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Engineering

Surveying

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Stormwater Analysis

for

Change in Use

25469 Hwy 126
Assessor's Map 17-05-31-1
Tax Lot #1500



EXPIRES: 6/30/2011

Driveway Paving Pollution Reduction

by use of

Filter Strip

Prepared for
City of Veneta

February 2011

Proposal

Paving the driveway and parking area for the proposed change in use requires stormwater treatment for the runoff from the new impervious area. Veneta Development Code requires five parking spaces for the proposed use of the building. The parking area is measured to be 2,030 square feet of paving. The 145 foot long driveway is 2,907 square feet. The proposed design for the driveway paving includes use of two filter strips between three drive aisles. This approach is discussed in Chapter 2 of the current Portland Stormwater Management Manual (August 1, 2008). A detail section of the proposed paving is shown on the site plans and is also included as a part of this report. Use of filter strips reduces the driveway paving to 1,822 square feet, for a total new impervious area of 3,852 square feet. Section 5.16 of the Veneta Land Development Ordinance requires that all stormwater runoff from new impervious area be treated for both quality and quantity during a 10 year storm event and for the pollution reduction storm.

Study Methodology

This report determines the required size of a Vegetated Filter Strip for the treatment of runoff from the new paving using the pollution reduction 24-Hour Depth of 1.4 inches, and 4.46 inches of depth for the 10 year 24-Hour Depth. The optimum size for the treatment facility is such that there is not only pollution reduction but also a no-net increase in runoff amount.

Computations

This report first computes the runoff from the existing graveled area using the SBUH method. The 3,852 square feet of graveled surface has a

computed peak runoff of 0.42 cfs and a volume of 0.019 af during the 10 year event. The new paved area is then modeled and routed through the filter strip. That model reveals a small increase in the peak runoff (0.49 cfs) and 0.031 af. Infiltration rate for the filter strip was set at a low 0.5 in/hr due to the slow permeability of the in-situ soils. The initial model for the filter strip set the size to be ten feet wide along the entire length of the driveway (145 feet). Eight feet of this area is located within the two (4 foot wide) filter strip aisles. This sets the area of the filter strip to be 1,472 square feet. Pooling of runoff in the filter strip is considered to be no deeper than 0.1' during the 10 year event. A sharp created weir is modeled at the lower edge of the filter area to measure the amount of overflow during the 10 year event. The elevation of the weir crest is set 0.1' above the filter strip elevation to imitate pooling during the peak of the storm event. The area of the filter strip is then adjusted until the overflow across the weir is no greater than the existing runoff volume from the graveled drive. The computed size of the filter strip, being 1,472 square feet is shown in the attached reports. This area will accommodate the additional runoff volume (0.012 af) from the paved area with the peak at 12 hours, and no infiltration at 21 hours. Please note: The 1,472 square foot filter strip allows 0.019 af infiltration and 0.0012 af overflow. This new design will reduce runoff experienced under the current site conditions.

Infiltration Information

Although the soil permeability is low, none of the driveway runoff will leave the property. This is confirmed in the last model. This model was created to check the size of filter strip required to allow all runoff to infiltrate with no overflow. This report indicates that a filter area of 12,250 square feet will

allow enough area to provide for infiltration of the entire 0.049 af of runoff in a 10 year event. Runoff volume peaks at 12 hours into the event, with no more infiltration after 22 hours. Although this area sounds quite large, it is only 145 feet long by 84.4 feet wide. It is located over 140 away from the existing swale that flows along the west boundary of the property.

Conclusion

This report confirms that the paving of the driveway will not have any adverse effects on the public stormwater system. The use of a vegetated filter strip for treatment of the paving runoff will allow adequate infiltration during a 10 year event, while preventing any runoff from leaving the property.

EXISTING GRAVEL DRIVEWAY

Prepared by Goebel Engineering & Surveying, Inc.

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Type II 24-hr 10 YEAR Rainfall=4.46"

Printed 2/21/2011

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Summary for Subcatchment 1S: EXISTING GRAVEL DRIVEWAY

[49] Hint: $T_c < 2dt$ may require smaller dt

Runoff = 0.42 cfs @ 11.96 hrs, Volume= 0.024 af, Depth> 3.25"

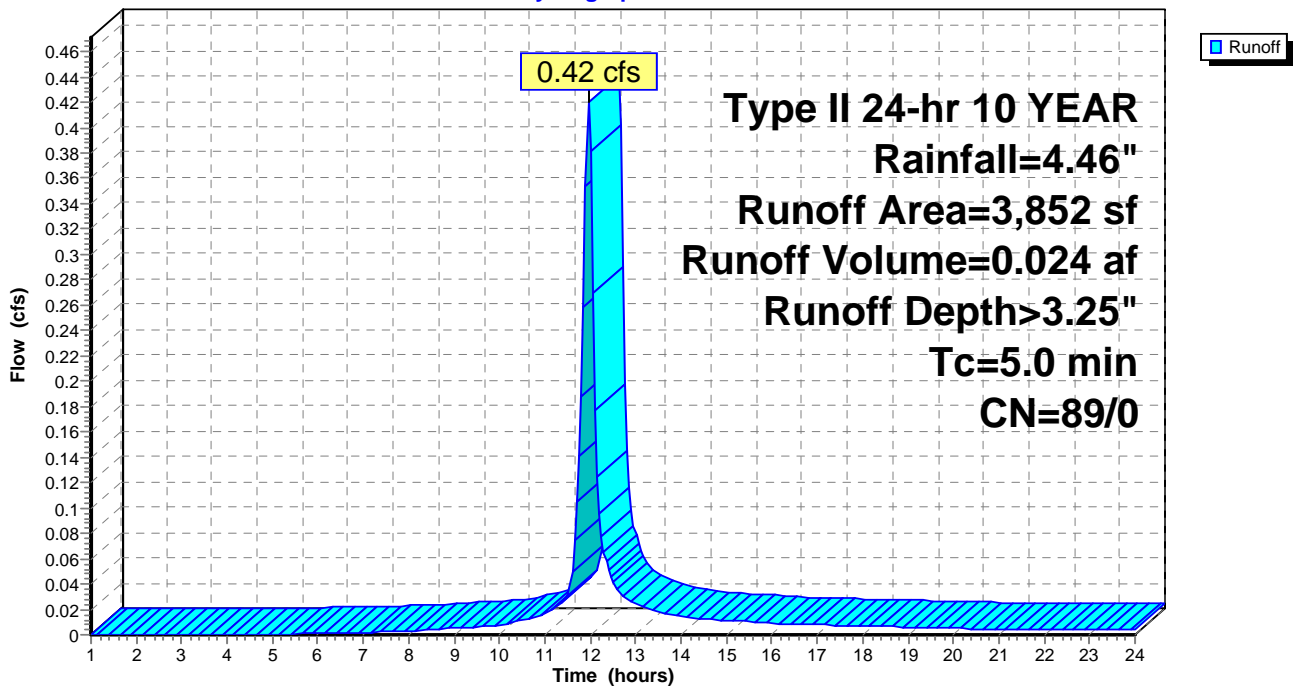
Runoff by SBUH method, Split Pervious/Imperv., Time Span= 1.00-24.00 hrs, $dt= 0.05$ hrs
Type II 24-hr 10 YEAR Rainfall=4.46"

Area (sf)	CN	Description
3,852	89	<50% Grass cover, Poor, HSG D
3,852	89	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, MINIMUM

Subcatchment 1S: EXISTING GRAVEL DRIVEWAY

Hydrograph



EXISTING GRAVEL DRIVEWAY

Type II 24-hr 10 YEAR Rainfall=4.46"

Prepared by Goebel Engineering & Surveying, Inc.

Printed 2/21/2011

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Hydrograph for Subcatchment 1S: EXISTING GRAVEL DRIVEWAY

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
1.00	0.05	0.00	0.00	0.00
1.50	0.07	0.00	0.00	0.00
2.00	0.10	0.00	0.00	0.00
2.50	0.13	0.00	0.00	0.00
3.00	0.15	0.00	0.00	0.00
3.50	0.18	0.00	0.00	0.00
4.00	0.21	0.00	0.00	0.00
4.50	0.25	0.00	0.00	0.00
5.00	0.28	0.00	0.00	0.00
5.50	0.32	0.00	0.00	0.00
6.00	0.36	0.01	0.00	0.00
6.50	0.40	0.02	0.00	0.00
7.00	0.44	0.03	0.00	0.00
7.50	0.49	0.04	0.00	0.00
8.00	0.54	0.05	0.00	0.00
8.50	0.59	0.07	0.00	0.00
9.00	0.66	0.10	0.00	0.01
9.50	0.73	0.13	0.00	0.01
10.00	0.81	0.17	0.00	0.01
10.50	0.91	0.23	0.00	0.01
11.00	1.05	0.31	0.00	0.02
11.50	1.26	0.46	0.00	0.03
12.00	2.96	1.86	0.00	0.38
12.50	3.28	2.15	0.00	0.04
13.00	3.44	2.30	0.00	0.02
13.50	3.56	2.42	0.00	0.02
14.00	3.66	2.50	0.00	0.01
14.50	3.74	2.58	0.00	0.01
15.00	3.81	2.64	0.00	0.01
15.50	3.87	2.70	0.00	0.01
16.00	3.92	2.75	0.00	0.01
16.50	3.97	2.80	0.00	0.01
17.00	4.02	2.84	0.00	0.01
17.50	4.07	2.89	0.00	0.01
18.00	4.11	2.92	0.00	0.01
18.50	4.15	2.96	0.00	0.01
19.00	4.18	2.99	0.00	0.01
19.50	4.22	3.03	0.00	0.01
20.00	4.25	3.05	0.00	0.00
20.50	4.27	3.08	0.00	0.00
21.00	4.30	3.11	0.00	0.00
21.50	4.33	3.13	0.00	0.00
22.00	4.36	3.16	0.00	0.00
22.50	4.38	3.19	0.00	0.00
23.00	4.41	3.21	0.00	0.00
23.50	4.44	3.23	0.00	0.00
24.00	4.46	3.26	0.00	0.00

PAVED DRIVEWAY-10 YR NO NET INC

Type II 24-hr 10 YEAR Rainfall=4.46"

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Printed 2/21/2011

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Summary for Subcatchment 2S: DRIVEWAY

[49] Hint: Tc<2dt may require smaller dt

Runoff = 0.49 cfs @ 11.95 hrs, Volume= 0.031 af, Depth> 4.22"

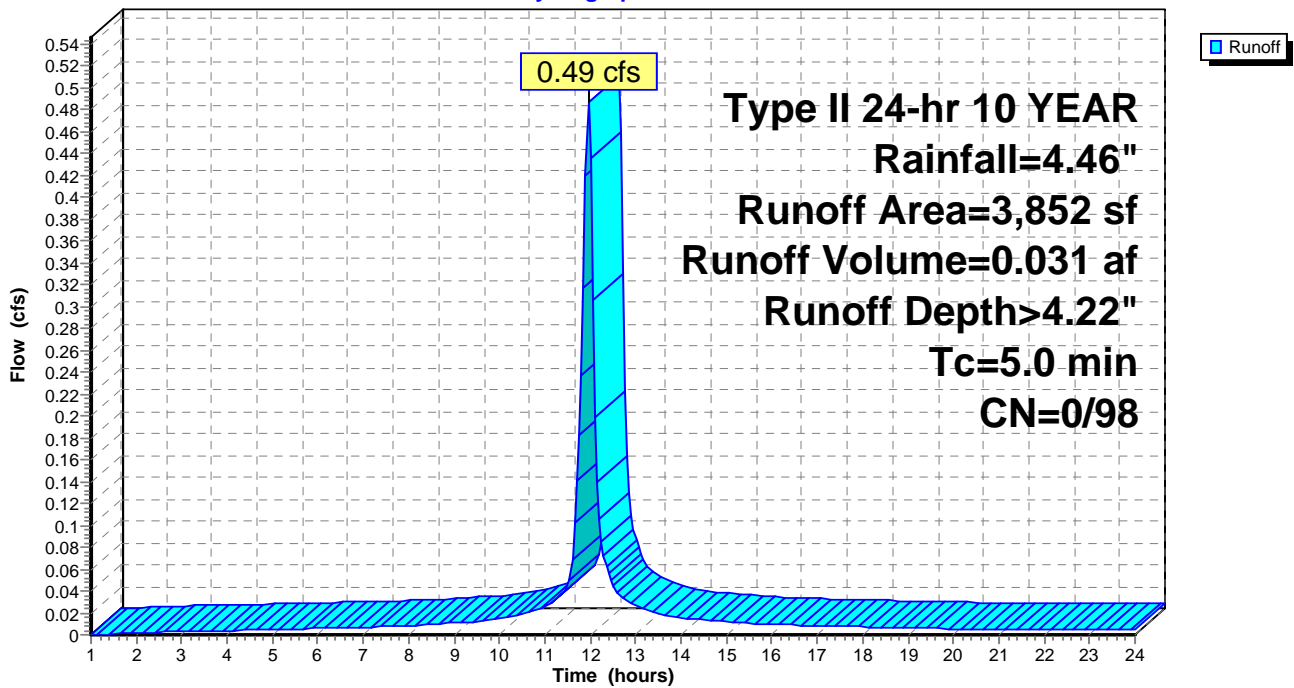
Runoff by SBUH method, Split Pervious/Imperv., Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 YEAR Rainfall=4.46"

Area (sf)	CN	Description
3,852	98	Paved parking, HSG D
3,852	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, MINIMUM

Subcatchment 2S: DRIVEWAY

Hydrograph



PAVED DRIVEWAY-10 YR NO NET INC

Type II 24-hr 10 YEAR Rainfall=4.46"

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Hydrograph for Subcatchment 2S: DRIVEWAY

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
1.00	0.05	0.00	0.00	0.00
1.50	0.07	0.00	0.00	0.00
2.00	0.10	0.00	0.01	0.00
2.50	0.13	0.00	0.02	0.00
3.00	0.15	0.00	0.04	0.00
3.50	0.18	0.00	0.06	0.00
4.00	0.21	0.00	0.08	0.00
4.50	0.25	0.00	0.10	0.00
5.00	0.28	0.00	0.13	0.00
5.50	0.32	0.00	0.16	0.01
6.00	0.36	0.00	0.19	0.01
6.50	0.40	0.00	0.23	0.01
7.00	0.44	0.00	0.27	0.01
7.50	0.49	0.00	0.31	0.01
8.00	0.54	0.00	0.35	0.01
8.50	0.59	0.00	0.40	0.01
9.00	0.66	0.00	0.46	0.01
9.50	0.73	0.00	0.53	0.01
10.00	0.81	0.00	0.61	0.01
10.50	0.91	0.00	0.70	0.02
11.00	1.05	0.00	0.84	0.03
11.50	1.26	0.00	1.05	0.04
12.00	2.96	0.00	2.73	0.44
12.50	3.28	0.00	3.05	0.05
13.00	3.44	0.00	3.21	0.03
13.50	3.56	0.00	3.33	0.02
14.00	3.66	0.00	3.42	0.02
14.50	3.74	0.00	3.50	0.01
15.00	3.81	0.00	3.57	0.01
15.50	3.87	0.00	3.64	0.01
16.00	3.92	0.00	3.69	0.01
16.50	3.97	0.00	3.74	0.01
17.00	4.02	0.00	3.79	0.01
17.50	4.07	0.00	3.83	0.01
18.00	4.11	0.00	3.87	0.01
18.50	4.15	0.00	3.91	0.01
19.00	4.18	0.00	3.95	0.01
19.50	4.22	0.00	3.98	0.01
20.00	4.25	0.00	4.01	0.01
20.50	4.27	0.00	4.04	0.01
21.00	4.30	0.00	4.07	0.00
21.50	4.33	0.00	4.09	0.00
22.00	4.36	0.00	4.12	0.00
22.50	4.38	0.00	4.15	0.00
23.00	4.41	0.00	4.17	0.00
23.50	4.44	0.00	4.20	0.00
24.00	4.46	0.00	4.22	0.00

Summary for Pond 1P: VEGETATED FILTER-POLL REDUC

Inflow Area = 0.088 ac, 100.00% Impervious, Inflow Depth > 1.18" for POLLUTION REDUCTION event
 Inflow = 0.15 cfs @ 11.95 hrs, Volume= 0.009 af
 Outflow = 0.02 cfs @ 11.70 hrs, Volume= 0.009 af, Atten= 88%, Lag= 0.0 min
 Discarded = 0.02 cfs @ 11.70 hrs, Volume= 0.009 af

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 410.10' @ 12.40 hrs Surf.Area= 1,472 sf Storage= 141 cf

Plug-Flow detention time= 59.3 min calculated for 0.009 af (100% of inflow)
 Center-of-Mass det. time= 57.2 min (831.3 - 774.1)

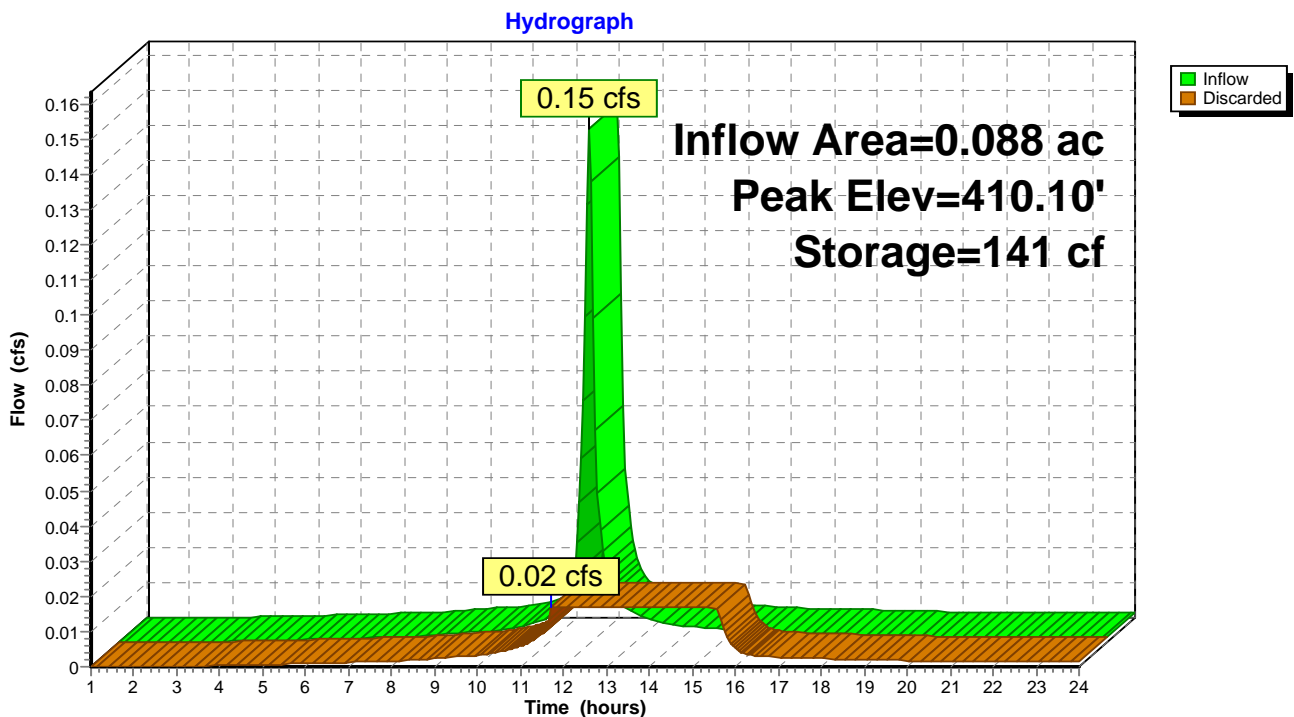
Volume	Invert	Avail.Storage	Storage Description
#1	410.00'	1,472 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
410.00	1,472	0	0
411.00	1,472	1,472	1,472

Device	Routing	Invert	Outlet Devices
#1	Discarded	410.00'	0.500 in/hr Exfiltration over Horizontal area

Discarded OutFlow Max=0.02 cfs @ 11.70 hrs HW=410.01' (Free Discharge)
 ↳1=Exfiltration (Exfiltration Controls 0.02 cfs)

Pond 1P: VEGETATED FILTER-POLL REDUC



Hydrograph for Pond 1P: VEGETATED FILTER-POLL REDUC

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Discarded (cfs)
1.00	0.00	0	410.00	0.00
1.50	0.00	0	410.00	0.00
2.00	0.00	0	410.00	0.00
2.50	0.00	0	410.00	0.00
3.00	0.00	0	410.00	0.00
3.50	0.00	0	410.00	0.00
4.00	0.00	0	410.00	0.00
4.50	0.00	0	410.00	0.00
5.00	0.00	0	410.00	0.00
5.50	0.00	1	410.00	0.00
6.00	0.00	1	410.00	0.00
6.50	0.00	1	410.00	0.00
7.00	0.00	1	410.00	0.00
7.50	0.00	1	410.00	0.00
8.00	0.00	1	410.00	0.00
8.50	0.00	2	410.00	0.00
9.00	0.00	2	410.00	0.00
9.50	0.00	2	410.00	0.00
10.00	0.00	3	410.00	0.00
10.50	0.00	4	410.00	0.00
11.00	0.01	5	410.00	0.01
11.50	0.01	8	410.01	0.01
12.00	0.13	99	410.07	0.02
12.50	0.01	140	410.10	0.02
13.00	0.01	128	410.09	0.02
13.50	0.01	110	410.07	0.02
14.00	0.00	89	410.06	0.02
14.50	0.00	66	410.04	0.02
15.00	0.00	43	410.03	0.02
15.50	0.00	18	410.01	0.02
16.00	0.00	5	410.00	0.01
16.50	0.00	3	410.00	0.00
17.00	0.00	2	410.00	0.00
17.50	0.00	2	410.00	0.00
18.00	0.00	2	410.00	0.00
18.50	0.00	2	410.00	0.00
19.00	0.00	2	410.00	0.00
19.50	0.00	2	410.00	0.00
20.00	0.00	1	410.00	0.00
20.50	0.00	1	410.00	0.00
21.00	0.00	1	410.00	0.00
21.50	0.00	1	410.00	0.00
22.00	0.00	1	410.00	0.00
22.50	0.00	1	410.00	0.00
23.00	0.00	1	410.00	0.00
23.50	0.00	1	410.00	0.00
24.00	0.00	1	410.00	0.00

PAVED DRIVEWAY-10 YR NO NET INC

Type II 24-hr 10 YEAR Rainfall=4.46"

Prepared by Goebel Engineering & Surveying, Inc.

Printed 2/21/2011

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Summary for Pond 2P: VEGETATED FILTER-10 YR STM

[88] Warning: Qout>Qin may require Finer Routing>1

Inflow Area = 0.088 ac, 100.00% Impervious, Inflow Depth > 4.22" for 10 YEAR event
 Inflow = 0.49 cfs @ 11.95 hrs, Volume= 0.031 af
 Outflow = 0.50 cfs @ 11.96 hrs, Volume= 0.031 af, Atten= 0%, Lag= 0.4 min
 Discarded = 0.02 cfs @ 10.55 hrs, Volume= 0.019 af
 Secondary = 0.48 cfs @ 11.96 hrs, Volume= 0.012 af

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 410.11' @ 11.96 hrs Surf.Area= 1,472 sf Storage= 162 cf

Plug-Flow detention time= 40.6 min calculated for 0.031 af (100% of inflow)
 Center-of-Mass det. time= 38.6 min (784.8 - 746.2)

Volume	Invert	Avail.Storage	Storage Description
#1	410.00'	1,472 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

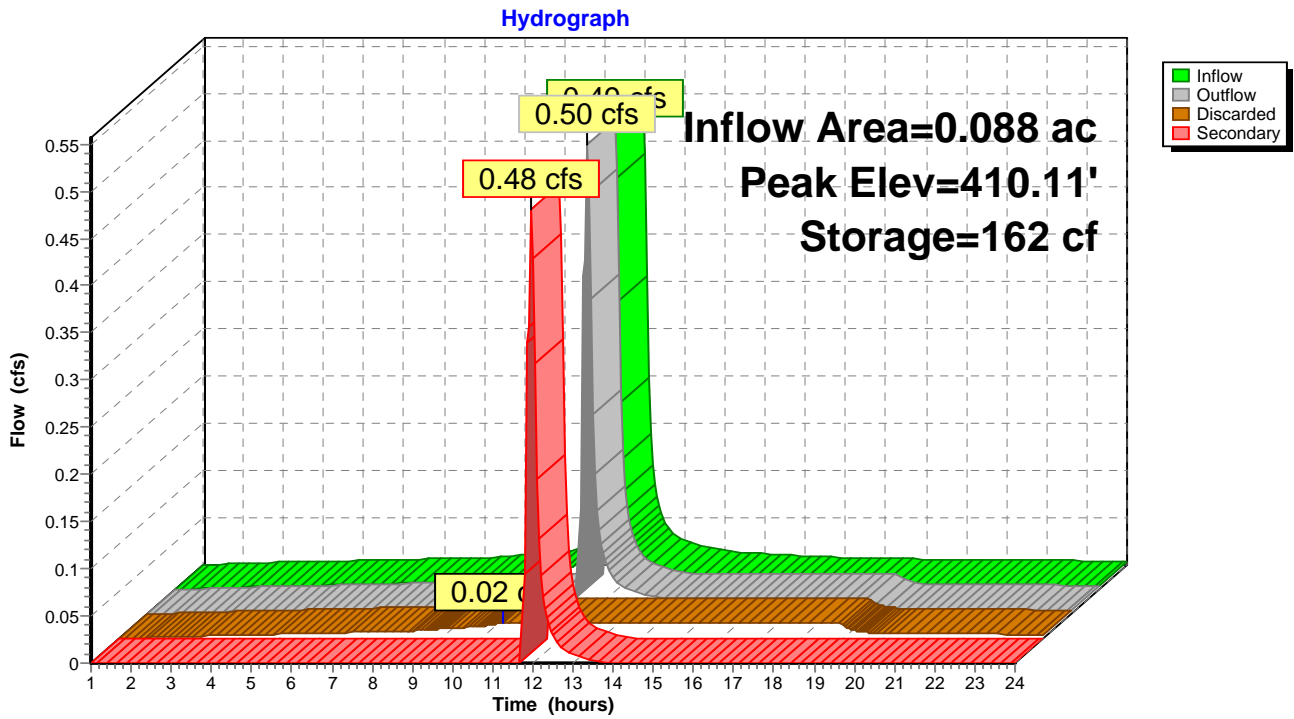
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
410.00	1,472	0	0
411.00	1,472	1,472	1,472

Device	Routing	Invert	Outlet Devices
#1	Discarded	410.00'	0.500 in/hr Exfiltration over Horizontal area
#2	Secondary	410.10'	144.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s) 2.0' Crest Height

Discarded OutFlow Max=0.02 cfs @ 10.55 hrs HW=410.01' (Free Discharge)
 ↳1=Exfiltration (Exfiltration Controls 0.02 cfs)

Secondary OutFlow Max=0.46 cfs @ 11.96 hrs HW=410.11' (Free Discharge)
 ↳2=Sharp-Crested Rectangular Weir (Weir Controls 0.46 cfs @ 0.32 fps)

Pond 2P: VEGETATED FILTER-10 YR STM



PAVED DRIVEWAY-10 YR NO NET INC

Type II 24-hr 10 YEAR Rainfall=4.46"

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Hydrograph for Pond 2P: VEGETATED FILTER-10 YR STM

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Secondary (cfs)
1.00	0.00	0	410.00	0.00	0.00	0.00
1.50	0.00	0	410.00	0.00	0.00	0.00
2.00	0.00	1	410.00	0.00	0.00	0.00
2.50	0.00	2	410.00	0.00	0.00	0.00
3.00	0.00	2	410.00	0.00	0.00	0.00
3.50	0.00	3	410.00	0.00	0.00	0.00
4.00	0.00	3	410.00	0.00	0.00	0.00
4.50	0.00	4	410.00	0.00	0.00	0.00
5.00	0.00	4	410.00	0.00	0.00	0.00
5.50	0.01	4	410.00	0.01	0.01	0.00
6.00	0.01	5	410.00	0.01	0.01	0.00
6.50	0.01	5	410.00	0.01	0.01	0.00
7.00	0.01	6	410.00	0.01	0.01	0.00
7.50	0.01	6	410.00	0.01	0.01	0.00
8.00	0.01	7	410.00	0.01	0.01	0.00
8.50	0.01	8	410.01	0.01	0.01	0.00
9.00	0.01	9	410.01	0.01	0.01	0.00
9.50	0.01	10	410.01	0.01	0.01	0.00
10.00	0.01	11	410.01	0.01	0.01	0.00
10.50	0.02	15	410.01	0.02	0.02	0.00
11.00	0.03	24	410.02	0.02	0.02	0.00
11.50	0.04	54	410.04	0.02	0.02	0.00
12.00	0.44	161	410.11	0.45	0.02	0.43
12.50	0.05	148	410.10	0.05	0.02	0.03
13.00	0.03	147	410.10	0.03	0.02	0.01
13.50	0.02	147	410.10	0.02	0.02	0.00
14.00	0.02	147	410.10	0.02	0.02	0.00
14.50	0.01	142	410.10	0.02	0.02	0.00
15.00	0.01	134	410.09	0.02	0.02	0.00
15.50	0.01	124	410.08	0.02	0.02	0.00
16.00	0.01	112	410.08	0.02	0.02	0.00
16.50	0.01	98	410.07	0.02	0.02	0.00
17.00	0.01	82	410.06	0.02	0.02	0.00
17.50	0.01	66	410.04	0.02	0.02	0.00
18.00	0.01	49	410.03	0.02	0.02	0.00
18.50	0.01	31	410.02	0.02	0.02	0.00
19.00	0.01	12	410.01	0.01	0.01	0.00
19.50	0.01	6	410.00	0.01	0.01	0.00
20.00	0.01	5	410.00	0.01	0.01	0.00
20.50	0.01	4	410.00	0.01	0.01	0.00
21.00	0.00	4	410.00	0.01	0.01	0.00
21.50	0.00	4	410.00	0.00	0.00	0.00
22.00	0.00	4	410.00	0.00	0.00	0.00
22.50	0.00	4	410.00	0.00	0.00	0.00
23.00	0.00	4	410.00	0.00	0.00	0.00
23.50	0.00	4	410.00	0.00	0.00	0.00
24.00	0.00	4	410.00	0.00	0.00	0.00

Summary for Pond 1P: VEGETATED FILTER-NO OVERFLOW

Inflow Area = 0.088 ac, 100.00% Impervious, Inflow Depth > 4.22" for 10 YEAR event
 Inflow = 0.49 cfs @ 11.95 hrs, Volume= 0.031 af
 Outflow = 0.07 cfs @ 12.31 hrs, Volume= 0.030 af, Atten= 85%, Lag= 21.3 min
 Discarded = 0.07 cfs @ 12.31 hrs, Volume= 0.030 af

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 410.05' @ 12.31 hrs Surf.Area= 12,250 sf Storage= 619 cf

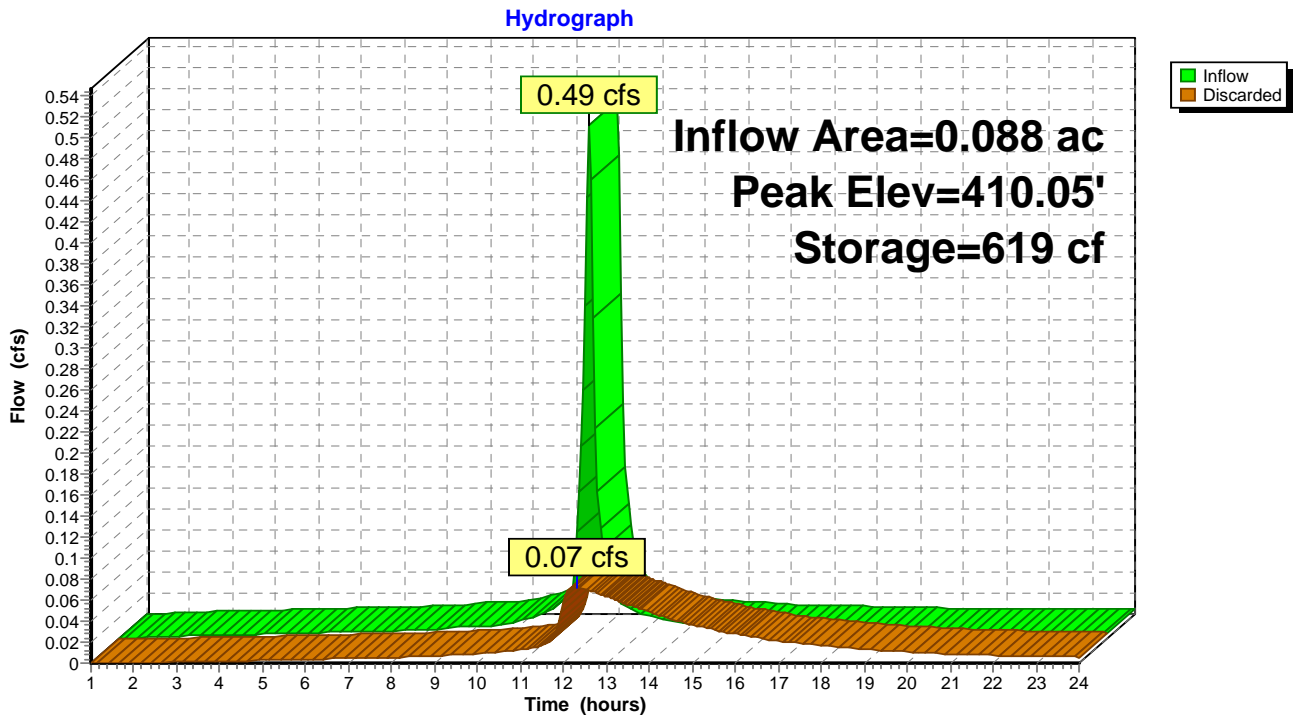
Plug-Flow detention time= 140.4 min calculated for 0.030 af (96% of inflow)
 Center-of-Mass det. time= 117.3 min (863.5 - 746.2)

Volume	Invert	Avail.Storage	Storage Description
#1	410.00'	122,500 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
410.00	12,250	0	0
411.00	12,250	12,250	12,250
420.00	12,250	110,250	122,500

Device	Routing	Invert	Outlet Devices
#1	Discarded	410.00'	0.500 in/hr Exfiltration over Horizontal area

Discarded OutFlow Max=0.14 cfs @ 12.31 hrs HW=410.05' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 0.14 cfs)

Pond 1P: VEGETATED FILTER-NO OVERFLOW



PAVED DRIVEWAY-10 YR NO NET INC*Type II 24-hr 10 YEAR Rainfall=4.46"*

Prepared by Goebel Engineering & Surveying, Inc.

Printed 2/21/2011

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Hydrograph for Pond 1P: VEGETATED FILTER-NO OVERFLOW

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Discarded (cfs)
1.00	0.00	0	410.00	0.00
1.50	0.00	1	410.00	0.00
2.00	0.00	3	410.00	0.00
2.50	0.00	6	410.00	0.00
3.00	0.00	9	410.00	0.00
3.50	0.00	12	410.00	0.00
4.00	0.00	16	410.00	0.00
4.50	0.00	20	410.00	0.00
5.00	0.00	24	410.00	0.00
5.50	0.01	28	410.00	0.00
6.00	0.01	32	410.00	0.00
6.50	0.01	36	410.00	0.00
7.00	0.01	40	410.00	0.00
7.50	0.01	44	410.00	0.01
8.00	0.01	48	410.00	0.01
8.50	0.01	53	410.00	0.01
9.00	0.01	60	410.00	0.01
9.50	0.01	68	410.01	0.01
10.00	0.01	77	410.01	0.01
10.50	0.02	89	410.01	0.01
11.00	0.03	109	410.01	0.01
11.50	0.04	144	410.01	0.02
12.00	0.44	496	410.04	0.06
12.50	0.05	609	410.05	0.07
13.00	0.03	547	410.04	0.06
13.50	0.02	481	410.04	0.06
14.00	0.02	419	410.03	0.05
14.50	0.01	364	410.03	0.04
15.00	0.01	316	410.03	0.04
15.50	0.01	275	410.02	0.03
16.00	0.01	240	410.02	0.03
16.50	0.01	209	410.02	0.02
17.00	0.01	184	410.02	0.02
17.50	0.01	162	410.01	0.02
18.00	0.01	144	410.01	0.02
18.50	0.01	128	410.01	0.01
19.00	0.01	115	410.01	0.01
19.50	0.01	103	410.01	0.01
20.00	0.01	92	410.01	0.01
20.50	0.01	83	410.01	0.01
21.00	0.00	76	410.01	0.01
21.50	0.00	70	410.01	0.01
22.00	0.00	64	410.01	0.01
22.50	0.00	60	410.00	0.01
23.00	0.00	56	410.00	0.01
23.50	0.00	53	410.00	0.01
24.00	0.00	50	410.00	0.01

See [Appendix G.1 SW-160](#) for typical filter strip details.

Facility Description

Vegetated filter strips are gently sloped areas that are designed to receive sheet flows. They are typically linear facilities that run parallel to the impervious surface and are commonly used to receive the runoff from walkways and driveways. Filter strips are covered with vegetation, including grasses and groundcovers, that filter and reduce the velocity of the stormwater. As the stormwater travels downhill, it infiltrates into the soils below.

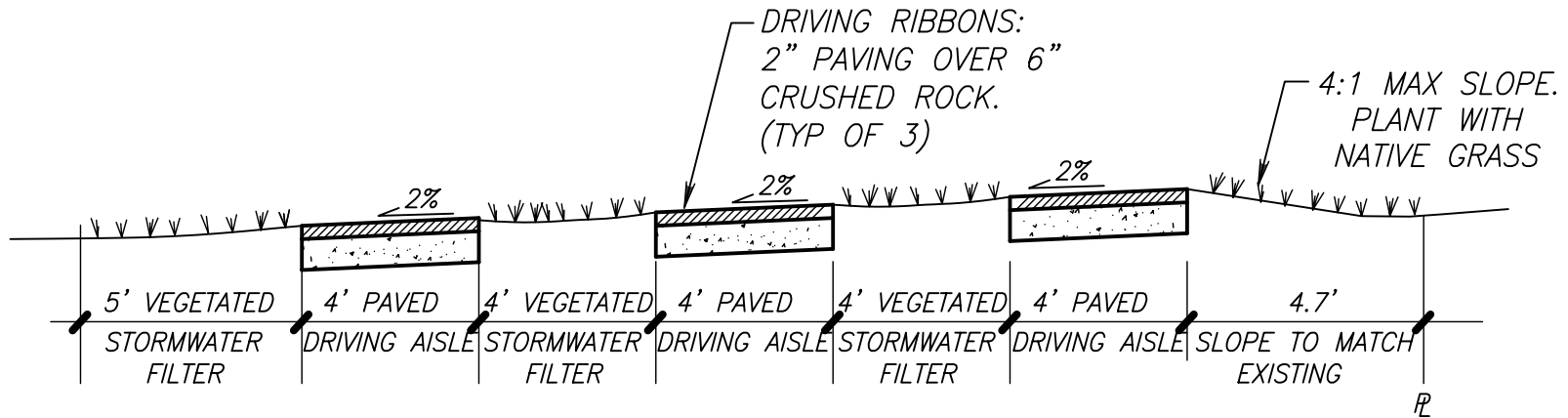
Driveway center filter strips are used between the drive aisles of residential driveways. They are typically 3 feet wide and placed between two 3-foot-wide paved sections. (The minimum width of a residential driveway is 9 feet, of which the inner 3-foot section could be pervious and used for infiltration as long as all other code requirements are met.) The strip is used exclusively to treat and infiltrate the stormwater from the impervious area of the drive aisles. The drive aisles must be sloped toward the driveway center filter strip. The driveway center filter strip must be maintained to the required design requirements (including 100 percent landscaping coverage) stated below.

Design Requirements

- **Soil Suitability:** Filter strips are appropriate for all soil types. Unless existing vegetated areas are approved as a filter, stormwater facility growing medium shall be used for the top 12 inches of the facility.
- **Setbacks:** The facility must begin 5 feet from the property line; 10 feet from buildings; and 50 feet from wetlands, rivers, streams, and creeks, unless an appeal is approved by the Bureau of Development Services.
- **Sizing:** Where the Simplified Approach is applicable, the filter strip is sized at 20 percent of impervious area treated up to 500 square feet of impervious area. If the Simplified Approach cannot be used, the Performance Approach will be required for sizing the filter strip, with demonstration of infiltration feasibility.
- **Dimensions and slopes:** Filter strips shall slope between 0.5 and 6 percent. Slope of pavement area draining to the strip shall be less than 6 percent. Filter strips shall have a minimum width of 5 feet, measured in the direction of the flow.

- **Level spreaders:** A grade board or sand/ gravel trench may be required to disperse the runoff evenly across the filter strip. The top of the level spreader must be horizontal and at an appropriate height to provide sheet flow directly to the soil without scour. Level spreaders shall not hold a permanent volume of runoff. Grade boards can be made of any material that will withstand weather and solar degradation. Trenches used as level spreaders can be filled with washed crushed rock, pea gravel, or sand. (See [Appendix G.5 SW-524](#)).
- **Growing medium:** For filters designed with the Simplified Approach or filters on private property, the imported soil shall be a sandy loam mixed with compost or a sand/soil/compost blend. It shall be roughly one-third compost by volume, free-draining, and support plant growth. The compost shall be derived from plant material; animal waste is not allowed. The growing medium shall be 12 inches deep for filter strips.
- **Vegetation:** The entire filter strip must have 100 percent coverage by native grasses, native wildflower blends, native ground covers, or any combination thereof. See [Appendix F.4](#) for more information.
- **Check dams:** If necessary, check dams shall be constructed of durable, non-toxic materials such as rock or brick or graded into the native soils. Check dams shall be 12 inches wide, 3 to 5 inches high, and run the length of the filter. .

STORMWATER REPORT
CHANGE IN USE-SITE PLAN REVIEW
FOR CORNERSTONE FAMILY PROPERTIES LLC
NE 1/4 SEC. 31, T.17S., R.5W., W.M.
VENETA, LANE COUNTY, OREGON
February 21, 2011



DRIVEWAY-VEGETATED BUFFER DETAIL

NO SCALE



EXPIRES: 6/30/2011