

OFFICIAL PUBLIC NOTICE



AMENDMENT NO. 13 TO THE DESIGN CRITERIA AND STANDARD SPECIFICATIONS

Date: October 10, 2023

Attention: Engineers, Landscape Architects, Architects, Developers and Contractors

Subject: Revisions to the Post-Construction BMP Manual.

Effective November 1, 2023, the following clarifications and changes in policies, design standards and specifications within the Post-Construction BMP Manual shall also apply to all new projects requiring such BMPs within the City Limits of Manhattan, Kansas. The changes are as follows:

A. Section 4 – Structural BMPs

1. Subsection 4.1 Hydrology Models:

- a. For BMPs designed for the Water Quality Volume (WQv), the Methods given in Section 4.1 of the manual shall be used. Refer to the 90th percentile storm event volume of 1.10 inches for Manhattan in all hydrological calculations for BMP design. The volumes once developed may be routed using the Manhattan 6-hour design storm hydrograph as given in the 2023 Stormwater Design Criteria. (No reduction in WQv made for application of the 6-hour instead of a 24-hour storm) Direct application of curve numbers to calculate losses during a water quality event are not allowed, as the initial abstraction term estimate too much loss from pervious areas during small storms.
 - b. For BMPs designs based on peak discharges during the Water Quality event, the WQ peak will be estimated at 30% of the 2-year storm peak, as determined using the calibrated Rational Formula method given in the City of Manhattan's Stormwater Management Criteria, 2023 (SMC). *(Note: this 30% factor is derived from the ratio of the 90th percentile storm intensities to the 2-year intensities as shown in Appendix A).* The Rational Formula guidance in Subsection 4 and IDF curves referenced Appendix A in the Post-Construction BMP Manual are no longer applicable.
2. **BMP Options:** The BMPs described in the Manual is not an exhaustive list of the various BMPs that may be used to address stormwater quality and treatment. Other BMPs described in the MARC BMP Manual (as used in the Kansas city metropolitan area) or other acceptable resources may be proposed.
 3. **Infiltration-Based BMPs:** Infiltration-based BMPs should have Ksat of ≥ 0.5 in./hr. WebSoil Survey may help identify if soils are suitable, but soils should have on-site perc tests to confirm.

- a. In some cases, low Ksat values might be mitigated by modifying the BMP with an adequate soil mix to promote surface infiltration and store for slower perc or may also require a supplemental underdrain. It should be designed to maintain the required retention/detention/treatment time, but not excessively so as to result in frequent long-term ponding.
 - b. Infiltration-based BMPs include, but are not necessarily limited to rain gardens, bioretention, bio-swales, pervious pavement, infiltration basins, and infiltration strips.
- 4. Pre-manufactured BMPs:** Pre-manufactured BMP products shall carry an acceptable certification regarding their reported performance and effectiveness. This requirement may be waived by the City Engineer for specific products upon submission of adequate testing and performance documentation of equivalent performance. Recognized certification programs include:
- a. “GULD” designation issued by the Washington State Department of Ecology.
 - b. Certified through the NJCAT Technology Verification Program.
- 5. Subsection 4.4 Vegetated Swales:**
- a. The design objective is to create a sheet flow condition where the stormwater passes through the base of the vegetation at a shallow depth rather than over the top. The design flow depth should not exceed 4-inches or 1/3 the established/maintained height of the vegetation lining the swale, whichever is less.
 - b. Manning’s values provided under Subsection 4.4.3.3 are for sheet flow calculations using the Manning’s kinematic equation, not Manning’s formula for open channel flow. However, the Manning’s formula for open channel flow may also be used in the design of the Vegetated Swale to determine flow depth and velocity (<1.0 fps required). The following Manning’s “n” values were determined by following HEC-15 (Chapter 4 and the Fall-Board Test in Appendix E therein). These “n” values are considered appropriate for using the Manning’s open channel flow formula to design Vegetated Swales for the stormwater quality event:

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| 1) Tall Fescue (mowed – 4” ht): | 0.041 |
| 2) Tall Fescue (unmowed – 30” ht): | 0.092 |
| 3) Switchgrass (unmowed – 48” ht): | 0.132 |
| 4) Prairie Cordgrass (unmowed – 42” ht): | 0.124 |
| 5) Smooth Brome (unmowed – 18” ht): | 0.082 |
| 6) Eastern Gamagrass (unmowed – 30” ht): | 0.106 |
| 7) Indiangrass (unmowed – 30” ht): | 0.099 |
| 8) Little Bluestem (unmowed – 30”): | 0.083 |
| 9) Big Bluestem (unmowed – 48”): | 0.086 |
| 10) Native Grass Mix (unmowed – 24” ht): | 0.088 |
 - c. Vegetated Swales designed based on unmowed grasses shall have a sign posted saying “Private Stormwater Treatment BMP. Limited mowing only.
- 6. Subsection 4.5 Filter Strips:** The filter strip design shall maintain a sheet flow drainage condition across the entire strip. Concentrated, channelized flows are not acceptable.
- 7. Subsection 4.7 Extended Dry Detention:**
- a. Clarification: Required detention will be 40-hours the minimum release period. Reference to 24-hour detention was informational only.

b. Revision: The 4-inch minimum orifice outlet size may be reduced to 1.5-inches.

B. Appendix “A”:

1. As noted in the revisions of Subsection 4.1, the data in this Appendix is no longer directly used for any calculation.

C. Appendix “B”:

1. Disregard maps showing soil types for the Manhattan Region. Use the NRCS Websoil Survey (<https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>) to identify site-specific HGS soil group for local soils. Site specific geotechnical studies may be used in lieu of Websoil Survey.
2. Disregard Infiltration Rate Table on the Statewide Soils Map. Use the NRCS Websoil Survey (<https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>) to identify K-Sat values for local on-site soils. Lab testing of infiltration rates may be used in lieu of Websoil Survey.
3. Bioretention Soil Mixture (Pg A-6 thru A-8): Substitutes to this engineered BSM mix may be allowed by the City Engineer following an approvals processes and adequate confirmation of mixture control, infiltration and constructability.
4. Addition to Bioretention Construction (Pg A-10): Avoid glazing, slicking or sealing the finished bottom and sides of the bioretention basin. Excavation operations within this zone shall use a “raking” motion of the backhoe bucket to remove the material being excavated.

D. Appendix “E”: Appendix “E” has been removed. Refer to the MDC and the SMC, Chapter 4, for stream setback requirements.

E. Appendix “H”: “The use of the charts in this Appendix to exempt projects from post-construction BMPs is no longer applicable. To the extent that minimizing impervious surfaces on sites with more porous soils may allow existing green spaces to be used for infiltration, such infiltration areas must be subject to calculation and designated for protection onsite.”

Respectfully,



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Review History: This amendment was circulated for public review from August 18 to September 7, 2023. No comments were received. The final version includes only minor revisions for clarity.