

**CITY OF NEWTON, KANSAS**

**DESIGN STANDARDS  
FOR WATERLINE IMPROVEMENTS**

**APRIL 2005**

THE CITY  
OF  
NEWTON, KANSAS

STANDARD ENGINEERING DESIGN CRITERIA  
AND  
GENERAL IMPROVEMENT POLICY

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THE CITY OF NEWTON, KANSAS  
STANDARD ENGINEERING DESIGN CRITERIA  
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GENERAL IMPROVEMENT POLICY

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**CITY OF NEWTON, KANSAS**

**STANDARD SPECIFICATIONS**

**FOR**

**WATERLINE IMPROVEMENTS**

**APRIL 2005**

| <b>No.</b> | <b>Revision</b> | <b>Date</b> |
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## I. GENERAL

### A. Purpose

The City of Newton is striving to provide uniformity in construction efforts involving public works. To accomplish this it is important that initial design comply with established standards and specifications approved by the City. In addition to initial design, there are many construction activities that will be performed which will not require design and construction documents, which must also comply with uniform City standards. The following document will serve as the standard guideline for all public works construction.

### B. Scope

This document includes design criteria and typical construction details for Water Systems. In addition a brief material specification will be outlined.

### C. Variation from Design Criteria

Variations will be permitted from the Standard Engineering Design Criteria and General Improvement Policy when a formal request is made to the City. The request will involve the following:

1. List any and all variations being requested.
2. Provide a justification for each variation in writing. In the case of a detail, provide a sketch or an engineered drawing indicating the modification requested.
3. Request a formal meeting with the City to discuss the suggested variation.
4. Obtain in writing an approval of the modification.

Special circumstances may be encountered where a specific item is not included in the Standard Engineering Design Criteria and General Improvement Policy. If

this occurs, a formal request shall be made to the City and shall meet the requirements as shown above for a variation.

D. Compliance with Applicable Statutory Requirements

Compliance with all Federal, State and Local Laws will be required. Where permits are required by Federal, State and Local Agencies, the Project Owner will be required to complete all filing, pay all fees, and obtain an approved permit. All information including maps, plans, specifications, etc., required to obtain an approved permit shall be provided to the City. Traffic control for all projects shall be established and shall conform to the latest version Manual on Uniform Traffic Control (MUTCD).

E. Amendment to Standard Engineering Design Criteria

Amendments to the Standard Engineering Design Criteria and General Improvement Policy will be approved by the City. The Amendments will be made available by the City for insertion into this document. It is the responsibility of the holder of this document to assure themselves that they have all the amendments or a current document.

F. General Development Plan or Plat

Any development plan or proposed plat shall be submitted to the City with utilities and pavement generally located within the boundary of the plan or plat. For plats the utilities will be located within dedicated easements and right-of-ways. The general development plan or plat shall show preliminary elevations for all sanitary sewers, streets, and storm drainage conveyance systems. In addition, the project owner for a plat shall submit a four corner lot grading plan indicating elevations at each corner for the subdivision that is being developed. The four corner lot grading plans will be placed on file with the City and will be reviewed during requests for building permits.

## V. WATER SYSTEM CRITERIA

### A. General

Design of water systems shall meet the Policies, General Considerations, and Design Requirements for Public Water Systems in Kansas, as established by the Kansas Department of Health and Environment (KDHE) and shall also meet the requirements of the City of Newton Design Standards as herein outlined. Prior to submittal to KDHE, the designer shall provide the City with two sets of Office Copy plans for review and comment. The designer shall submit a Public Water Supply Permit as required along with plans, specifications, and two extra plan and specification covers to KDHE and must obtain approval prior to the bid letting. The requirement of submitting a Public Water Supply Permit may be waived by KDHE for projects with less than 5,280 feet of total length of water line.

### B. Water Line Materials and Design

Approved pipe material for use on water lines shall include Ductile Iron Pipe (DIP).

#### 1. Ductile Iron Pipe

DIP shall be minimum thickness class 52 and shall be cement lined and seal coated with an approved bituminous seal coat in accordance with AWWA C-104. Polyethylene encasement shall be provided for a DIP and fittings.

## 2. PVC Pipe

The use of PVC pipe for waterline construction may be allowed only with prior approval by the City of Newton. PVC pipe 4" and larger shall be AWWA C-900, pressure class 150 pipe. Fittings for use with DIP or PVC pipe shall be CICL or DICL conforming to AWWA C110. Compact fittings may be used conforming to AWWA C153.

## 3. Design Considerations

The minimum depth of cover for all water lines shall be 42". Minor deflections of PVC pipe shall be made through the use of couplings. The maximum deflection shall not exceed 4°. High points in the profile of water lines shall be minimized. High points shall be located where fire hydrants or other outlets are located. Detectable metallic tape shall be placed over all water lines constructed. The tape shall be blue with a warning message of "CAUTION - BURIED WATERLINE BELOW" being included on the tape. All PVC waterlines shall include tracer wire installed for future locating of the waterlines.

## 4. Water Line Sizing

Water lines shall be sized based on peak demands from the service area. Minimum diameter of public water lines will be 4". Water lines serving fire hydrants or fire protection systems shall be a minimum of 8" in diameter.

## 5. Water Line Location

Water lines shall typically have an 8' offset off property lines, and shall be located within public street right-of-way. If required, easements shall be obtained for installation and maintenance purposes. Any water line

locations which are not in public street right of way shall be approved by the City. Water lines shall typically be located on the north and east portions of right of ways and easements.

## 6. Testing

All completed water lines shall be subjected to a pressure and leakage test. The pressure test consists of the water line being subjected to the rated working pressure of the pipe installed (typically 150 psi) for a period of 1 hour. A two hour leakage test will follow the pressure test. An approved leakage test will consist of an allowable leakage quantity not being exceeding in the two hour time period. The allowable leakage is calculated based on the following equation:

|                   |  |
|-------------------|--|
| PVC Pipe          | $L = 0.0001351 (N) (D) (P)^{1/2}$      |
| Ductile Iron Pipe | $L = 0.0000075 (S)(D)(P)^{1/2}$        |
|                   | L = Allowable Leakage (gal/hr)         |
|                   | D = Nominal Pipe Diameter (in)         |
|                   | P = Pressure (PSIG)                    |
|                   | S = Length of Pipe Tested (ft)         |
|                   | N = Number of joints in tested section |

## 7. Disinfection

All completed water lines shall be flushed and disinfected per AWWA C601. Waterlines shall be disinfected by the "continuous feed" method. A chlorine concentration of 50 mg/l shall be introduced into the newly constructed water line. The chlorinated water shall remain in the water line for a 24-hour period. At the end of the 24 hour period, the residual chlorine concentration shall be 25 mg/l (minimum). The water lines shall

then be flushed so the final chlorine concentration in the water line is less than 1 mg/l.

C. Trench and Backfill Requirements

Approved material includes UD-1 meeting KDOT Standard Specifications or ASTM C-33 Size No. 67 crushed rock (granular) material. Approved backfill material includes approved granular material (sand) free from debris, organic material and stones with 100% passing thru 3/4" sieve or compacted earth.

1. Trenching through Pavement

Pavement shall be saw cut in a neat line and replaced to a depth of 1 1/3 times the original pavement thickness. The replaced pavement shall be widened a minimum of 12" each way from the trench limits.

2. Backfilling Under Pavement

Pavement backfill material shall be compacted sand or excavatable flowable fill as approved by the City. The material shall be backfilled to a level 2' from the bottom of pavement.

3. Pipe Zone Backfilling

Class B bedding shall be used for flexible pipe. Class C bedding shall be used for rigid pipe. If wet conditions are encountered, Class B or C improved bedding shall be utilized.

#### 4. Protective Fill

Protective fill shall be provided during construction where the cover over the proposed water line is less than 2 feet. Protective fill shall be placed and compacted in place prior to construction of the water line. The completed waterline shall have a minimum cover of 42".

#### D. Fire Hydrants, Valves and Appurtenances

Water line fire hydrants, valves, appurtenances shall meet all requirements as established by AWWA, and as set forth in the City of Newton Design Standards as herein outlined.

##### 1. Fire Hydrants Assembly

Fire hydrants shall be Mueller Centurion A-423. The fire hydrant assembly shall include an MJ Anchor Tee, 6" MJ Gate Valve, 6" Valve box, and a variable length of 6" DICL. Fire hydrant spacing shall be a maximum of 400'. Fire hydrants shall be located near intersections and within 3-8 ft from existing or proposed curbs/edge of road.

##### 2. Valves

Resilient Seat Gate Valves meeting AWWA C509 with a non-rising stem and square operating nut shall be furnished for use on 12" water lines and smaller. Gate valves shall be as manufactured by Mueller or AVK. Valves greater than 12" shall be Butterfly valves meeting AWWA C504.

Anchored valve assemblies shall include the use of an MJ Anchor Coupling for pipes 12" and smaller. For larger pipes, restrained joints shall be used as thrust restraint for the anchored valve.

3. Valve Boxes

Valve boxes shall be cast iron with lock type cover extension with a screw type adjustment. Valve boxes shall be 4" diameter with a flared base. Wall thickness shall be 3/16" thick. Valve box tops shall be set flush with proposed grade.

4. Blow-Off Assembly

Blow off assemblies shall be provided at the end of water lines only with prior approval from the City. The designer shall minimize the use of blow off assemblies by installation of fire hydrants in locations that will require air release or flushing of the water lines in lieu of blow off assemblies.

E. Protection of Water Supplies

When potable water pipes and sanitary sewers are laid parallel to each other, the horizontal distance between them shall be not less than 10 feet. The laying of water pipes and sanitary sewers shall be in separate trenches with undisturbed earth between them.

When a water pipe and a sanitary sewer cross and the sewer is 2 feet or more (clear space) below the water pipe, no special requirements or limitations are provided herein. At all other crossings, the sanitary sewer is to be constructed of Ductile Iron, PVC, or Reinforced Concrete pipe, meeting the requirements specified in Section 02605 – Sanitary Sewer Construction.

Joints in the sewer pipe shall be located as far as practical from the intersected water main. A distance of 10 feet is to be maintained as the distance of a sewer joint to the water line.

Where a water main is laid across or through an area where there is an existing sanitary sewer, which is not constructed of one of the above specified materials, and is two feet (2') or less below the water pipe, the existing sanitary sewer shall

be encased with reinforced concrete with a minimum of six to eight inches (6" to 8") thickness for a ten-foot (10') distance on each side of the crossing of the crossing or the crossed section of sewer replaced to meet the above specified construction requirements. If the water pipe is below the sanitary sewer, regardless of clear space, the sanitary sewer shall be reinforced concrete encased for a distance of ten feet (10') each way from the water line crossing.

F. Thrust Blocks

All plugs, caps, tees, and bends deflecting 11 1/4° or more shall be provided with thrust restraint. The approved method for thrust restraint will be through the use of concrete reaction backing. The concrete reaction backing shall be placed between undisturbed earth and the fitting to be restrained. The thrust restraint shall be designed to overcome the resultant force at the fitting at the test pressure of the pipe or the surge pressure, whichever is greater. As an alternate, other restraint methods may be used with prior approval from the City.

G. Partial List of Bid Items

To the extent possible, standard bid items shall be used in designing and bidding projects. Additional bid items will occasionally be necessary due to the varying nature of projects. A partial list of common bid items and their units of measurement are listed here for information.

|  |          |
|--|----------|
| X" Waterlines                            | Lin. Ft. |
| Fire Hydrant Assembly                    | Each     |
| X" Valve Assembly                        | Each     |
| X" Anchored Valve Assembly               | Each     |
| X" x X" tapping Sleeve and Valve         | Each     |
| X" (min) Boring and Steel Casing Pipe    | Lin. Ft. |
| Asphalt Pavement Removal and Replacement | Lin. Ft. |
| Site Clearing and Restoration            | Lump Sum |
| 2" Blowoff Assembly                      | Each     |

#### H. Erosion Control

All projects shall incorporate the use of best management practices to reduce erosion on the project and eliminate discharges of pollutants from the project site. Erosion control measures shall include the use of hay bale dams/silt fences and temporary seeding and mulching. Temporary seeding shall include the use of rye grass and shall be applied within 14 days after the area was disturbed, unless permanent seeding is performed within this time frame. All applicable requirements for the NPDES storm water pollution prevention shall be met. This will include a pollution prevention plan and storm water permit be prepared and submitted to the Kansas Department of Health and Environment if the disturbed construction area exceeds the requirements.