



CIVIL ENGINEERING
LAND SURVEYING
301 East 6th St. Suite 1
Port Angeles, Washington 98362
(360) 417-0501
E-mail: zenovic@olympus.net

LARKIN SHORT PLAT DRAINAGE REPORT

The drainage plan has been prepared to explain in detail the stormwater management design for the Short Plat for lot 16 of Eagle Crest Estates. The site is 2.1 acres, and is located on the south side of Miller Rd., approximately ¼ mile east of Sequim Avenue and approximately ½ mile south of U.S. Highway 101 in Sequim, WA. The report will provide information on existing conditions of the site, proposed construction, method of stormwater runoff analysis and stormwater detention design.

The existing site is a 2.1-acre lot with the southerly portion previously developed with a single-family residence and driveway. The north portion of the lot is currently undeveloped with grass and a few tree clusters. Topography of the site slopes towards the northwest corner of the site at grades between 10 to 15 percent. Soils, as described in the Soil Survey of Clallam County Area, Washington, consist of approximately 7 inches of Gravelly Loam on top of approximately 30 inches of Clay Loam, underlain by compact glacial till. The site should be moderately well drained, but construction during the wet season will create a high erosion risk.

The proposed short plat will consist of 3 conventional single-family lots and 1 remainder lot that has already been developed. Lot sizes will be approximately 0.32 acres for the 3 new lots and the remainder lot will be 1.19 acres. Proposed construction will include: Constructing paved roadway, power, water, irrigation, telephone, and cable underground utilities, and constructing a stormwater conveyance system.

In 2007, when Eagle Crest Estates was first permitted, a stormwater runoff analysis was performed using the Santa Barbara Urban Hydrograph method and computer program StormShed2G, consistent with the Stormwater Management Manual of the Puget Sound Region (Ecology, 1992). This design method looked at the entire site and performs analysis based on historical rainfall data, pre-developed and developed site condition, to determine the allowable runoff rate from the site. The goal of the design was to detain and release water at rates that are relative to the site prior to development. The design looks at three different storms: The 2 year-24 hour storm, 10 year-24 hour storm, and the 100 year-24 hour storm. The 2 year-24 hour storm is the largest storm that is expected to occur once every 2 years for a 24 hour time period. Similar definitions apply for the 10 and 100 year -24 hour storms. Using these three storm events, the pre-developed peak runoff rates from the site are calculated.

The amount of impervious area was calculated by determining the square footage of asphalt road and concrete sidewalk and a maximum impervious surface of 5,000 sf for Lot 1 and a maximum of 4,696 sf for the remaining 22 lots. The initial development was to be in 2 Phases. Phase A, which was completed, created 15 single-family lots and (1) remainder lot (Lot 16). Lot 16 was to become Phase B, with the proposed creation of 8 total lots (37,567 sf of impervious surface). The revised Drainage Report for Eagle Crest Subdivision is included as Appendix A.

Lot 16 (Proposed Lot A) currently has been developed with approximately 14,261 sq. ft. of impervious surface. Based on the previous design a maximum of 7,769 s.f. of impervious surface would be allowed for proposed lots B, C and D. Shown on Sheet C2 is a schematic of a typical developed lot having 3,000 sq. ft. roof area, 780 sq. ft. concrete apron and 1,545 sq. ft. private driveway for a total of 5,325 sq. ft. per lot. This leaves a balance of 7,332 sq. ft. impervious surface based on original stormwater design for the existing pond.

Based on this review of the original design the existing lot and proposed 3 lots will not exceed the capacity of the existing stormwater pond. The runoff from the proposed 3 lots will be collected by roof gutters and a downspout tightline connected to the storm main in Miller Road. Surface water runoff for the private driveways will be collected in catch basins and connected to the downspout tightline. Road surface water in Miller Rd will be conveyed to through a roadside ditch to an existing catch basin connected to the stormwater pond.

Before any collected water is allowed to leave the site it must be treated to remove pollutants, such as sediment, debris, and oil. Any water collected from an asphalt roadway runs the risk of carrying oil from vehicle spills and leaks. To prevent the oil from be carried in the stormwater and deposited into fish bearing streams, catch basin inserts and oil control tee's shall be installed on all curb side catch basins. The water will then be piped to the detention pond where it will be detained to allow sediment and debris to settle out. When the water is discharged from the pond it will travel through approximately 1 mile of vegetated swales and roadside ditches to further filter the water and ensure that it will not detrimentally affect water quality or quantity in the downstream water bodies. (Bell Creek and the Strait of Juan de Fuca)



APPENDIX – A

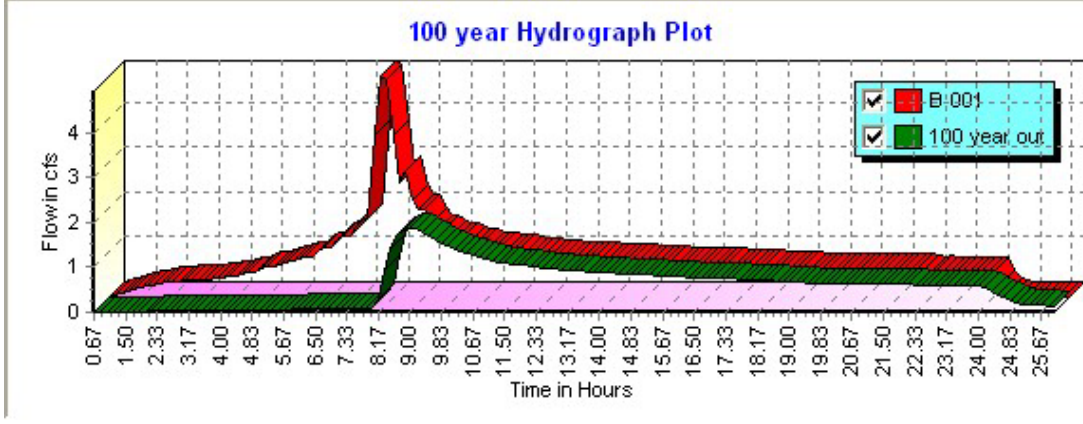
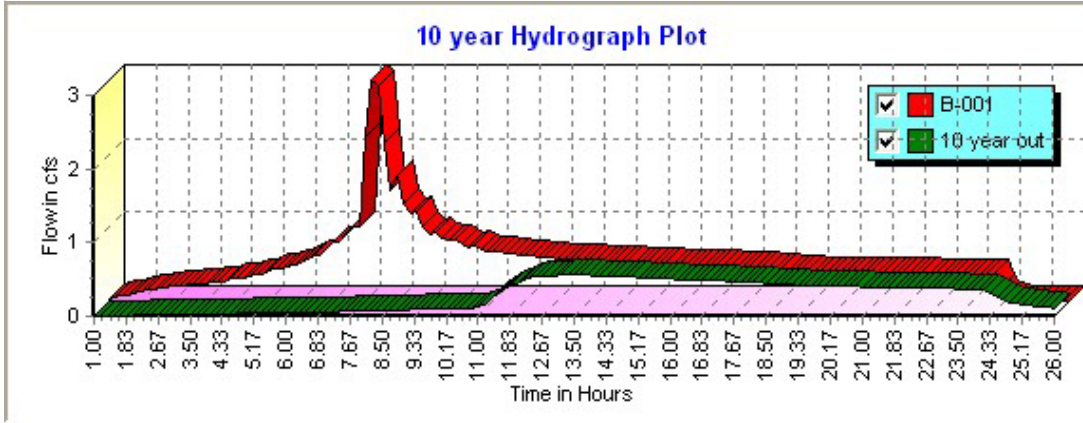
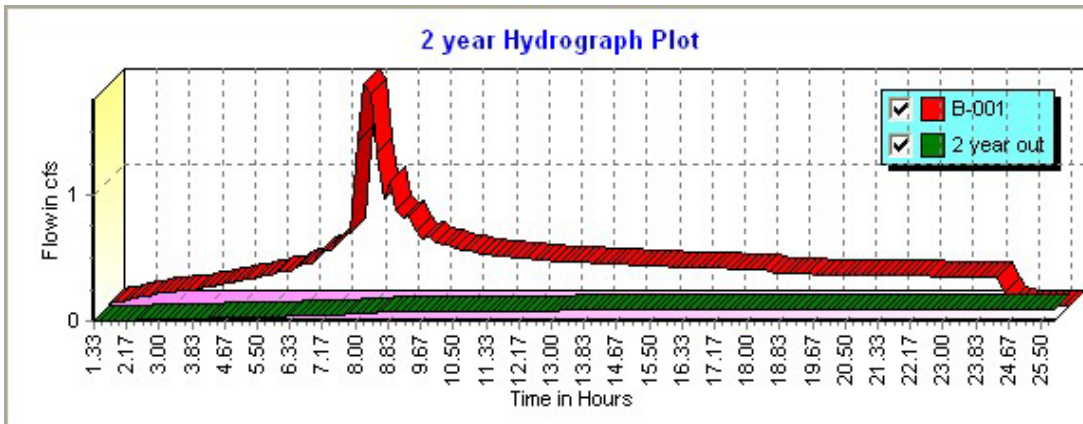
APPENDIX A

EAGLE CREST SUBDIVISION STORMWATER CALCULATIONS – FEBRUARY 2008

DRAINAGE CALCULATIONS AND DESIGN EAGLE CREST SUBDIVISION

DRAINAGE SUMMARY: These drainage calculations assume 23 lots with 4,696 s.f. of impervious area per lot (with the exception of one lot, which will have 5,000 s.f. of impervious area), in addition to the impervious area for the required roadways and sidewalks. The required pond must provide a minimum of 27,150 c.f. of storage volume and 4'-10½" of storage depth. The outlet structure will consist of one orifice and one weir. The orifice is to be 4" to 6" from the pond bottom and 1.31" in diameter. The weir is to be 8" tall and 1'-6" long, at 4'-4" from the pond bottom.

Event	Match Q (cfs)	Peak Q (cfs)	Peak Stg (ft)	Vol (cf)	Vol (acft)	Time to Empty
2 year	0.0961	0.0958	104.2288	22211.10	0.5099	158.00
10 year	0.7251	0.5624	104.5409	24650.10	0.5659	161.67
100 year	1.8934	1.8806	104.8606	27149.14	0.6233	162.00



Summary Report of all Detention Pond Data

Event	Precip (in)
6-month	0.9600
2 year	1.5000
10 year	2.2500
100 year	3.3500

BasinID	Event	Peak Q (cfs)	Peak T (hrs)	Peak Vol (ac-cf)	Area (ac)	Method/Loss	Raintype
B-001 - Predeveloped	2 year	0.1922	9.00	0.2129	8.12	SBUH/SCS	TYPE1A
B-001	2 year	1.7573	7.83	0.6406	8.11	SBUH/SCS	TYPE1A
B-001 - Predeveloped	10 year	0.7251	8.17	0.5200	8.12	SBUH/SCS	TYPE1A
B-001	10 year	3.0020	7.83	1.0881	8.11	SBUH/SCS	TYPE1A
B-001 - Predeveloped	100 year	1.8934	8.17	1.0745	8.12	SBUH/SCS	TYPE1A
B-001	100 year	4.9231	7.83	1.7802	8.11	SBUH/SCS	TYPE1A

Record Id: B-001 - Predeveloped

Design Method	SBUH	Rainfall type	TYPE1A
Hyd Intv	10.00 min	Peaking Factor	484.00
		Abstraction Coeff	0.20
Pervious Area (AMC 2)	8.12 ac	DCIA	0.00 ac
Pervious CN	81.00	DC CN	0.00
Pervious TC	31.07 min	DC TC	0.00 min

Pervious CN Calc

Description	SubArea	Sub cn
Trees- 2nd growth	8.12 ac	81.00
Pervious Compositd CN (AMC 2)		81.00

Pervious TC Calc

Type	Description	Length	Slope	Coeff	Misc	TT
Sheet	trees	300.00 ft	13.30%	0.4000	2.50 in	27.42 min
Shallow	trees	320.00 ft	13.30%	0.0800		3.64 min
Pervious TC						31.07 min

Record Id: B-001

Design Method	SBUH	Rainfall type	TYPE1A
Hyd Intv	10.00 min	Peaking Factor	484.00
		Abstraction Coeff	0.20
Pervious Area (AMC 2)	3.65 ac	DCIA	4.45 ac
Pervious CN	86.65	DC CN	98.18
Pervious TC	13.88 min	DC TC	1.80 min

Pervious CN Calc		
Description	SubArea	Sub cn
Cleared Roadside	0.49 ac	90.00
Lots - Pervious	3.06 ac	86.00
Detention Area	0.11 ac	90.00
Pervious Compositd CN (AMC 2)		86.65

Pervious TC Calc						
Type	Description	Length	Slope	Coeff	Misc	TT
Sheet	lawn	300.00 ft	13.30%	0.1500	2.50 in	12.51 min
Shallow	lawn	320.00 ft	13.30%	0.0300		1.37 min
Pervious TC						13.88 min

Directly Connected CN Calc		
Description	SubArea	Sub cn
Roadway	1.35 ac	98.00
Sidewalk	0.20 ac	98.00
Lots - Impervious	2.49 ac	98.00
Detention Pond	0.41 ac	100.00
DC Compositd CN (AMC 2)		98.18

Directly Connected TC Calc						
Type	Description	Length	Slope	Coeff	Misc	TT
Sheet	pavement	300.00 ft	13.30%	0.0110	2.50 in	1.55 min
Shallow	pavement	150.00 ft	13.30%	0.0120		0.26 min
Directly Connected TC						1.80min

HYDLIST SUMMARY

HydID	Peak Q (cfs)	Peak T (hrs)	Peak Vol (ac-ft)	Cont Area (ac)
2 year out	0.0958	24.17	0.6406	8.1092
10 year out	0.5624	13.50	1.0881	8.1092
100 year out	1.8806	9.00	1.7801	8.1092

Record Id: Pond Model

Descrip:	Sample pond for B-001	Increment	0.10 ft
Start El.	100.0000 ft	Max El.	106.0000 ft
Stage Volume			
Stage (ft)		Volume (cf)	
100.00		0.0000	
101.00		3591.3000	
102.00		8154.9300	
103.00		13746.7800	
104.00		20422.7300	
105.00		28238.6500	
106.00		37254.1400	

Record Id: Outlet Structure

Descrip:	Combination of orifice and weir	Increment	0.10 ft
Start El.	100.0000 ft	Max El.	105.0000 ft
List of Discharge Structures:	Weir Orifice		

Record Id: Weir

Descrip:	Rectangular weir model	Increment	0.10 ft
Start El.	104.3330 ft	Max El.	105.0000 ft
Length	1.50 ft		
Cd	3.1300	Use variable Cd based on head for calcs	

Record Id: Orifice

Descrip:	Orifice at 4 to 6 inches	Increment	0.10 ft
Start El.	100.0000 ft	Max El.	105.0000 ft
Orif Coeff	0.62	Lowest Orif El.	100.50
Lowest Diam	1.3100 in	Dist to next	0.0000 ft

Licensed to: Zenovic & Assoc., Inc.