

**CITY OF NEWTON, KANSAS**

**DESIGN STANDARDS**

**FOR SANITARY SEWER IMPROVEMENTS**

**APRIL 2005**

THE CITY  
OF  
NEWTON, KANSAS

STANDARD ENGINEERING DESIGN CRITERIA  
AND  
GENERAL IMPROVEMENT POLICY

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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.

#### **IV. SANITARY SEWER DESIGN CRITERIA**

##### **A. General**

Design of sanitary sewer systems shall meet the Minimum Standards of Design for Water Pollution Control Facilities as established by the Kansas Department of Health and Environment (KDHE) and shall also meet the requirements of the City of Newton.

Prior to submittal to KDHE, the designer shall provide the City with two sets of Office Copy plans for review and comment. Following Newton's review, the designer shall submit a sanitary sewer extension permit along with plans, specifications, and two extra plan and specification covers to KDHE and must obtain approval prior to the bid letting.

##### **B. Sanitary Sewer Pipe Materials and Design**

Approved pipe material for use on sanitary sewers shall include Ductile Iron Pipe and PVC pipe.

###### **1. Rigid Gravity Sewer Pipe**

###### **Ductile Iron Pipe**

Ductile Iron Pipe for use on gravity sanitary sewers shall be minimum thickness class 52. The Ductile Iron Pipe shall be lined with a chemically inert liner such as "Polybond, Plus", "Protecto 401" or approved equal. All exterior surfaces of Ductile Iron pipe shall be coated with an approved bituminous material (AWWA C-104). All exterior surfaces of Ductile Iron Pipe inside structures, vaults, or manholes shall be provided with shop applied primer and epoxy coating (Tnemec Series 66 Hi-Build Epoxy or

approved equal). All buried ductile iron pipe/fittings shall be incased with polyethylene tube meeting the requirements of AWWA C-105.

2. Flexible Gravity Sewer Pipe

Polyvinyl Chloride Pipe for use on gravity sanitary sewers will include the use of ASTM D-3034, SDR35 PVC Pipe for pipes 8" or longer. Pipe joints shall be elastomeric seals meeting requirements of ASTM D-3212. All pipe and fittings less than 8" in diameter shall be Schedule 40 PVC pipe, meeting the requirements of ASTM D1785.

3. Sanitary Sewer Pipe Slopes

Minimum pipe slopes for sanitary sewers shall be utilized to maintain a minimum velocity of 2 ft/s of the wastewater. Minimum pipe slopes are listed below:

<u>Pipe Diameter (Inches)</u>	<u>Slope (%)</u>
8	0.40
10	0.25
12	0.20
15	0.15
18	0.12
21	0.10
24	0.08

A slope of 0.3% may be used with 8" PVC Pipe with prior approval by the City.

4. Sanitary Sewer Capacity

Sanitary sewers shall be sized to carry the design flow when running 2/3 full for pipes 18" and smaller. Sanitary sewers shall be designed to carry all pre-existing flows plus additional capacity for peak future flows plus an allowance for infiltration. Calculated flows from future developments

should include population density per acre, with a projected domestic flow of 100 gallons per capita-day, with a minimum peaking factor of 3.

5. Testing

All sanitary sewers (gravity) shall be air tested to 4 psi. The pipe between manholes will be accepted if the maximum drop after 4 minutes for 8" pipe is less than 1 psi. (5 minutes - 10", 5.5 minutes - 12", 7.5 minutes - 15", and 8.5 minutes - 18"). Air testing for PVC sanitary sewers shall meet the requirements of Table 2 of ASTM F1417.

All flexible sanitary sewers (gravity) shall be tested for deflection by pulling a mandrel through the pipe. Maximum deflection shall not exceed 5% of the internal diameter.

6. Video Inspection

All sanitary sewers 8" diameter and larger shall be televised by the City prior to acceptance.

C. Trench and Backfill Requirements

Approved pipe bedding 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 level, 2' from the bottom of pavement.

3. Pipe Zone Backfilling - (See Figures IV-1 and IV-2)

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.

D. Manholes - (See Figure IV-3)

Approved manholes for use with sanitary sewer construction shall be a minimum of 4 ft. inside diameter with 5" thick reinforced walls. Precast reinforced concrete manholes shall conform to the latest revision of ASTM C-478.

Manholes shall be provided with a minimum 8" thick precast base, constructed on an 8" thick crushed rock base. All pipe penetrations shall be provided with A-LOK gaskets for pipe connections to manholes. If a manhole is to be constructed over an existing pipe, a 12" reinforced cast in place base will be required, with the bottom section of the precast manhole extending into the base a minimum of 4". Any pipe connections to manholes that are not made with an A-LOK gasket shall be concrete encased a minimum of 3 feet from the manhole wall.

All manhole joints shall be sealed with 2 wraps of mastic or other approved gasket material.

1. Frame and Cover

Manhole frame and cover shall be Deeter No. 1261 meeting the requirements of ASTM A-48, Class 30.

2. Manhole Coatings

The interior of manholes shall be coated with 2 coats of Tnemec Series 66 Hi Build Epoxy or equal. The interior coating may be applied prior to shipment of precast sections. Exterior coating of manholes shall include 1 coat of Valsper Hi-Build Bituminous coating 35-J-10, Tnemec 46-450 Heavy Tnemecol or equal. Exterior coatings shall be applied after manholes have been stacked and have passed the vacuum test.

3. Manhole Testing

All manholes shall be vacuum tested prior to backfill. Pipe penetrations shall be plugged and braced prior to vacuum testing. The completed manhole (stacked manhole including adjustment rings) with the exception of exterior coating and backfill shall be included in the test.

The vacuum test will consist of creating a vacuum of 10 inches of mercury by pumping air out of the manhole. An approved test will consist of achieving less than 1 inch of Mercury drop in vacuum in a 2 minute time period.

E. Manhole and Sanitary Sewer Locations

Offset distances for sanitary sewer from property lines shall typically be 5'.

Sanitary sewers shall typically be located on the south and west portions of utility easements.

F. Protection of Water Supplies

Sanitary sewers laid parallel to water lines shall maintain a minimum horizontal distance of 10 feet between the sanitary sewer and water lines. When a water line and sanitary sewer cross and the sanitary sewer is 2 feet or more below the water line, no special attention is needed. At all other crossings, the sanitary sewer shall be constructed of an approved pipe material with gasketed joints. One full length pipe section shall be centered at the water line crossing. The sanitary sewer shall also be concrete encased a minimum of 10 feet each way from the proposed crossing.

G. Easement Requirements - (Figure IV-6)

All sanitary sewers shall be constructed in easements. The minimum width of the easement is 20 feet, whether it is a utility easement or a sanitary sewer easement. Easements shall be obtained for sanitary sewer construction.

Access to manholes shall be evaluated and any additional required easements shall be obtained for maintenance purposes. Utility easements shall be graded as part of the sanitary sewer construction. The easement grades shall be established based on an approved drainage plan.

H. Sanitary Sewer Service Connections

Sanitary sewer service connections shall be provided for all lots that are to be serviced. Service connections will include either a 4" or 6" stub from a manhole,

or an 8" x 4" or 8" x 6" saddle tee (see Figure IV-4). If a service connection is greater than 12' deep, (measured from finished ground to flow line of the lateral) riser pipe shall be extended to 8' below proposed grade (see Figure IV-4a).

If one or two residential lots are required to be serviced and no future extension of the sewer is necessary, the lots may be serviced with an 8" x 4" in-line wye with an 8" cleanout assembly constructed on the end of the line (see Figure IV-5). A cleanout may be provided only if the total length to the nearest downstream manhole is less than 150 feet.

#### I. Force Main Construction

Approved pipe material for use on sanitary sewer force mains will include Ductile Iron Pipe or PVC AWWA C900 pressure Class 100 pipe. Ductile Iron Pipe shall be pressure Class 150 (min), cement lined and seal coated with an approved bituminous seal coat in accordance with AWWA C-104, and polyethylene encased.

Force mains constructed inside structures, vaults, or manholes shall be flanged Ductile Iron pipe with an approved epoxy coating.

High points shall be minimized in the profile of sanitary sewer force mains. Provisions shall be made in the design to remove air from high points in the force main.

#### J. Wastewater Pump Stations

Pump design shall include a minimum of two pumps, each with the capacity to handle the projected peak flows from the service area. All pump stations shall include a backup power source which typically includes the use of a natural gas powered generator. Smaller pump stations serving residential units may be a

factory built vacuum primed pump station module, as manufactured by Smith and Loveless. This type of pump station shall be wet well mounted above grade. Other pump stations will include centrifugal and submersible pump stations. The designer shall obtain approval from the City for the best pump station type based on design considerations. A reinforced concrete slab and access drive shall be included in design.

1. Pump Sizing

Each pump shall be sized to accommodate peak flows from the service area. Detention times for the sewerage shall be determined for initial flows into the pump station. If the detention times warrant the use of smaller pumps, provisions shall be made to increase the capacity of the pumps by changing out the impellers and/or motors for future peak flows.

2. Wet Well

The wet well shall be sized to accommodate the peak flows from the service area. A precast manhole may be used as a wet well. The wet well shall be coated with Raven Ultra High Build Epoxy or approved equal. Bouyancy of the wet well shall be calculated and additional thickness added to the wet well base as warranted. A screened stainless steel vent pipe shall be included at the top of the wet well. Bottom of wet well invert shall be sloped at a 60° slope.

3. Controls

An ultrasonic transducer shall be furnished for each level of operation. Float controls shall be provided for the alarm conditions. The levels shall be as follows:

- a. Low level "alarm"
- b. Low level "off"
- c. Low level "on"
- d. High level "on"
- e. High level "alarm"

Alarm conditions shall be indicated through the use of emergency lights and horn located at the pump station site. A dialer shall also be included in the design to transmit alarm conditions.

K. 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" Sanitary Sewer	Lin. Ft.
4' Diameter Type A Manhole (0-6')	Each
Extra Depth for 4' Diameter Type A Manhole	Lin. Ft.
Bore and Steel Encasement (X" ID min.)	Lin. Ft.
Asphalt Drive Removal and Replacement	Lin. Ft.
Flowable Fill	Lin. Ft.
Reinforced Concrete Encasement on X" Pipe	Lin. Ft.
X" Stub and Plug	Each
Site Clearing and Restoration	Lump Sum
Lift Station and Wet Well	Lump Sum

L. 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 (see Figure II-14) 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 may include a pollution prevention plan be prepared and submitted to the Kansas Department of Health and Environment if the disturbed construction area exceeds the requirements.