J.R. RUSSO & ASSOCIATES, LLC
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JOB 2016-037
SHEET NO. 1 OF 3
CALCULATED BY TAC DATE 9/30/16
CHECKED BY DATE
SCALE

TEMPORARY SEDIMENT BASIN SIZING
(PER 2002 CT E+S GUIDELINES)

BASIN # 1

① Contributing Drainage Area

DA = 14.08 Ac (see Drainage Area Map)

Cover Type:
Disturbed Soil = 12.48 Ac

Vegetated Soil = 1.60 Ac

② Required Sediment Storage (V):

$$V = \frac{(DA)(A)(DR)(TE)(2{,}000\ lbs/ton)}{\gamma}$$

where V = sediment storage (cf/yr)
DA = drainage area (acres)
A = average annual erosion (tons/ac/yr) see below
DR = delivery ratio = 33 (from Fig. SB-12)
TE = trap efficiency = 0.8
γ = sediment density = 85 lb/cf (Fig. SB-2)

$$A = \frac{(12.48\ ac)(50\ ton/ac/yr) + (1.60\ ac)(1.0\ ton/ac/yr)}{(14.08\ ac)}$$

A = 44.43 ton/ac/yr

$$V = \frac{(14.08\ ac)(44.43\ ton/ac/yr)(0.33)(0.8)(2{,}000\ lbs/ton)}{85\ lb/cf}$$

V = 3,886 CF

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Basin #1 continued

③ Sizing Criteria

Required Min. Depth = 4'
Required width (W):
$W = 10\sqrt{Q5}$ where Q5 = 5-yr Peak Flow = 21.7 cfs (see attached)
$W = 10\sqrt{21.7}$
W = 46.6 ft
Required length (L) = 2 x W = 93.2 ft

Basin volume = one year's sediment storage plus volume necessary to provide 10-yr, 24-hour storm a 10 hour residence time.

④ Proposed Basin Size

Depth = 4'
Width = 62' ±
Length = 175' ±
Capacity:

Elev.	Area (SF)	Inc. Storage (CF)	Cum. Storage (CF)
126.0	4108	0	0
128.0	6548	10,656	10,656
130.0	9231	15,779	26,435

Adjusted Capacity to remove sediment storage

Elev	Cum Storage (CF)
130.0	22,549

Required sediment storage + wet storage = 2 x 3,886 cF
= 7,772 cF

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Basin #1 Continued

(5) Infiltration Rate

Soil Type: Manchester Gravelly Sandy Loam
Published Transmissivity: 6.0 - 20.0 in/hr

Assume low end and roughly 85% clogging for sediment basin:

Design Transmissivity = 0.85 x 6.0 in/hr
= 0.9 in/hr

(6) Basin Capacity Check

As shown on the attached HydroCAD data sheets for the 10-year, 24-hr storm, the proposed basin has sufficient capacity to provide the minimum 10-hour (600 minutes) residence time.

5-year Storm

Summary for Pond 2P: Sediment Basin

Inflow Area =	14.078 ac,	0.00% Impervious,	Inflow Depth =	1.53"	
Inflow =	21.70 cfs @	12.14 hrs,	Volume=	1.796 af	
Outflow =	8.10 cfs @	12.50 hrs,	Volume=	1.796 af,	Atten= 63%, Lag= 21.8 min
Discarded =	0.22 cfs @	12.50 hrs,	Volume=	0.859 af	
Primary =	7.88 cfs @	12.50 hrs,	Volume=	0.937 af	

Routing by Stor-Ind method, Time Span= 1.00-84.00 hrs, dt= 0.05 hrs
Peak Elev= 130.43' @ 12.50 hrs Surf.Area= 10,172 sf Storage= 30,583 cf

Plug-Flow detention time= 770.5 min calculated for 1.796 af (100% of inflow)
Center-of-Mass det. time= 770.4 min (1,626.5 - 856.1)

Volume	Invert	Avail.Storage	Storage Description
#1	126.00'	49,299 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
126.00	4,108	0	0
128.00	6,548	10,656	10,656
130.00	9,231	15,779	26,435
132.00	13,633	22,864	49,299

Device	Routing	Invert	Outlet Devices
#1	Discarded	126.00'	**0.900 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 0.00'
#2	Primary	130.15'	**20.0' long x 15.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=0.22 cfs @ 12.50 hrs HW=130.43' (Free Discharge)
└─**1=Exfiltration** (Controls 0.22 cfs)

Primary OutFlow Max=7.85 cfs @ 12.50 hrs HW=130.43' (Free Discharge)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 7.85 cfs @ 1.42 fps)

Summary for Subcatchment 1S: POST

Runoff = 28.33 cfs @ 12.14 hrs, Volume= 2.311 af, Depth= 1.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-84.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.70"

Area (ac)	CN	Description
1.599	30	Woods, Good, HSG A
12.479	77	Newly graded area, HSG A
14.078	72	Weighted Average
14.078		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	36	0.0500	0.48		**Sheet Flow,** Fallow n= 0.050 P2= 3.20"
2.4	64	0.0300	0.44		**Sheet Flow,** Fallow n= 0.050 P2= 3.20"
5.4	1,050	0.0400	3.22		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
9.0	1,150	Total			

Summary for Pond 2P: Sediment Basin

Inflow Area =	14.078 ac,	0.00% Impervious,	Inflow Depth =	1.97"	for 10-year event
Inflow =	28.33 cfs @	12.14 hrs,	Volume=	2.311 af	
Outflow =	16.23 cfs @	12.33 hrs,	Volume=	2.311 af,	Atten= 43%, Lag= 11.5 min
Discarded =	0.22 cfs @	12.33 hrs,	Volume=	0.865 af	
Primary =	16.00 cfs @	12.33 hrs,	Volume=	1.445 af	

Routing by Stor-Ind method, Time Span= 1.00-84.00 hrs, dt= 0.05 hrs
Peak Elev= 130.59' @ 12.33 hrs Surf.Area= 10,538 sf Storage= 32,306 cf

Plug-Flow detention time= 603.2 min calculated for 2.311 af (100% of inflow)
Center-of-Mass det. time= 603.1 min (1,451.7 - 848.5)

Volume	Invert	Avail.Storage	Storage Description
#1	126.00'	49,299 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
126.00	4,108	0	0
128.00	6,548	10,656	10,656
130.00	9,231	15,779	26,435
132.00	13,633	22,864	49,299

Device	Routing	Invert	Outlet Devices
#1	Discarded	126.00'	**0.900 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 0.00'
#2	Primary	130.15'	**20.0' long x 15.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=0.22 cfs @ 12.33 hrs HW=130.59' (Free Discharge)
└─**1=Exfiltration** (Controls 0.22 cfs)

Primary OutFlow Max=15.82 cfs @ 12.33 hrs HW=130.59' (Free Discharge)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 15.82 cfs @ 1.79 fps)

Hydrograph for Pond 2P: Sediment Basin

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
1.00	0.00	0	126.00	0.00	0.00	0.00
3.50	0.00	0	126.00	0.00	0.00	0.00
6.00	0.00	0	126.00	0.00	0.00	0.00
8.50	0.00	0	126.00	0.00	0.00	0.00
11.00	**0.74**	**1,200**	**126.28**	**0.09**	**0.09**	**0.00**
13.50	**2.87**	**29,171**	**130.29**	**2.96**	**0.21**	**2.75**
16.00	1.31	28,570	130.23	1.38	0.21	1.17
18.50	0.75	28,298	130.20	0.77	0.21	0.57
21.00	0.60	28,167	130.18	0.61	0.21	0.40
23.50	0.46	28,060	130.17	0.47	0.20	0.27
26.00	0.00	26,631	130.02	0.20	0.20	0.00
28.50	0.00	24,881	129.83	0.19	0.19	0.00
31.00	0.00	23,182	129.64	0.19	0.19	0.00
33.50	0.00	21,533	129.45	0.18	0.18	0.00
36.00	0.00	19,935	129.26	0.17	0.17	0.00
38.50	0.00	18,387	129.06	0.17	0.17	0.00
41.00	0.00	16,889	128.87	0.16	0.16	0.00
43.50	0.00	15,442	128.68	0.16	0.16	0.00
46.00	0.00	14,045	128.49	0.15	0.15	0.00
48.50	0.00	12,697	128.30	0.15	0.15	0.00
51.00	0.00	11,400	128.11	0.14	0.14	0.00
53.50	0.00	10,151	127.92	0.14	0.14	0.00
56.00	0.00	8,949	127.73	0.13	0.13	0.00
58.50	0.00	7,792	127.54	0.13	0.13	0.00
61.00	0.00	6,679	127.35	0.12	0.12	0.00
63.50	0.00	5,612	127.16	0.12	0.12	0.00
66.00	0.00	4,589	126.98	0.11	0.11	0.00
68.50	0.00	3,612	126.79	0.11	0.11	0.00
71.00	0.00	2,678	126.60	0.10	0.10	0.00
73.50	0.00	1,789	126.41	0.10	0.10	0.00
76.00	0.00	945	126.22	0.09	0.09	0.00
78.50	0.00	163	126.04	0.06	0.06	0.00
81.00	0.00	7	126.00	0.00	0.00	0.00
83.50	0.00	0	126.00	0.00	0.00	0.00