



**Stormwater Management
Criteria Update
Manhattan, KS**

October 19, 2022

Why Update the Criteria?



- ▶ Replace the May 1994 Stormwater Management Criteria
- ▶ Reflect experience gained
- ▶ Satisfy regulatory requirements
- ▶ Establish clear, consistent criteria for stormwater infrastructure

Your Review is Appreciated

- ▶ Materials for Review are on City website. Google “Manhattan Kansas Stormwater” and follow links to “updated Stormwater Management Criteria”
- ▶ Email written comments to Bill Heatherman at bill.heatherman@cityofmhk.com



Proposed Criteria and Standards

- [Proposed Stormwater Management Criteria, Public Comment Edition, September 2022](#) (PDF)
- [Proposed Standard Drawings for Stormwater, Public Comment Edition, September 2022](#) (PDF)
- Proposed Construction Specifications for Stormwater (*Pending, to be posted for public comment separately*)

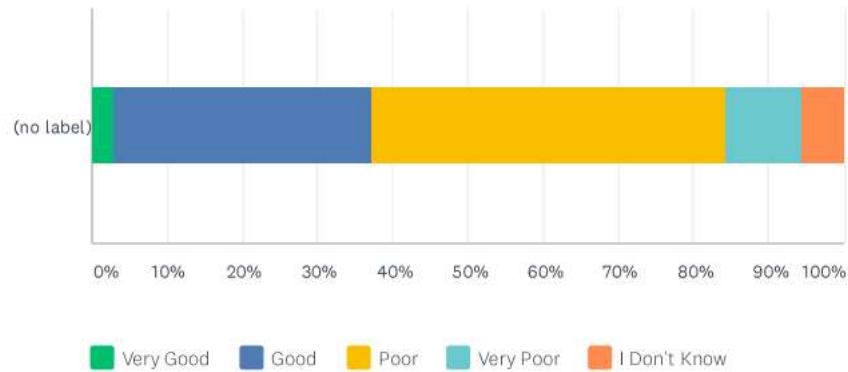
Supporting Materials

- [Draft Drainage Impact Study Template/Checklist](#) (PDF)
- [Results of Stormwater Design Survey Conducted June 2020](#) (PDF)
- [Technical Memo for Hydrology Methods, September 2022](#) (PDF)

Stakeholder Survey – Opinion of System

Q3 How would you rate the overall function and condition of the stormwater systems in Manhattan?

Answered: 70 Skipped: 0



	VERY GOOD	GOOD	POOR	VERY POOR	I DON'T KNOW	TOTAL	WEIGHTED AVERAGE
n)	2.86%	34.29%	47.14%	10.00%	5.71%	70	2.32
	2	24	33	7	4		

Stakeholder Survey - Priorities

	HIGH PRIORITY	MODERATE PRIORITY	LOW PRIORITY	NO CHANGES NEEDED	I DON'T KNOW	TOTAL	WEIGHTED AVERAGE
Handling Major Overflow Events/Floodplain Management	72.46% 50	21.74% 15	4.35% 3	1.45% 1	0.00% 0	69	3.65
Detention and Retention Systems	47.83% 33	39.13% 27	8.70% 6	2.90% 2	1.45% 1	69	3.34
Conveyance System of Pipes, Inlets & Ditches	47.06% 32	39.71% 27	7.35% 5	4.41% 3	1.47% 1	68	3.31
Accuracy of Flow Estimates (Hydrology)	29.41% 20	41.18% 28	11.76% 8	7.35% 5	10.29% 7	68	3.03
Natural Streamway Protections	34.78% 24	34.78% 24	21.74% 15	5.80% 4	2.90% 2	69	3.01
Erosion Control from Construction Sites	28.99% 20	37.68% 26	26.09% 18	4.35% 3	2.90% 2	69	2.94
Green Infrastructure/ Water Quality Enhancements	28.99% 20	33.33% 23	28.99% 20	8.70% 6	0.00% 0	69	2.83
Yard Drainage and Subdivision Grading	21.74% 15	37.68% 26	30.43% 21	8.70% 6	1.45% 1	69	2.74

Outline of the Criteria

- ▶ 2.0 General Requirements
- ▶ 3.0 Drainage Impact Study
- ▶ 4.0 Drainage Easements
- ▶ 5.0 Hydrology
- ▶ 6.0 Conveyance
- ▶ 7.0 Collection
- ▶ 8.0 Detention
- ▶ 9.0 Post-Construction Stormwater Best Management Practices



Section 3.0 – Drainage Studies

- ▶ Drainage Impact Study for most Planning, Building Permit and Public Works projects
- ▶ Grading Plans and early concept layouts and site assessments are key
- ▶ Pre-application meetings very helpful.
- ▶ Submittals scaled to level of need – and submitted timely
- ▶ Guidance and Checklists. Integration with existing review flows. New tools.
- ▶ Orderly and Consistent Documentation
- ▶ Simpler tools for small sites, single family homes, etc --- and integrated processes

Drainage
Decisions
– Timing
is Key

- Site Plan
- Field Check
- Office Check
- Final
- Construction Completion

Section 4.0 Drainage Easements

- ▶ Easements
 - Types and Use
 - Sizing
 - Platting and Maintenance Covenants
- ▶ Natural Stream Corridors - buffer widths

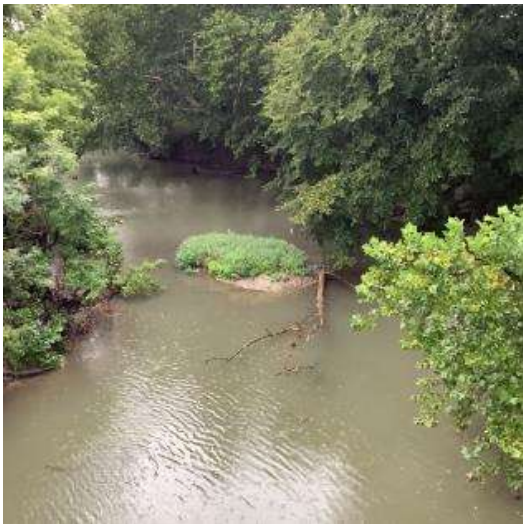


Note: City still working through ordinance and legal review

Contributing Drainage Basin Size	Buffer width, from the toe of channel outwards, measured separately in each direction
Less than 20 acres	20 feet
20 acres to 40 acres	30 feet
40 acres to 80 acres	50 feet
80 acres to 160 acres	60 feet
160 acres to 320 acres	80 feet
320 acres to 640 acres	100 feet
Greater than 640 acres	120 feet

Section 5.0 Hydrology

- ▶ Hydrograph Method
- ▶ Rational Method



- ▶ Design Event
 - Duration
 - ▶ 6-hr event
 - ▶ Drainage areas >640 acres, use 24-hr event
 - Distribution & Depth (Appendix)
 - Normalizing Rational Formula coefficients
- ▶ Time of Concentration

Section 6.0 Conveyance

- ▶ Requirements
- ▶ Design Procedures
- ▶ Underground enclosed system
- ▶ Overflow pathways/swales
- ▶ Natural Streams
- ▶ Engineered channels
- ▶ Culverts/Energy Dissipation



Section 7.0 Collection

- ▶ Inlet design tables – See Appendix
 - Complete Tables, More User Friendly
 - Matches Styles Currently in Use
 - Incorporates KDOT and JoCo Flume Studies on similar types
- ▶ Inlet locations
 - Consider hydraulic design criteria, geometric controls, or both
 - Governed by allowable spread and depth.

Street Typology	Number of Travel Lanes, (Total)	Allowable Gutter Spread, T_{allow} (ft)
Local Street	2	7.5
Collector	3	7.5
Arterial	4	13.5

Notes:

⁽¹⁾ Gutter Width = 1.5 feet

⁽²⁾ Gutter Spread, as measured from vertical face of curb for composite curb and gutter section (FHWA, 2013)

⁽³⁾ Allowable Gutter Spread pertains to both sides of the travel direction

Section 8.0 Detention

- ▶ Provided for all sites with an increase in impervious area of 10,000 Square Ft or more
 - In Lieu Fee option to be considered in some areas for Regional control.
- ▶ Post-project peak discharge rates set by consistent allowable release rate – over detention for system-wide benefit

Design Event by ARI	Release Rate (cfs/ac)
Water Quality Volume (WQv)	QWQ ⁽¹⁾
2-year	0.5
10-year	1.5
100-year	3.0

Notes:

- (1) The Water Quality Outflow Rate (QWQ) applies when extended dry detention or extended wet detention is incorporated into the detention facility as a proposed stormwater quality BMP. See Section 9 or Post-Construction BMP Manual.

Section 9.0 Post-Construction Stormwater BMPs

- ▶ Required for sites >1 acre, either individually or part of greater common plan (EPA required)
- ▶ Reference City of Manhattan's Post-Construction Stormwater BMP Manual
- ▶ Planned Addendum for some current corrections, issued separately



Discussion

▶ Time today for Discussion ---
and Comments Appreciated!

- ▶ Grading and Overflows
- ▶ System Performance/Hydrology
- ▶ Studies and Submittals
- ▶ Stormwater Detention
- ▶ Natural Streams and Green Infrastructure
- ▶ Maintenance



Next Steps

- ▶ Contacting Helps Us Continue Outreach – we need your Email
 - Comment Card Today
- ▶ Comment Period Open Until Nov 4th
 - Will be extensions for Specifications
 - Potentially Other Supplemental Review Materials – please check back on the site
- ▶ Updates Anticipated
- ▶ Commission Work Session/Presentation
- ▶ Aim for Adoption by Year End/Early 2023
- ▶ Continued Outreach and Progress
- ▶ **Thank You for Participating**



End

