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STORMWATER MANAGEMENT & EROSION CONTROL PLAN

Good Samaritan Inn
Ponderay, Idaho July 8, 2024

PROJECT LOCATION: The project location is legally described as Lot 8 of Block 2 of the Schweitzer Plaza Subdivision located in Section 11, Township 57 North, Range 2 West, Boise Meridian, Bonner County, Idaho.

PROJECT DESCRIPTION: To be permitted to construct a "Good Samaritan Inn" development to serve as temporary housing at the project location as described above. The project is proposed in two (2) phases. Phase 1 site improvements consist of three (3) 4-plex units, a community building, and a commercial building (H4 Building) along with approximately 3,800 square feet (sf) of concrete sidewalk and patios, 7,490 sf of asphalt parking area, and 2,140 sf of boardwalk pathway. Phase 2 site improvements consist of four (4) 4-plex units, a program manager's living quarters, approximately 1,400 square feet (sf) of concrete sidewalk and patios, 6,870 sf of asphalt parking area, and 2,400 sf of boardwalk pathway. The existing parcel is approximately 1.858 acres of vacant land with mild slopes across the site.

SOIL TYPE/SITE CHARACTERISTICS: The Soil Conservation Service's Soil Survey of the Bonner County Area lists soils in this area as Odenson Silt Loam type. This soil is evident on site with poorly draining soils. With mild slopes on site and poorly draining soils, the site shows no evident signs of slippage. The surrounding parcels appear to be consistent with this lot.

STORMWATER CRITERIA: City of Ponderay regulations state that stormwater not leave any site faster than the pre-development peak flow rate for a 25-year storm event. Stormwater detention for Phase 1 of the development will be attained using a grassed detention area that will capture runoff downstream of the new impervious surfaces on the property. An 8-inch outflow pipe will be placed at the elevation to release stormwater beyond the 25-year storm event into the existing roadside ditch along Triangle Drive. The pipe discharge will not exceed the pre-development peak flow rate. Phase 2 will also detain stormwater from the proposed development using a grassed detention area and an 8-inch outflow pipe to discharge flows beyond the 25-year storm event into the Triangle Drive roadside ditch. Overall development of the property will continue to route runoff as it has historically. The attached Stormwater Plans shows the relationship of the new impervious surfaces to the stormwater features.

EROSION/SEDIMENTATION: Temporary erosion and sedimentation control will be accomplished using silt fencing constructed and maintained before the point of discharge as described on the plans. All barriers will be installed prior to construction continuation, placed perpendicular to the line of flow, and inspected and maintained by the contractor until vegetation has been reestablished and the stormwater system is in place. All disturbed areas will be vegetated or improved according to the plans. A temporary gravel construction entrance to the site will be utilized for vehicle track-out control. Dust abatement will be attained using a water truck, as needed..

OPERATION AND MAINTENANCE PLAN: To keep erosion to a minimum, stormwater feature areas to be vegetated will be seeded and mulched upon final grading. Newly planted areas will be inspected after large storms for erosion until well established. Eroded areas will be replaced.
Inspection schedule and timing: At a minimum, inspection is to take place once every 7 days, within 24 hours of an anticipated storm event of 0.5 inches or greater, and within 24 hours of the end of a storm event of 0.5 inches or greater. The property owner will be responsible for maintenance of the system.

STORMWATER SYSTEM CALCULATIONS SUMMARY
The Rational Method with a 25-year return period was used for calculations in conjunction with the ITD intensity-duration-frequency curve. The Bowstring Method was used to determine the required detention volume. See attached calculations for additional information.

Pre-Development Peak Flow = 0.53 cfs

Phase 1 Post-Development Requirements
Peak Flow = 1.84 cfs
Difference in Peak Flows = 1.84 cfs – 0.53 cfs = 1.31 cfs
Required Detention = 734 CF
Increase in Impervious Surfaces = 20,641 SF

Detention volume provided by detention area 1= 735 CF

Overall Site Post-Development Requirements
Peak Flow = 2.65 cfs
Difference in Peak Flows = 2.65 cfs – 0.53 cfs = 2.12 cfs
Required Detention = 1,506 CF
Increase in Impervious Surfaces = 36,446 SF

Detention volume provided by detention area 2= 784 CF

Total Proposed Detention Volume = 1,519 CF

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The attached plan and this document were prepared by the undersigned, whose seal as a licensed professional engineer, is affixed below.

CLEARWATER ENGINEERING, LLC

Nicole M. Costello, P.E.
Managing Member, Project Engineer

PROFESSIONAL ENGINEER REGISTERED 18509 STATE OF IDAHO NICOLE M. COSTELLO

7/8/2024

GOOD SAMARITAN INN
SEC. 11, T57N, R2W, SCHWEITZER PLAZA, BLK 2, LOT 8
PONDERAY, ID
06.26.2024

STORMWATER ANALYSIS
Rational Method for Runoff Calculations - for Overall Site Development
Pre-Development

Water Quantity Storm 25 year -----

Surface Type	Area A (ft2)	Area A (Acres)	Runoff Coefficient C
Unimproved Area	80,934	1.858	0.15
Gravel Drive	-	0.000	0.85
Roofs + Concrete + Asphalt	-	0.000	0.95
Totals	80,934	1.858	

Weighted Runoff Coefficient, C = 0.150
i = 1.9 in/hr

TIME OF CONCENTRATION:

$tc=[C_t (Ln/S^{(1/2)})]^{0.6}$

Ct =	0.15	for overland flow
L =	252	ft
n =	0.40	0.4 for grass, 0.02 for pavement
S =	0.006	ft/ft
tc =	**11.08**	**min**

Peak Runoff, Qp = CiA **Qp= 0.53 cfs**

Post-Development

Water Quantity Storm 25 year -----

Surface Type	Area A (ft2)	Area A (Acres)	Runoff Coefficient C
Unimproved Area	44,488	1.021	0.15
Gravel Drive	-	0.000	0.85
Roofs + Concrete + Asphalt	36,446	0.837	0.95
Totals	80,934	1.858	

$tc=[C_t (Ln/S^{(1/2)})]^{0.6}$ Weighted Runoff Coefficient, C = 0.510
i = 2.8 in/hr

TIME OF CONCENTRATION:

Ct =	0.15	for overland flow	Ct =	0.15	for overland flow
L =	58	ft	L =	10	ft
n =	0.02	0.02 for pavement	n =	0.40	0.4 for grass
S =	0.001	ft/ft	S =	0.020	ft/ft
tc1 =	1.27	min	tc2 =	1.11	min

tc = tc1 + tc2 = 2.38 min ***Use min. 5 minutes***

Peak Runoff, Qp = CiA **Qp= 2.65 cfs**

Difference in Qp = 2.13 cfs
Increase in impervious surfaces 36,446 sf

GOOD SAMARITAN INN
SEC. 11, T57N, R2W, SCHWEITZER PLAZA, BLK 2, LOT 8
PONDERAY, ID
06.26.2024

STORMWATER ANALYSIS
Rational Method for Runoff Calculations - for Phase 1
Pre-Development

Water Quantity Storm 25 year -----

Surface Type	Area A (ft2)	Area A (Acres)	Runoff Coefficient C
Unimproved Area	80,934	1.858	0.15
Gravel Drive	-	0.000	0.85
Roofs + Concrete + Asphalt	-	0.000	0.95
Totals	80,934	1.858	

Weighted Runoff Coefficient, C = 0.150
i = 1.9 in/hr

TIME OF CONCENTRATION:

$tc=[C_t (Ln/S^{(1/2)})]^{0.6}$

Ct =	0.15	for overland flow
L =	252	ft
n =	0.40	0.4 for grass, 0.02 for pavement
S =	0.006	ft/ft
tc =	**11.08**	**min**

Peak Runoff, Qp = CiA **Qp= 0.53 cfs**

Post-Development

Water Quantity Storm 25 year -----

Surface Type	Area A (ft2)	Area A (Acres)	Runoff Coefficient C
Unimproved Area	60,293	1.384	0.15
Gravel	-	0.000	0.85
Roofs + Concrete + Asphalt	20,641	0.474	0.95
Totals	80,934	1.858	

Weighted Runoff Coefficient, C = 0.354
i = 2.8 in/hr

TIME OF CONCENTRATION:

$tc=[C_t (Ln/S^{(1/2)})]^{0.6}$

			Manning's Eqn. V=(1.49r^(2/3)s^(1/2))/n			tc2 = L/3600V		
			A =	0.30	sf (swale cross-sec)	V =	0.05	ft/s for open channel flow
Ct =	0.15	for overland flow	P =	6.01	ft (swale wetter perimeter)	L =	15	ft
L =	70	ft	R =	0.05	ft (A/P)			
n =	0.02	0.02 for pavement	n =	0.24	manning's n for grass			
S =	0.002	ft/ft	S =	0.003	ft/ft			
			V=	0.05	ft/s (velocity)			
tc1 =	1.22	min				tc2 =	0.09	min
tc =	**tc1 + tc2 =**	**1.31**	**min**		***Use min. 5 minutes***			

Peak Runoff, Qp = CiA **Qp= 1.84 cfs**

Difference in Qp =	1.31	cfs
Increase in impervious surfaces	20,641	sf

GOOD SAMARITAN INN
SEC. 11, T57N, R2W, SCHWEITZER PLAZA, BLK 2, LOT 8
PONDERAY, ID
06.26.24

BOWSTRING METHOD - FOR OVERALL SITE DEVELOPMENT

DETENTION BASIN DESIGN							
Within Property Boudaries							
Volume In =1.34 * Q dev.* t			(t <= tc)				
Volume In = (Q dev. * t) + (0.34 * Q dev.* Tc*60)			(t > tc)				
Volume Out = Outflow * t							
Time Increment (min.)	5						
Time of Concentration, tc (min.)	5						
Outflow (cfs)	0.53						
Design Year Flow (yr.)	25						
Area (acres)	1.858						
Developed "C" factor	0.51						
Area X "C"	0.948						
	Time Inc. (min.)	Time Inc. (sec.) t	Intensity (in./hr.) i	Q dev. (cfs) AxCxi	Volume in (cu. ft.)	Volume out (cu.ft.)	Storage (cu. ft.) Vin-Vout
	5	300	2.80	2.65	1,067	159	908
	10	600	2.10	1.99	1,397	318	1,079
	15	900	1.70	1.61	1,614	477	1,137
	20	1200	1.60	1.52	1,974	636	1,338
	25	1500	1.40	1.33	2,125	795	1,330
	30	1800	1.20	1.14	2,163	954	1,209
	35	2100	1.10	1.04	2,295	1,113	1,182
	40	2400	0.95	0.90	2,252	1,272	980
	45	2700	0.90	0.85	2,390	1,431	959
	50	3000	0.87	0.82	2,557	1,590	967
	55	3300	0.85	0.81	2,667	1,749	918
	60	3600	0.78	0.74	3,038	1,908	1,130
	65	3900	0.75	0.71	2,799	2,067	732
	70	4200	0.70	0.66	2,793	2,226	567
	75	4500	0.69	0.65	2,955	2,385	570
	80	4800	0.67	0.63	3,047	2,544	503
	85	5100	0.65	0.62	4,209	2,703	1,506
	90	5400	0.63	0.60	3,224	2,862	362
	95	5700	0.60	0.57	3,299	3,021	278
	100	6000	0.59	0.56	3,468	3,180	288
	105	6300	0.58	0.55	3,631	3,339	292
	110	6600	0.55	0.52	3,652	3,498	154
	115	6900	0.52	0.49	3,651	3,657	6
	120	7200	0.50	0.47	3,701	3,816	115
	240	14400	0.33	0.31	4,726	7,632	2,906
	480	28800	0.22	0.21	6,174	15,264	9,090
	720	43200	0.17	0.16	7,107	22,896	15,789
	1440	86400	0.11	0.10	8,698	45,792	37,094

Detention Required = 1,506 cf

GOOD SAMARITAN INN
SEC. 11, T57N, R2W, SCHWEITZER PLAZA, BLK 2, LOT 8
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BOWSTRING METHOD - FOR PHASE 1

DETENTION BASIN DESIGN							
Within Property Boudaries							
Volume In =1.34 * Q dev.* t			(t <= tc)				
Volume In = (Q dev. * t) + (0.34 * Q dev.* Tc*60)			(t > tc)				
Volume Out = Outflow * t							
Time Increment (min.)	5						
Time of Concentration, tc (min.)	5						
Outflow (cfs)	0.53						
Design Year Flow (yr.)	25						
Area (acres)	1.858						
Developed "C" factor	0.354						
Area X "C"	0.658						
	Time Inc. (min.)	Time Inc. (sec.) t	Intensity (in./hr.) i	Q dev. (cfs) AxCxi	Volume in (cu. ft.)	Volume out (cu.ft.)	Storage (cu. ft.) Vin-Vout
	5	300	2.80	1.84	740	159	581
	10	600	2.10	1.38	970	318	652
	15	900	1.70	1.12	1,120	477	643
	20	1200	1.60	1.05	1,370	636	734
	25	1500	1.40	0.92	1,475	795	680
	30	1800	1.20	0.79	1,501	954	547
	35	2100	1.10	0.72	1,593	1,113	480
	40	2400	0.95	0.62	1,563	1,272	291
	45	2700	0.90	0.59	1,659	1,431	228
	50	3000	0.87	0.57	1,775	1,590	185
	55	3300	0.85	0.56	1,851	1,749	102
	60	3600	0.78	0.51	2,109	1,908	201
	65	3900	0.75	0.49	1,943	2,067	124
	70	4200	0.70	0.46	1,937	2,226	289
	75	4500	0.69	0.45	2,048	2,385	337
	80	4800	0.67	0.44	2,115	2,544	429
	85	5100	0.65	0.43	2,922	2,703	219
	90	5400	0.63	0.41	2,238	2,862	624
	95	5700	0.60	0.39	2,290	3,021	731
	100	6000	0.59	0.39	2,408	3,180	772
	105	6300	0.58	0.38	2,520	3,339	819
	110	6600	0.55	0.36	2,535	3,498	963
	115	6900	0.52	0.34	2,534	3,657	1,123
	120	7200	0.50	0.33	2,569	3,816	1,247
	240	14400	0.33	0.22	3,281	7,632	4,351
	480	28800	0.22	0.14	4,285	15,264	10,979
	720	43200	0.17	0.11	4,933	22,896	17,963
	1440	86400	0.11	0.07	6,037	45,792	39,755

Detention Required = 734 cf