Virginia Runoff Reduction Method Worksheet

DEQ Virginia Runoff Reduction Method New Development Compliance Spreadsheet - Version 3.0

BMP Design Specifications List: 2013 Draft Stds & Specs

Site Summary

Project Title: O'Reilly Auto Parts - Rocky Mount
Date: 43347

Total Rainfall = 43 inches

Site Land Cover Summary

	A soils	B Soils	C Soils	D Soils	Totals	% of Total
Forest/Open (acres)	0.00	0.00	0.00	0.00	0.00	0
Managed Turf (acres)	0.00	0.41	0.00	0.00	0.41	39
Impervious Cover (acres)	0.00	0.63	0.00	0.00	0.63	61
					1.04	100

Site Tv and Land Cover Nutrient Loads

Site Rv	0.65
Treatment Volume (ft³)	2,470
TP Load (lb/yr)	1.55
TN Load (lb/yr)	11.10

Total TP Load Reduction Required (lb/yr)	1.13

Site Compliance Summary

Total Runoff Volume Reduction (ft³)	0
Total TP Load Reduction Achieved (lb/yr)	0.00
Total TN Load Reduction Achieved (lb/yr)	0.00
Remaining Post Development TP Load (lb/yr)	1.55
Remaining TP Load Reduction (lb/yr) Required	1.13

VIRGINIA NUTRIENT BANK

P.O. Box 142 Penn Laird, VA 22846 · (540) 908-1679 · www.VirginiaNutrientBank.com

June 4, 2018

Peter Myers
Bohler Engineering
28 Blackwell Park Lane Suite 201
Warrenton, VA 20186

Re: Nutrient Credit Availability - Old Franklin Turnpike - Site Plan - Franklin County

Mr. Myers,

The Virginia Nutrient Bank (VNB) is pleased to preliminary reserve approximately 3.00± pounds per year of phosphorus offsets (nutrient credits) for the Old Franklin Turnpike site plan in Franklin County, VA.

VNB has approval from the Virginia Department of Environmental Quality (VDEQ) for Nonpoint Source Offset Generation Certification. VNB is approved to transfer nutrient credits in accordance with the Chesapeake Bay Watershed Nutrient Credit Exchange Program (VA Code 62.1-44.19:14 et seq). These offsets are also transferable in accordance with the Virginia stormwater offset program (VA Code 62.1-44.15:35) and the Virginia Soil and Water Conservation Board's Guidance Document on Stormwater Nonpoint Nutrient Offsets approved on July 23, 2009, to those regulator entities qualifying for nutrient offsets.

VNB is managing the Chatham Nutrient Bank located in Pittsylvania County that will generate 64.12 pounds of phosphorus reduction and roughly 238.06 pounds of nitrogen reduction per year with the DEQ approval. VNB will retire 3.00± pounds of phosphorus credits and corresponding nitrogen credits from the Chatham nutrient bank within the watershed in accordance with the Nutrient Offset Certification regulations.

Respectfully,
Virginia Nutrient Bank, LLC

Nathan W. Blackwell, PE
540-908-1679
Owner - Conservation Director

Channel Report

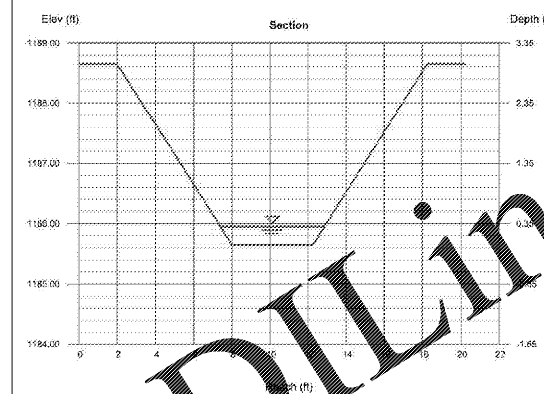
Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. — Friday, Oct 12 2018

A-1 Outfall Channel

Trapezoidal
Bottom Width (ft) = 4.25
Side Slopes (z:1) = 2.00, 2.00
Total Depth (ft) = 3.00
Invert Elev (ft) = 1185.65
Slope (%) = 1.20
N-Value = 0.033

Calculations
Compute by: Q vs Depth
No. Increments = 10

Highlighted
Depth (ft) = 0.30
Q (cfs) = 2.924
Area (sqft) = 1.46
Velocity (ft/s) = 2.01
Wetted Perim (ft) = 5.59
Crit Depth, Yc (ft) = 0.24
Top Width (ft) = 5.45
EGL (ft) = 0.36



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. — Monday, Oct 29 2018

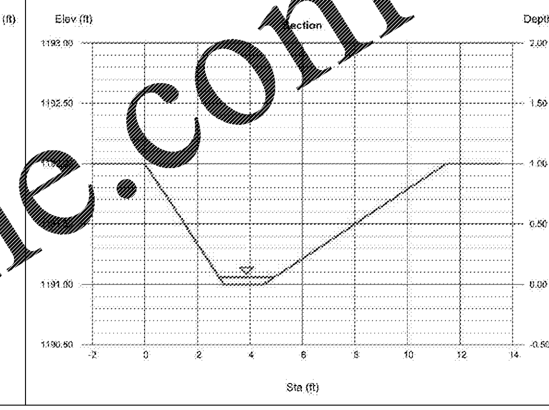
B-1 Outfall Channel

User-defined
Invert Elev (ft) = 1191.00
Slope (%) = 9.20
N-Value = 0.040

Calculations
Compute by: Known Q
Known Q (cfs) = 0.16

(Sta, El, n)-(Sta, El, n)...
(0.00, 1192.00)-(3.00, 1191.00, 0.040)-(4.50, 1191.00, 0.040)-(11.50, 1192.00, 0.040)

Highlighted
Depth (ft) = 0.06
Q (cfs) = 0.160
Area (sqft) = 0.11
Velocity (ft/s) = 1.48
Wetted Perim (ft) = 2.11
Crit Depth, Yc (ft) = 0.07
Top Width (ft) = 2.10
EGL (ft) = 0.09



ROOF DRAIN SCHEDULE

Pipe	Invert Elev. Upper (ft)	Invert Elev. Lower (ft)	Length (ft)	Slope (%)	Dia. (in)	Material
UD-11	1197.50	1196.59	91.33	1.00%	6	PVC
UD-10	1196.59	1195.50	10.01	10.89%	6	PVC
RD-9	1196.00	1195.50	5.00	10.00%	6	PVC
RD-8	1195.50	1193.00	25.00	10.00%	6	PVC
RD-7	1193.50	1193.00	5.00	10.00%	6	PVC
RD-6	1193.00	1192.50	25.00	2.00%	6	PVC
RD-5	1193.00	1192.50	5.00	10.00%	6	PVC
RD-4	1192.50	1191.50	25.00	4.00%	6	PVC
RD-3	1192.00	1191.50	5	10.00%	6	PVC
RD-2	1191.50	1189.90	24.82	6.45%	6	PVC
RD-1	1189.90	1189.25	13.50	4.81%	6	PVC

10 YEAR HEADWATER COMPUTATIONS

Structure No.	Structure Type	DA Drainage Area (ac)	C Runoff Coefficient	I Intensity (in/hr)	Q 10 Yr Flow (cfs)	Head Water (ft)	Rim / Invert Elevation (ft)	10 Yr WSE (ft)	Remarks
B-2	Grate DI-1	0.28	0.71	7.20	1.43	0.20	Rim 1193.75	[illegible]3.95	
B-3	Grate DI-1	0.07	0.30	7.20	0.15	0.18	Rim 1189.75	[illegible]9.93	

10 YEAR HGL COMPUTATIONS

Structure No.	Outlet WSE	Do (in)	Qo	Lo	Sfo (%)	Hf	Vo	Ho	Qi	Vi	Qi · Vi	Vi^2/2g	Hi	Angle	K	Hd	Ht	1.3 Ht	0.5 Ht	Final H	Inlet WSE	Flow Line Elev.	Inlet Shaping	Pre-Cast Structure	Junction Loss Reduction	Remarks
A-2	1185.60	18	3.77	12.39	0.13%	0.37	5.97	0.14									0.14	–	–	0.51	1186.[illegible]	[illegible]	–	–	–	
B-2	1189.28	15	1.40	85.85	0.05%	0.04	3.19	0.04	0.13	1.50	0.19	0.03	0.01	–	–	0.00	0.05	0.07	[illegible]	[illegible]	1189.35	1193.75	Yes	Yes	Yes	
B-3	1189.35	15	0.13	81.94	0.00%	0.00	1.50	0.01									0.01	[illegible]	0.01	0.01	1189.38	1189.75	Yes	Yes	Yes	
C-2	1189.28	15	1.52	10.33	0.03%	0.01	4.36	0.07									[illegible]0.07	[illegible]0.10	[illegible]	0.05	1189.33	1191.60	Yes	Yes	Yes	

10 YEAR STORM COMPUTATIONS

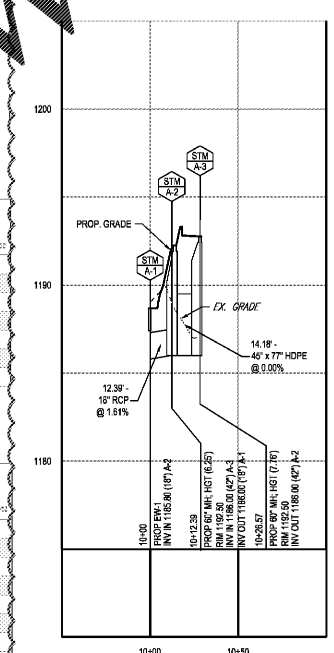
From Point	To Point	Drain. Area (acres)	Runoff Coeff. C	CA Incr.	CA ∑	Inlet Time (min)	Rainfall Intensity (in/hr)	Q Incr. (cfs)	Q Known (cfs)	Q ∑ (cfs)	Invert Elev. Upper (ft)	Invert Elev. Lower (ft)	Length (ft)	Slope (%)	Dia. (in)	n	Capacity (cfs)	Velocity (fps)	Flow Time Incr. (min)	Flow Time ∑ (min)	Q / Qfull	V / Vfull	Vfull	Remarks
A-2	A-1	–	–	–	–	–	–	–	3.77	[illegible]	1185.97	1185.80	12.39	1.37%	18	0.013	12.34	5.97	0.03	5.03	0.31	0.86	6.98	
B-3	B-2	0.07	0.30	0.02	0.02	5.00	6.59	[illegible]13	[illegible]	0.13	1186.94	1186.53	81.94	0.50%	15	0.013	4.58	1.50	0.91	5.91	0.03	0.40	3.73	
B-2	B-1	0.28	0.71	0.20	0.22	5.91	6.36	[illegible]	[illegible]	[illegible]40	1186.43	1186.00	85.85	0.50%	15	0.013	4.58	3.19	0.45	6.36	0.31	0.86	3.74	
C-2	C-1	0.26	0.90	0.23	0.23	5.00	[illegible]	1.52	–	1.52	1188.18	1188.07	10.33	1.06%	15	0.013	6.66	4.36	0.04	5.04	0.23	0.80	5.45	
RD	VAULT	0.17	0.90	0.1[illegible]	0.16	[illegible]	[illegible]6.59	[illegible]	–	1.06	1191.00	1189.00	32.00	6.25%	6	0.013	1.41	7.84	0.07	5.07	0.75	1.09	7.19	

10 YEAR INLET COMPUTATIONS

Inlet No.	Inlet Type	Length (ft)		DA Drain Area (acres)	C Runoff Coeff-icient	I Inten-sity (in/hr)	Q Incr. Flow (cfs)	Qb Carry-over Flow (cfs)	Qt Accum. Flow (cfs)	S Gutter Slope (%)	Sx Pvmt Cross Slope (%)	n	T Spread On Grade (ft)	W Gutter Width (ft)	W / T	Sw Gutter Cross Slope (%)	Sw / Sx	Eo (App. 9C-8)	a (in)	S'w = a / (12W) (%)	Se=Sx + S'w (Eo) (%)	Lt,Comp. Length (9C-17) (ft)	L,Spec-ified Length (ft)	L / Lt	E Eff. (9C-18)	Qi Int'x Flow (cfs)	Qb Byp. Flow (cfs)	Down Stream Str.	Sag Qi Int'x Flow (cfs)	Sag d Depth (ft)	Sag h (ft)	Sag d / h	Sag Ts Spread In Sag (ft)	Remarks
C-2	Comb DI-2B	6	LT RT	0.05 0.21	0.90 0.90	6.59	0.30 1.25	–	1.54	5.00 5.00	5.00	0.015	1.67 3.19	2.00	1.07 0.63	5.00			2.00							–	–	–	1.54	0.17	0.46	0.37	3.39	In Sag

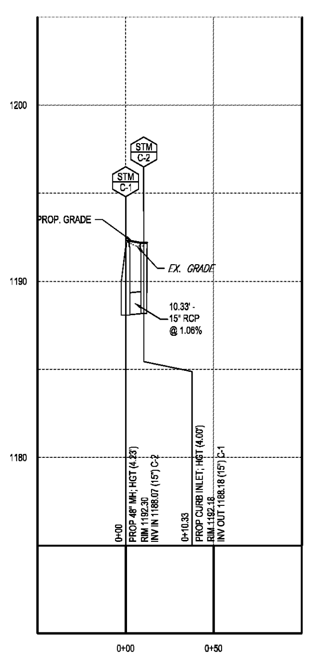
(Header groups: "On Grade Inlets Only" spans Sw/Sx through Down Stream Str.; "Sag Inlets Only" spans the last Qi through Ts.)

NOTE:
CONTRACTOR TO VERIFY ALL MANHOLE STRUCTURES PRIOR TO ORDERING STRUCTURES.



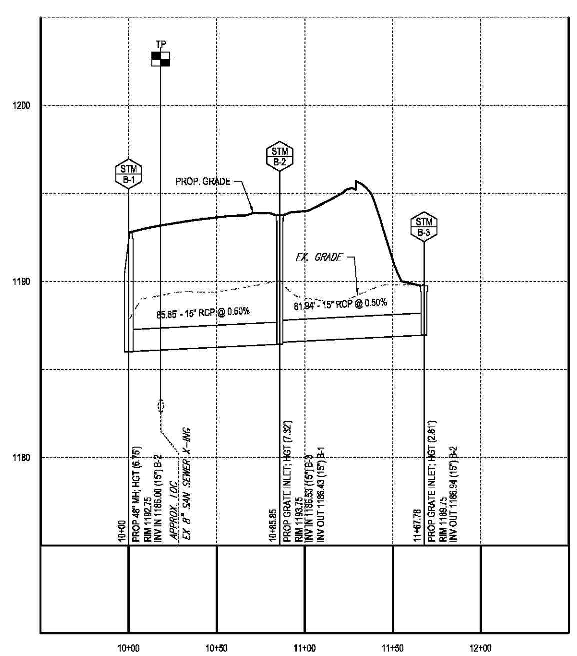
STORM DRAIN PROFILE A-1 TO A-3

SCALE: 1"= 50 ' HORIZONTAL
1"= 5 ' VERTICAL



STORM DRAIN PROFILE C-1 TO C-2

SCALE: 1"= 50 ' HORIZONTAL
1"= 5 ' VERTICAL



STORM DRAIN PROFILE B-1 TO B-3

SCALE: 1"= 50 ' HORIZONTAL
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