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509-200-6538 CELL
Project 19-244
12-01-2019

Robert Gordon, PE
625 S. College Avenue
College Place, Wa. 99362

Re: Stormwater Report for Whispering Creek 10 lot subdivision. 620 SE 8th. St.

The site involves 4.79 acres of open ground on the south side of SE 8th. Street. Setbacks for the critical creek area will be 35 feet for the buffer and 45 feet for the building limit. Pins are to be set on the lot lines at 35 feet from the creek centerline. Note that Garrison creek is a regulated creek which varies little over the seasons. It is regulated at the Army Corps facility at Bennington Lake.

1. A one-half street construction will be made on the SE 8th. Street frontage and a North-West cul-de-sac street will serve the interior lots. A decision to go to 60 foot right of ways was made to allow drainage swales along the streets with drop down curb slots for allowing water into the swales. Due to high ground water tables it was necessary to do shallow surface treatment. Treatment will be by infiltration through grasses with 5 feet or more of silty sands above the winter water table. The onsite home basement is down 7 feet and has not had ground water intrusion.
2. The land slopes gently toward the southeast and is bounded by Garrison Creek on the north and east sides. There is 6 feet of fall across the site diagonally. Soil types are AmA Ahtanum and YmA silt loam Infiltration rates are noted at 0.57 to 1.98 inches per hour. Our highly saturated soil tested at 2.25 inches/hour. The appendix details the test and times. A safety factor reduction of 3 will be applied for long term infiltration rates. Yma soil is rated by SCS at same rate as the AmA soil. Higher infiltration rates have been measured on the

site but are dependent of the level of soil saturation. A preliminary infiltration test indicates a much higher rate exists.

3. Post

Unit pervious and non-pervious areas were calculated. All street and sidewalk contributions are included and 400 sq. ft. is added for driveways draining into the street. The 400 sf for the drives comes from a 20 ft. setback to the garages x 20 ft. in width. Lot contributions are included for the front 20 feet of the abutting lots. The table also tabulates the SBHU peak runoff rates and stormwater volumes. Water quality rates were about the same for both methods, but differed significantly for the SBHU. Runoff by both methods are shown in the calculation. The SBHU spreadsheet curve types and a Type 1A storm was used. Infiltration facility drawings are on the plans with locations of swales.

Sizing concept: Due to the use of the surface soils for infiltration and treatment a fully saturated soil infiltration test was done. The soil was saturated for 14 hours noting when the rates stabilized. The final rate was 2.25 inches per hour. Application of the long term factor of safety of 3 gives a final swale design rate of 0.75 inches per hour.

A 25 yr. 24 hour storm gives 1.9" of rainfall per the Also a 20ft x 20 foot driveway area will be included. Typical lot frontage range around 100 feet. Runoff coefficients on 0.95 will be used on the street, sidewalk and driveways. The swale area and 20 ft. of lot frontage will use 0.30.

Street area $18 \times 100 = 1800$ sf Sidewalk and driveway $650 + 400 = 1,050$ sf
Swale area $6.5 \times 100 = 650$ sf. 20 ft. frontage area 2,000 sf of lots. (100 ft. strip)

Imperv. = 2,850 s.f.

Perv. = 2,650 s.f.

$2,850 \times (1.9/12)(0.95) = 429$ cf. $2650 \times (1.9/12)(0.35) = 147$ cf.

Water quality at 1.0"

$2850 \times 1.0/12 \times 0.95 = 226$ cf. (Imp. area only)

Total 576 cu.ft.

SBHU Spreadsheet 0.061 ac pervious 0.062 ac impervious

Water quality is 248 cf. (0.061 ac perv.) 0.065 imperv.)

Post = 1,038 cu. ft.

Isopoluvial $576 \text{ cf.} / 100 = 5.76$ cu. ft./ft. SBHU $1,038 \text{ cf.} / 100 = 10.38$ cf.

$$\text{WQ } 226/100=2.26 \text{ cu.ft.}$$

$$\text{WQ } 248/100=2.48 \text{ cu. ft.}$$

Swales will contain the water quality volume of both methods. Swale volume is 3.25 cf. for the 6.5 ft. swale and 2.7 cf. for the 4.5 ft.

SBHU nearly doubles the runoff. Likely the method is not as applicable to small areas. The isopoluvial is I believe more applicable for small areas and will be used.

Swale bottom area is 6.5 sq. ft. $6.5 \times (0.75/12) = 0.41 \text{ cf. per hour}$

$$\underline{5.76 \text{ cf.}/0.41 \text{ cf./hr.}=14 \text{ hrs.}}$$

$$\underline{10.38 \text{ cf.}/0.41 = 25.3 \text{ hrs.}}$$

Cul-de-sac has a 4.5 ft. swale width. A proposed 4.5'x1.5' deep gravel filled trench is to be added for more early storage. A one foot width at the center of the swale of the cul-de sac circle was measured in autocad to develop contributing areas to the 4.5 ft. rock filled swale. (1.6 degree wedge)

Unit volumes at 1.9 inch for storm.

Impervious area 20.64 sq. ft. $20.64(1.9/12)(0.95)=3.11 \text{ cf.}$

Pervious area 33.55 sq. ft. $33.55(1.9/12)(0.35)=1.86 \text{ cf.}$

Swale bottom area is 4.5 sq. ft. Infiltration rate is 0.41 cf. per hour

Swale storage = $4.5 \times 1.5 \times 0.40 = 2.7 \text{ cf.}$

$3.11 + 1.86 = 4.97 \text{ cf. to infiltrate in storm}$ $4.97/0.41 = \underline{12.12 \text{ hours}}$

The figure show that the surface swales can infiltrate the 24hr/25yr storm in 112-14 hours at 1.9" and up to 25-26 hours per the SHBU method

Maintenance of the facilities will be accomplished by home owners. Summer irrigation of the swales will be necessary. Drought resistant grasses should be planted. Use of surface swales will allow a much simpler and maintainable approach. A brief EC&S plan is on the plans.

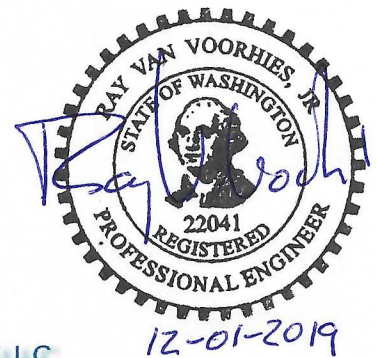
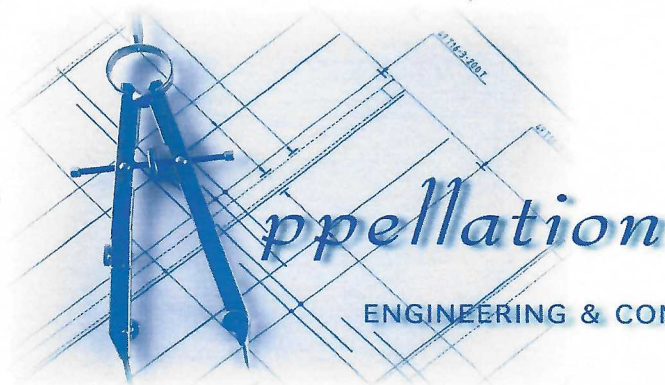
Appendix Items:

SCS soil types and information

Surface infiltration test details.

SBHU spreadsheet of a typical 100 ft. frontage.

Test pit soil profiles and water table depths with regard to mottling for historical winter high water tables.



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11-24-2019

APPENDIX SURFACE SOILS INFILTRATION TEST.

The following test was performed to determine the fully saturated infiltration rates of the top 12" of soil on the Preas' Whispering Creek Subdivision.

The test hole was 4 foot X 4foot by 12" deep.

Start of Test began at 12:45 PM: The test hole was refilled to the top for each timed interval.

Time interval	Water level drop (inches)	
12:45 to 1:00 PM	12	
1:10 to 1:25	11	
3:30 to 3:45	11	6 hrs. less refill time saturation
3:50 to 4:05	10.	
5:30 to 6:00	8.5	
6:15 to 6:45	7.5	

Pit left over night with slow hose running. Restart of timed drops the next day.
 9.75 hours of saturation.

4:30 to 4:45 AM	3.75	
5:30 to 5:45	3.25	
6:30 to 7:00	3.0	
7:10 to 7:40	2.75	8.8 hrs. less refill time saturation
7:45 to 8:45	3	
8:50 to 9:50	3	
9:55 to 10:55	2.5	
11:00 to 12:00 PM	2.25	

12:10 to 1:10 Pm 2.25 Test ended.

The final two one hour test periods were at 2.25 inches of fall. $2.25/3=0.75$ inches per hour for the long term factored infiltration rate to be used to size site Infiltration trenches.

WATER QUALITY

Water Quality Calculations, Design Storm is 1 inch in 24 hrs													
Enter data into yellow highlighted cells.													
Total Area	0.123	acres											
Rainfall P	1	inches (water quality storm)											
Time Step	6	minutes											
Tc	15	Time of Concentration											
w	0.166667	routing constant											
Pervious Area													
Area	0.061	acres											
Curve No.	89												
S	1.2360												
0.2S	0.2472												
Impervious Area													
Area	0.065	acres											
Curve No.	98												
S	0.2041												
0.2S	0.0408												
													0.136
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)		
Time	Time	Rainfall	Incremental	Accumulated	PERVIOUS		IMPERVIOUS		Total	Instant	Design	Total	
Increment	(minutes)	Dist. (fraction)	Rainfall (inches)	Rainfall (inches)	Accumulated Runoff (inches)	Incremental Runoff (inches)	Accumulated Runoff (inches)	Incremental Runoff (inches)	Runoff (inches)	Flowrate (cfs)	Flowrate (cfs)	Runoff (cf)	
0	0		-	-	-	-	-	-	-	-	-	-	
1	6	0.002200	0.002	0.002	-	-	-	-	-	-	-	-	
2	12	0.002100	0.002	0.004	-	-	-	-	-	-	-	-	
3	18	0.002000	0.002	0.006	-	-	-	-	-	-	-	-	
4	24	0.001900	0.002	0.008	-	-	-	-	-	-	-	-	
5	30	0.001800	0.002	0.010	-	-	-	-	-	-	-	-	
6	36	0.001800	0.002	0.012	-	-	-	-	-	-	-	-	
7	42	0.001900	0.002	0.014	-	-	-	-	-	-	-	-	
8	48	0.002000	0.002	0.016	-	-	-	-	-	-	-	-	
9	54	0.002100	0.002	0.018	-	-	-	-	-	-	-	-	
10	60	0.002200	0.002	0.020	-	-	-	-	-	-	-	-	
11	66	0.002800	0.003	0.023	-	-	-	-	-	-	-	-	
12	72	0.002900	0.003	0.026	-	-	-	-	-	-	-	-	
13	78	0.003000	0.003	0.029	-	-	-	-	-	-	-	-	
14	84	0.003100	0.003	0.032	-	-	-	-	-	-	-	-	
15	90	0.003200	0.003	0.035	-	-	-	-	-	-	-	-	
16	96	0.003000	0.003	0.038	-	-	-	-	-	-	-	-	
17	102	0.003000	0.003	0.041	-	-	0.000	0.000	0.000	0.00	0.000	0	
18	108	0.002900	0.003	0.044	-	-	0.000	0.000	0.000	0.00	0.000	0	
19	114	0.003100	0.003	0.047	-	-	0.000	0.000	0.000	0.00	0.000	0	
20	120	0.003000	0.003	0.050	-	-	0.000	0.000	0.000	0.00	0.000	0	
21	126	0.003100	0.003	0.053	-	-	0.001	0.000	0.000	0.00	0.000	0	
22	132	0.003200	0.003	0.056	-	-	0.001	0.000	0.000	0.00	0.000	0	
23	138	0.003200	0.003	0.060	-	-	0.002	0.000	0.000	0.00	0.000	0	
24	144	0.003300	0.003	0.063	-	-	0.002	0.001	0.000	0.00	0.000	0	
25	150	0.003200	0.003	0.066	-	-	0.003	0.001	0.000	0.00	0.000	0	
26	156	0.003200	0.003	0.069	-	-	0.003	0.001	0.000	0.00	0.000	0	
27	162	0.003200	0.003	0.072	-	-	0.004	0.001	0.000	0.00	0.000	1	
28	168	0.003200	0.003	0.076	-	-	0.005	0.001	0.000	0.00	0.000	1	
29	174	0.003200	0.003	0.079	-	-	0.006	0.001	0.000	0.00	0.000	1	
30	180	0.003200	0.003	0.082	-	-	0.007	0.001	0.001	0.00	0.001	1	
31	186	0.003100	0.003	0.085	-	-	0.008	0.001	0.001	0.00	0.001	1	
32	192	0.003200	0.003	0.088	-	-	0.009	0.001	0.001	0.00	0.001	2	
33	198	0.003200	0.003	0.092	-	-	0.010	0.001	0.001	0.00	0.001	2	
34	204	0.003200	0.003	0.095	-	-	0.011	0.001	0.001	0.00	0.001	2	
35	210	0.003300	0.003	0.098	-	-	0.013	0.001	0.001	0.00	0.001	2	
36	216	0.003500	0.004	0.102	-	-	0.014	0.001	0.001	0.00	0.001	3	
37	222	0.003500	0.003	0.105	-	-	0.015	0.001	0.001	0.00	0.001	3	
38	228	0.003600	0.004	0.109	-	-	0.017	0.002	0.001	0.00	0.001	3	
39	234	0.003700	0.004	0.112	-	-	0.019	0.002	0.001	0.00	0.001	4	
40	240	0.003700	0.004	0.116	-	-	0.020	0.002	0.001	0.00	0.001	4	
41	246	0.003700	0.004	0.120	-	-	0.022	0.002	0.001	0.00	0.001	4	
42	252	0.003700	0.004	0.123	-	-	0.024	0.002	0.001	0.00	0.001	5	
43	258	0.003800	0.004	0.127	-	-	0.026	0.002	0.001	0.00	0.001	5	
44	264	0.003900	0.004	0.131	-	-	0.028	0.002	0.001	0.00	0.001	5	
45	270	0.003900	0.004	0.135	-	-	0.030	0.002	0.001	0.00	0.001	6	
46	276	0.004000	0.004	0.139	-	-	0.032	0.002	0.001	0.00	0.001	6	
47	282	0.004100	0.004	0.143	-	-	0.034	0.002	0.001	0.00	0.001	7	
48	288	0.004200	0.004	0.147	-	-	0.037	0.002	0.001	0.00	0.001	7	
49	294	0.004300	0.004	0.152	-	-	0.039	0.002	0.001	0.00	0.001	8	
50	300	0.004400	0.004	0.156	-	-	0.042	0.003	0.001	0.00	0.002	8	
51	306	0.004600	0.005	0.161	-	-	0.044	0.003	0.001	0.00	0.002	9	
52	312	0.004700	0.005	0.165	-	-	0.047	0.003	0.002	0.00	0.002	10	
53	318	0.004800	0.005	0.170	-	-	0.050	0.003	0.002	0.00	0.002	10	
54	324	0.004900	0.005	0.175	-	-	0.053	0.003	0.002	0.00	0.002	11	
55	330	0.005000	0.005	0.180	-	-	0.056	0.003	0.002	0.00	0.002	12	
56	336	0.004900	0.005	0.185	-	-	0.060	0.003	0.002	0.00	0.002	12	
57	342	0.005100	0.005	0.190	-	-	0.063	0.003	0.002	0.00	0.002	13	
58	348	0.005200	0.005	0.195	-	-	0.066	0.003	0.002	0.00	0.002	14	
59	354	0.005300	0.005	0.201	-	-	0.070	0.004	0.002	0.00	0.002	15	
60	360	0.005500	0.005	0.206	-	-	0.074	0.004	0.002	0.00	0.002	15	
61	366	0.006000	0.006	0.212	-	-	0.078	0.004	0.002	0.00	0.002	16	
62	372	0.006100	0.006	0.218	-	-	0.082	0.004	0.002	0.00	0.003	17	
63	378	0.006200	0.006	0.224	-	-	0.087	0.004	0.002	0.00	0.003	18	
64	384	0.006300	0.006	0.231	-	-	0.091	0.005	0.002	0.00	0.003	19	
65	390	0.006400	0.006	0.237	-	-	0.096	0.005	0.002	0.00	0.003	20	
66	396	0.005900	0.006	0.243	-	-	0.101	0.004	0.002	0.00	0.003	21	

Post-Construction Flow Control Calculations, Design Storm is a 10 yr event

Enter data into yellow highlighted cells.

Total Area 0.126 acres
 Rainfall P 3 inches (10-yr, 24 hr event)
 Time Step 6 minutes
 Tc 15 Time of Concentration
 w 0.16667 routing constant

Pervious Area	
Area	0.061 acres
Curve No.	89
S	1.23596
0.2S	0.24719

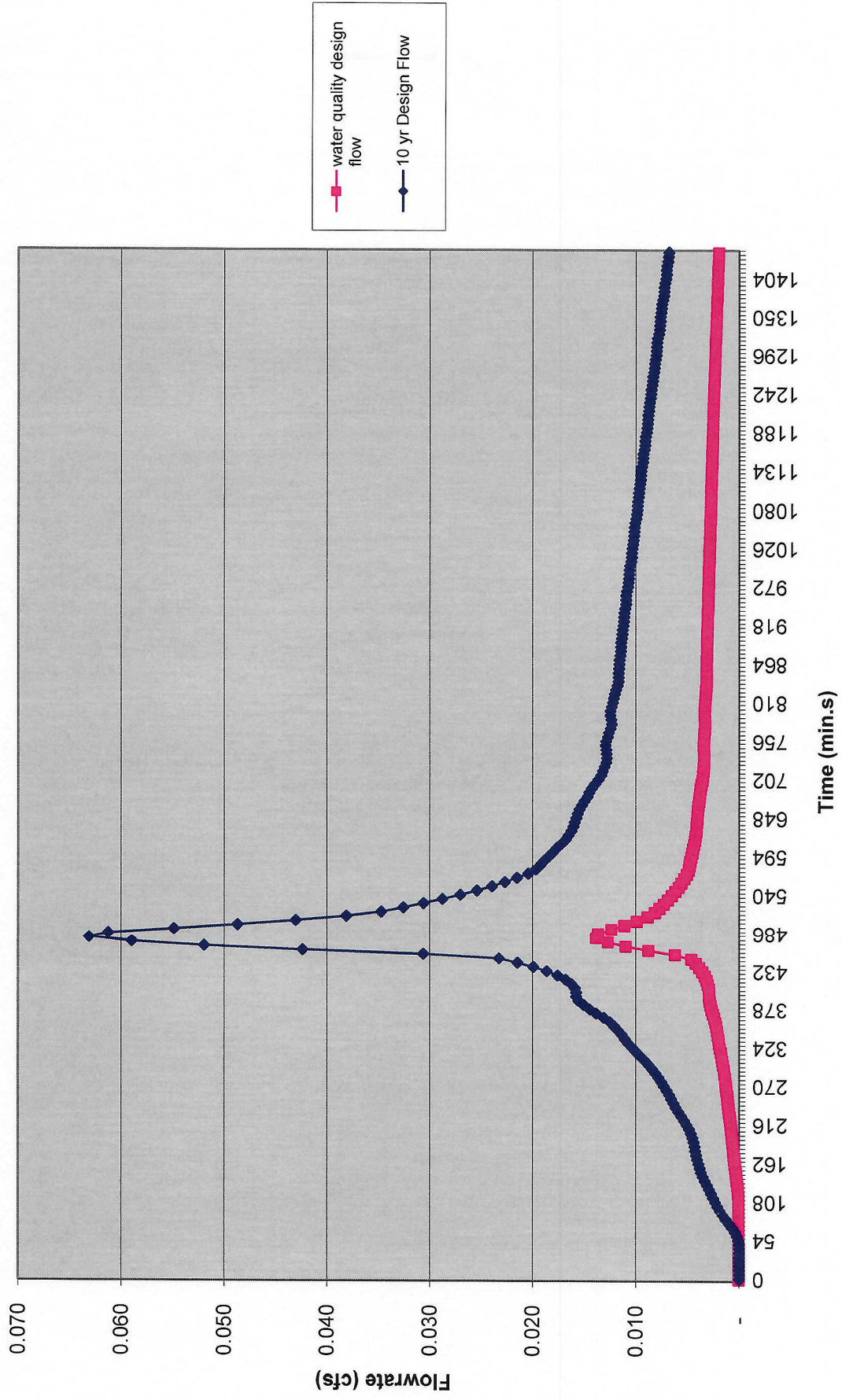
Impervious Area	
Area	0.062 acres
Curve No.	98
S	0.20408
0.2S	0.04082

Peak Flow 0.063 cfs
 24 Hour Ru 1,038 cf

SCRUNCHED TO SHOW inputs

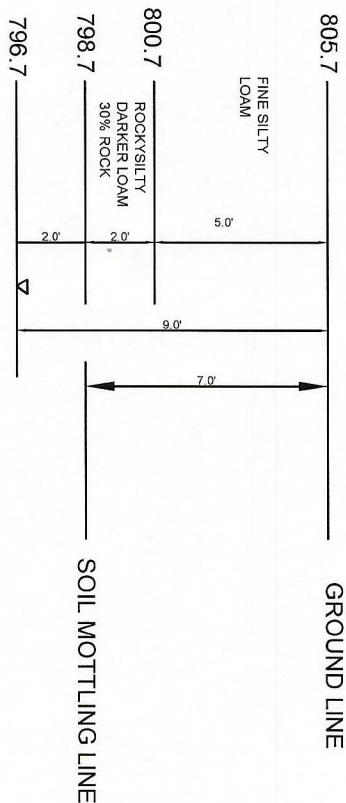
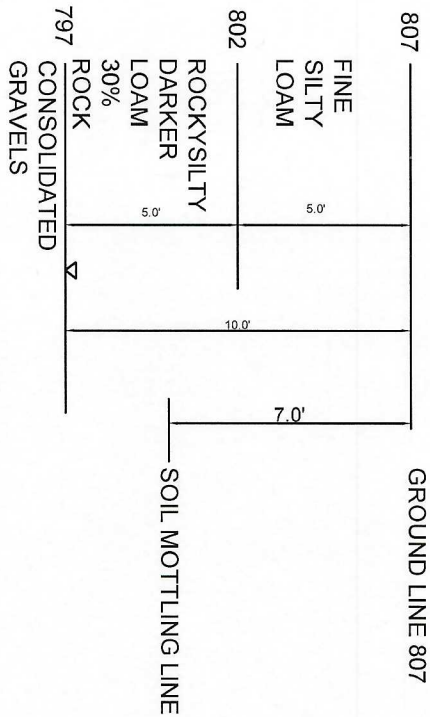
(1) Time Increment (minutes)	(2) Time Increment (minutes)	(3) Rainfall Increment (fraction)	(4) Rainfall Increment (inches)	(5) Rainfall Accumulate (inches)	(6) PERVIOUS Runoff (inches)	(7) PERVIOUS Runoff (inches)	(8) IMPERVIOUS Runoff (inches)	(9) IMPERVIOUS Runoff (inches)	(10) Total Runoff (inches)	(11) Instant Flowrate (cfs)
0	0		-	-	-	-	-	-	-	-
1	6	0.0022	0.007	0.007	-	-	-	-	-	-
2	12	0.0021	0.006	0.013	-	-	-	-	-	-
3	18	0.0020	0.006	0.019	-	-	-	-	-	-
4	24	0.0019	0.006	0.025	-	-	-	-	-	-
5	30	0.0018	0.005	0.030	-	-	-	-	-	-
6	36	0.0018	0.005	0.035	-	-	-	-	-	-
7	42	0.0019	0.006	0.041	-	-	0.000	0.000	0.000	0.00
8	48	0.0020	0.006	0.047	-	-	0.000	0.000	0.000	0.00
9	54	0.0021	0.006	0.053	-	-	0.001	0.001	0.000	0.00
10	60	0.0022	0.007	0.060	-	-	0.002	0.001	0.000	0.00
11	66	0.0028	0.008	0.068	-	-	0.003	0.002	0.001	0.00
12	72	0.0029	0.009	0.077	-	-	0.005	0.002	0.001	0.00
13	78	0.0030	0.009	0.086	-	-	0.008	0.003	0.001	0.00
14	84	0.0031	0.009	0.095	-	-	0.012	0.003	0.002	0.00
15	90	0.0032	0.010	0.105	-	-	0.015	0.004	0.002	0.00
16	96	0.0030	0.009	0.114	-	-	0.019	0.004	0.002	0.00
17	102	0.0030	0.009	0.123	-	-	0.024	0.004	0.002	0.00
18	108	0.0029	0.009	0.132	-	-	0.028	0.004	0.002	0.00
19	114	0.0031	0.009	0.141	-	-	0.033	0.005	0.002	0.00
20	120	0.0030	0.009	0.150	-	-	0.038	0.005	0.002	0.00
21	126	0.0031	0.009	0.159	-	-	0.044	0.005	0.003	0.00
22	132	0.0032	0.010	0.169	-	-	0.049	0.006	0.003	0.00
23	138	0.0032	0.010	0.179	-	-	0.055	0.006	0.003	0.00
24	144	0.0033	0.010	0.188	-	-	0.062	0.006	0.003	0.00
25	150	0.0032	0.010	0.198	-	-	0.068	0.006	0.003	0.00
26	156	0.0032	0.010	0.208	-	-	0.075	0.007	0.003	0.00
27	162	0.0032	0.010	0.217	-	-	0.082	0.007	0.003	0.00
28	168	0.0032	0.010	0.227	-	-	0.089	0.007	0.003	0.00
29	174	0.0032	0.010	0.236	-	-	0.096	0.007	0.003	0.00
30	180	0.0032	0.010	0.246	-	-	0.103	0.007	0.004	0.00
31	186	0.0031	0.009	0.255	0.000	0.000	0.110	0.007	0.003	0.00

SBUH Hydrograph

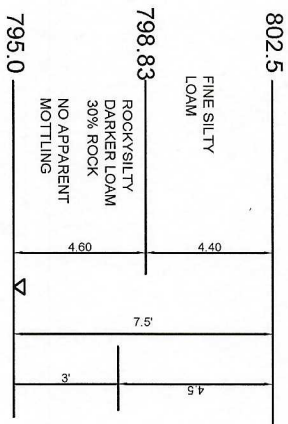


TEST PIT No. 1

TEST PIT No. 2



TEST PIT No. 3b



PITS



46 MEADOWLARK LANE
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DAN PREAS



DRAWN BY: VV
REVIEWED BY: VV
DATE: 12-01-2019
PROJ: 19-24

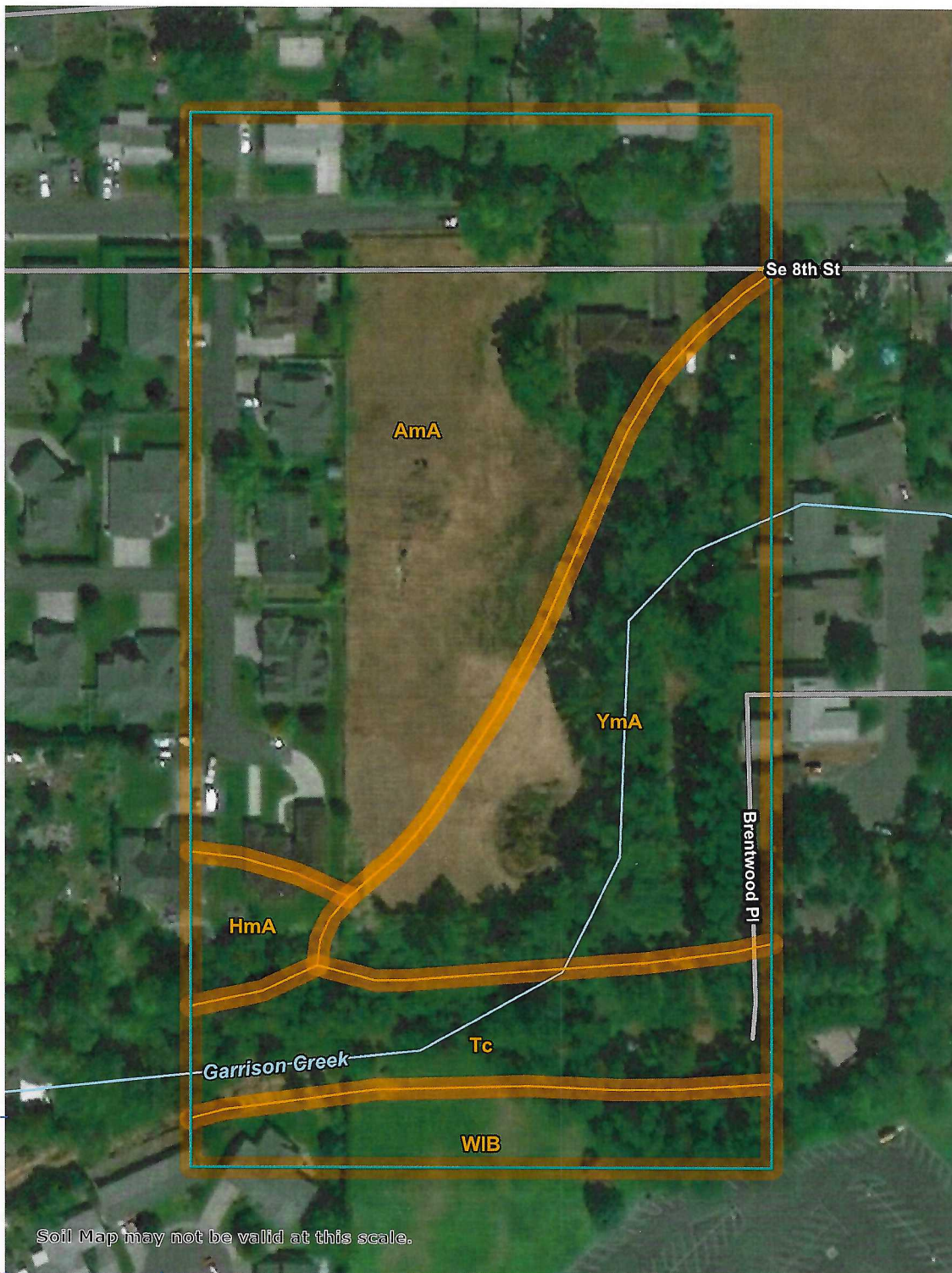
Soil Map—Walla Walla County Area, Washington

118° 22' 55" W

118° 22' 43" W

46° 2' 33" N

46° 2' 33" N



46° 2' 22" N

46° 2' 22" N

118° 22' 55" W

118° 22' 43" W



Map Scale: 1:1,630 if printed on A portrait (8.5" x 11") sheet.

0 20 40 80 120 Meters

0 50 100 200 300 Feet

Map projection: Web Mercator Corner coordinates: WGS84



Natural Resources
Conservation Service

Web Soil Survey
National Cooperative Soil Survey

8/20/2019
Page 1 of 3

MAP LEGEND

	Area of Interest (AOI)		Spoil Area
	Area of Interest (AOI)		Stony Spot
	Soil Map Unit Polygons		Very Stony Spot
	Soil Map Unit Lines		Wet Spot
	Soil Map Unit Points		Other
	Special Point Features		Special Line Features
	Blowout		Streams and Canals
	Borrow Pit		US Routes
	Clay Spot		Major Roads
	Closed Depression		Local Roads
	Gravel Pit		Aerial Photography
	Gravelly Spot		
	Landfill		
	Lava Flow		
	Marsh or swamp		
	Mine or Quarry		
	Miscellaneous Water		
	Perennial Water		
	Rock Outcrop		
	Saline Spot		
	Sandy Spot		
	Severely Eroded Spot		
	Sinkhole		
	Slide or Slip		
	Sodic Spot		

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:31,700.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Walla Walla County Area, Washington
Survey Area Data: Version 3, Oct 22, 2018

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 7, 2014—Oct 27, 2016

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.


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Report Properties

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Map Unit Description

Walla Walla County Area, Washington

AmA - Ahtanum silt loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2d5h
 Elevation: 700 to 3,000 feet
 Mean annual precipitation: 6 to 12 inches
 Mean annual air temperature: 48 to 52 degrees F
 Frost-free period: 140 to 165 days
 Farmland classification: Not prime farmland

Map Unit Composition

Ahtanum and similar soils: 100 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ahtanum

Setting

Landform: Depressions

Parent material: Loess and pumice alluvium

Typical profile

H1 - 0 to 7 inches: silt loam

H2 - 7 to 34 inches: silt loam

H3 - 34 to 40 inches: cemented silt loam

H4 - 40 to 60 inches: silt loam

Properties and qualities

Slope: 0 to 3 percent

Depth to restrictive feature: 20 to 40 inches to duripan

Natural drainage class: Somewhat poorly drained

Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.57 in/hr)

Depth to water table: About 0 to 18 inches

Frequency of flooding: Frequent

Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Salinity, maximum in profile: Moderately saline to strongly saline (8.0 to 16.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 10.0
Available water storage in profile: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6w
Hydrologic Soil Group: C/D
Ecological site: ALKALI BOTTOM 6-10 PZ (R007XY401WA)
Hydric soil rating: Yes

HmA—Hermiston silt loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2d7g
Elevation: 200 to 2,500 feet
Mean annual precipitation: 10 to 16 inches
Mean annual air temperature: 48 to 54 degrees F
Frost-free period: 130 to 195 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Hermiston and similar soils: 100 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hermiston

Setting

Landform: Flood plains
Parent material: Loess alluvium

Typical profile

H1 - 0 to 23 inches: silt loam
H2 - 23 to 60 inches: silt loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent

Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 15.0
Available water storage in profile: High (about 11.6 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: B
Ecological site: LOAMY BOTTOM 10-16 PZ (R008XY402WA)
Hydric soil rating: No

Tc—Terrace escarpments**Map Unit Setting**

National map unit symbol: 2dbv
Elevation: 350 to 1,000 feet
Mean annual precipitation: 6 to 12 inches
Mean annual air temperature: 50 to 54 degrees F
Frost-free period: 135 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Terrace escarpments and similar soils: 100 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Terrace Escarpments**Setting**

Landform: Escarpments on terraces
Parent material: Glaciofluvial deposits

Typical profile

H1 - 0 to 4 inches: silt loam
H2 - 4 to 31 inches: stratified very gravelly sand to clay loam
H3 - 31 to 35 inches: unweathered bedrock

Properties and qualities

Slope: 45 to 80 percent
Depth to restrictive feature: 15 to 31 inches to paralithic bedrock
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent

Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Low (about 4.8 inches)

Interpretive groups

- Land capability classification (irrigated): None specified
- Land capability classification (nonirrigated): 7e
- Hydrologic Soil Group: C
- Hydric soil rating: No

WIB—Walla Walla silt loam, lacustrine substratum, 0 to 8 percent slopes

Map Unit Setting

- National map unit symbol: 2dcc
- Elevation: 300 to 3,000 feet
- Mean annual precipitation: 12 to 15 inches
- Mean annual air temperature: 52 degrees F
- Frost-free period: 130 to 180 days
- Farmland classification: All areas are prime farmland

Map Unit Composition

Walla walla and similar soils: 100 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Walla Walla

Setting

- Landform: Hills
- Parent material: Loess

Typical profile

- H1 - 0 to 14 inches: silt loam
- H2 - 14 to 35 inches: silt loam
- H3 - 35 to 60 inches: stratified loamy fine sand to silt loam

Properties and qualities

- Slope: 0 to 8 percent
- Depth to restrictive feature: More than 80 inches
- Natural drainage class: Well drained
- Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
- Depth to water table: More than 80 inches
- Frequency of flooding: None
- Frequency of ponding: None
- Calcium carbonate, maximum in profile: 30 percent
- Salinity, maximum in profile: Very slightly saline to slightly saline (2.0 to 4.0 mmhos/cm)
- Available water storage in profile: High (about 10.4 inches)

Interpretive groups

Land capability classification (irrigated): 3e
 Land capability classification (nonirrigated): 2e
 Hydrologic Soil Group: C
 Ecological site: COOL LOAMY 10-16 PZ (R008XY103WA)
 Hydric soil rating: No

YmA—Yakima silt loam, 0 to 3 percent slopes**Map Unit Setting**

National map unit symbol: 2dcm
 Elevation: 400 to 2,200 feet
 Mean annual precipitation: 6 to 14 inches
 Mean annual air temperature: 48 to 50 degrees F
 Frost-free period: 130 to 180 days
 Farmland classification: Not prime farmland

Map Unit Composition

Yakima and similar soils: 100 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Yakima**Setting**

Landform: Flood plains

Parent material: Loess and basalt alluvium over gravelly and cobblely outwash

Typical profile

H1 - 0 to 9 inches: silt loam

H2 - 9 to 20 inches: loamy fine sand

H3 - 20 to 60 inches: very gravelly loamy sand, very gravelly sand, extremely gravelly sand

H3 - 20 to 60 inches:

H3 - 20 to 60 inches:

Properties and qualities

Slope: 0 to 3 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Somewhat excessively drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)

Depth to water table: About 36 to 60 inches

Frequency of flooding: Occasional

Frequency of ponding: None

Available water storage in profile: Low (about 5.1 inches)

Interpretive groups

Land capability classification (irrigated): 3e

Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: B
Ecological site: LOAMY BOTTOM 6-10 PZ (R007XY402WA)
Hydric soil rating: No