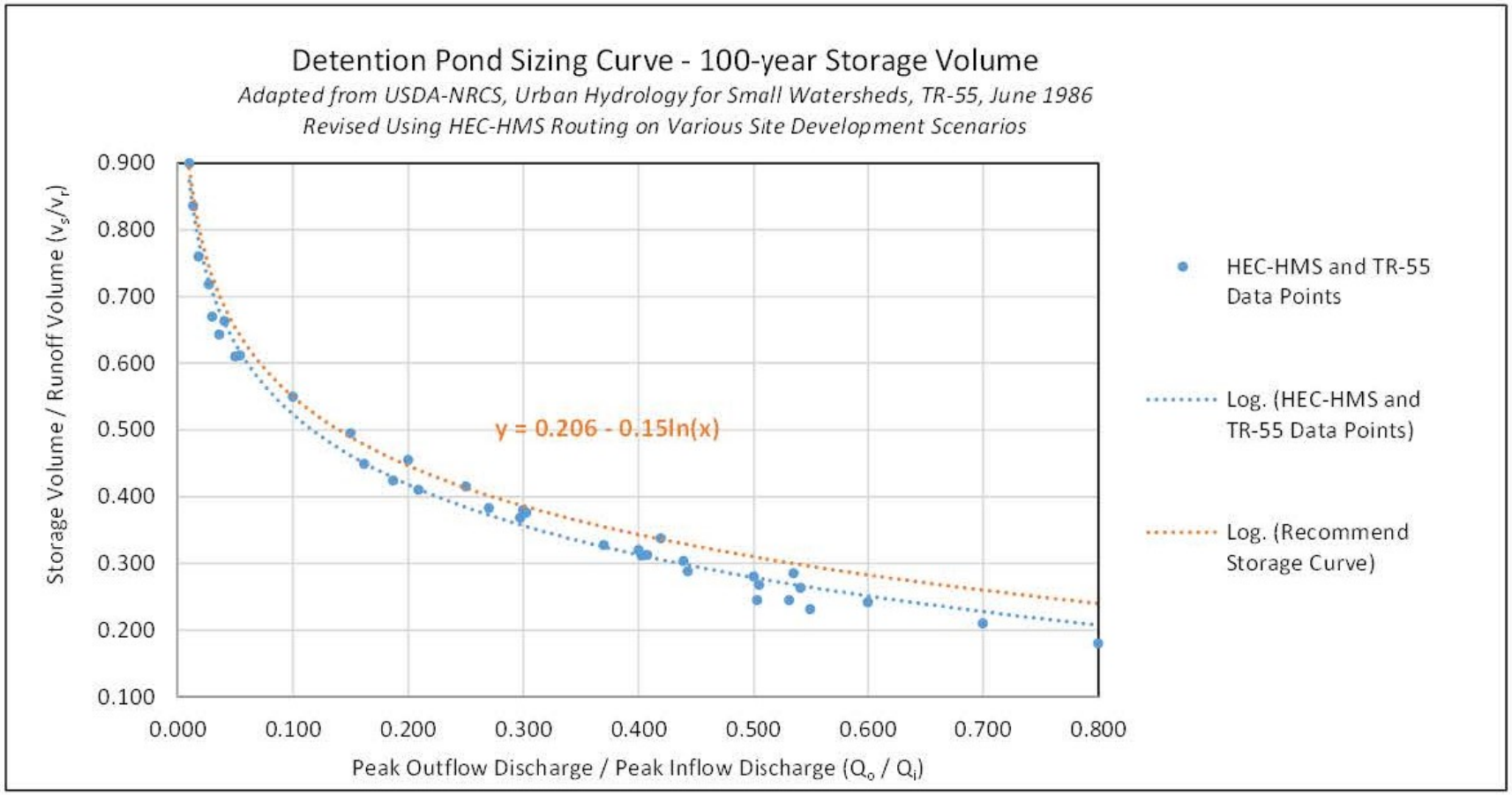
Appendix J:
Design Reference



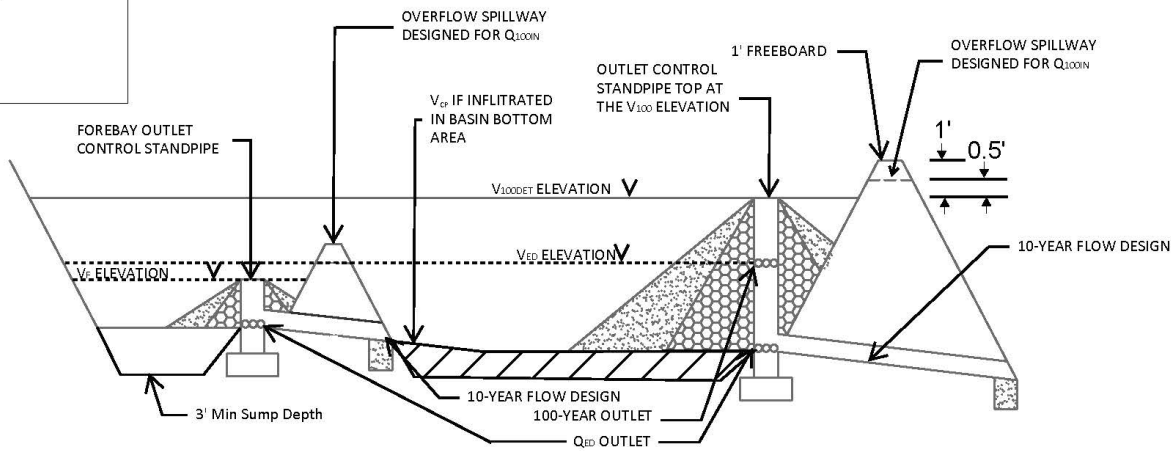
Original TR-55 Table included Qo/Qi values ranging from 0.10 to 0.80

Additional values added using HEC-HMS routing, including Qo/Qi values less than 0.10

TYPICAL DETENTION BASIN WITH FOREBAY

REQUIRED PROFESSIONAL ENGINEER CERTIFICATIONS

-CHANNEL PROTECTION VOLUME "CREDIT" ($V_{CP\text{-}C}$) ← 1.3"
-INFILTRATION RATES
-100-YEAR ALLOWABLE OUTLET RATE (Q_{100ALL})
-MEP FOR ACHIEVED INFILTRATION VOLUME
-STORMWATER SYSTEM O&M PLANS



WATER QUALITY VOLUME (V_{WQ})

V_{WQ}= (1"/12")(43,560)(C)(A)
V_{WQ}= (3,630)(C)(A)

CHANNEL PROTECTION VOLUME (V_{CP})

V_{CP}= (1.3"/12")(43,560)(C)(A)
V_{CP}= (4,719)(C)(A)

FOREBAY VOLUME (V_F)

A FOREBAY FOR ALL INLETS SHALL CAPTURE SILT, SAND, TRASH AND DEBRIS FOR REMOVAL. THEY ARE SIZED AT 15% OF THE WATER QUALITY VOLUME (V_{WQ})

V_F = (1"/12")(43,560)(C)(A)(P)
P_F =0.15

V_F IS A MINIMUM OF V_{WQ} WHEN DOWNSTREAM INFILTRATION IS PROPOSED

FOREBAY OUTLET SIZE

THE FOREBAY OUTLET SIZE IS THE SAME AS THE EXTENDED DETENTION OUTLET SIZE

NOTE: ALTERNATIVE FOREBAY OUTLETS REQUIRE PRE-APPROVAL FROM THE OCWRC

EXTENDED DETENTION VOLUME (V_{ED})

EXTENDED DETENTION CONTROLS THE 2-YEAR BANK FULL RELEASE RATE BY DEWATERING THE V_{ED} OVER 48-HOURS

V_{ED}= (1"/12")(43,560)(C)(A)(P)
P_{ED} =1.9

EXTENDED DETENTION OUTLET RATE

$Q_{ED}=(V_{ED})/((48)(60)(60))$

$H_{ED}=(V_{ED})/((4{,}800)(h)^{(1/2)})$

H_{ED}= NUMBER OF 1-INCH DEWATERING HOLES
h=TOTAL HEAD ON THE ORIFICES
NOTE: THIS EQUATION CONSIDERS THE AVERAGE HEAD TO BE 0.4 TIMES THE TOTAL HEAD

100-YEAR POST-CONSTRUCTION INLET RATE (Q_{100IN})

$$Q_{100IN} = (C)(A)\left(\frac{30.2033 * 100^{0.2203}}{(T_C + 9.1747)^{0.8069}}\right)$$

USE T_C FROM STORM SEWER DESIGN

100-YEAR ALLOWABLE OUTLET RATE (Q_{100ALL})

THE ALLOWABLE 100-YEAR OUTLET RATE, IN CFS, IS THE LESSER OF:

-OCWRC RESTRICTED RATE FOR THE DRAIN (Q_R)
-PRO-RATED SHARE OF THE DRAINS CAPACITY (Q_P)
OR
-THE VARIABLE RELEASE RATE (Q_{VRR})

Q_{VRR}=1.1055 - 0.206LN(A)

100-YEAR DETENTION VOLUME (V_{100DET})

R=0.206-(0.15)(LN(Q_{100ALL}/Q_{100IN}))

R=STORAGE CURVE FACTOR

V_{100IN}=(3,630)(C)(A)(p)
P_{100} = 5.23

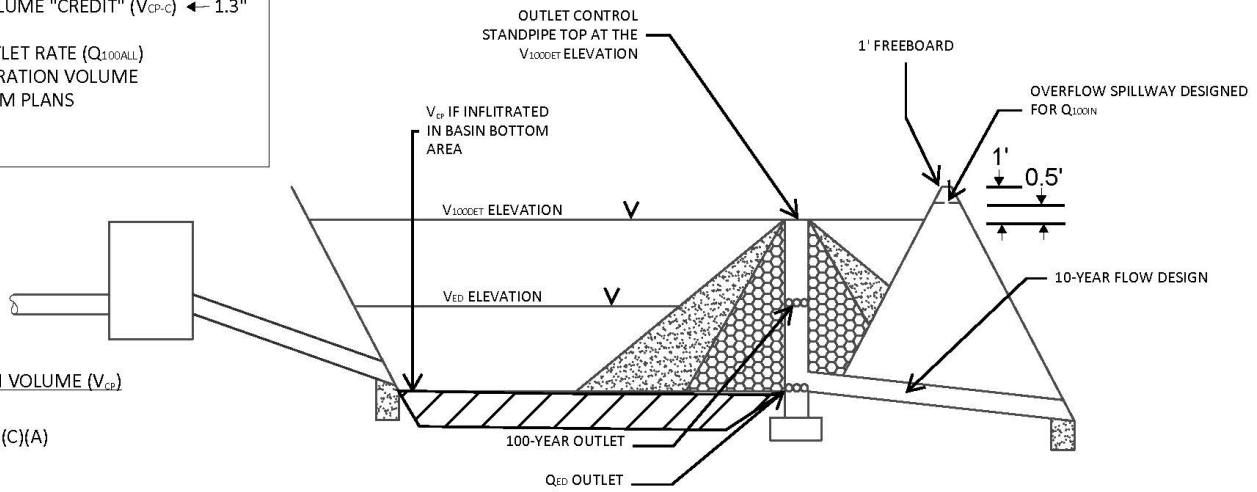
$V_{100DET}=(V_{100IN})(R)-V_{CP\text{-}C}$
(MINIMUM OF V_{ED})

REV-3/12/2021

TYPICAL DETENTION BASIN WITH MECHANICAL SEPARATOR

REQUIRED PROFESSIONAL ENGINEER CERTIFICATIONS

-CHANNEL PROTECTION VOLUME "CREDIT" (V_{CP-C}) ◄— 1.3"
-INFILTRATION RATES
-100-YEAR ALLOWABLE OUTLET RATE (Q_{100ALL})
-MEP FOR ACHIEVED INFILTRATION VOLUME
-STORMWATER SYSTEM O&M PLANS



CHANNEL PROTECTION VOLUME (V_{CP})

V_{CP}= (1.3"/12")(43,560)(C)(A)
V_{CP}= (4,719)(C)(A)

MECHANICAL SEPARATOR

REQUIRED WATER QUALITY TREATMENT IS 80 MG/L TSS, OR 80% TSS REMOVAL

SIZED BASED ON THE 1-YEAR WATER QUALITY PEAK FLOW RATE (Q_{WQ})

Q_{WQ}= (C)(A)(97/(Tc+30)

REPLACES FOREBAY REQUIREMENT

INSTALLED OFFLINE AND UPSTREAM OF ANY DETENTION OR RETENTION BASIN

NOTES:
-MUST BE NJDEP CERTIFIED
-EXCLUDES UPSTREAM CONTRIBUTING AREA'S WHERE 1-INCH WATER QUALITY CONTROL IS PROVIDED THROUGH OTHER BMP'S

EXTENDED DETENTION VOLUME (V_{ED})

EXTENDED DETENTION CONTROLS THE 2-YEAR BANK FULL RELEASE RATE BY DEWATERING THE V_{ED} OVER 48-HOURS

V_{ED}= (1"/12")(43,560)(C)(A)(P)
P_{ED}= 1.9

EXTENDED DETENTION OUTLET RATE

Q_{ED}=(V_{ED})/((48)(60)(60))

H_{ED}=(V_{ED})/((4,800)(h)$^{(1/2)}$)

H_{ED}= NUMBER OF 1-INCH DEWATERING HOLES
h=TOTAL HEAD ON THE ORIFICES
NOTE: THIS EQUATION CONSIDERS THE AVERAGE HEAD TO BE 0.4 TIMES THE TOTAL HEAD

100-YEAR POST-CONSTRUCTION INLET RATE (Q_{100IN})

$$Q_{100IN} = (C)(A)\left(\frac{30.2033 * 100^{0.2203}}{(T_c + 9.1747)^{0.8069}}\right)$$ USE T_c FROM STORM SEWER DESIGN

100-YEAR ALLOWABLE OUTLET RATE (Q_{100ALL})

THE ALLOWABLE 100-YEAR OUTLET RATE IS THE LESSER OF:

-OCWRC RESTRICTED RATE FOR THE DRAIN (Q_R)
-PRO-RATED SHARE OF THE DRAINS CAPACITY (Q_P)
OR
-THE VARIABLE RELEASE RATE (Q_{VRR})

Q_{VRR}=1.1055 - 0.206LN(A)

100-YEAR DETENTION VOLUME (V_{100DET})

R=0.206-(0.15)(LN(Q_{100ALL}/Q_{100IN}))

R=STORAGE CURVE FACTOR

V_{100IN}=(3,630)(C)(A)(P)
P_{100}=5.23

V_{100DET}=(V_{100IN})(R)-V_{CP-C}
(MINIMUM OF V_{ED})

REV-3/12/2021

Land Use Summary

must be included on the O&M Plan Sheet for all site plans

Land Use Data	**Characteristic**	**Existing Conditions**	**Proposed Condition**	
	Total Development Area (ac)			
	Impervious Area (ac)			
	Total Pervious Area (ac)			
Perviousness	**Change in Perviousness by Cover Type**			
	Meadow/fallow/natural areas (non-cultivated)	x.xx acres	x.xx acres	
	Improved areas (turf grass, landscape, row crops)	x.xx acres	x.xx acres	
	Wooded Areas	x.xx acres	x.xx acres	
Calculations	CPVC Volume ***Required*** (cubic feet)			
	CPVC Volume ***Provided*** (cubic feet)			
	CPRC Volume ***Required*** cubic feet)			
	CPRC Volume ***Provided*** (cubic feet)			
Soil Group	**Percent of site in each Hydrologic Soil Group**			
	A	B	C	D

The Professional Engineer who signs and seals this site plan certifies that the values in this table reflect the LCDC stormwater calculations required for this development and that geotechnical investigations were performed that provide conclusive documentation that demonstrates whether infiltration (i.e., CPVC) is practicable.

Notes:

- *The Professional Engineer Certification Statement (see above) must be included with the Land Use SummaryTable.*
- *Areas to be shown to the nearest 0.01 acre*
- *'Predominant' soil type shall the soil type with the largest percentage coverage over the designated land use(e.g., 70% Soil Type B and 30% Soil Type C shall be listed in the table as "Soil Type B")*
- *USDA soil types cannot be used to determine site suitability for infiltration and meeting the CPVC volume standard; direct infiltration testing will be required to determine site suitability for infiltration*