integrated Stormwater Management iSWM

TECHNICAL FEEDBACK FROM ISWM ADOPTERS

WEBINAR

MARCH 30, 2020

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INTRODUCTIONS

NCTCOG:

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- Sydni Ligons

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- Ben Pylant, PE, CFM
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OVERVIEW & GOAL

- Initiated by the iSWM Implementation Subcommittee (IIS)
- Goal - receive feedback about the iSWM program regarding:
  - Criteria Manual, Technical Manuals, Supporting Documents, & Training
- Final feedback will be summarized in a memorandum with recommendations to IIS
- Feedback consists of:
  - Corrections
  - Methodology
  - Missing information
  - Clarifications

LINKS

- Construction Controls - http://iswm.nctcog.org/Documents/technical_manual/Construction%20Controls_9-2014.pdf
- Hydraulic Manual - http://iswm.nctcog.org/Documents/technical_manual/Hydraulics_9-2014.pdf
- Hydrology Manual - http://iswm.nctcog.org/Documents/technical_manual/Hydrology_9-2014.pdf

- Please submit questions via chat during the webinar

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WEBINAR OUTLINE

- Summary of Online Survey Results
- Addressing Feedback
  - Construction Control Technical Manual
  - Hydrology & Hydraulics Technical Manuals
  - iSWM Implementation & Enforcement
  - Site Development Controls Technical Manual

    (Feedback is being addressed under another task)
- Questions & Next Steps

ONLINE SURVEY RESULTS

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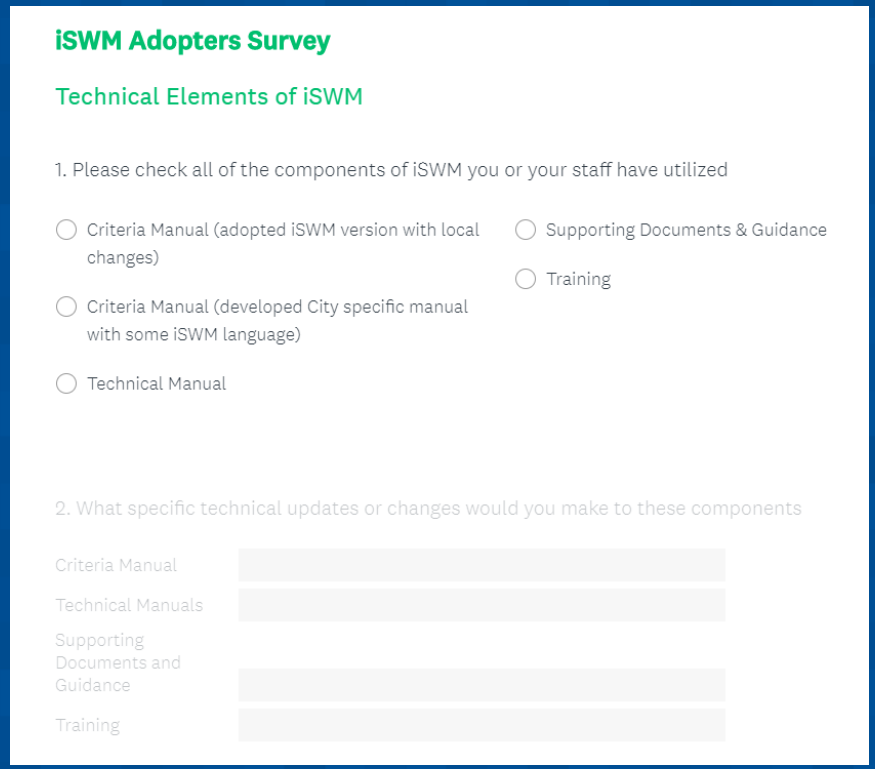
ONLINE SURVEY OVERVIEW

- Survey sent out by NCTCOG between December 9, 2019 to January 31, 2020
- 5 respondents
- Provided opportunities for open answer feedback



iSWM Adopters Survey

Technical Elements of iSWM

1. Please check all of the components of iSWM you or your staff have utilized

- ○ Criteria Manual (adopted iSWM version with local changes)
- ○ Criteria Manual (developed City specific manual with some iSWM language)
- ○ Technical Manual
- ○ Supporting Documents & Guidance
- ○ Training

2. What specific technical updates or changes would you make to these components

- Criteria Manual
- Technical Manuals
- Supporting Documents and Guidance
- Training

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ONLINE SURVEY QUESTIONS & RESULTS

■ Please check all of the components of iSWM you or your staff have utilized

	Votes
Criteria Manual (adopted iSWM version with local changes)	5
Criteria Manual (developed City specific manual with some iSWM language)	0
Technical Manual	0
Supporting Documents & Guidance	0
Training	0

ONLINE SURVEY QUESTIONS & RESULTS

- Where do you see is the greatest need for additional training and clarity regarding iSWM requirements?

	Votes
For Developers	4
For Designers	1
For City staff/reviewers	0

ONLINE SURVEY QUESTIONS & RESULTS

- Have you had challenges implementing or enforcing iSWM criteria?

	Votes
Yes	1
No	2
Somewhat	1

ONLINE SURVEY QUESTIONS & RESULTS

- What is the general level of concern in your community regarding the downstream impacts on other cities (water quality, erosion, trash/debris management, etc.) associated with a lack of post construction BMP implementation?

	Votes
Very high	1
Somewhat high	2
Somewhat low	0
Very low	1

ONLINE SURVEY QUESTIONS & RESULTS

- Has iSWM helped you achieve your communities' goals? If so, how? If not, why

	Votes
Yes	4
No	0

CONSTRUCTION CONTROLS TECHNICAL MANUAL

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CONSTRUCTION CONTROLS

CORRECTION

- Section 3.9 – Sediment Basin – Inconsistent draw down time requirement
  - Pages CC-115 and CC-118 require 36 hours
  - Page CC-135 of the Sediment Basin Design Procedures Step 14 (a) requires 6 hours

RECOMMENDATION

- Recommend update to manual
  - Recommend 36 hours draw down time
  - Correct wording on page CC-135

CONSTRUCTION CONTROLS

CLARIFICATION

- Section 3.9 – Sediment Basin
  - Include a comment about having wording that the orifice be no less than 3” due to clogging issues

RECOMMENDATION

- Recommend no update to manual
  - Wording on page CC-135:

    “*Diameter of the dewatering orifice should never be less than 3 inches in order to help prevent clogging by soil or debris.*”

CONSTRUCTION CONTROLS

CORRECTION

- Section 3.9.7 – Sediment Basin – Design Procedures – Step 1
  - Correct or add reference to *Hydrology Technical Manual* for required volume calculations
  - Where did this Equation (3.2) come from?

Equation (3.2)

$$V_1 = 0.4 \times A_1 \times D_1$$

V_1 = the storage volume (ft^3)

A_1 = the surface area of the flooded area (ft^2)

D_1 = max depth (ft)

RECOMMENDATION

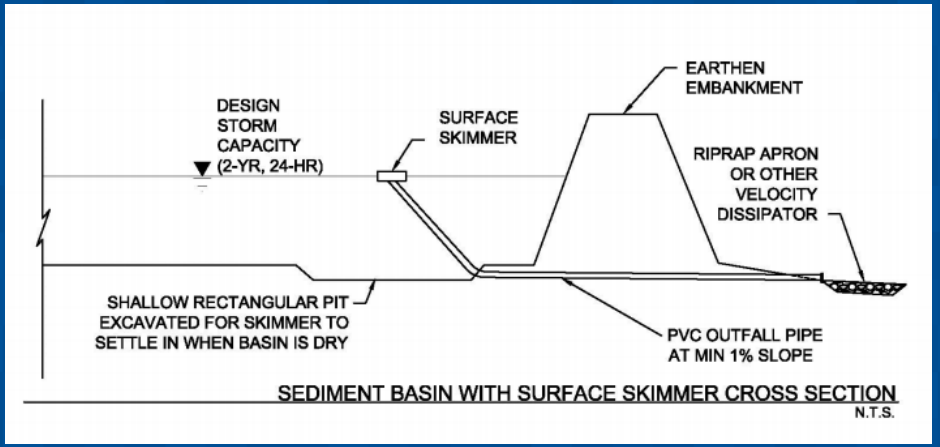
- Recommend update to manual
  - Add wording to Section 3.9.7 page CC-125

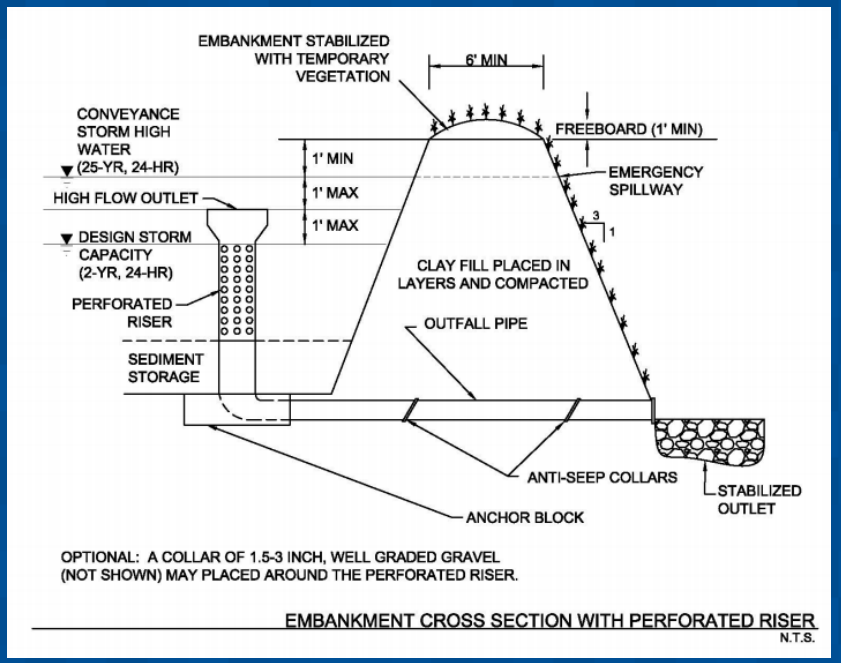
"Please refer to Section 1.0 of the Hydrology Technical Manual to determine the method appropriate to size the required volume for your storage facility. Please refer to corresponding section in Hydrology Technical Manual to calculate required volume."

CONSTRUCTION CONTROLS

CLARIFICATION & METHODOLGY

- Section 3.9 – Sediment Basin
  - Need better explanation to drive use of surface skimmers. Highlight skimmers may be reusable
  - Surface drawdown vs. perforated riser – Remove section for perforated riser with rock diaphragm (page CC-124)





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CONSTRUCTION CONTROLS

RECOMMENDATION

- Recommend 1 update to manual
  - Add wording to Section 3.9.3 Design Criteria page CC-118:

    “Surface skimmers may be reusable.”
- Recommend no update to manual
  - Though surface skimmers are preferable, perforated risers will remain in manual as an option with the existing caveat:

    “Perforated riser may be used as an outlet when surface discharge is not feasible. A perforated rise has the advantage of dewatering the basin; however, it also results in the lowest sediment removal efficiency.”

HYDROLOGY & HYDRAULICS TECHNICAL MANUALS

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HYDRAULICS

CORRECTION

- Storage Design Section 2.1.3 Stage-Storage Relationship Equation 2.2 (page HA-94)
  - The frustrum of a pyramid formula is expressed as:

$$V = (d/3)[A_1 + (A_1 \times A_2)^{0.5} + A_2]/3$$

where the final /3 is wrong it should be:

$$V = (d/3)[A_1 + (A_1 \times A_2)^{0.5} + A_2]$$

The frustum of a pyramid formula is expressed as:

$$\mathbf{V = d/3\ [A_1 + (A_1 \times A_2)^{0.5} + A_2]/3}$$

where:

V	=	volume of frustum of a pyramid (ft^3)
d	=	change in elevation between points 1 and 2 (ft)
A_1	=	surface area at elevation 1 (ft^2)
A_2	=	surface area at elevation 2 (ft^2)

RECOMMENDATION

- Recommend update to manual
  - Equation should be corrected on page HA-94

HYDRAULICS

MISSING INFORMATION

- Need an on grade inlet calculation for parabolic crowned streets - check with your development staff

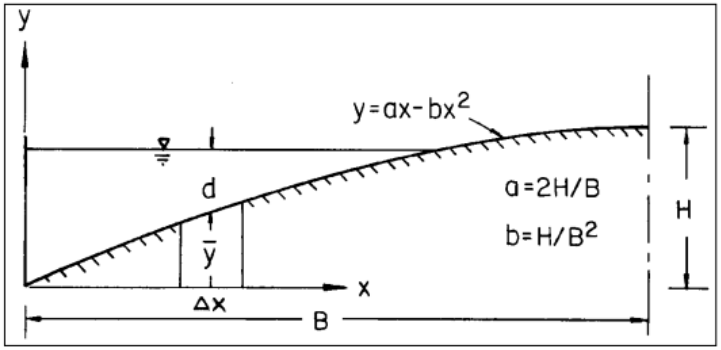

Figure B-2. Properties of a parabolic curve.

RECOMMENDATION

- Recommend update to manual
  - Add reference to HEC-22 FHWA Urban Drainage Design Manual Section B.3 – Spread-Discharge Relationships for Parabolic Cross Sections

https://www.fhwa.dot.gov/engineering/hydraulics/pubs/10009/10009.pdf

Table B-2 (English). Conveyance Computations, Parabolic Street Section.

Distance From Curb	Vertical Rise y	Ave. Rise Y_a	T = 2 ft		T = 4 ft		T = 6 ft	
			Ave. Flow Depth (d)	$d^{5/3}$	Ave. Flow Depth (d)	$d^{5/3}$	Ave. Flow Depth (d)	$d^{5/3}$
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
0	0	0.0384	0.0383	0.0043	0.1083	0.0244	0.1716	0.0527
2	0.0767	0.1117			0.0350	0.0037	0.0983	0.0208
4	0.1467	0.1784					0.0316	0.0031
6	0.2100	0.2384						
8	0.2667	0.2917						
10	0.3167	0.3384						
12	0.3600	0.3784						
14	0.3967	0.4118						
16	0.4268	0.4385						
18	0.4501	0.4585						
20	0.4668	0.4718						
22	0.4768	0.4784						
24	0.4800							
Sum				0.0043		0.0281		0.0766
	$Q/S^{0.5}$ =		0.8 ft^3/s		5.23 ft^3/s		14.27 ft^3/s	

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METHODOLOGY

- Need a more coherent section on using method for detention sizing
- Hydrology Section 1.5 - Modified Rational Method
  - Is Method OK or only approximating volume for preliminary design?
  - Why provide non-iterative approach when statement says it is usually done in spreadsheet

HYDROLOGY

RECOMMENDATION

- Recommend no update to manual
  - Table 1.1 in Hydrology Technical Manual
  - Only appropriate for preliminary design, approximate volumes – Not recommended for final design for facilities with drainage areas more than 200 acres

    Page HO-3: *"Where the Modified Rational Method is used for conceptualizing, the engineer is cautioned that the method could underestimate the storage volume."*

Table 1.1 Applications of the Recommended Hydrologic Methods

Method	Technical Manual Section	Rational Method	SCS Method	Modified Rational	Snyder's Unit Hydrograph	USGS / TXDOT Equations	iSWM Water Quality Volume Calculation
Water Quality Protection Volume (WQ_v)	Section 1.2 of Water Quality						✓
Streambank Protection Volume (SP_v)	Section 3.0 of Hydrology		✓		✓		
Flood Mitigation Discharge (Q_f)	Section 1.3 of Criteria Manual		✓		✓	✓	
Storage Facilities	Section 2.0 of Hydraulics		✓	✓	✓		✓
Outlet Structures	Section 2.2 of Hydraulics		✓		✓		
Gutter Flow and Inlets	Section 1.2 of Hydraulics	✓					
Storm Drain Pipes	Section 1.1 of Hydraulics	✓	✓		✓		
Culverts	Section 3.3 of Hydraulics	✓	✓		✓	✓	
Bridges	Section 3.4 of Hydraulics		✓		✓		
Small Ditches	Section 3.2 of Hydraulics	✓	✓		✓		
Open Channels	Section 3.2 of Hydraulics		✓		✓	✓	
Energy Dissipation	Section 4.0 of Hydraulics		✓		✓		

HYDROLOGY

METHODOLOGY

- The SCS Unit Hydrograph for existing conditions peak seems very large (especially compared to old Rational Method and in smaller basins) possibly create a more workable solution

RECOMMENDATION

- Recommend no update to manual
  - SCS UH is a conservative approach
  - Only recommend Rational Method for areas above 100 acres

Table 1.2 Constraints on Using Recommended Hydrologic Methods

Method	Size Limitations[1]	Comments
Rational	0 – 100 acres	Method can be used for estimating peak flows and the design of small site or subdivision storm sewer systems.
Modified Rational[2]	0 – 200 acres	Method can be used for estimating runoff volumes for storage design.
Unit Hydrograph (SCS)[3]	Any Size	Method can be used for estimating peak flows and hydrographs for all design applications.

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METHODOLOGY

- Section 1.3.7 Simplified SCS Peak Runoff
  - Method as described is not complete method - prefer to just have a note referring any one who wished to use the method refer back to TR-55 for the full description. Suggest to remove this section or remove equations and reference software programs. Reference when/where/why applicable

HYDROLOGY

RECOMMENDATION

- Recommend update to manual
  - Add note: *“For full description and compliance with methodology please refer to SCS Technical Release 55 (USDA, 1986).”*
  - Manual states: *These procedures are applicable to small drainage areas (typically less than 2,000 acres) with homogeneous land uses, which can be described by a single CN value.*

ISWM IMPLEMENTATION & ENFORCEMENT

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CLARIFICATION

- Clarify times when iSWM applies and when it doesn't. What if the property was platted before iSWM was adopted by municipality?

RECOMMENDATION

- Recommend no update to iSWM program
  - Legal non-conforming is a city decision – Contact the local City where site is located
  - For new developments and redevelopments, iSWM requires discussion during platting period

Table 1.1 iSWM Applicability
Applicable for iSWM Site Design:
Land disturbing activity of 1 acre or more **OR** land disturbing activity of less than 1 acre where the activity is part of a common plan of development that is one acre or larger.
Applicable for iSWM Construction:
Land disturbing activity of 1 acre or more **OR** land disturbing activity of less than 1 acre where the activity is part of a common plan of development that is one acre or larger.

ISWM IMPLEMENTATION & ENFORCEMENT

MISSING INFORMATION

- Developers aren't familiar with iSWM requirements and the additional costs to comply
- Developers and engineer's dealing with the various local changes adopted by the many DFW communities.
- Training on using iSWM manual to design storm drainage pipe system

RECOMMENDATION

- Recommend to incorporate into NCTCOG's training agenda
- Existing Training on iSWM website - http://iswm.nctcog.org/training.html#RulesofThumb

SITE DEVELOPMENT CONTROLS TECHNICAL MANUAL

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SITE DEVELOPMENT CONTROLS

- Workshop #1 – October 9, 2019

  http://iswm.nctcog.org/training/20191009_Site_Dev_Controls_Workshop1.pdf

- Workshop #2 – February 5, 2020

  http://iswm.nctcog.org/training/20200205_Site_Dev_Controls_Workshop2.pdf

- Currently working on implementing recommendations discussed at workshops

QUESTIONS?

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NEXT STEPS

- **April 2020 –** Summarize final recommended updates in memorandum and present to iSWM Implementation Subcommittee

For follow up questions or information contact:

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