Willamette Engineering, Inc.

PO Box 9032, Salem, Or 97305 Ph (503) 304-0905 Fax (503) 304-9512

PRELIMINARY

STORMWATER REPORT

FOR

250 SUNSET SUBDIVISION

LOCATED AT:

250 SUNSET AVE N.

KEIZER, OR

SUBMITTED JUNE 18, 2020

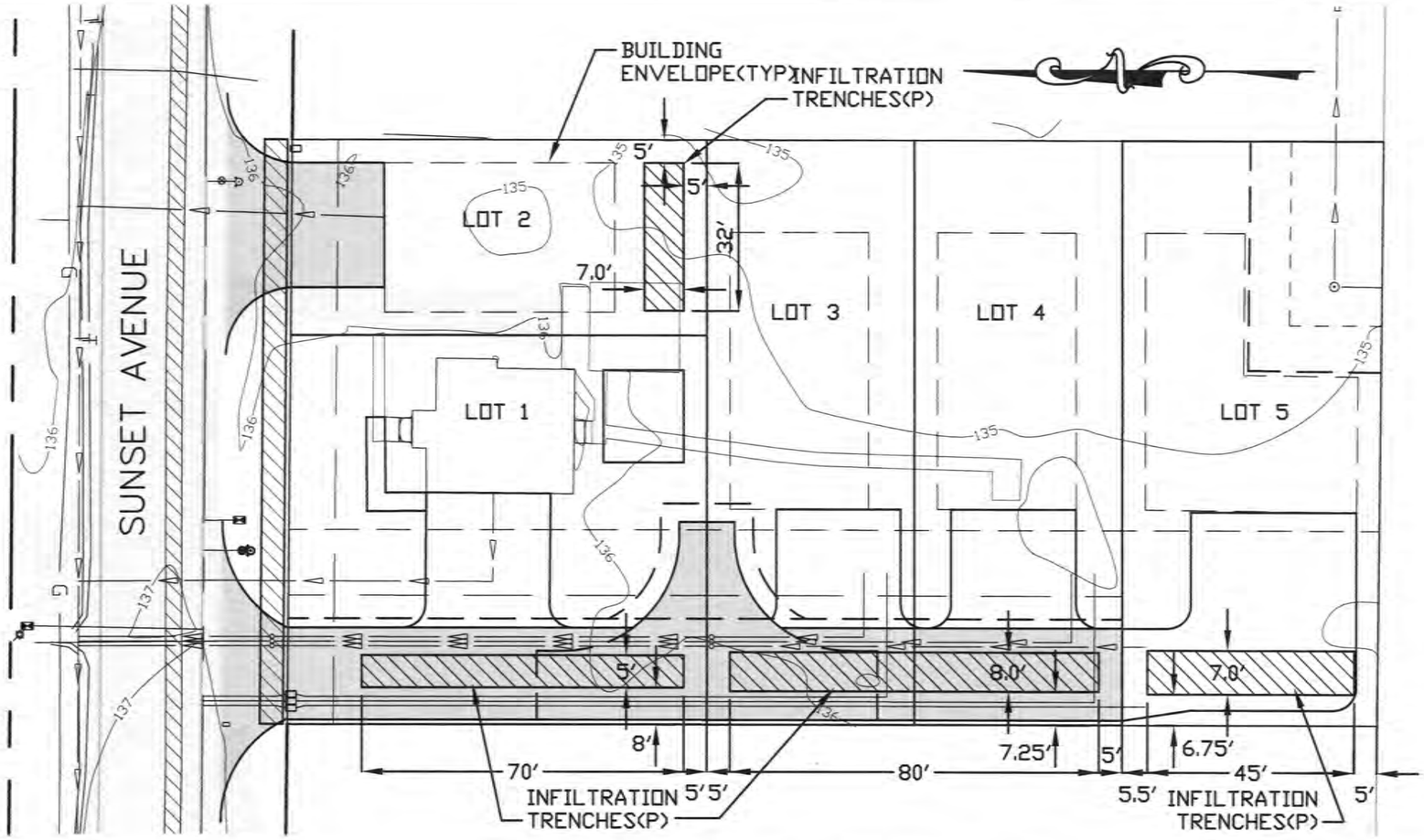
BY WILLAMETTE ENGINEERING

PO BOX 9032

SALEM, OREGON 97305

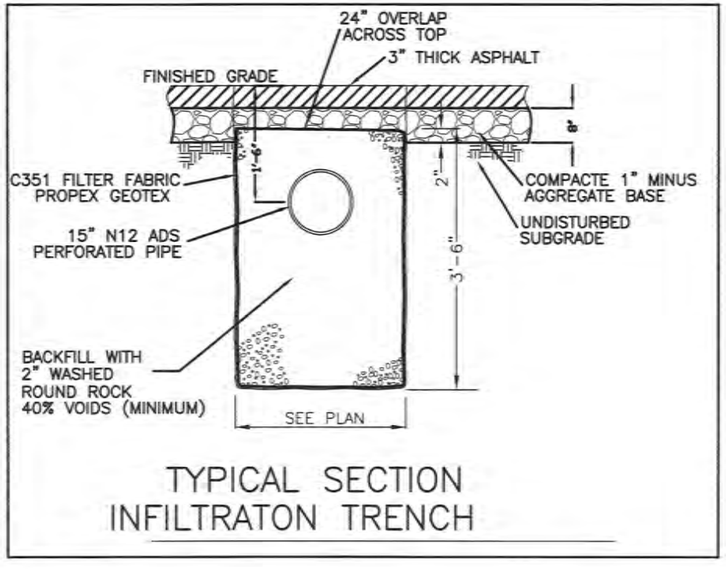
PH: 503-304-0905

JER.WILLENGR@JUNO.COM



DRAINAGE PLAN

SCALE: 1"=30'



TYPICAL SECTION INFILTRATON TRENCH

REGISTERED PROFESSIONAL ENGINEER
13685
OREGON
JULY 16, 1987
GERALD P. HORNER

EXPIRES: JUNE 30, 2021

ENGINEER:
WILLAMETTE ENGINEERING INC.
P.O. BOX 9032
SALEM, OREGON 97305
PH: 503-304-0905
FAX: 503-304-9512

PROPOSED
DRAINAGE PLAN

SUNSET SUBDIVISION

250 SUNSET AVE N
KEIZER, OR 97303

DESIGNED BY:	GPH
DRAWN BY:	RJW
DATE:	06-17-20
JOB NO.	2020-56
CLIENT NO.	
DRAWING NO.	C2
REV.	0

250 SUNSET 5-LOT SUBDIVISION WITH TURNAROUND STORM WATER NARRATIVE

DATE - June 18, 2020 – Original

Existing Conditions:

The property is a 0.69 acre parcel. There is an existing house and unattached garage with a paved driveway. The property is relatively flat sloping slightly from northwest to southeast.

Sunset Ave is approximately 1' higher than the front portion of the development property. The property drainage path is to the southeast.

Sunset Ave does not have a storm water system.

Design Requirements and Design Approach

1. Storm detention to be designed to 100 year storm.
2. No overflow to existing Sunset Ave is allowed.
3. On site storm water must remain on site. This will be accomplished by infiltration into the existing subgrades.
4. On site systems are not allowed to have 100 year overflow to any street. Water quality is not required.

The Engineer and Developer have decided to design an UIC System.

Encased Falling Head Test was used for infiltration tests.

The encased falling head procedure is based on a modification of the EPA Falling Head Percolation Test Procedure (Onsite Wastewater Treatment and Disposal Systems Design Manual, EPA/625/1-80-012, 1980). The most significant modification is that this test is performed with a six-inch casing that is embedded approximately 1" into the native soil. The goal of this field test is to evaluate the vertical infiltration rate through a six-inch plug of soil, without allowing any lateral infiltration. The test is not appropriate in gravelly soils or in other soils where a good seal with the casing cannot be established.

(1). Embed a solid six-inch-diameter casing into the native soil at the elevation of the proposed facility bottom (see Figure 4C). Ensure that the embedment provides a good seal around the pipe casing so that percolation will be limited to the six-inch plug of the material within the casing. This method can also be applied to testing within hollow stem augers, provided the driller and tester are reasonably certain that a good seal has been achieved between the soil and auger.

(2). A two-inch layer of coarse sand or fine gravel may be placed to protect the bottom from scour and sloughing.

(3). Fill the pipe with clean water a minimum of one foot above the soil to be tested, and maintain this depth for at least one hour to presoak the native material.

It is important that the soil be allowed to soak for a sufficiently long period of time to allow the soil to swell if accurate results are to be obtained. Any soil that sloughed into the hole during the soaking period must be removed and the water level shall be adjusted to six inches above the added gravel (or eight inches above the bottom of the hole). In sandy soils with little or no clay, soaking is not necessary. If after filling the hole twice with 12 inches of water, the water seeps completely away in less than ten minutes, the test can proceed immediately.

(4). To conduct the first trial of the test, fill the pipe to approximately six inches above the soil and measure the water level to the nearest 0.01 foot (⅛ inch). The level should be measured with a tape or other device with reference to a fixed point. The top of the pipe is often a convenient reference point. Record the exact time.

(5). Measure the water level to the nearest 0.01 foot (⅛ inch) at ten-minute intervals for a total period of one hour (or 20-minute intervals for two hours in slower soils) or until all of the water has drained. The infiltration test is continued until the measured infiltration rate between two successive trials does not vary by more than five percent. At least three trials must be conducted. After each trial, the water level is readjusted to the six inch level. Enter results into the Data Table (see Figure 4C). At no time during the test is the water level allowed to rise more than six inches above the gravel.

(6). The result of the last water level drop is used to calculate the tested infiltration rate. The final rate must be reported in inches per hour.

(7). Upon completion of the testing, the casings must be immediately pulled, and the test pit must be backfilled.

Site Observation

Groundwater – Several holes were excavated for the infiltration tests. There was no indication of ground water.

In reviewing the site and excavation, it is safe to consider that the water table is more than 2' lower than the infiltration trench bottom.

No soil mottling was observed, which would indicate a nearby water table.

Infiltration test holes were presoaked for one hour prior to beginning measurements. This presoak period was selected from receiving the recent heavy rain several weeks before tests.

Infiltration test locations – see Sheet TP1.

Soil classification – Entire Site – Cm: Cloquato Silt Loam

Test Pits

Five Test pits were prepared.

The locations are shown on the attached Test Pit Map.

Test Pit was dug in an area that was a previous utility trench. Testing results would be unreliable. Therefore, Test Pit 1 was not tested.

The remaining 4 holes ranged from 2" to 2.5" per hour.

UIC Lot 1 Trench Size for Post-Development Infiltration Trenches

Coefficients of Discharge

Roofs	0.90
Pavement	0.90

Areas for Detention

Existing House	900 square feet
Garage	400 square feet
Sidewalks	200 square feet
Asphalt drives	3,860 square feet
Total	5,360 square feet = 0.123 Acre

Test Pit (2) Infiltration Test Result – 2.5"/Hour - (Reduce 50% safety reduction) – 1.25" per hour = 0.104' hour

Trench Size – 7' wide x 70' long =490 square feet

Infiltration Rate – $\frac{\text{490 Square Feet (.104'/Hour)}}{\text{3600 Sec/Hour}}$ = 0.0142 CFS

CA = (0.90) * (0.123 Acres) = 0.111

Required Storage – 464 cubic feet of voids in trench drain rock, see next sheet.

Install 15" perforated ADS pipe in the trench with 40% aggregate voids

15" pipe volume – (0.625')*(0.625')*(3.14)*(68') = 83 cubic feet
Trench Size -

Lot 1 - 0.4(W)(70')(3.5' Deep) = (464-83) Cubic Feet
W = 3.89' wide.

Add 83 cubic feet to offset 15" pipe.

Added width to trench = (83 cu. feet)/((0.4)(3.5' Deep)(70' Long)(W))
w = 0.85'
Total Trench Width = 3.89' + 0.85' = 4.74' Use 5' - OK

UIC Lots 3 and 4 Trench Size for Post-Development Infiltration Trenches

Coefficients of Discharge

Roofs	0.90
Pavement	0.90

Areas for Detention

Existing House	900 square feet
Garage	400 square feet
Sidewalks	200 square feet
Asphalt drives	3,860 square feet
Total	7,165 square feet = 0.164 Acre

Test Pit (2) Infiltration Test Result – 2.00"/Hour - (Reduce 50% safety reduction) – 1.00" per hour = 0.08' hour

Trench Size – 6' wide x 80' long =480 square feet

Infiltration Rate – $\frac{480 \text{ Square Feet } (.08'/\text{Hour})}{3600 \text{ Sec/Hour}}$ = 0.0107 CFS

CA = (0.90) * (0.164 Acres) = 0.148

Required Storage – 870 cubic feet of voids in trench drain rock, see next sheet.

Install 15" perforated ADS pipe in the trench with 40% aggregate voids

15" pipe volume – (0.625')*(0.625')*(3.14)*(78') = 97 cubic feet

Trench Size -

Lot 1 - 0.4(W)(80')(3.5' Deep) = (870-97) Cubic Feet
W = 6.90' wide.

Add 97 cubic feet to offset 15" pipe.

Added width to trench = (97 cu. feet)/((0.4)(3.5' Deep)(80' Long)(W))
w = 0.87'
Total Trench Width = 6.90' + 0.87' = 7.77'. Use 8.0'. OK.

UIC Lot 2 Trench Size for Post-Development Infiltration Trenches

Coefficients of Discharge

Roofs	0.90
Pavement	0.90

Areas for Detention

House	2,150 square feet
Pavements	1,050 square feet
Total	3,200 square feet = 0.0735 Acre

Test Pit (3) Infiltration Test Result – 2.50"/Hour - (Reduce 50% safety reduction) – 1.25" per hour = 0.105' hour

Trench Size – 7' wide x 32' long = 224 square feet

Infiltration Rate – $\frac{\text{224 Square Feet (.105'/Hour)}}{\text{3600 Sec/Hour}}$ = 0.0065 CFS

CA = (0.90) * (0.0735 Acres) = 0.066

Required Storage – 311 cubic feet of voids in trench drain rock, see next sheet.

Install 15" perforated ADS pipe in the trench with 40% aggregate voids

15" pipe volume – (0.625')*(0.625')*(3.14)*(30') = 37 cubic feet

Trench Size -

Lot 1 - 0.4(W)(32')(3.5' Deep) = (311-37) Cubic Feet
W = 6.10' wide.

Add 37 cubic feet to offset 15" pipe.

Added width to trench = (37 cu. feet)/((0.4)(3.5' Deep)(32' Long)(W))
w = 0.82'
Total Trench Width = 6.10' + 0.82' = 6.92'. Use 7.0'. OK.

UIC Lot 5 Trench Size for Post-Development Infiltration Trenches

Coefficients of Discharge

Roofs	0.90
Pavement	0.90

Areas for Detention

House	2,200 square feet
Pavements	1,850 square feet
Total	4,050 square feet = 0.093 Acre

Test Pit (3) Infiltration Test Result – 2.00"/Hour - (Reduce 50% safety reduction) – 2.00" per hour = 0.08' hour

Trench Size – 6' wide x 45' long = 270 square feet

Infiltration Rate – $\frac{\text{270 Square Feet (.08'/Hour)}}{\text{3600 Sec/Hour}}$ = 0.0060 CFS

CA = (0.90) * (0.093 Acres) = 0.0837

Required Storage – 434 cubic feet of voids in trench drain rock, see next sheet.

Install 15" perforated ADS pipe in the trench with 40% aggregate voids

15" pipe volume – (0.625')*(0.625')*(3.14)*(43') = 52 cubic feet

Trench Size -

Lot 1 - 0.4(W)(45')(3.5' Deep) = (434-52 Cubic Feet
W = 6.06' wide.

Add 52 cubic feet to offset 15" pipe.

Added width to trench = (52 cu. feet)/((0.4)(3.5' Deep)(45' Long)(W))
w = 0.82'
Total Trench Width = 6.06' + 0.82' = 6.88'. Use 7.0'. OK.

LOT 1 ROOF DRAIN AND PAVEMENT
100 YEAR STORM
STORAGE VOLUME
250 SUNSET AVE, KEIZER, OR
5 LOT SUBDIVISION

Willamette Engineering
Gerald Horner
6/19/2020

TIME MINUTES	CA ACRES	RAINFALL IN/HOUR	INFLOW CU. FEET/SEC	INFLOW VOL CU. FEET	OUTFLOW CU. FEET/SEC	OUTFLOW VOL. CU. FEET	REQ'D. STORAGE CU. FEET
5	0.111	3.10	0.34	103	0.0142	4	99
6	0.111	2.90	0.32	116	0.0142	5	111
7	0.111	2.73	0.30	127	0.0142	6	121
8	0.111	2.60	0.29	139	0.0142	7	132
9	0.111	2.50	0.28	150	0.0142	8	142
10	0.111	2.40	0.27	160	0.0142	9	151
15	0.111	2.00	0.22	200	0.0142	13	187
20	0.111	1.77	0.20	236	0.0142	17	219
25	0.111	1.54	0.17	256	0.0142	21	235
30	0.111	1.40	0.16	280	0.0142	26	254
35	0.111	1.27	0.14	296	0.0142	30	266
40	0.111	1.16	0.13	309	0.0142	34	275
50	0.111	0.90	0.10	300	0.0142	43	257
60	0.111	0.88	0.10	352	0.0142	51	301
70	0.111	0.80	0.09	373	0.0142	60	313
80	0.111	0.72	0.08	384	0.0142	68	315
90	0.111	0.68	0.08	408	0.0142	77	331
100	0.111	0.64	0.07	426	0.0142	85	341
150	0.111	0.51	0.06	509	0.0142	128	382
200	0.111	0.44	0.05	586	0.0142	170	416
300	0.111	0.36	0.04	719	0.0142	256	464

9/28/16

LOT 2 ROOF DRAIN AND PAVEMENT
100 YEAR STORM
STORAGE VOLUME
250 SUNSET AVE, KEIZER, OR

Willamette Engineering
Gerald Horner
6/19/2020

TIME MINUTES	CA ACRES	RAINFALL IN/HOUR	INFLOW CU. FEET/SEC	INFLOW VOL CU. FEET	OUTFLOW CU. FEET/SEC	OUTFLOW VOL. CU. FEET	REQ'D. STORAGE CU. FEET
5	0.0837	3.10	0.26	78	0.0060	2	76
6	0.0837	2.90	0.24	87	0.0060	2	85
7	0.0837	2.73	0.23	96	0.0060	3	93
8	0.0837	2.60	0.22	104	0.0060	3	102
9	0.0837	2.50	0.21	113	0.0060	3	110
10	0.0837	2.40	0.20	121	0.0060	4	117
15	0.0837	2.00	0.17	151	0.0060	5	145
20	0.0837	1.77	0.15	178	0.0060	7	171
25	0.0837	1.54	0.13	193	0.0060	9	184
30	0.0837	1.40	0.12	211	0.0060	11	200
35	0.0837	1.27	0.11	223	0.0060	13	211
40	0.0837	1.16	0.10	233	0.0060	14	219
50	0.0837	0.90	0.08	226	0.0060	18	208
60	0.0837	0.88	0.07	265	0.0060	22	244
70	0.0837	0.80	0.07	281	0.0060	25	256
80	0.0837	0.72	0.06	289	0.0060	29	260
90	0.0837	0.68	0.06	307	0.0060	32	275
100	0.0837	0.64	0.05	321	0.0060	36	285
150	0.0837	0.51	0.04	384	0.0060	54	330
200	0.0837	0.44	0.04	442	0.0060	72	370
300	0.0837	0.36	0.03	542	0.0060	108	434

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LOTS 3 AND 4 ROOF DRAIN AND PAVEMENT
100 YEAR STORM
STORAGE VOLUME
250 SUNSET AVE, KEIZER, OR
5 LOT SUBDIVISION

Willamette Engineering
Gerald Horner
6/19/2020

TIME	CA	RAINFALL	INFLOW	INFLOW VOL	OUTFLOW	OUTFLOW VOL.	REQ'D. STORAGE
MINUTES	ACRES	IN/HOUR	CU. FEET/SEC	CU. FEET	CU. FEET/SEC	CU. FEET	CU. FEET
5	0.148	3.10	0.46	138	0.0107	3	134
6	0.148	2.90	0.43	155	0.0107	4	151
7	0.148	2.73	0.40	170	0.0107	4	165
8	0.148	2.60	0.38	185	0.0107	5	180
9	0.148	2.50	0.37	200	0.0107	6	194
10	0.148	2.40	0.36	213	0.0107	6	207
15	0.148	2.00	0.30	266	0.0107	10	257
20	0.148	1.77	0.26	314	0.0107	13	302
25	0.148	1.54	0.23	342	0.0107	16	326
30	0.148	1.40	0.21	373	0.0107	19	354
35	0.148	1.27	0.19	395	0.0107	22	372
40	0.148	1.16	0.17	412	0.0107	26	386
50	0.148	0.90	0.13	400	0.0107	32	368
60	0.148	0.88	0.13	469	0.0107	39	430
70	0.148	0.80	0.12	497	0.0107	45	452
80	0.148	0.72	0.11	511	0.0107	51	460
90	0.148	0.68	0.10	543	0.0107	58	486
100	0.148	0.64	0.09	568	0.0107	64	504
150	0.148	0.51	0.08	679	0.0107	96	583
200	0.148	0.44	0.07	781	0.0107	128	653
300	0.148	0.36	0.05	959	0.0107	193	766

Bio 8/16

LOT 5 ROOF DRAIN AND PAVEMENT
100 YEAR STORM
STORAGE VOLUME
250 SUNSET AVE, KEIZER, OR
5 LOT SUBDIVISION

Willamette Engineering
Gerald Horner
6/19/2020

TIME MINUTES	CA ACRES	RAINFALL IN/HOUR	INFLOW CU. FEET/SEC	INFLOW VOL CU. FEET	OUTFLOW CU. FEET/SEC	OUTFLOW VOL. CU. FEET	REQ'D. STORAGE CU. FEET
5	0.0837	3.10	0.26	78	0.0060	2	76
6	0.0837	2.90	0.24	87	0.0060	2	85
7	0.0837	2.73	0.23	96	0.0060	3	93
8	0.0837	2.60	0.22	104	0.0060	3	102
9	0.0837	2.50	0.21	113	0.0060	3	110
10	0.0837	2.40	0.20	121	0.0060	4	117
15	0.0837	2.00	0.17	151	0.0060	5	145
20	0.0837	1.77	0.15	178	0.0060	7	171
25	0.0837	1.54	0.13	193	0.0060	9	184
30	0.0837	1.40	0.12	211	0.0060	11	200
35	0.0837	1.27	0.11	223	0.0060	13	211
40	0.0837	1.16	0.10	233	0.0060	14	219
50	0.0837	0.90	0.08	226	0.0060	18	208
60	0.0837	0.88	0.07	265	0.0060	22	244
70	0.0837	0.80	0.07	281	0.0060	25	256
80	0.0837	0.72	0.06	289	0.0060	29	260
90	0.0837	0.68	0.06	307	0.0060	32	275
100	0.0837	0.64	0.05	321	0.0060	36	285
150	0.0837	0.51	0.04	384	0.0060	54	330
200	0.0837	0.44	0.04	442	0.0060	72	370
300	0.0837	0.36	0.03	542	0.0060	108	434

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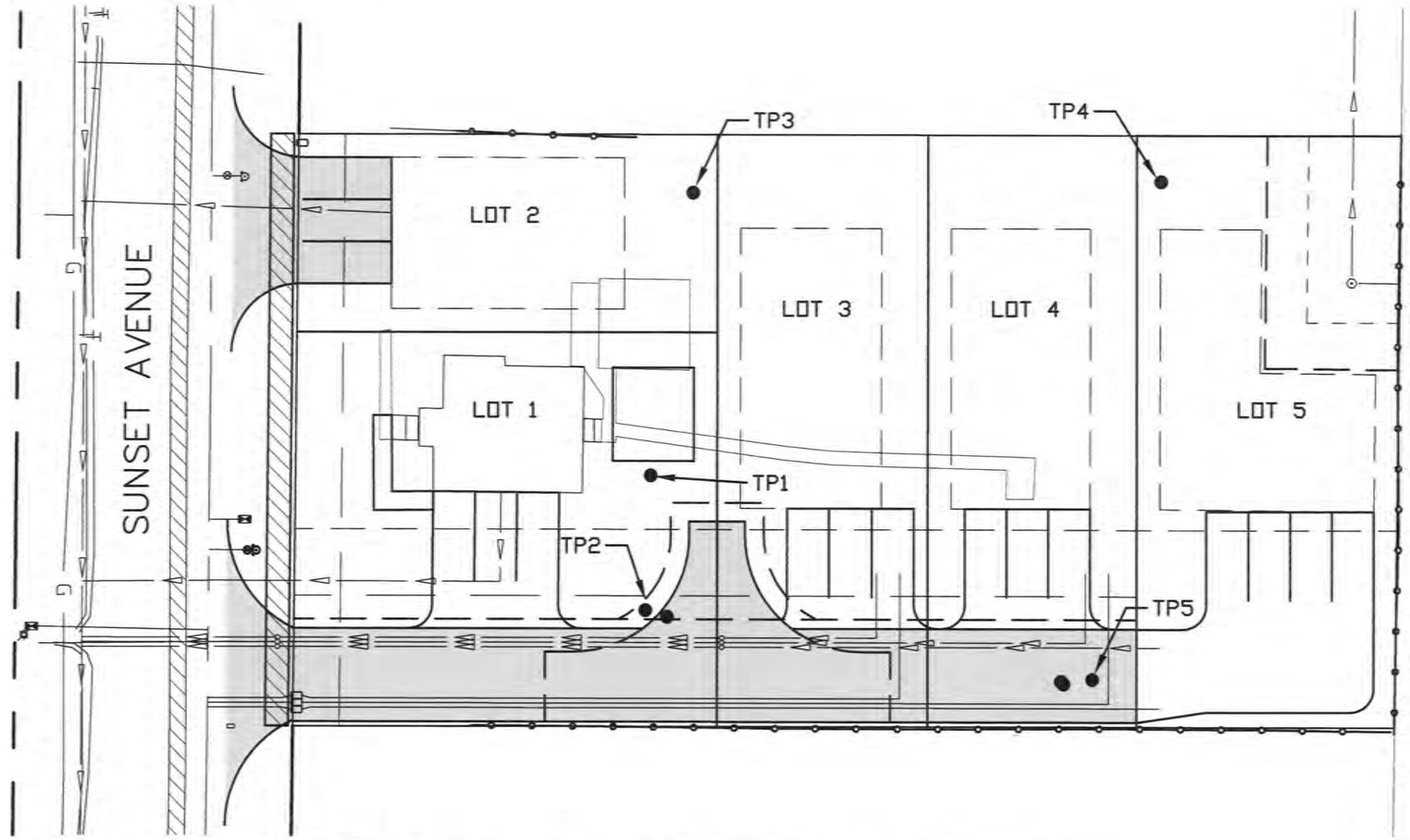

INFILTRATION TEST PIT LOCATIONS

SCALE: 1"=30'

REGISTERED PROFESSIONAL ENGINEER
13685
OREGON
JULY 16, 1987
GERALD P. HORNER

EXPIRES: JUNE 30, 2021

ENGINEER:
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INFILTRATION TEST PIT LOCATIONS

SUNSET SUBDIVISION

250 SUNSET AVE N
KEIZER, OR 97303

DESIGNED BY:	GPH
DRAWN BY:	RJW
DATE:	06-17-20
JOB NO.	2020-56
CLIENT NO.	
DRAWING NO.	TP1
REV.	0

Pg 13 of 16

Location: SUNSET SQB	Date: 5-8-2020	Test Hole Number: 2
Depth to bottom of hole: 42"	Diameter of hole: 6	Test Method: Falling Head
Tester's Name: Katie WILLAMETTE ENGR		
Tester's Company:	Tester's Contact Number: 503 304 0905	
Depth, feet: 48"	Soil Texture: SILTY loam	
10- start test		

Time	Time interval, minutes	Measurement, feet	Drop in water level, feet	Percolation rate, inches per hour	Remarks
10:30	30		1 1/2 inches		
11:00	30		1 1/2 inches		
11:30	30		1 1/2 inches		
12:00	30		1 inches		
12:30	30		1 inches		
1:00	30		1 inches		
1:30	30		1 1/4 inches		
2:00	30		1 1/4 inches		
2:30	30		1 1/4 inches		

Figure 4C-3. Infiltration Test Data Table

Location: SUNSET SQB	Date: 5-8-2020	Test Hole Number: 3
Depth to bottom of hole: 42"	Diameter of hole: 6	Test Method: Falling Head
Tester's Name: Katie WILLAMETTE ENGR		
Tester's Company:	Tester's Contact Number: 503 304 0905	

Depth, feet	Soil Texture
	SILTY LOAM

Time	Time interval, minutes	Measurement, feet	Drop in water level, feet	Percolation rate, inches per hour	Remarks
10:30	30		3 1/4 inches		
11:00	30		2 1/2 inches		
11:30	30		2 3/4 inches		
12:00	30		1 3/4 inches		
12:30	30		2 1/2 inches		
1:00	30		2 inches		
1:30	30		2 inches		
2:00	30		1 3/4 inches		
2:30	30		2 1/4 inches		

Figure 4C-3 Infiltration Test Data Table

Pg 15 of 16

Location: SUNSET SQB	Date: 5-8-2020	Test Hole Number: 4
Depth to bottom of hole: 42"	Diameter of hole: 6	Test Method: Falling Head
Tester's Name: Katie WILLAMETTE ENGR		
Tester's Company:	Tester's Contact Number: 503 304 0905	

Depth, feet	Soil Texture
	SILTY LOAM

Time	Time interval, minutes	Measurement, feet	Drop in water level, feet	Percolation rate, inches per hour	Remarks
10:30	30		1/2 inch		
11:00	30		1/2 inch		
11:30	30		1/2 inch		
12:00	30		1/2 inch		
12:30	30		1/2 inch		
1:00	30		1 inch		
1:30	30		1 inch		
2:00	30		1 inch		
2:30	30		1 inch		

Figure 4C-3 Infiltration Test Data Table

Pg 15 of 16

Location: SUNSET SQB	Date: 5-8-2020	Test Hole Number: 3
Depth to bottom of hole: 42"	Diameter of hole: 6	Test Method: Falling Head
Tester's Name: Katie WILLAMETTE ENGR		
Tester's Company:	Tester's Contact Number: 503 304 0905	

Depth, feet	Soil Texture
	SILTY LOAM

Time	Time interval, minutes	Measurement, feet	Drop in water level, feet	Percolation rate, inches per hour	Remarks
10:30	30		1 1/2 inches		
11:00	30		1 1/4 inches		
11:30	30		1 1/4 inches		
12:00	30		1 inch		
12:30	30		1 1/4 inches		
1:00	30		1 1/4 inches		
1:30	30		1 inch		
2:00	30		3/4 inch		
2:30	30		1 inch		

Figure 4C-3 Infiltration Test Data Table