

Appendix E
Design Standards Comparison Tables

Table 1: Examples of Municipalities addressing Stormwater Design Criteria within the Public Right-of-Way

Municipality	Language	Reference
NE, Kearney	<p>9-1606 APPLICABILITY.</p> <p>A. This Article shall be applicable to all construction activity and land developments requiring; including, but not limited to site plan applications, subdivision applications, building applications, and right-of-way applications from the City, unless exempt pursuant to Paragraph B of this Section below. These provisions apply to all portions of any common plan of development or sale which would cause the disturbance of at least one acre of soil even though multiple, separate and distinct land development activities may take place at different times on different schedules.</p> <p>B. The following activities are exempt from this Article:</p> <p>(1) Any emergency activity that is necessary for the immediate protection of life, property, or natural resources; and</p> <p>(2) Construction activity that provides maintenance and repairs performed to maintain the original line and grade, hydraulic capacity, or original purpose of a facility.</p> <p>(Ord. No. 7573, 2-23-2010)</p> <p>9-1626 POST-CONSTRUCTION REQUIREMENT OF PERMANENT BMPs.</p> <p>A. Land development that meets the requirements of Section 9-1606 of this Article must address storm water runoff quality through the use of permanent BMPs. Permanent BMPs shall be provided for in the drainage plan for any subdivision plat, annexation plat, development agreement, subdivision agreement or other local development plan.</p> <p>B. Structural BMPs located on private property shall be owned and operated by the owner(s) of the property on which the BMP is located; unless the City agrees in writing that a person or entity other than the owner shall own or operate such BMP. As a condition of approval of the BMP, the owner shall also agree to maintain the BMP in perpetuity to its design capacity unless or until the City shall relieve the property owner of that responsibility in writing. The obligation to maintain the BMP shall be memorialized on the subdivision plat, annexation plat, development agreement, subdivision agreement or other form acceptable to the City and shall be recorded with the City of Kearney Public Works Department.</p> <p>(Ord. No. 7573, 2-23-2010)</p>	<p>9-1602 http://citycode.kearneygov.org/citycode/</p>
PA, Philadelphia	<p>Section 600.1 Definitions</p> <p>(e) Development: Any human-induced change to improved or unimproved real estate, whether public or private, including but not limited to land development, construction, installation, or expansion of a building or other structure, land division, street construction, and site alteration such as embankments, dredging, grubbing, grading, paving, parking or storage facilities, excavation, filling, stockpiling, or clearing. As used in these Regulations, development encompasses both new development and redevelopment. It includes the entire development site, even when the project is performed in stages.</p> <p>(q) Redevelopment: Any development on a site that requires demolition or removal of existing structures or impervious surfaces and replacement with new impervious surfaces. This includes replacement of impervious surfaces that have been removed on or after January 1, 1970, with new impervious surfaces. Maintenance activities such as top-layer grinding and re-paving are not considered redevelopment. Interior remodeling projects are also not considered redevelopment.</p> <p>Section 600.2 Regulations</p> <p>(a) Regulated activities under these Regulations include any development, including new development and redevelopment, that results in an area of earth disturbance greater than or equal to 15,000 square feet. The area of Earth Disturbance during the construction phase determines requirements for both the erosion and sediment controls and the post-construction stormwater management.</p>	<p>Philadelphia Water Department Regulations, Section 600.1 Stormwater Management, 600.1 Definitions http://www.pwdplanreview.org/WICLibrary/StormwaterRegulations.pdf</p>

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VA, Suffolk	<p>Sec 35-5 (d) The following activities are exempt from the stormwater performance standards: (1) Permitted surfaces or deep mining operations and projects, or oil and gas operations and projects conducted under the provisions of Code of Virginia, Tit. 45.1. (2) Tilling, planting or harvesting of agricultural, horticultural or forest crops. (3) Construction of single-family residences separately built and not part of a subdivision, including additions or modifications to existing single-family detached residential structures. (4) Land development projects located within Chesapeake Bay Preservation Areas that disturb less than 2500 square feet of land area or outside of CBPA's that disturb less than 10,000 square feet of land area. (5) Linear development projects, provided that: a. Less than one acre of land will be disturbed per outfall or water shed, b. There will be insignificant increases in the peak flow rates. Insignificant increases are generally considered to be less than one cubic foot per second (cfs), however the reviewing authority's discretion will be applied.; and c. There are no existing, or anticipated, flooding or erosion problems downstream of the discharge point. (Ord. No. 07-O-097, 9-5-2007)</p>	<p>http://library.municode.com/index.aspx?clientId=14461</p>
WA, Seattle	<p>Development means any activity that requires a permit or approval, including, but not limited to, a building permit, grading permit, shoreline substantial development permit, conditional use permit, special use permit, zoning variance or reclassification, subdivision, short subdivision, urban planned development, binding site plan, site development permit, or right-of-way use permit. "Development" does not include a Class I, II, III, or IV-S forest practice conducted in accordance with Chapter 76.09 RCW and Title 222 WAC or a class IV-G nonconversion forest practice, as defined in KCC 21A.06, conducted in accordance with Chapter 76.09 RCW and Title 222 WAC and a county approved forest management plan.</p> <p>Site (a.k.a. development site) means a single parcel, or two or more contiguous parcels that are under common ownership or documented legal control, used as a single parcel for purposes of applying for authority from King County to carry out a development/project proposal. For projects located primarily within dedicated rights-of-way, site includes the entire width of right-of-way within the total length of right-of-way subject to improvements proposed by the project.</p> <p>Transportation redevelopment project means a stand-alone transportation improvement project that proposes to add, replace, or modify impervious surface, for purposes other than maintenance, within a length of dedicated public or private road right-of-way that has an existing impervious surface coverage of thirty-five percent or more. Road right-of-way improvements required as part of a subdivision, commercial, industrial or multifamily project may not be defined as a separate transportation redevelopment project.</p> <p>Drainage review is required for any proposed project (except those proposing only maintenance) that is subject to a King County development permit or approval, including but not limited to those listed at right, AND that meets any one of the following conditions: 1. The project adds or will result in 2,000 square feet or more of new impervious surface, replaced impervious surface, or new plus replaced impervious surface, OR...</p> <p>Impervious Surface Exemption for Transportation Redevelopment Projects A proposed transportation redevelopment project is exempt if it meets all of the following criteria: a) Less than 2,000 square feet of new impervious surface will be added, AND b) Less than 35,000 square feet of new pervious surface will be added, AND c) The total new impervious surface within the project limits is less than 50% of the existing impervious surface.</p>	<p>http://your.kingcounty.gov/dnrp/library/water-and-land/stormwater/surface-water-design-manual/MainBody-2009.pdf (page 1-5)</p>
WI, Madison	<p>(e) Municipal road or county highway projects not exempted under s. 14.47(2)(b) (projects exempted from local erosion control ordinances under state or federal statute) are exempt from s. 14.51(2)(c) (runoff rate control) where all of the following conditions are met: 1. The purpose of the project is only to meet current state or federal design or safety guidelines; 2. All activity takes place within existing public right-of-way; 3. All other requirements of s. 14.51 are met; and 4. The project does not include the addition of new driving lanes.</p>	<p>http://danedocs.countyofdane.com/webdocs/pdf/ordinances/ord014.pdf</p>

Table 2: Examples of Stormwater Design Standards within the Great Plains States

Municipality	Reference	Water Quality Treatment Objective	Channel Protection	Flood Control	Conveyance
IA, Des Moines	<p>Iowa Statewide Urban Design and Specifications, (SUDAS) Design Manual for detention requirements.</p> <p>For Des Moines water quality: http://www.dmgov.org/Departments/PublicWorks/Pages/WaterQuality.aspx</p> <p>Chapter 106, Article III, Div. 1, Sec. 106-136 - Stormwater runoff control.</p>	<p>Chapter 106, Article III, Div. 1, Sec. 106-136 - Stormwater runoff control.</p> <p>A stormwater runoff control plan shall reduce projected runoff for a project by controlling rain events that total 1.25" or less in a 24-hour period, with the resulting volume being released at a rate that allows for a detention time of 24 hours through incorporation of stormwater management facilities.</p>	<p>"Emphasis should be placed on detention, storage, and the use of other BMPs to manage rainfall with a goal of not increasing erosion, sedimentation, or the discharge rate downstream from that existing prior to development"</p>	<p>Release rate for 2- and 5-year design storms, shall be limited to pre-developed peak rates from those same storms. 10- to 100-year storm events shall not exceed existing pre-development rate for a 5-year frequency storm. Duration of these storms is based on a critical duration of rainfall requiring the greatest detention volume.</p>	<p>5-year storm for local and minor collectors 10-year storm for major collectors, arterials, freeways</p>
KS, Kansas City	No standards found online				

Municipality	Reference	Water Quality Treatment Objective	Channel Protection	Flood Control	Conveyance
KS, Wichita	<p>City of Wichita Code of Ordinances, Title 16 - Sewers, Sewage Disposal and Drains, Chapter 16.32 - Stormwater Pollution Prevention</p> <p>City of Wichita and Sedgwick County Stormwater Design Manual Volume 1 chapter 3 for water quality</p>	<p>The 80% TSS removal standard shall be applied to the 85th percentile storm event for the Wichita area, which is equal to 1.2 inches of rainfall. Property owners must adhere to one of the following options in order to comply with the water quality treatment requirement for redevelopments.</p> <ol style="list-style-type: none"> 1. A 20% reduction in impervious area on the property; 2. Stormwater runoff from at least thirty percent (30%) of the site's existing impervious cover and for one-hundred percent (100%) of the impervious cover for any newly disturbed area must be treated for water quality prior in accordance with the standards and criteria presented in this section of the Stormwater Manual; 3. Equivalent water quality controls must be provided at an alternative location in the same watershed as the proposed redevelopment; 4. One or more known downstream water quality or channel erosion issues located within the same watershed as the proposed redevelopment must be addressed through stream restoration and/or other off-site remedies. 5. Payment of a fee in-lieu-of water quality control and channel protection control facilities. 6. Any combination of (1) through (5). 	<p>The runoff volume from the new or redevelopment that results from the 1-year, 24-hr storm shall be detained for not less than 24 hours, or the volume difference between pre and post must be infiltrated, reused or evaporated.</p>	<p>Storm water runoff peak discharge analysis and control shall be required for applicable new developments or redevelopments with the storm water quantity standards and criteria provided in the Storm Water Manual.</p> <p>The calculated peak discharge of stormwater runoff at each site outfall resulting from the 2-, 5-, 10-, 25- and 100-yr 24- hour storm shall be no greater than pre-development. (pg. 3-8 in Volume I of SW Manual).</p>	<p>Design storms range from 2- to 10-years depending on the land use.</p>

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MN, Minneapolis	<p>Minneapolis Ordinance, Chapter 54. Storm Water Management</p> <p>Minneapolis Storm Water Management Design Manual (copies can be obtained from the Minneapolis Department of Public Works)</p>	<p>In general, the purpose of the storm water management ordinance is to minimize negative impacts of storm water runoff rates, volume, and quality on Minneapolis lakes, streams, wetlands and the Mississippi River by guiding future development and redevelopment activity.</p>		<p>Stormwater management standards are set according to the receiving water body, and for Minneapolis streams there is to be no increase in rate of runoff from a site.</p>	<p>Cannot find on-line.</p>
MO, Springfield	<p>City of Springfield Drainage Criteria Manual, Chapter 9 - Detention for Flood Control and Chapter 10-Water Quality</p>	<p>To minimize potential adverse impacts of urbanization and improve water quality, the City of Springfield, MO, along with many communities around the United States, encourages the widespread use of storm water Best Management Practices (BMPs) on all development sites. The purpose of this chapter is to provide guidance for selecting, designing, and maintaining BMPs.</p>		<p>The post-development peak runoff rate for all land development must be no greater than the pre-development peak runoff rate for the 1-, 10- and 100-year design storms.</p>	<p>25-year HGL to not exceed elevation of gutter</p> <p>100-year HGL to meet street inundation criteria</p>

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MO, St. Louis	<p>St. Louis County Phase II Storm Water Management Plan 2008-2013</p> <p>St. Louis County Highways and Traffic Design Criteria Manual</p>	See Flood Control language below.	Ponds and/or lakes will be dewatered at a rate not to exceed a 15-year design storm to protect against erosion and siltation damage to adjacent properties and roads.	Site Design Guidance - Long term storm water runoff from projects that disturb an area greater than or equal to one acre, including projects less than one acre that are part of a larger common plan of development or sale, that discharge in to the Municipal Separate Storm Sewer System (MS4), shall ensure that controls are in place that have been designed and implemented to prevent or minimize water quality impacts by reasonably mimicking preconstruction runoff conditions on all affected new development projects and by effectively utilizing water quality strategies and technologies on all affected redevelopment projects, to the maximum extent practicable. Site characteristics shall be assessed at the beginning of the construction / site design phase to ensure adequate planning for storm water program compliance. Design that promotes storm water infiltration within the site shall be emphasized.	Cannot find on-line.
NE, Lincoln	City of Lincoln Drainage Criteria Manual	Specifically, the water quality control volume (WQCV) that is <u>recommended</u> for control is the first half inch (0.5 inches) of runoff from the basin tributary to the BMP.	Detention facilities shall have release rates which do not exceed the pre-development discharge rates for the 2-, 10- and 100-year storms.		Inlet control: 5-year for residential areas 10-year for commercial, industrial, and arterial

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OK, Oklahoma City	<p>Oklahoma City Municipal Code, 2010 Chapter 16-9 - Drainage and Flood Control, Detention http://library.municode.com/index.aspx?clientId=17000</p>	No water quality criteria.	No channel protection criteria.	<p>In drainage areas with known downstream flooding of structures, or if it is determined that development of subject property will cause or contribute to flooding or sedimentation of existing structures downstream, the developer shall install detention facilities maintaining a discharge rate not to exceed the historical runoff rate prior to development.</p> <p>In drainage areas where the City has no record of downstream flooding of structures and development of the subject property using a runoff coefficient of 70 percent would not cause downstream flooding of existing structures, detention will not be required. Detention storage will be required for the increased runoff resulting from development having an imperviousness in excess of 70 percent for all developments on parcels greater than two acres.</p> <p>The required volume for stormwater detention shall be calculated on the basis of the runoff from a 100-year frequency rainfall of an appropriate duration.</p>	Surface water collected in streets shall be diverted to storm drains at satisfactory intervals to prevent overflow of six-inch-high curbs during 25-year frequency rain for the area and grades involved. Drainage area allowed for surface flow on streets at point of diversion shall not exceed 20 acres, regardless of flow.

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OK, Tulsa	<p>City of Tulsa Stormwater Management Plan (accessed online: http://www.cityoftulsa.org/city-services/flood-control/stormwater-management-plan.aspx)</p> <p>City of Tulsa Code of Ordinances - Title 11-A - Stormwater Management and Hazard Mitigation Program, Chapter 3 - Watershed Development Regulations</p>	<p>Stormwater quality is of growing concern in municipal drainage management. Tulsa has geared up to meet new federal requirements for stormwater discharge NPDES permits (National Pollutant Discharge Elimination System permits). Tulsa's most serious problem with runoff quality was found to be sediment, which is being addressed through vigorous regulation of erosion from construction projects.</p> <p>The city is also emphasizing street sweeping, environmental monitoring, and stormwater laboratory services as part of its stormwater quality program.</p>	<p>New or substantially improved developments must detain the excess stormwater on site - unless they are exempted in master plans or allowed to pay a fee in lieu of on-site detention. Water from detention basins is released slowly downstream.</p> <p>In-lieu fees are allocated for regional detention facilities. In most instances, the city has found regional detention basins to function more satisfactorily than smaller, scattered on-site facilities.</p> <p>"No rise allowed" in City of Tulsa floodplain.</p>		Cannot find on-line.
TX, Fort Worth	City of Fort Worth Integrated Storm Water Management (iSWM) Criteria Manual for Site Development and Construction, August 1, 2012	Water Quality Protection is not currently required by the CFW.	Downstream impacts due to a development must be analyzed and mitigated for the 1-, 10-, and 100-year floods for the entire Zone of Influence, as determined by the development engineer's analysis. The Zone of Influence for any proposed development must be defined by the development engineer, based on a drainage study that determines the specific location along the drainage route where "no adverse impacts" from the new development exist. Storm drainage from a development must be carried to an "adequate outfall" or "acceptable outfall."		The design storm is a minimum of the 100-year storm for the combination of the closed conduit and surface drainage system. Runoff from the 5-year storm must be contained within the permissible spread of water in the gutter. The 100-year storm flow must be contained within the ROW. Adequate inlet capacity shall be provided to intercept surface flows before the street ROW capacity is exceeded. Note: The capacity of the underground system may be required to exceed the 5-year storm in order to satisfy the 100-year storm criteria.
TX, Lubbock	City of Lubbock Stormwater Management Drainage Criteria Manual, 1997	No water quality criteria.	Lubbock does not have any specific detention/flood control criteria. They have criteria for runoff carrying capacities in the streets, storm drains, open channels, culverts and playa lakes. The playa lakes help detain stormwater. An analysis is required for the 100-year storm and at times, a 500-year storm.		Street capable of conveying the 100-year event within boundary conditions of street. 5-year event for pipes with inlets on grade and 25-year event for pipes with inlets in low points.