

# DETENTION DETAILS & COMPUTATIONS

Small Watershed Method of Hydrograph Development (10-YEAR)  
Method by H.R. Malcom

To obtain hydrograph, input values in blue shaded cells:

V*	Excess Runoff Volume (inches)	7.30	inches
A	Total Area contributing to runoff (acres)	7.30	acres
Qp**	Peak Developed Discharge (cfs)	24.5	cfs
Tincr***	Time increment (minutes)	12	minutes
Qun	Peak Undeveloped Discharge (cfs)	8.4	cfs
tp	Time to Peak (minutes)	91	minutes
Volume	Required Storage Volume (ac-ft)	2,494	ac-ft

Time (minutes)	qi (dev) (cfs)	qi (undev) (cfs)	Volume ac-ft
0	0.00	0.00	0
12	1.04	0.54	0.004
24	3.99	1.08	0.032
36	8.34	1.62	0.112
48	13.35	2.15	0.260
60	18.18	2.69	0.481
72	22.00	3.23	0.764
84	24.16	3.77	1.088
96	24.30	4.31	1.421
108	22.39	4.85	1.762
120	19.07	5.39	1.980
132	16.06	5.92	2.187
144	13.52	6.46	2.329
156	11.39	7.00	2.423
168	9.59	7.54	2.477
180	8.08	8.08	2.494
192	6.80	8.60	2.494
204	5.73	9.13	2.494
216	4.82	9.67	2.494
228	4.06	10.21	2.494
240	3.42	10.75	2.494
252	2.88	11.29	2.494
264	2.43	11.83	2.494
276	2.04	12.37	2.494
288	1.72	12.91	2.494
300	1.45	13.45	2.494
312	1.22	13.99	2.494
324	1.03	14.53	2.494
336	0.88	15.07	2.494
348	0.73	15.61	2.494
360	0.61	16.15	2.494
372	0.52	16.69	2.494
384	0.44	17.23	2.494
396	0.37	17.77	2.494
408	0.31	18.31	2.494
420	0.26	18.85	2.494
432	0.22	19.39	2.494
444	0.18	19.93	2.494
456	0.16	20.47	2.494
468	0.13	21.01	2.494
480	0.11	21.55	2.494

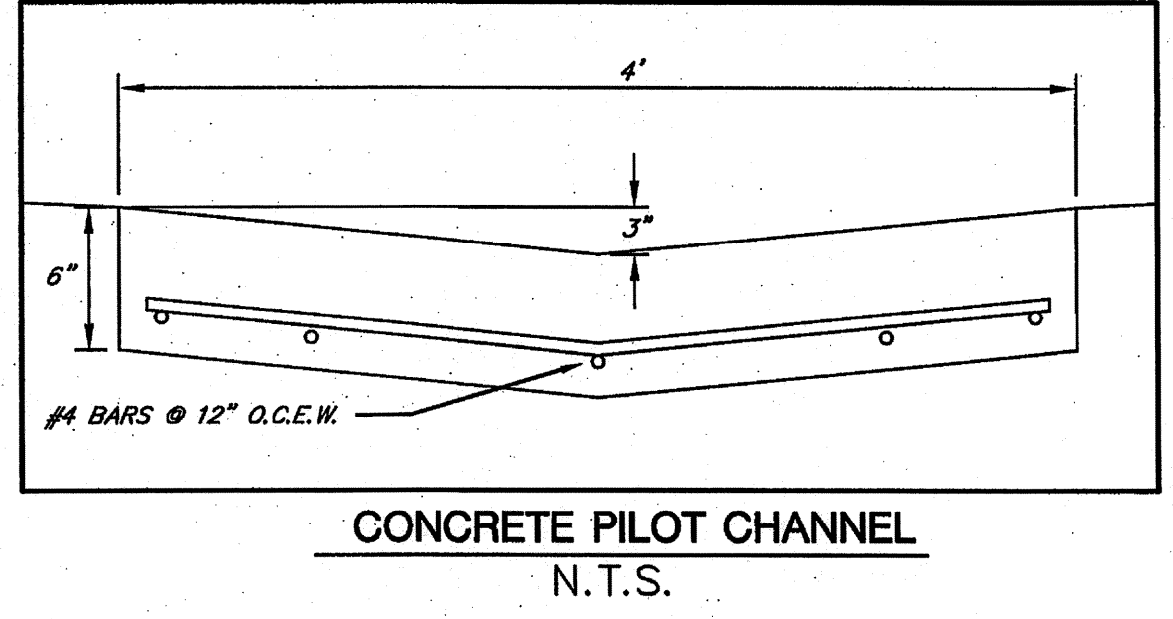
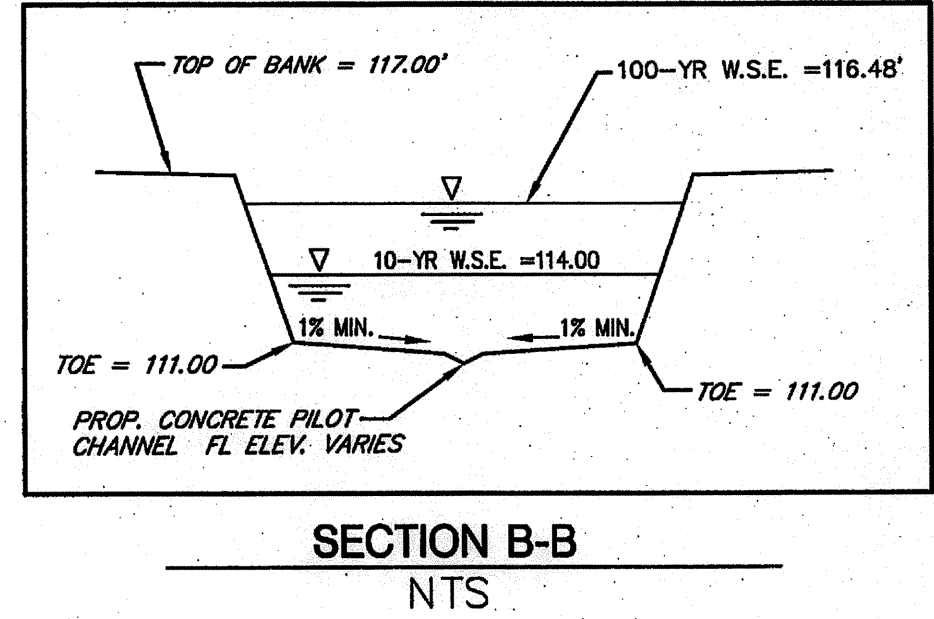
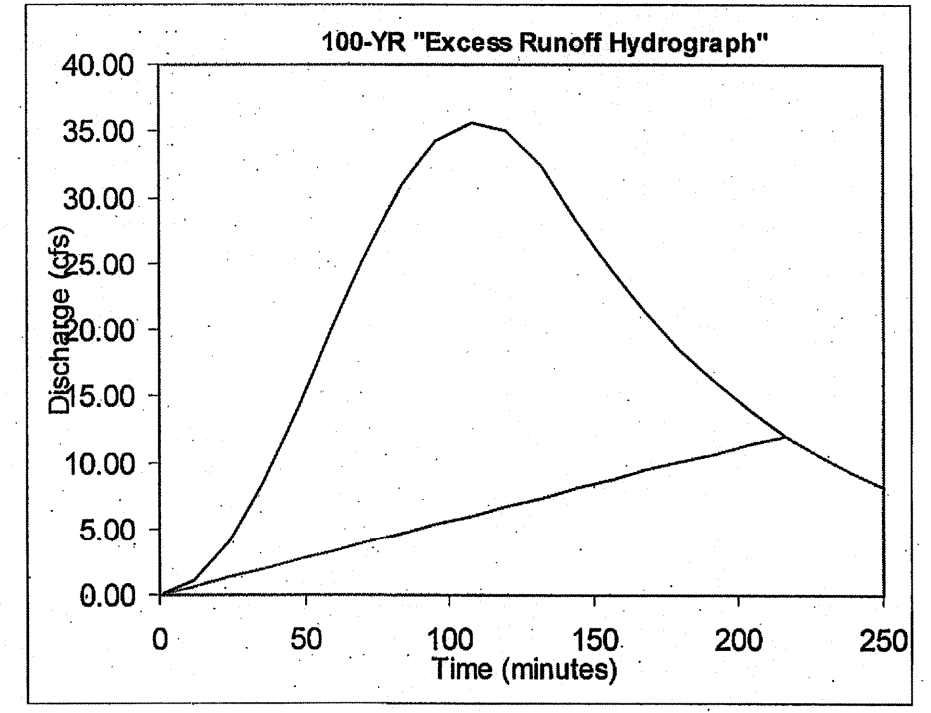
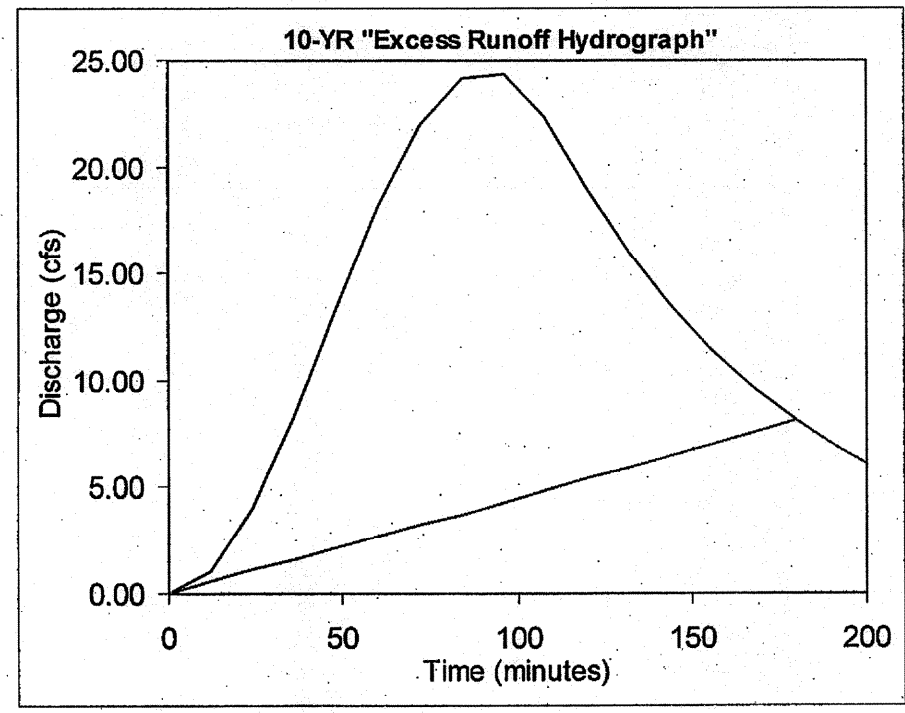
Small Watershed Method of Hydrograph Development (100-YR)  
Method by H.R. Malcom

To obtain hydrograph, input values in blue shaded cells:

V*	Excess Runoff Volume (inches)	12.90	inches
A	Total Area contributing to runoff (acres)	7.30	acres
Qp**	Peak Developed Discharge (cfs)	35.7	cfs
Tincr***	Time increment (minutes)	12	minutes
Qun	Peak Undeveloped Discharge (cfs)	12.11	cfs
tp	Time to Peak (minutes)	110	minutes
Volume	Required Storage Volume (ac-ft)	4,340	ac-ft

Time (minutes)	qi (dev) (cfs)	qi (undev) (cfs)	Volume ac-ft
0	0.00	0.00	0
12	1.04	0.67	0.003
24	4.03	1.34	0.028
36	8.62	2.02	0.105
48	14.28	2.69	0.255
60	20.36	3.36	0.492
72	26.15	4.03	0.815
84	30.98	4.70	1.215
96	34.28	5.37	1.671
108	35.67	6.05	2.155
120	34.99	6.72	2.633
132	32.32	7.39	3.073
144	28.29	8.06	3.448
156	24.56	8.73	3.744
168	21.31	9.40	3.973
180	18.50	10.06	4.141
192	16.05	10.75	4.255
204	13.93	11.42	4.320
216	12.09	12.09	4.340
228	10.49	12.76	4.340
240	9.11	13.43	4.340
252	7.90	14.10	4.340
264	6.86	14.77	4.340
276	5.95	15.44	4.340
288	5.17	16.11	4.340
300	4.48	16.78	4.340
312	3.89	17.45	4.340
324	3.38	18.12	4.340
336	2.93	18.79	4.340
348	2.54	19.46	4.340
360	2.21	20.13	4.340
372	1.92	20.80	4.340
384	1.68	21.47	4.340
396	1.44	22.14	4.340
408	1.25	22.81	4.340
420	1.09	23.48	4.340
432	0.94	24.15	4.340
444	0.82	24.82	4.340
456	0.71	25.49	4.340
468	0.62	26.16	4.340
480	0.54	26.83	4.340

To be used in Harris County:  
Varies for other locations  
\* Based on HCFCD Manual, Section 3.6 for Direct Runoff (Greens Bayou)  
\*\* Based on HCFCD Hydrology Manual, Section 3.3 for Site Runoff Curves  
\*\*\* Use a 5-minute increment



# SWQMP DETAILS & COMPUTATIONS

Terra Associates, Inc.

Project: Discount Tire - Willow Brook DATE: 11-5-8  
Job No: 0280-0706  
System: Greens Bayou  
By: VMN

Storm Water Quality Management Equations

Structural Feature: Dry Detention Pond

Water Quality Volume:  $V_w = 0.5in(1R/12in)(43560sf(S))$   
S = Drainage Area: 7 AC  
Water Quality Volume: 12705 CF

Water Quality Release Feature

Area of Opening ( $A_o$ ):  $A_o = \frac{A_s(AH)^{0.5}}{100.3c\Delta T}$   
 $A_s = 7668$  SQ FT @ Elev. = 112.32'  
 $\Delta T = 48$  HR  
 $c = 2.21$  FT  
Conversion Factor = 100.3  
Orifice Discharge Coefficient ( $c$ ) = 0.6

Area of Opening Allowed ( $A_o$ ) = 3.95 SQ IN  
Area of Opening Provided = 3.14 SQ IN Use 8" HDPE with 2" Drilled Opening @ Cap End.

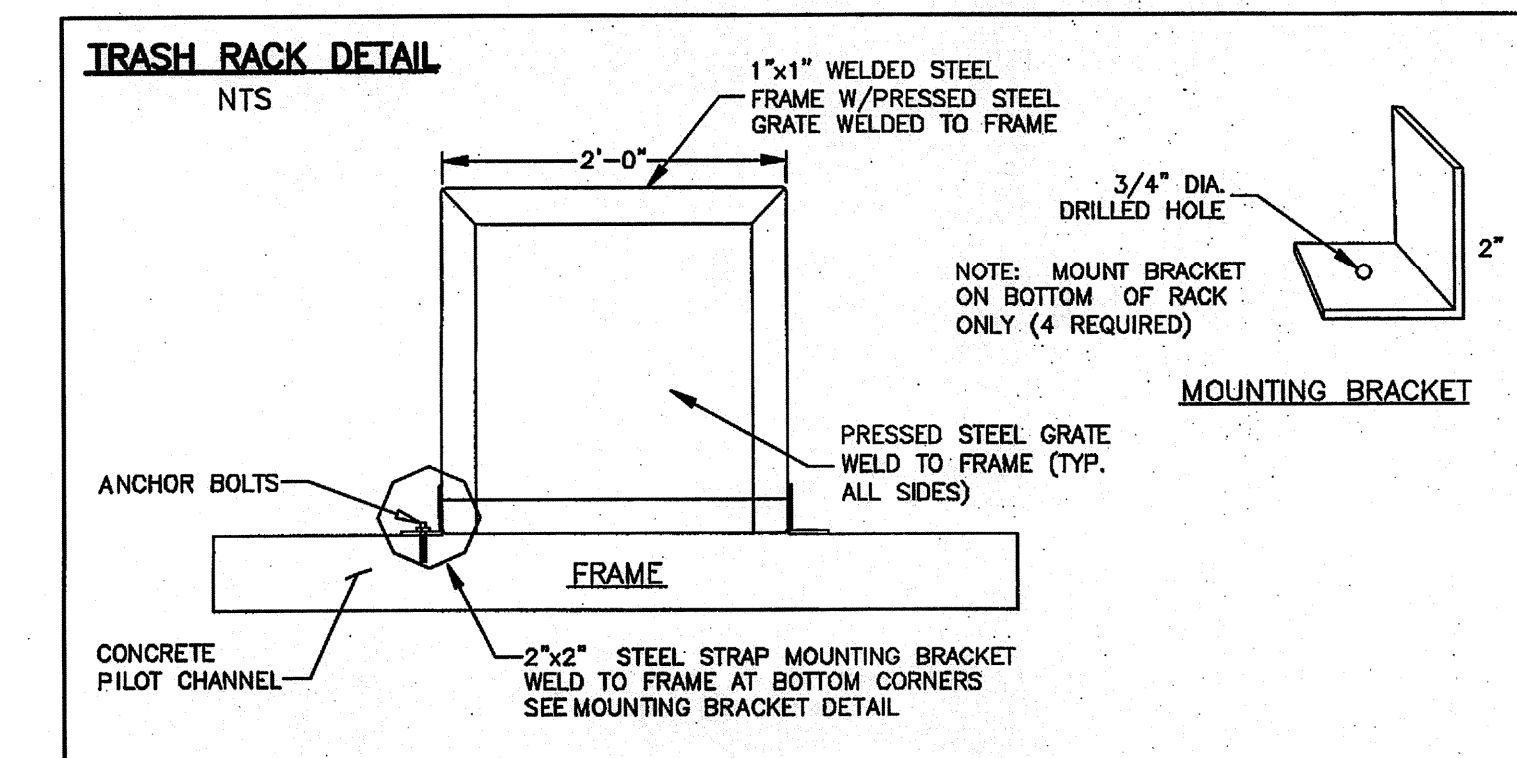
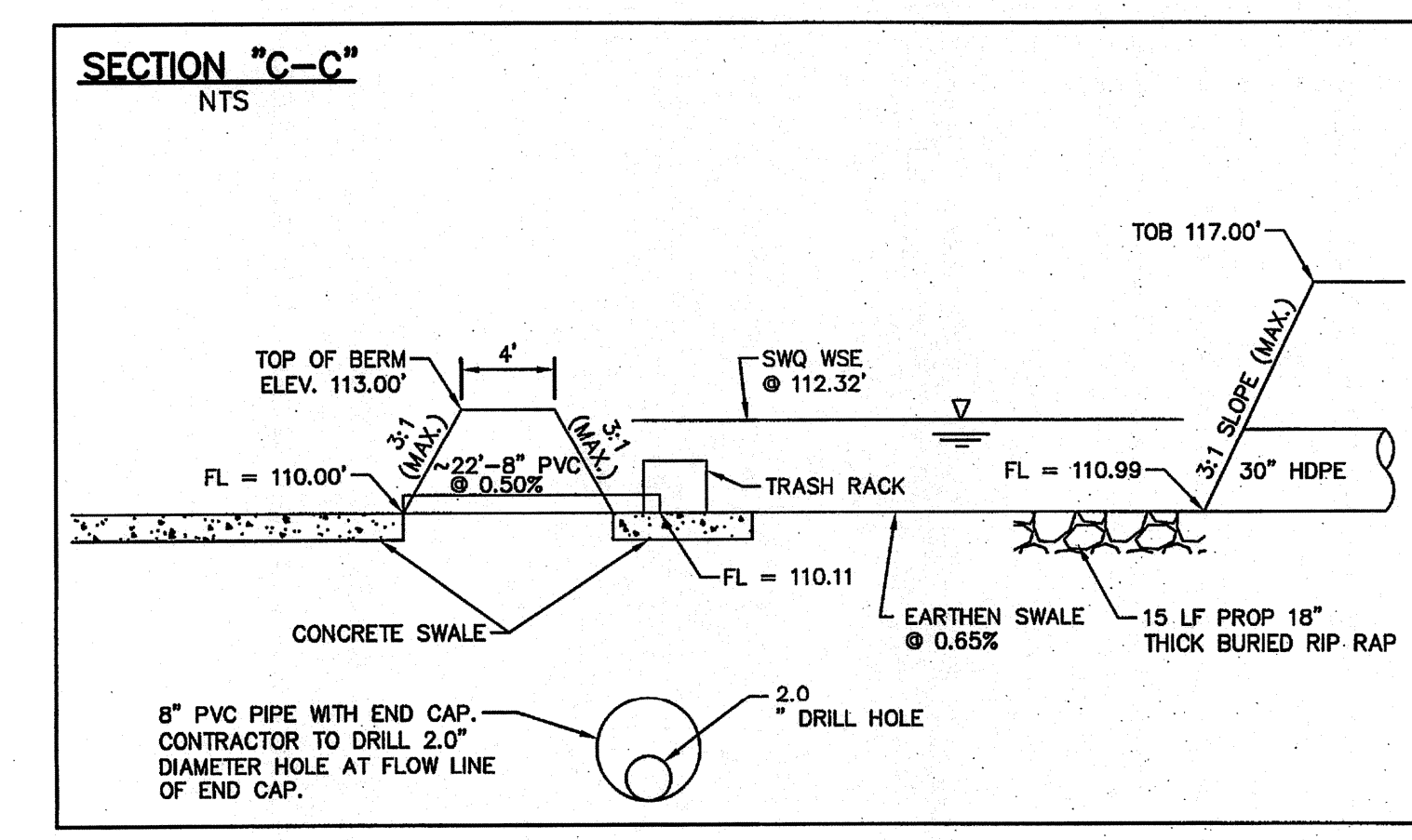
SWQMP PERMIT REQUIREMENTS

UPON COMPLETION OF CONSTRUCTION, THE PERMANENT STORM WATER QUALITY FEATURE WILL BE CLEANED OF ALL SEDIMENT AND DEBRIS THAT MAY HAVE ACCUMULATED. ADDITIONALLY, ALL DISTURBED AREAS RELATED TO THIS PROJECT WILL BE COMPLETELY STABILIZED. THIS WILL BE DONE PRIOR TO SUBMITTING AN "AS-BUILT CERTIFICATE" AND CALLING FOR FINAL INSPECTION. HARRIS COUNTY ENGINEERING WILL NOT PASS THE FINAL INSPECTION OR ISSUE THE CERTIFICATE OF COMPLIANCE UNTIL THE REQUIRED FINAL CLEANOUT AND STABILIZATION HAVE BEEN COMPLETED. THE DEVELOPMENT IS NOT APPROVED FOR OPERATION UNTIL A CERTIFICATE OF COMPLIANCE HAS BEEN ISSUED.

SWQ (Volume Calculations)

Elevation (ft.)	Area (sq. ft.)	Avg. Volume (cu. ft.)	Average Vol. (cu. yds.)	Accum. Vol. (cu. yds.)	Accum. Vol. (cu. ft.)	Accum. Vol. (ac.ft)
110.10	0	0	0	0	0	0.00
110.50	4702	940	35	35	940	0.02
111.00	6135	2709	100	135	3650	0.08
112.00	7291	6713	249	384	10363	0.24
112.32	7668	2394	89	472	12756	0.29
113.00	8502	5498	204	676	18254	0.42

=> SWQ Elevation



Kevin Polasek, P.E.  
STATE OF TEXAS  
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LICENSED PROFESSIONAL ENGINEER  
THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY KEVIN POLASEK, P.E. 96632 ON 11-5-2007

REV. NO.	DESCRIPTION	DATE	APP.

DISCOUNT TIRE (DISTRIBUTION)  
HOUSTON - WILLOWBROOK

DETENTION/SWQMP  
COMPUTATIONS & DETAILS

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3000 WILCREST - SUITE 200  
HOUSTON, TEXAS ZIP 77042  
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DRAWN BY: DAB	SCALE: N/A	CONTRACT: 1
CHECKED BY: KBP	DATE: NOVEMBER 2008	PROJECT No. 0280-0706
FILE NAME: CB-SWQMP.DWG	PLOT SCALE: 1:1	SHEET CB OF 15

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