

CITY OF NEWTON, KANSAS

STANDARD ENGINEERING
DESIGN CRITERIA

FOR
EROSION AND SEDIMENT CONTROL

NOVEMBER 2025

THE CITY OF
NEWTON, KANSAS

STANDARD ENGINEERING DESIGN CRITERIA AND
GENERAL IMPROVEMENT POLICY

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GENERAL

Purpose

- A. The City of Newton strives 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 paving and drainage design.

Scope

- A. This document includes design criteria for erosion and sediment control. City standard specifications and Standard Details must also be referenced and utilized for all work.

Variation from Design Criteria

- A. Variations from the Standard Engineering Design Criteria and General Improvement Policy will be considered upon a formal request is made to the City. The request will involve the following:
 - 1. List any and all variations being requested.
 - 2. Provide 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 approval of the modification in writing.
 - 5. 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.

Compliance with Applicable Statutory Requirements

- A. 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).

Amendment to Standard Engineering Design Criteria

- A. 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. It is the responsibility of the holder of this document to assure themselves that they have all the amendments or a current document.

EROSION AND SEDIMENT CONTROL

All erosion and sediment control shall be designed and constructed to City Engineering Standards and Specifications, as outlined in this section.

Temporary Construction Entrance

- A. Planning Considerations: Areas that are graded for construction vehicle transport and parking purposes are especially susceptible to erosion. The exposed soil surface is continually disturbed, leaving no opportunity for vegetation to become established. During wet weather, they often become muddy quagmires that generate significant quantities of sediment deposits transported off site on the wheels of construction vehicles. These non-surfaced traveled ways can become so unstable during wet weather that they are virtually unusable and unsafe. Therefore, unpaved traveled ways for construction shall be planned and minimized to provide necessary access. Temporary construction entrances shall be installed at all locations where vehicles leave the site.
- B. Design Criteria
 - 1. Length and Width as shown on City Standard Details.
 - 2. Surface water – All surface water flowing to or diverted toward construction entrances shall be piped under the entrance to maintain positive drainage. Pipe installed under the construction entrance shall be protected with a mountable berm. The Pipe shall be sized according to the drainage with the minimum diameter being 12 inches. A pipe will not be necessary when the entrance is located at a high spot.
 - 3. Location – A temporary construction entrance shall be located at every point where construction traffic enters or leaves a construction site. Vehicles leaving the site must travel over the entire length of the stabilized construction entrance.

Drop Inlet and Curb Inlet Protection

- A. Design Criteria
 - 1. Drainage Area: Less than 1 acre.
 - 2. Capacity: 2-year or design storm should enter inlet without bypass flow.
 - 3. The inlet protection device shall be constructed as detailed in the City Standard Details.
 - 4. Design criteria more specific to each particular inlet protection device shall be provided in the City Standard Details and City Standard Specifications.

B. Outlet Stabilization

1. Riprap: Riprap should consist of a well-graded mixture of rock as detailed in the City Standard Specifications.
2. Riprap Thickness and Length: Minimum thickness of riprap should be 1.5 times the maximum rock diameter. The length of riprap pad must be designed such that erosion of the receiving material at the outlet is minimal.

Temporary Diversion

A. Design Criteria

1. Diversion location shall be determined by considering outlet conditions, topography, land use, soil type, length of slope, seepage planes, and development layout. Diversions shall be engineered to ensure adequate capacity is provided in non-erosive manner. The following design criteria shall be met:
 - a. Drainage Area: The maximum recommended drainage area is 5 acres.
 - b. Height: The minimum recommended height of the earthen berm is 6 inches.
 - c. Side Slopes: IH:IV or flatter minimum Type B Compaction with a minimum top width of 2 feet.
 - d. Grade: The channel shall have a positive, non-erosive grade to a stabilized outlet.
 - e. Outlet: The diverted runoff should be released through a stabilized outlet, slope drain, or sediment trapping measure.

Temporary Stream Crossing

- A. Application:** They are generally applicable to flowing streams with drainage areas less than one square mile. Crossings serve to help protect sediment from entering the stream from construction within approach areas, minimize the amount of disturbance within the stream itself, and allow vehicle access across the stream.
1. Vehicular Crossings planning consideration
 - a. Temporary stream crossings are necessary to prevent construction vehicles from damaging stream banks and continually tracking sediment and other pollutants into the flow regime. They should be planned to be in service for the shortest practical period of time and to be removed as soon as their function is completed. The designer must also be aware that such structures are subject to the rules and regulations of the U.S. Army Corps of Engineers for in-stream modifications (i.e., the 404 permit).

2. Utility crossings planning consideration
 - a. Utility construction, by virtue of its sprawling, linear nature, frequently crosses and impacts live streams. There is a potential for excessive sediment loss into a stream by both the disturbance of the approach areas and by the work within the streambed and banks.

Temporary Slope Break

A. Design Criteria

1. Slope Breaks: Use slope breaks, such as diversions, sediment fence or other devices to reduce the length of cut-and-fill slopes to limit sheet and rill erosion. Refer to the following Table, which provides suggested guidelines for spacing of slope breaks.

Slope	Spacing (ft)
33 – 50 %	20
25 – 33 %	40
15 – 25 %	60
10 – 15 %	80
6 – 10 %	120
3 – 6 %	200
< 3 %	300

2. Surface Runoff: Avoid disturbing natural drainageways, if possible. At each slope break, intercept runoff and channel to storm drains or stabilized watercourses. If runoff is laden with sediment, protect drain inlets with a filter or divert water to a sediment trap or basin according to the site grading plan.
3. Erosion Control: Graded areas should be stabilized per the City Standard Specifications and Stormwater Design Guide.
4. Borrow and Disposal Areas: Borrow and disposal areas shall be shown on the grading plan and no closer than 50 feet to a streambank. Sediment control devices must be used on a down slope side of these areas.
5. Outlet: Stable channels and waterways should be provided for runoff from the disturbed area to retain sediment on site.

Temporary Sediment Basin

A. Planning Considerations

1. Effectiveness: The Effectiveness of the basin is based on primarily two factors: the system of erosion and sediment controls above the basin and the designed

shape of the basin. The sediment basin is usually the final control before stormwater discharges from the site; therefore, it should be used in conjunction with erosion control practices such as temporary seeding, mulching, and other sediment control devices to reduce the amount of sediment flowing into the basin.

The shape of the basin can increase its effectiveness by increasing the distance between where runoff enters the basin and where it is discharged; this will increase the settling time for the sediment.

The sediment removal efficiency problems of the temporary sediment trap are also applicable to the sediment basin. In order to contain the majority of sediment which flows to the structure, the basin should have a permanent pool, or wet storage area, and a dry storage area which dewater over time. The volume of wet storage required to prevent short-circuiting of the basin during larger storm events must follow KDHE rules and regulations.

Sediment basins, along with other perimeter controls intended to trap sediment shall be constructed as a first step in any land disturbing action and shall be made functional before upslope land disturbance takes place.

2. **Location:** To improve the effectiveness of the basin, it should be located to intercept the largest possible amount of runoff from the disturbed area. The best locations are generally low areas and natural drainageways below disturbed areas. The basin must not be located in a live stream but should be located to trap runoff before it enters a stream. The basin should not be located where its failure could result in the loss of life or interruption of public utility service or roads.
3. **Multiple Use:** Sediment basins may remain in place after construction and final site stabilization are completed to service as permanent stormwater management structures. Because the most practical location for a sediment basin is often the most practical location for a stormwater management basin, it is often desirable to utilize these structures for permanent stormwater management purposes. It should be noted that in most cases, a typical structure's outfall system will be defined during construction and post-construction periods. Care must be taken to avoid constructing an outfall system which will achieve the desired post-construction control but will not provide the requirements for construction runoff. The design for permanent ponds is beyond the scope of these standards and specifications.

B. Design Criteria

1. Sediment basins shall be designed by a Professional Engineer in Kansas and shall satisfy all applicable Local, State and Federal rules and regulations.
2. The embankment, reservoir, spillway and appurtenances shall be constructed as

shown on plans drawings prepared by the Professional Engineer and as approved by the City of Newton.

3. Basin Shape: To improve sediment trapping efficiency of the basin, the effective flow length should be twice the effective flow width. This basin shape may be attained by properly selecting the site of the basin or by using excavation or baffles.

Temporary Sediment Trap

- A. Application: Locate the trap below disturbed areas where the total contributing drainage area is less than 3 acres. The trap will be used no longer than 18 months. The sediment trap may be constructed either independently or in conjunction with a temporary diversion.
- B. Design Criteria:
 1. Trap Capacity: The sediment trap must have an initial storage volume of 134 cubic yards per acre of drainage area, half of which shall be in the form of a permanent pool or wet storage to provide a stable settling medium. The remaining half shall be in the form of a drawdown or dry storage which will provide extended settling time during less frequent, larger storm events. The volume of the wet storage shall be measured from the low point of the excavated area to the base of the stone outlet to the rest of the stone outlet overflow mechanism. Sediment should be removed from the basin when the volume of the wet storage is reduced by one-half.

For a sediment trap the wet storage volume may be approximated as follows:

$$V_1 = 0.85 \times A_1 \times D_1$$

where,

V_1 = the wet storage volume in cubic feet.

A_1 = the surface area of the flooded area at the base of the stone outlet in square feet.

D_1 = the maximum depth in feet, measured from the low point in the trap to the base of the stone outlet.

The dry storage volume may be approximated as follows:

$$V_2 = \{(A_1 + A_2) / 2\} \times D_2$$

where,

V_2 = the dry storage volume in cubic feet.

A_1 = the surface area of the flooded area at the base of the stone outlet in square feet.

A_2 = the surface area of the flooded area at the crest of the stone outlet overflow

mechanism, in square feet.

D_2 = the depth in feet, measured from the base of the stone outlet to the crest of the stone outlet.

The design shall attempt to provide a storage area which has a minimum 2:1 length to width ratio measured from the point of maximum runoff introduction to outlet.

2. Excavation: Side slopes of excavated areas should be no steeper than 1H:1V. The maximum depth of excavation within the wet storage area should be 4 feet to facilitate clean-out and for site safety considerations.
3. Outlet Structure: The outlet structure for the sediment trap shall consist of a stone section of the embankment located at the low point in the basin. A combination of coarse aggregate and riprap shall be used to provide for filtering and detention as well as outlet stability. The minimum length of the outlet shall be 6 feet times the number of acres comprising the total area draining to the trap. The crest of the stone outlet must be at least 1.0 foot below the top of the embankment to ensure that the flow will travel over the stone and not the embankment.
4. Embankment Cross Section: The maximum height of the sediment trap embankment shall be 5 feet as measured from the base of the stone outlet. Side slopes of the embankment shall be 2H:1V or flatter.
5. Removal: Sediment traps must be removed after the contributing drainage area is stabilized. Restore original grade elevations and stabilize soil throughout limits of sediment trap, after removal.