

**SECTION 5600 - STORM DRAINAGE SYSTEMS & FACILITIES  
CITY OF LEE'S SUMMIT, MISSOURI  
DESIGN CRITERIA**

This is Lee's Summit, Missouri's supplement to Section 5600 of the Kansas City Metropolitan Chapter of APWA Design Criteria, current edition. The following additions, deletions and/or revisions are adopted as a part of Section 5600 for use within Lee's Summit, Missouri.

5601.5 System Types and Applications, Under A. General Guidelines:  
DELETE the fourth paragraph and REPLACE it with the following:

*The engineered drainage system shall begin where the tributary area reaches 2 acres.*

Table 5601-1: Level of Service for Street Crossings

CHANGE Minimum Design Storm Capacity for Arterial Streets to the following:  
"1%".

CHANGE Minimum Design Storm Capacity for Collector Streets to the following:  
"2%".

ADD the following note at the bottom of Table 5601-1:

*"Water backing up onto adjacent properties for 1% storm capacity will require an inundation (drainage) easement."*

5601.5.A.4.a Default Strategy: Comprehensive Protection

Delete this section in its entirety and insert the following:

*"The City has adopted the Default Strategy: Comprehensive Protection method. Under this strategy, peak runoff control will be required for the 1%, 10%, and 50% annual chance storm event. Peak runoff control is required where there are known downstream flooding problems or where an increase in the peak runoff from a development has the potential to create flooding of property, structures, stormwater infrastructure, roads, bridges, and dams. Under this strategy, volumetric and/or extended detention control of the 90% mean annual event storm event shall be provided for broad protection of the receiving system, including channel erosion protection and flood peak reductions over a range of return periods. Volumetric and/or extended detention control of the 90% mean annual event storm shall be implemented for all sites unless otherwise exempt by Section 5601.3. Performance standards and sizing criteria are provided in Section 5608."*

5601.8.A. Protection of Property

ADD the following subparagraphs 3 and 4.

**3. Master Drainage Plans**

*To address level of service issues on an individual building lot basis, the Developer shall submit a Master Drainage Plan with the engineering plans for each development. The plan shall cover all*

*portions of the development whether it is to be developed as single or multiple final plats, and shall cover all areas outside of the existing or proposed public rights-of-way. All lots must be graded in accordance with the approved Master Drainage Plan to the extent that swales, channels, diversion berms and grading activities are provided to establish the overall drainage patterns. The Master Drainage Plan is not intended to replace good lot grading practices during construction, but rather to establish overall drainage patterns for each lot and the development as a whole. Information on the plan shall include, but not be limited to, the following.*

- a. Overall drainage map, including off-site tributary areas contributing to the runoff in the development.*
  - b. Existing and proposed contours at two-foot or smaller contour intervals.*
  - c. Property boundary, lot lines and numbers, and streets.*
  - d. Location(s) of all existing and proposed swales and channels, either natural or improved, along with design flows, typical sections, details, upstream and downstream elevations, and approximate slope.*
  - e. Limits of regulatory floodplain, where applicable.*
  - f. Limits of 1% storm water surface elevation for all swales and channels not within regulatory floodplain.*
  - g. Required buffer zones for natural streams.*
  - h. The elevation of the minimum, or lowest, building opening elevation (MBOE) for each lot. If a lot is adjacent to or contains a designated swale or channel, the MBOE must be set at the 1% water surface elevation plus two feet. If there is significant change in elevation along a swale or channel, as determined by the City Engineer, multiple MBOEs may be required for different sides of the building.*
  - i. Lots where walkout basements and daylight basement plans will be allowed.*
  - j. Finished elevations at all corners of each lot with a minimum of four elevations per lot.*
- 4. The Developer shall include on the plats for the development covered by the Master Drainage Plan, a restriction that the individual lot owner(s) shall not change or obstruct the overall drainage flow lines or paths on the lots, as shown on the Master Drainage Plan, unless specific application is made and approved by the City Engineer.*

Section 5603.1 Hydraulic Calculation for Pipes, Culverts, and Open Channels

Add the following:

***“Enclosed systems will use the open channel, or gravity, flow design method for the appropriate design storm.”***

5604.1.B Inlet Design - Type

REVISE the dimension for opening length as follows:

***Opening length, inside 4.0 ft (min), 8.0 ft. (max)***

5604.1.C Inlet Design – Design Method

REVISE references to Figures 5604-37 and 5604-38 to ***Figures 5604-19 and 5604-21 respectively.***

ADD the following sentences to the paragraph:

***Figures 5604-2 through 5604-19 apply to a curb inlet with a 10-inch throat opening height, similar to Standard Drawing CI-2. For curb inlets with different opening heights, specific design calculations must be submitted.***

5604.1 Inlet Design

Add the following as Paragraph D:

***D. Location: Curb inlets shall not be located in the radius of two intersecting streets. Maximum spacing of inlets shall be 400 feet.***

Section 5608.7.B Additional Requirements, Underground Storage

Add the following:

***“Underground detention systems typically allow some storage volume for voids in open-graded aggregate backfill around the storage chambers. Industry standard assumes the aggregate has 40% voids in the aggregate; the City will allow up to 30% voids in the aggregate. Storage in aggregate voids may be further reduced based on design conditions, maintenance programs, site conditions, etc. The Design Engineer will provide a maintenance program for underground detention systems to ensure the system will continue to function as intended.”***

Table 5603-1

Add the following under Closed Conduits

High Density Polyethylene Pipe (HDPE)	0.010
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Section 5605.7.E Culverts, Bridges, and Above Grade Crossings

Delete the last sentence and replace with the following:

***“Culverts shall be designed so the headwater to opening dimension ratio (i.e., generally referred to as HW/D) is no greater than 1.5 for the 4% design storm. All other design parameters, including the requirement that the 1% water surface elevation within the unregulated, non-special flood hazard area remain unchanged on adjacent properties unless appropriate easements are obtained, shall apply.”***

Section 5605.10 Floodplain Fills

Delete the entire paragraph and replace with the following:

***“Fills placed within areas designated as special flood hazard areas by the Federal Emergency Management Agency (FEMA) shall comply with the City of Lee’s Summit Unified Development Ordinance (UDO) “Floodplain Overlay District”. Fills placed outside these limits shall not cause a rise in the 1% water surface elevation beyond the limits controlled by the developer or owner, unless appropriate easements have been obtained from adjacent property owners.”***