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June 16, 1999

To: Stormwater System Designers

From: Chad Voigt, Public Works

Re: Updated Curb Inlet Design Requirements

Applicability:

This update applies to all systems that are required to comply with the City of Lawrence, Kansas *Stormwater Management Criteria.* These specifications replace Section 5.3.B, Section 5.3.C, Table G and Figure 9 of the February, 1996 *Criteria.*

Basis:

The November, 1998 revision to the Storm Sewer Standard Details sheet specifies 10" steel frame curb inlets similar to those used in several other communities. The University of Kansas, Civil Engineering Department performed a study for KDOT, which collected capacity data for these inlets. The attached specifications have been derived from that study.

Gutter capacity requirements and sump inlet capacities have been simplified based on typical Lawrence street sections.

Update:

The information below applies to ½" per foot street cross slopes, for systems designed in english units. Additional information will be provided at a later date for ¼" per foot cross slopes and for metric design units.

Curb Inlet Design Equations: ½" per foot street cross slope

1. Criteria for Allowable Street Flow (all street widths)

During a 10-yr storm	$Q_{cap} = 70\ (s)^{½}$	cfs
During a 100-yr storm	$Q_{cap} = 472\ (s)^{½}$	cfs

s = street slope in ft/ft

2. Criteria for Sump Inlet Capacities

During a 10-yr storm	$Q_{cap} = 1.5\ L$	cfs
During a 100-yr storm	$Q_{cap} = 2.4\ L$	cfs

L = inlet length in ft

3. Criteria for Sloped Inlet Capacities

$$Q_{cap} = (915\ L + 1782) / (10{,}000\ (s)^{½}) \quad \text{cfs}$$

Table:

The attached table summarizes the results of these equations. These values may be read manually, or the equations may be entered into design spreadsheets.

Use:

Storm drainage systems must be designed to provide capacity for the 100-year peak flow within platted drainage easements or public right-of-way. Enclosed systems must be designed to provide capacity for a minimum of the 10-year peak flow. Where overflow restrictions exist, enclosed systems must be designed for greater capacity as required.

Allowable street flows and allowable sump inlet flows are limited by spread. Actual flows must not exceed the capacity determined by the above equations. Both the 10-year and 100-year peak flows must be checked.

On-grade inlets must be used to control street flows and sump inlet flows. Sloped inlet capacities are not related to storm frequency. Bypass flows must be accounted for in system designs.

City of Lawrence Curb Inlet Design Values: 1/2" per foot street cross slope

Inlet Length (ft)	5	6	7	8	10	12
Sump Inlet Q10 (cfs)	7.5	9.0	10.5	12.0	15.0	18.0
Sump Inlet Q100 (cfs)	12.0	14.4	16.8	19.2	24.0	28.8

Street Q10 (cfs)	Street Q100 (cfs)	Street Slope (ft/ft)	5	6	7	8	10	12
			Sloped Inlet Capacity (cfs)					
7	47	0.010	6.4	7.3	8.2	9.1	10.9	12.8
9	58	0.015	5.2	5.9	6.7	7.4	8.9	10.4
10	67	0.020	4.5	5.1	5.8	6.4	7.7	9.0
11	75	0.025	4.0	4.6	5.2	5.8	6.9	8.1
12	82	0.030	3.7	4.2	4.7	5.3	6.3	7.4
13	88	0.035	3.4	3.9	4.4	4.9	5.8	6.8
14	94	0.040	3.2	3.6	4.1	4.6	5.5	6.4
15	100	0.045	3.0	3.4	3.9	4.3	5.2	6.0
16	106	0.050	2.8	3.3	3.7	4.1	4.9	5.7
16	111	0.055	2.7	3.1	3.5	3.9	4.7	5.4
17	116	0.060	2.6	3.0	3.3	3.7	4.5	5.2
18	120	0.065	2.5	2.9	3.2	3.6	4.3	5.0
19	125	0.070	2.4	2.7	3.1	3.4	4.1	4.8
19	129	0.075	2.3	2.7	3.0	3.3	4.0	4.7
20	134	0.080	2.2	2.6	2.9	3.2	3.9	4.5
20	138	0.085	2.2	2.5	2.8	3.1	3.7	4.4
21	142	0.090	2.1	2.4	2.7	3.0	3.6	4.3
22	145	0.095	2.1	2.4	2.7	3.0	3.5	4.1
22	149	0.100	2.0	2.3	2.6	2.9	3.5	4.0