

CITY OF SHAWNEE DESIGN STANDARDS REVISION
Adopted by City Council on 11-13-2007

Modification to Existing Design Criteria Division 4600

Section 4607 Stormwater Detention Facilities

Sections 4607.02.A and 4607.02.B shall be modified to replace the five (5) year design storm with the one (1) year design storm. The new design storms for analysis of the maximum allowable release rate and the detention storage volume will be the one (1), ten (10), twenty-five (25), and one hundred (100) year return period storms.

New Standards

4609 Post Construction Stormwater Quality: This Section presents design guidance for planning and final design of Post Construction Stormwater Quality Facilities. Within this Section, the term Stormwater Quality Facility shall mean all BMPs implemented or constructed to comply with SMC 11.16 and this Section.

.01 General Principles: The implementation of Stormwater Quality Facilities typically necessitates an integrated site design approach that incorporates the Stormwater Quality Facilities into the overall development plan and the neighborhoods and other areas surrounding the development. This can usually be accomplished utilizing a thorough preliminary analysis of the required treatment and identification of the most appropriate Stormwater Quality Facilities for the particular development density, topography, existing natural resources, and proposed site layout. The selected Stormwater Quality Facilities should be situated and designed to be integrated with the landscaping, green space, and other development requirements to provide a pleasant appearance. The selection and placement of the Stormwater Quality Facility should recognize the need to minimize the potential for human interaction with vectors, rodents, mosquitoes, or other natural elements that may be associated with these Facilities.

.02 Stormwater Quality Design Criteria: The 2007 Final version of the "Manual of Best Management Practices for Stormwater Quality" prepared by the Mid-America Regional Council (MARC) and the Kansas City Metro Chapter of the American Public Works Association, is the official Stormwater Quality Design Criteria for the City of Shawnee.

.03 Stormwater Management Studies: When application is made for a preliminary plat or site plan, the design engineer will submit a Preliminary Stormwater Management Study. Upon submittal of a final plat or construction permitting documents, the design engineer will submit a Final Stormwater Management Plan.

- A. A Preliminary Stormwater Management Study will include sufficient information (i.e., maps, hydrologic calculations, BMP level of service calculations, etc.) to evaluate the environmental characteristics of the project site, the potential impacts of all proposed development of the site, both present and future, on the water resources, and the effectiveness and acceptability of the measures proposed for managing stormwater generated

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at the project site. This Study shall be prepared and sealed by a Professional Engineer and shall include the following:

- (1) Topographic Base Map: A 1"=200' topographic base map of the site which extends a minimum of 100 feet beyond the limits of the proposed development and indicates existing surface water drainage including streams, ponds, culverts, ditches, and wetlands; current land use including all existing structures; locations of utilities, roads, and easements; and significant natural and manmade features not otherwise shown.
- (2) A map (or maps) indicating the location of existing and proposed buildings, roads, parking areas, utilities, structural stormwater management and sediment control facilities. The map(s) also will clearly show proposed land use with tabulation of the percentage of surface area to be adapted to various uses; drainage patterns; locations of utilities, roads, and easements; the limits of clearing and grading; a written description of the site plan and justification of proposed changes in natural conditions.
- (3) Sufficient engineering analysis to show that the proposed Stormwater Quality Facilities are capable of controlling and treating runoff from the water quality storm at the site in compliance with Shawnee Municipal Code 11.16 and the Shawnee Design Manual. This includes all calculations and underlying assumptions that the proposed facilities will meet the applicable design criteria.
- (4) A written or graphic inventory of the natural resources at the site and surrounding area as it exists prior to the commencement of the project and a description of the watershed and its relation to the project site. This description should include a discussion of soil conditions, forest or vegetative cover, topography, wetlands, and other native vegetative areas on the site. Particular mention should be paid to environmentally sensitive features, including water body impairments listed in the Clean Water Act 303(d) listing as identified by KDHE, which may be impacted by stormwater discharges from the site.
- (5) Identification and preliminary plan for control of any stormwater "hot spots" that could pose an environmental hazard such as, but not limited to; fuel dispensing facilities, above ground storage of liquid materials, solid waste storage areas, exterior storage of bulk materials, material transfer areas and loading docks, equipment and vehicle washing facilities, covered parking areas, and high-use vehicle and equipment traffic areas, parking, and vehicle storage.
- (6) A written description of the required maintenance burden for any proposed structural and non-structural Stormwater Quality Facility.

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- (7) Schedule for required maintenance for structural or non-structural Best Management Practices as well as identification of party responsible for the maintenance.
 - (8) For redevelopment occurring on a previously developed site, the applicant is required to include within the plan measures for controlling existing stormwater runoff discharges from the site in accordance with the standards of the Shawnee Design Manual
- B. After review of the preliminary stormwater management concept plan, and modifications to that plan as deemed necessary by the Director, a final stormwater management plan must be submitted for approval prior to issuance of a Permit for improvements required in Shawnee Municipal Code Title 11. The final stormwater management plan shall include, in addition to other requirements in Title 11, the information from the preliminary plan and all of the following information:
- (1) Contact Information: The name, address, and telephone number of all persons having a legal interest in the property and the tax reference number and parcel number of the property or properties affected.
 - (2) Calculations: Hydrologic and hydraulic design calculations for the pre-development and post-development conditions for the design storm(s) specified in the Stormwater Quality Design Criteria. Such calculations shall include:
 - i) Description of the design storm frequency, intensity, and duration, (the design storm for water quality BMPs is the water quality storm, which is the storm event that produces less than or equal to 90 percent volume of all 24-hour storms on an annual basis)
 - ii) Time of concentration,
 - iii) Soil Curve Numbers or runoff coefficients,
 - iv) Peak runoff rates and total runoff volumes for each watershed area;
 - v) Infiltration rates, where applicable,
 - vi) Data on the increase in rate and volume of runoff for the design storms referenced in the current Stormwater Quality Design Criteria,
 - vii) Pre- and post-development percent imperviousness of the site, and
 - viii) Documentation of sources for all computation methods and field test results.
 - (3) Soils information: If a Stormwater Quality Facility depends on the hydrologic properties of soils (i.e., infiltration basins, porous pavement), then a soils report shall be submitted. This report shall be based on adequate and necessary test borings, giving an adequate description of the soils affecting the Facility with conclusions and recommendations regarding the effect of soils conditions on the proposed Stormwater Quality Facility, and giving opinions and recommendations covering the

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adequacy of the soils conditions for the proposed uses. Recommendations included in the report shall be required to be incorporated in the plan. The engineering soils report shall include:

- i. Data regarding the nature, distribution, strength, and permeability of existing soils;
- ii. If applicable, data regarding the nature, distribution, strength, and permeability of soil to be placed on the site;
- iii. Conclusions and recommendations for grading and construction procedures;
- iv. Conclusions and recommended designs for interim soil treatments and permanent soil conditions after construction is completed;
- v. Design criteria for corrective measures when necessary;
- vi. Opinions and recommendations covering the suitability of the soils for the proposed use;
- vii. Subsurface conditions;
- viii. Soil boring results; and
- ix. Overview of geology of site.

(4) Maintenance and Repair Plan

The design and planning of all Stormwater Quality Facilities, both structural and non-structural, shall include detailed maintenance and repair procedures to ensure their continued function. These plans will identify the parts or components of a Stormwater Quality Facility that need to be maintained and the equipment and skills or training necessary. Provisions for the periodic review and evaluation of the effectiveness of the maintenance program and the need for revisions or additional maintenance procedures shall be included in the plan.

- i. Landscaping plan: The applicant must present a detailed plan for management of vegetation at the site after construction is finished, including who will be responsible for the maintenance of vegetation at the site and what practices will be employed to ensure that adequate vegetative cover is preserved. This plan must be prepared by a registered Landscape Architect.
- ii. Stormwater Quality Facility Tracts and Easements: The applicant must ensure access to all Stormwater Quality Facilities at the site for the purpose of inspection and repair by ensuring all Stormwater Quality Facilities are located in a tract or easement as indicated in the Title 11. These tracts and easements will be recorded in the land records of the County and will remain in effect even with transfer of title to the property.
- iii. Maintenance Agreement: The applicant must include a maintenance agreement including all components identified in Section 11.16.150.
- iv. Erosion and Sediment Control Plans for Construction of Stormwater Management Measures: The applicant must prepare an erosion and sediment control plan for all construction activities related to implementing any on-site stormwater management practices as required in Title 11 of the SMC..

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- v. Other Environmental Permits: The applicant shall assure that all other applicable environmental permits have been acquired for the site.

(5) Sequencing and Protection of Structural BMPs During Construction:

The sequencing and protection of Stormwater Quality Facilities during construction is an important design consideration to ensure the Facilities will perform as designed. The final stormwater management plan shall include a schedule of construction activities that indicates the point at which the Stormwater Quality Facilities will be constructed. In addition, the plan shall indicate the protection measures necessary to ensure runoff from construction operations, which typically includes an increased amount of sediment, will not adversely impact the design, operation, or maintenance of the Stormwater Quality Facility. Notwithstanding the above, Stormwater Quality Facilities which include plantings or infiltration practices shall not be constructed until 90% of the tributary watershed has been developed and permanently stabilized. If the construction sequence is not known, the plan shall indicate the construction activities required to be completed prior to construction of the Stormwater Quality Facility, and it shall indicate the protection and maintenance measures to be provided during construction activities to ensure proper Stormwater Quality Facility function following completion of construction activities.

(6) Projected Maintenance and Replacement Costs and Timeframes

The projected yearly maintenance costs for all Stormwater Quality Facilities to be constructed shall be included in the report to provide budgeting information for future owners. In addition, potential replacement costs and anticipated life expectancy of the Facilities should be indicated to provide long-term budgeting information for future owners. This information shall be included in the Maintenance Agreement to be filed by the Landowner.

C. The application for a Stormwater Management Permit for facilities required by the Shawnee Municipal Code 11.16 shall include the following:

- (1) Site Map and Existing Conditions as described in D. below.
- (2) Stormwater Quality Facility Construction Plans and Specifications.
- (3) Completed Final Stormwater Management Study.
- (4) Certification by a Professional Engineer in accordance with this Manual.
- (5) The City may require any additional information or data deemed appropriate and/or may impose conditions thereto as the Director may deem necessary to ensure compliance with the provisions of this Chapter and to preserve public health and safety.

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- (6) The Director may waive the requirements for maps, plans, reports, or drawings, if the Director finds that the information otherwise is submitted or to be submitted will be sufficient to show that the proposed work will conform to the requirements of this Chapter.

D. Plan Requirements for Site Map and Existing Conditions

- (1) An attached vicinity map showing the location of the site in relation to the surrounding area's watercourses, water bodies, and other significant geographic and natural features, and street and other significant features.
- (2) The vicinity map also should identify any watercourses or water bodies where drainage on the site may flow to waters that are known to be impaired as defined by the Clean Water Act 303d listing as identified by KDHE or are known to have any special designation, such as habitat for a protected species. Also, if impaired waters or special designations are present, list impairments and special designations.
- (3) Existing and proposed topography of the entire site with contour lines drawn with less than or equal to a 2-foot interval.
- (4) Show on/off-site drainage, including the subwatershed as well as the entire drainage basin;
- (5) Site's property lines shown in true location of all existing and proposed natural and man-made drainage facilities;
- (6) Graphic representation of the location of and legend of soil types if applicable to proposed runoff controls (including source of information);
- (7) A clear and definite delineation of any wetlands, natural or artificial water storage detention areas, and drainage ditches on this site, or a statement that there are no wetlands, detention areas or drainage ditches located on the property;
- (8) A clear and definite delineation of any proposed or existing drainage, sanitary, utility, or other easement(s) on or near the site;
- (9) A clear and definite delineation of applicant's determination, based on the best available information and sound engineering principles of the existence of a regulatory 1% chance floodplain, of any fully urbanized floodplain on or near the site as determined by the City or other watershed study or a statement that there are no such floodplains located on the property;
- (10) Location and legend of existing vegetative cover and the location and legend of vegetative cover to be left undisturbed;

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- (11) Location of existing surface runoff and detention control measures;
- (12) The signature and seal of a Professional Engineer.

.04 Coordination with other Stormwater Management Criteria: The requirements of this section and SMC 11.16 shall not change, abridge, or nullify other requirements of the SMC or Shawnee Design Manual. In particular, compliance for stream setbacks, buffers, and protection from 100-yr flood flows shall be verified during planning, design, and construction of Stormwater Quality facilities.

.05 Tracts and Easements: All Stormwater Quality Facilities shall be located in a separate tract dedicated for this purpose. If the Stormwater Quality Facility serves lands from only one lot and is located on the lot served, the facility may alternatively be located in an Easement dedicated for this purpose. These tracts or easements shall include a minimum buffer of 10 feet outside of the limits of the Stormwater Quality Facility. The tract or easement shall include provisions for access from the public Right of Way up to the Stormwater Quality Facility, and all access and maintenance routes around the Facility shall be graded for vehicular access.

.06 Stormwater Quality Facility Setbacks: All Stormwater Quality Facilities shall be located according to the following minimum setback restrictions:

- A. Ten (10) feet from Right-of-Way
- B. Twenty (20) feet from an existing or proposed property line.
- C. Sixty (60) feet from habitable residential structures, and twenty (20) feet from habitable non-residential structures.

.07 Landscape plantings: All grasses, shrubs, trees, or other vegetation proposed for post construction Stormwater Quality facilities shall be in accordance with the Stormwater Quality Design Criteria and this Section, unless modified by the Director. Further, no planting shall be proposed which would be Noxious Weed as defined in the Shawnee Municipal Code.

Landscaping for Stormwater Quality Facilities shall fit in with the overall landscaping plan for the proposed development and adjacent lands. The transition from landscaped areas to more native plantings in a Facility shall be gradual and aesthetically pleasant, with shorter plants nearest the edges and taller plantings further from the landscaped areas. The number of different species in the transition zone shall be minimized (typically no more than 3 different species). Where possible, a landscaped edge of maintained plantings shall be provided along the outside edge of the Facility.

.08 Special Consideration for Sites containing less than 5 acres of gross area: For all sites with a gross land area less than 5 acres, not part of a larger plan or development of greater than 5 acres, and otherwise subject to the requirements of this Section and SMC 11.26, shall have a reduced Stormwater

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Quality requirement. For sites meeting these criteria, the Design Criteria shall be modified to require a Level of Service of 4.

.09 Listed 303 (d) streams: For developments located in the upstream watershed of streams or stream segments listed on the KDHE 303 (d) list of water quality impaired streams, special consideration shall be given to treating pollutants with a Total maximum Daily Load with a priority of "High". This shall include consideration of those BMPs which best treat this pollutant, or an explanation why such BMPs are not practicable on the site.

.10 Qualified Professional Engineer: A qualified Professional Engineer for the design and certification of post construction Stormwater Quality facilities shall be a Professional Engineer in the State of Kansas who has attended a minimum of 4 hours of training on the use of the Design Criteria for this section. Such training shall be provided by MARC, APWA or another qualified Professional Engineer, and certification of attendance shall be available upon request.

.11 Signage: All Stormwater Quality Facilities shall be provided with informational signs within the tract or easement. The signs shall be located at a sufficient number of locations to provide information to the public and maintenance personnel. The sign(s) will be provided by the City, and it (they) shall be mounted in a location approved by the Director. The sign(s) shall be mounted utilizing methods and materials to provide a permanent, attractive, and durable installation.

.12 Swales: Swales used as Stormwater Quality Facilities shall include no more than three (3) species of vegetation for ease of future maintenance and identification. In addition, swales shall have a minimum longitudinal slope of 3%.

.13 Turf Grass Swales: Notwithstanding other requirements of the Design Manual, requirements for Turf Grass Swales shall be modified as follows:

- A minimum tract or easement width of 10 feet with no buffer requirement
- No property line setback requirement
- Turf Grass Swales shall be a minimum of 5 feet from any structure.

.14 Vegetated Filter Strips Vegetated Filter Strips (VFS) are hereby included as an approved Stormwater Quality Facility for stormwater treatment as follows:

A. Vegetated filter strips are uniformly graded and densely vegetated sections of land, engineered and designed to treat runoff and remove pollutants through vegetative filtering and infiltration. Filter strips are best suited to treating runoff from roads, roof downspouts, small parking lots, and pervious surfaces. They are also ideal as pretreatment for another structural stormwater control. Filter strips rely on the use of vegetation to slow runoff velocities and filter out sediment and other pollutants from urban stormwater. To be effective, sheet flow must be maintained across the entire filter strip.

B. Vegetated filter strips shall be designed to meet the following requirements:

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(1) Entrance Flow: Flow must enter and exit the filter strip as sheet flow spread out over the width (long dimension perpendicular to flow) of the strip, and shall be no deeper than ½ inch. For runoff from impervious areas, flow spreaders such as concrete sills, curb stops, curb cuts, or pea gravel diaphragms (gravel-filled trench) shall be incorporated along the upstream length of the VFS.

(2) Sizing: Filter strips may be used to treat small drainage areas if the flow enters the filter strip as sheet flow. The filter strip length shall be properly sized in order to provide adequate filtration and contact time for water quality treatment. The following requirements shall apply to the design of vegetated filter strips:

- Maximum effective inflow approach length (area tributary to VFS) shall be 130 feet. Effective inflow length (L_a) shall be calculated as follows:

$$L_a = P_L + 2 \cdot I_L$$

Where: P_L = pervious area flow length

I_L = impervious area flow length

- VFS length (measured in the direction of flow through VFS) shall be equal to one third (1/3) of the effective inflow approach length (L_a) with a minimum of ten (10) feet.

(3) Grades: Ground slope across the VFS shall be greater than 1% and less than 6%, measured in the direction of flow. The areas at the entrance and exits of the vegetated filter strips should be graded to provide a smooth transition for flow entering and discharging from the filter strip.

- Vegetation: Filter strips should not be used on soils that cannot sustain a dense grass cover with high retardance. Grasses in filter strips must be able to withstand relatively high velocity flows at the entrances, and both wet and dry periods. For constructed or enhanced filter strips, designers should reference MARC/APWA BMP Manual Section 7.3 and plant species lists provided in Chapter 8 for a list of acceptable grasses for use in this region. In addition, non-invasive species listed in "Flora of the Great Plains" (Barkley, 1986) may be utilized. For existing vegetated areas to function as a VFS, the area must contain dense grassy (non-wooded) vegetation with a minimum height of 12" providing complete coverage (no areas of open bare soil) and be able to withstand relatively high flow velocities. Turf grass is not an approved filter strip. Grass and filter strip areas shall be protected from frequent mowing.

C. Inflow areas treated by a vegetated filter strip as described above shall be assigned a Value Rating of 5.0. A Value Rating of 9.25 for "native vegetation" shall be applied to the area of the vegetated filter strip.

