EROSION AND SEDIMENT CONTROL REPORT

Prepared for:

HCI DP LAND ACQUISITION LLC

INDUSTRIAL DEVELOPMENT

NEW BRITAIN TOWNSHIP
BUCKS COUNTY
PENNSYLVANIA

Prepared by:

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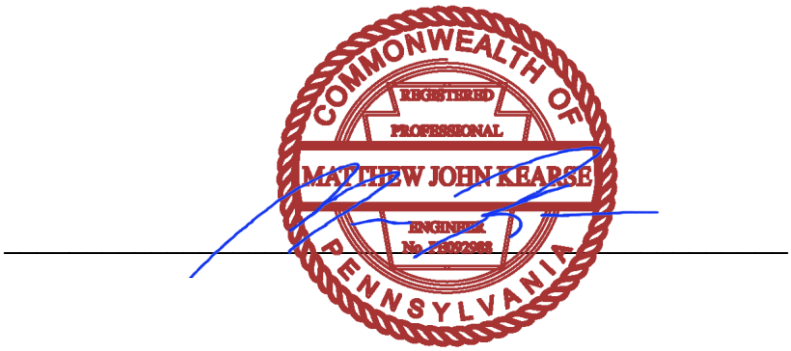

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Table of Contents

General Project Description/ Stormwater Management 1
General Project Description 1
Introduction 1
Project Information 1
Soils 2
E&S Pollution 2
Operations and Maintenance for E&S BMPs 3

Supplementary Calculations 4
Sediment Basin Calculations 4
Compost Filter Sock Calculations 13
Level Spreader Calculations 16

General Project Description/Erosion Control

GENERAL PROJECT DESCRIPTION

HCI DP Land Acquisition LLC proposes to develop the existing property located between Walnut Street, Schoolhouse Road, County Line Road and Independence Lane. The existing site is vacant with the West Branch of Neshaminy Creek travelling through the center of the property. The existing site also contains various woodland areas, wetlands, floodplain and riparian buffer areas. Currently the entire project consists of four (4) lots totaling 85.11 acres. The four (4) lots will be consolidated into one (1) lot. The proposal for the property is to develop the site with three (3) industrial buildings. The proposal also includes utilities and stormwater management controls necessary to support the development. Pertinent data characterizing the existing and future site conditions are shown on the accompanying Preliminary Land Development Plans.

Introduction

As part of the National Pollution Discharge Elimination System (NPDES) permit, the project is required to provide an E&S Plan and Report. The Pennsylvania Department of Environmental Protection (PADEP) issued the PADEP Erosion and Sediment Pollution Control Program Manual (E&S Manual) as guidance for the completion of the E&S design. The proposed plans incorporate guidelines and calculation methodologies from the E&S Manual.

Project Information

The past land use includes:

Past 5 Years Land Use

The overall site is currently a mix of open space, woods, the West Branch Neshaminy Creek and farm fields.

Past 50 Years Land Use

The overall site has been a mix of open space, woods, the West Branch Neshaminy Creek and farm fields for the past 50 years. Schoolhouse

The site is bound by wooded areas to the Northwest, Schoolhouse Road to the Northeast, Walnut Street to the East/Southeast, and Countyline Road to the West/Southwest. The West Branch Neshaminy Creek traverses the site.

The development property drains toward the West Branch Neshaminy Creek, Unnamed Tributary 02875 to West Branch Neshaminy Creek, and Unnamed Tributary 02874 to West Branch Neshaminy Creek.

West Branch Neshaminy Creek and the Unnamed Tributaries 02875 and 02874 to West Branch Neshaminy Creek have a Designated Use classification of Warm Water Fishes (WWF), Migratory Fishes (MF).

Onsite areas generally drain towards the West Branch Neshaminy Creek and the Unnamed Tributaries 02875 and 02874 to West Branch Neshaminy Creek have a Designated Use classification of Warm Water Fishes (WWF), Migratory Fishes (MF).

Soils

Soil mapping and properties including depths, slopes, and limitations for the calculations presented in this report, were obtained from the NRCS Web Soil Survey. Project soil locations is shown on the plan drawings, and a summary of the soils as well as a copy of the NRCS Web Soil Survey map are included in the Appendix. The NRCS Web Soil Survey soils found within the site area are listed below in Table 3.1. Only soils which are within the tributary areas to the analyzed wetlands are listed:

Soil Code	Soil Description	Hydrologic Soil Group
AbA	Abbottstown silt loam, 0 to 3 percent slopes	D
AbB	Abbottstown silt loam, 3 to 8 percent slopes	D
Bo	Bowmansville-Knauers silt loams	C/D
BwB	Buckingham silt loam, 3 to 8 percent slopes	C/D
ReA	Readington silt loam, 0 to 3 percent slopes	C
ReB	Readington silt loam, 3 to 8 percent slopes	C
RiA	Reaville channery silt loam, 0 to 3 percent slopes	D
RiB	Reaville channery silt loam, 3 to 8 percent slopes	D
RiC	Reaville channery silt loam, 8 to 15 percent slopes	D
Ro	Rowland silt loam	C
UgB	Urban land-Abbottstown complex, 0 to 8 percent slopes	D
UrcB	Urban land-Abbottstown complex, 0 to 8 percent slopes	D
W	Water	N/A

Erosion and Sediment Pollution Control

This project will be submitted to the Bucks County Conservation District (BCCD) for the required Erosion and Sediment Pollution Controls (E&SPC) approval as required by the Pennsylvania Clean Stream Law and regulations from Chapter 102. The E&SPC construction sequence is provided on the E&SPC plans and includes the construction sequence for PCSM BMP installations for the project.

Emergency spillways were sized to pass the unrouted, 100-yr inflow while providing a minimum of one foot of freeboard. Temporary channels were sized for the 2 year storm event and evaluated for

resistance to sheer. Sediment basins are designed for the maximum watershed expected during construction under bare earth conditions. Time of concentration was assumed to be 6 minutes.

Operations and Maintenance for E&S BMPs

The operation and maintenance of the temporary E&S BMPs located onsite are the responsibility of the contractor. The contractor must follow the maintenance requirements listed in the E&S plans.

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Sediment Basin Calculations

Sediment Basin Capacity Requirements

Project: **PAC250095.00 - Hanover Industrial**

Description: **Sediment Basin 1**

Basin Number	**Sediment Basin 1**
Permanent or Temporary Basin - (*P or T*)	**Temp.**
Special Protection Watershed - (*Yes or No*)	**No**
Karst Soils - (Yes or No)	**No**
A - Maximum Total Drainage Area - (Ac)	**6.74**
Is drainage Area (A) More than 10% Larger than the Preconstruction Condition? - (*Yes or No*)	**No**
A_1 - Disturbed Acres in drainage area - (AC)	**6.74**
I - Initial Required Dewatering Zone (5000 x A) - (cf)	**33,700**
T - Reduction for Top Dewatering (-700 x A) - (cf)	**0**
P - Reduction for Permanent Pool (-700 x A) - (cf)	**0**
L - Reduction for 4:1 Flow Ratio (-350 x A) - (cf)	**0**
D - Reduction for 4-7 Day Dewatering (-350 x A) - (cf)	**0**
Sv - Required Dewatering Zone [I - (T + P + L + D)] - (cf)[1]	**33,700**
Sd - Required Sediment Storage Volume (1000 x A_1) - (cf)	**6,740**
St - Total Required Storage Volume (Sv + Sd) - (cf)	**40,440**
Total Storage Volume Provided (@ Elev 3) - (cf)[2]	**97,490**
Dewatering Time for Dewatering Zone - (days)	**5 days**
Required Discharge Capacity (2 x A) - (cfs)[3]	**109.77**
Principal Spillway Type	**SKIMMER**
Peak Flow from 10yr/24hr Storm for Drainage Area (A) - (cfs)	**69.69**
Principal Spillway Capacity (@ Elev 5) - (cfs)[4]	**0.00**
Emergency Spillway Capacity (@ Elev 5) - (cfs)[4]	**109.77**
Total Basin Discharge Capacity (@ Elev 5) - (cfs)	**109.77**
Emergency Spillway Protective Lining[5]	**NAG SC250**
Outlet to a Surface Water - (*Yes or No*)[6]	**No**
Peak Flow from a 100yr/24hr Storm for Drainage Area (A) - (cfs)	**109.77**

(1) The minimim dewatering zone capacity for sediment basins is (3,600 x A). No reduction is permitted in Special Protection (HQ and EV) Watersheds.

(2) Total Storage Volumed provided at riser crest.

(3) Or provide calcualtions to show peak flow from 25yr/24hr storm for area (A) is routed through the basin

(4) Provide supporting computations

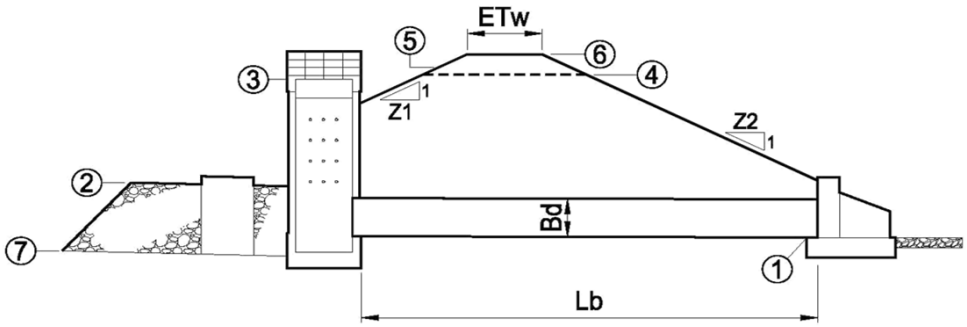
(5) If grass lining is proposed, spillways should be constructed in original ground unless a suitable TRM lining is used. Wherever a TRM is used, riprap should be placed at the bottom of the embankment to prevent scour.

(6) if NO, and basin is permanent or drainage area is more than 10% larger than preconstruction, provide supporting calculations to show accelerated erosion will not result from the proposed discharge. For discharges increasing volume or rate flow onto a neighboring property prior to entering a surface water, an easement should be obtained prior to plan submittal.

Sediment Basin Dimensions and Elevations

Project: **PAC250095.00 - Hanover Industrial**

Description: **Sediment Basin 1**



Basin Number	**Sediment Basin 1**
1 - Discharge Pipe Elevation - (ft)	**269.00**
2 - Sediment Storage Elevation (@ Sd) *(minimum 1.0' above elevation 7)* - (ft)	**275.00**
3 - Elevation at Top of Settling Volume (St) *(crest of principal spillway)* - (ft)	**278.00**
4 - Emergency Spillway Crest Elevation *(min. 0.5' above elevation 3)* - (ft)	**278.50**
5 - 2 cfs/acre or 25yr/24hr Flow Elevation - (ft)	**278.97**
6 - Top of Embankment Elevation *(min. 24" above elevation 5 OR 12" with routed 100yr/24hr storm)* - (ft)	**280.00**
7 - Bottom Elevation - (ft)	**274.00**
Average Bottom Width - (ft)	**138**
Average Bottom Length - (ft)	**144**
SA_{min} - Required Surface Area at Elevation 2 - (sf)	**7,215**
Surface Area Provided at Elevation 2 - (sf)	**22,199**
W - Average Basin Width at Elevation 3 - (ft)	**170**
L - Flow Length at Elevation 3 - (ft)	**280**
L/W - Flow Length:Width Ratio at Elevation 3	**1.64**
Silt Curtain or Forebay (*if yes, indicate which*)	**Silt Curtain**
ETw - Embankment Top Width - (ft) *(8' min.)*	**10.00**
Embankment Soil Type(s)	**GC**
Key Trench Depth *(2' min.)* - (ft)	**2.00**
Key Trench Width *(4' min)* - (ft)	**4.00**
TRd - Riser Diameter/Type *(15" min.)* - (in)	**-**
Bd - Barrel Diameter/Type *(12" min.)* - (in)	**-**
Lb - Barrel Length - (ft)	**105**
Emergency Spillway Width - (ft)	**120**
Emergency Spillway Side Slopes (H:V)	**3:1**
Emergency Spillway Depth - (ft)	**1.50**

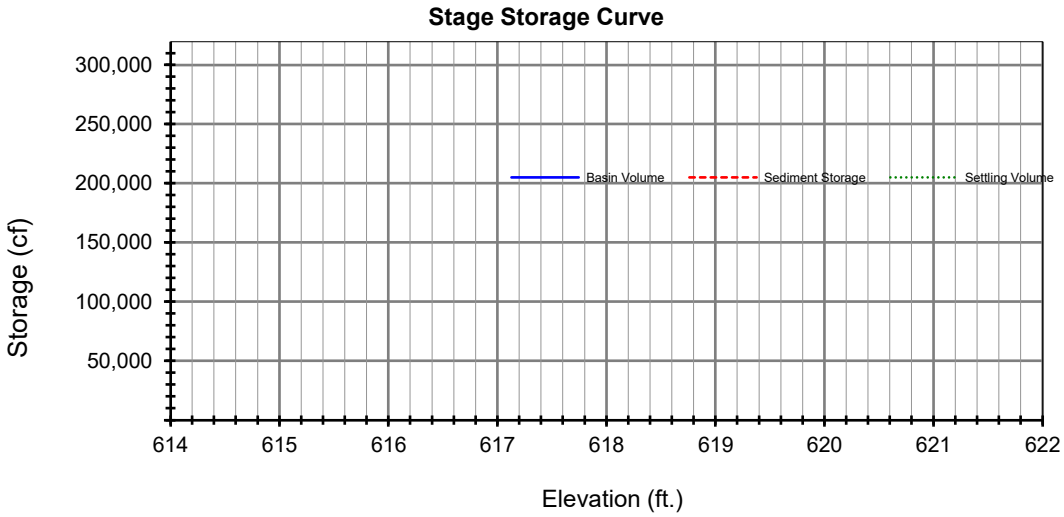
For irregular shaped traps, provide stage storage data

Sediment Basin Storage Data

Project: **PAC250095.00 - Hanover Industrial**

Description: **Sediment Basin 1**

Water Surface Elevation (ft)	Area (s.f.)	Average Area (s.f.)	Difference in Elevation (ft)	Storage Volume (cuft)	
				Incremental	Total
274.00	19,913				
		21,056	1.00	21,056	
275.00	22,199				21,056
		23,297	1.00	23,297	
276.00	24,395				44,353
		25,468	1.00	25,468	
277.00	26,540				69,821
		27,670	1.00	27,670	
278.00	28,799				97,490
		29,976	1.00	29,976	
279.00	31,152				127,466
		32,182	1.00	32,182	
280.00	33,211				159,647



Sediment Basin Dewatering Time

Project: **PAC250095.00 - Hanover Industrial**

Description: **Sediment Basin 1**

Water Surface Elevation[1] (ft)	Storage Volume[2] (cuft)	Incremental Storage Volume (cuft)	Discharge[3] (cfs)	Average Discharge (cfs)	Time (hrs)	Accumulated Time (hrs)
278.00	97,490		1.16			
		27,670		1.02	7.52	
277.00	69,821		0.89			7.52
		25,468		0.63	11.27	
276.00	44,353		0.37			18.79
		23,297		0.18	35.20	
275.00	21,056					53.99
		21,056				

Required Dewatering Time **2 to 7 days**

Provided Dewatering Time **5 days**

(1) From E&S Worksheet #15, 1st column

(2) From E&S Worksheet #14, 6th column

(3) From E&S Worksheet #15, last column

SEDIMENT BASIN DISCHARGE CAPACITY

Project: **PAC250095.00 - Hanover Industrial**

Description: **Sediment Basin 1**

Principal Spillway Discharge Capacity

Water Surface Elevation[1]	Flow Into Top of Temporary Riser			Flow Into Top of Permanent Riser			Barrel			Principal Spillway Capacity[4]
	Head (ft)	Orifice Flow[2] Q (cfs) *	Weir Q (cfs)	Head (ft)	Orifice Flow[2] Q (cfs) *	Weir Q (cfs)	C.L. Elevation	Head[3] (ft)	Q (cfs)	
278.50	**-**	**-**	**-**	**-**	**-**	**-**	**275.25**	**3.25**	**55.00**	**55.00**

Emergency Spillway Discharge Capacity

Water Surface Elevation[1] (ft)	Bottom Width[5] (ft)	Table or C Value Used[6]	Emergency Spillway Capacity (cfs)	Required Discharge Capacity (cfs)	Total Discharge Capacity Provided[7] (cfs)
278.97	**120.00**	**2.80**	**109.77**	**109.77**	**164.78**

(1) 24" below top of embankment (12" if 100yr storm routed through basin).

(2) Flow into top of riser only (Flow through perforations not included).

(3) Water surface elevation minus elevation at centerline of pipe outlet.

(4) Least of orifice, weir, or pipe flow (Peak flow from 10yr/24hr storm min.).

(5) 8' minimum.

(6) Use Tables 7.5 through 7.8 or equation for broad-crested weir [$Q = CLH^{1.5}$, where $C \leq 2.8$ (max)]; for Riprap larger than R-3 or flows less than 1.5' deep adjust C downward.

(7) Principal Spillway Capacity + Emergency Spillway Capacity

Emergency Spillway Design

Project: **PAC250095.00 - Hanover Industrial**

Description: **Sediment Basin 1**

Determine Values for Equation $Q = C \times L \times H^{3/2}$

Required Discharge Capacity

109.77	cfs (100-Year Maximum Flow)
0.00	cfs (Principal Spillway Capacity)
109.77	cfs (Emergency Spillway Capacity)

Depth of Flow Above Spillway Crest

L =	**120**	ft (spillway length)
H =	**0.47**	ft (depth of flow)

Determine Required Top of Berm Elevation

	278.50	Spillway Elevation
+		
	0.47	Depth of Flow (from H above)
+		
	1.00	Required Freeboard
=		
	279.97	Required Top of Berm
	280.00	Provided Top of Berm

Determine Spillway Lining

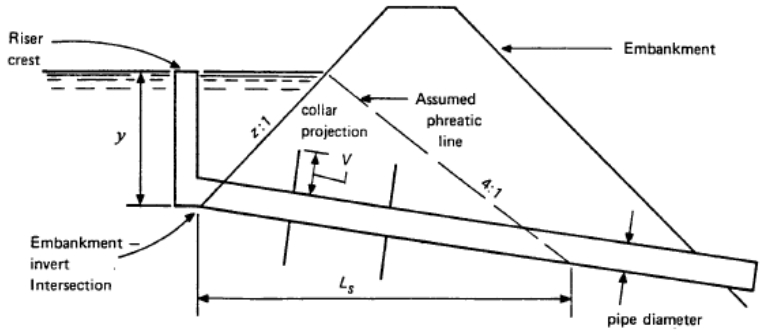
Slope =	0.33	ft/ft (Downslope of Spillway)
	9.77	Calculated Shear Stress

Spillway Lining

Lining	**NAG SC250**	
	10.00	Maximum Allowable Shear Stress

ANTI-SEEP COLLAR DESIGN

Project: **PAC250095.00 - Hanover Industrial**



Basin No.	Temporary or Permanent	Y (ft)	Z	Ls	Lf	V (in)	Barrel Diameter (in)	Collar Size (in)	No. Collars	Collar Spacing (ft)	Distance to 1st Collar (ft)
Sediment Basin 1	**Temporary**	**4.00**	**3.00**	**34.60**	**38.06**	**24.00**	**30.00**	**78.00**	**1**	**10.00**	**4.00**

Skimmer Calculations

PROJECT NAME: PAC250095.00 - Hanover Industrial
LOCATION:
PREPARED BY: DATE:
CHECKED BY: DATE:

Skimmer Dewatering Time

Determine Skimmer Size:

	33,700	cuft (Dewatering Volume)
Size:	**2.5**	**inches (Skimmer Dia.)**
	6,234	cuft/day (Approx. Dewatering Capacity)
	5.4	Days (Dewatering Time)

→ Make orifice size the same as skimmer size

→ **Orifice:** **2.5** inches

Dewatering Time: **5.4** **Days**

Determine Arm Length:

278.00	(Max. Water Surface Elevation)
274.00	(Skimmer Invert Elevation)
4.00	ft. (Max. Water Depth)
45	Deg. (Skimmer Arm Angle)

5.7 **ft. (Arm Length)**

Note: Calculations based on a document entitled: "Determining the Skimmer Size and the Required Orifice for the Faircloth Skimmer Surface Drain", dated November 2007

Compost Filter Sock Calculations

Compost Filter Sock Worksheet

Project: **Hanover Industrial**

Description: **Compost Filter Socks**

Location	SiltSoxx Size (inches)	Slope (%)	Max. Allowable Slope Length Above Barrier (ft)*	Provided Slope Length Above Barrier (ft)
FS #1	18	4.46	413	381
FS #2	18	4.26	436	399
FS #3	18	4.43	416	361
FS #4	8	5.08	198	118
FS #5	8	4.57	229	175
FS #6	12	3.21	411	374
FS #7	8	4.57	229	175
FS #8	8	3.76	283	213
FS #9	12	4.48	297	290
FS #10	8	2.31	379	325
FS #11	18	2.59	631	501
FS #12	12	2.82	446	443
FS #13	8	9.85	103	66
FS #14	8	6.00	180	150
FS #15	8	2.78	348	18
FS #16	8	2.56	362	78
FS #17	8	2.76	349	181
FS #18	8	2.57	362	214
FS #19	8	2.21	386	271
FS #20	8	2.29	381	306
FS #21	8	1.84	400	190
FS #22	8	5.59	188	179
FS #23	8	7.00	160	50
FS #24	8	1.11	400	135
FS #25	18	2.08	690	624
FS #26	18	2.31	664	520

FS #27	18	3.31	547	543
FS #28	8	7.69	146	13
FS #29	8	10.71	92	14
FS #30	8	9.09	118	11
FS #31	8	6.67	167	15
FS #32	8	12.50	73	12
FS #33	8	5.10	198	49
FS #34	8	2.04	397	49
FS #35	8	4.28	248	187
FS #36	12	7.10	206	169
FS #37	24	4.57	571	481
FS #38	24	4.89	518	460
FS #39	24	3.55	741	633
FS #40	24	3.67	722	586
FS #41	24	3.46	757	535
FS #42	18	4.48	410	368
FS #43	12	2.85	444	351
FS #44	8	3.53	298	85
FS #45	12	4.84	264	258

**Silt socks greater in size than 32" are the total stacked size. Refer to the plans for stacked configuration.*

Level Spreader Calculations

Level Spreader Design (BMP Manual)

Project: **PAC250095.00: Hanover Industrial - Chalfont**

Description: **Level Spreaders**

Level Spreader Length Design

Level Spreader	*10-Yr Peak Flow (CFS)*	*10 -Yr (13 LF/1 CFS) Length (Ft)*	*Provided Length (Ft)*	*Height of Water over Weir (Ft)*	*100-Yr Velocity (fps)*	*Less than Max. Allowable Velocity for RFB (2.0 fps)?*
LS-1	0.92	12	20	0.06	0.53	**Yes**
LS-2	12.59	164	164	0.09	0.63	**Yes**
LS-3	12.07	157	157	0.09	0.63	**Yes**
LS-4	8.13	106	106	0.09	0.62	**Yes**
LS-5	11.53	150	150	0.09	0.63	**Yes**
LS-6	9.98	130	130	0.09	0.63	**Yes**
LS-7	10.67	139	139	0.09	0.63	**Yes**

Calculation of Head over spreader based on allowable velocity

$V = 1.5 \times Cw \times H^{1/2}$

Max =	*Max. velocity of downslope cover*	4.00	fps (grass)
V =	*33% of Max*	1.33	fps
Cw =	*weir coefficient*	3.00	
H =	*height of water over weir*	**0.09**	ft

2-Yr Storm Even Velocity Check

Level Spreader	*2-Yr Peak Flow (CFS)*	*Provided Length (Ft)*	*Height of Water over Weir (Ft)*	*2-Yr Velocity (fps)*	*Less than Max. Allowable Velocity for RFB (1.5 fps)?*
LS-1	0.00	20	0.00	0.00	**Yes**
LS-2	6.23	164	0.05	0.49	**Yes**
LS-3	5.95	157	0.05	0.49	**Yes**
LS-4	4.96	106	0.06	0.53	**Yes**
LS-5	6.09	150	0.06	0.51	**Yes**
LS-6	4.89	130	0.05	0.49	**Yes**
LS-7	5.84	139	0.06	0.51	**Yes**

Calculation of Head over spreader based on 2-Yr Peak Flow

$Q = Cw \times L \times H^{1/2}$

Q =	*2-yr peak flow (fps)*
Cw =	*weir coefficient (3.0)*
L =	*10-yr provided length of level spreader (ft)*
H =	*height of water over weir (ft)*

Calculation of Velocity based on height of water over weir at the 2-year event

$V = 1.5 \times Cw \times H^{1/2}$

V =	*velocity at 2-yr storm event (fps)*
Cw =	*weir coefficient*
H =	*height of water over weir (ft)*