 400 feet for sewers 15" diameter or less, and 500 feet for larger sewers.
5. Manholes with sewer force mains discharging into them and other manholes, that if in the opinion of the City could be adversely affected by corrosive gases shall be fiberglass lined. Fiberglass liners shall be of the integral corbel polyester wound design to meet the ASTM D3753 specification for a minimum 16,000 lb. wheel load capacity. Liners shall be full interior length, and full inside diameter. Liner shall include a fiberglass corbel. Liner and corbel to have minimum 3/8" thickness.

Strong Seal, or equal methods of lining the manhole(s) will be considered as an alternative to an insert, depending upon application.

6. Laterals shall be a minimum of 4" diameter PVC and WYE connect to the main. Contractor must submit in the as-built plans, specific WYE locations, and lengths of laterals. All lateral lines stubbed across streets must extend beyond water main and storm sewer. All ends of lateral lines must be stubbed up a maximum depth of nine feet at lateral end and marked with PVC pipe or wooden 2 X 4 extended 2' above ground.
7. Sewer pipe must conform to APWA section 2500, and for installation depths greater than 15 feet, the pipe thickness must be established by the engineer, based on the specific local soil and laying conditions of the pipe. In no case, will wall thickness be less than SDR 26. It may be thicker, depending on the engineer's determination.

8. Force Mains

- a. Force mains shall be 4" minimum, AWWA C-900 PVC DR14, or corrosion resistant ductile iron, AWWA C-151, Class 52, with factory applied lining designed to resist hydrogen sulfide.
- b. Force main cleanout/emergency pump connection (at least the same diameter as the force main pipe) is required with a minimum 4" access.
- c. Bends in sanitary force main shall be by restrained joint ductile iron fittings restrained in accordance with manufacturer's recommendations. Sanitary sewer force main shall be installed with locating tracer wire. Tracer wire shall be insulated THNN, 12 gauge copper wire. All wire shall be joined by use of wire clamps. These connections shall be sealed and taped to create a watertight connection. Tracer wire shall be secured to the top of the main by tape a minimum of 3 times in each standard length of pipe. Tracer wire shall be looped to the top of valve boxes for access, surface at intervals of 300 feet, protected by access pipe and at ends for conductivity.
- d. The manhole accepting the force main, shall be fiberglass lined, or lined with an acceptable corrosion-resistant material, such as Strong Seal or equal. Fiberglass liners shall meet the ASTM D 3753 specifications. Liners shall be full interior length and full inside diameter. Liner shall have a fiberglass corbel. Liner and corbel to have minimum 3/8 inch thickness.
- e. Piping for air release valves (if needed) shall be saddle-tapped to PVC force mains. Manufacturer's shop drawings and proposed installation piping/manhole drawings shall be submitted to the City for approval prior to construction.



Clay & Bailey Manhole Lid #2007