



Storm Drainage Report for

COTTLE PARTITION



**15379 SW SUNSET BLVD
SHERWOOD, OR 97140**

Welkin JO: 24-500.12
Submitted: 08/27/2025

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Project Information

Prepared for: Mark Cottle

Site Location: 15379 SW Sunset Blvd
Sherwood, OR 97140

Tax Lot: 13400

Contact: MARK@PAULSENGILGAN.COM

Reviewing Agency

Jurisdiction: Washington County

Agency: Engineering Division

Contact: Salley Curran, PE, City Engineer

Phone: (503) 783-3800

References: Washington County Department of Land Use and Transportation
Road Design and Construction Standards, February 2011
Clean Water Services Design and Construction Standards for
Sanitary Sewer and Surface Water Management, December 2019

Project Engineer

Prepared by: Welkin Engineering
25260 SW Parkway Ave., Suite G
Wilsonville, OR 97070

Contact: Melanie F. Plenert, PE
mpf@welkinpc.com
(503) 598-1866

I hereby certify that I am responsible for the preparation of this Drainage Report for the COTTLE PARTITION project, either directly or under my supervision. I acknowledge and agree that the jurisdiction shall not assume liability for the sufficiency, suitability, or performance of the facilities designed herein.



VALID THROUGH 12-31-25

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1. Project Overview:

Pre-developed Conditions

The 1.35-ac site located off SW Sunset Boulevard between SW Pine Street and SW Aldergrove Ave. The site is mostly flat with a very gentle southern slope towards the highway. According to USDA Web Soil Survey, the site is completely covered in Laurelwood Silt Loam with 7-12 percent slopes. Laurelwood silt loam is categorized as hydrologic group B and reported to have infiltration rates between 0.20-.57-in/hr. The Websoils report has been included in the appendix following this report.

Mitigated Conditions

Proposed conditions partitioning the site into three separate parcels and installing a 12-ft wide interim access road with utility and public easements, and widening of the existing driveway accessed from Sunset Blvd. Storm, sanitary and water utilities are also proposed for this plan.

2. Stormwater Management Requirements

The Washington County Department of Land Use and Transportation Road Design and Construction Standards, published February 2011, outlines use of the Clean Water Services (CWS) Design and Construction Standards as guidelines for drainage design, Section 330.010.2. Storm Design

3. Stormwater Design

3.1 Site Impervious Area

The project results in 8,369 sf of new impervious area in the interim road and driveway expansion, and an additional assumed future impervious area of 5,280 sf (2,640 sf per lot), for a total of 13,649 sf impervious surfaces. Runoff from this area is proposed to follow its naturally occurring drainage path. See the following page for impervious area

diagram. Runoff from the developed lots will be captured and routed to the regional water quality and detention facility, with a Fee-In-Lieu being paid.

3.2 Hydromodification

Per CWS Code 4.03.2, a hydromodification assessment is not necessary as this improvement is located in an area with a District approved subbasin strategy with an identified regional stormwater management approach for hydromodification.

3.3 Water Quality Treatment Requirements

Per CWS Code 4.04.1, greater than 1,000 square feet of impervious surfaces will be modified by the proposed improvements, therefore permanent water quality approaches are required to be implemented or funded. This project falls under the criteria outlined in CWS Code 4.04.2.a (1), as implementation of an on-site treatment approach would be impractical. Onsite soil was determined to have extremely low infiltration rates (between 0.06 and 0.20-inches/hour), and spacial limitations do not provide enough room for treatment facilities. A Fee-In-Lieu shall be paid due to the impracticality of facility implementation for the 3,800 square feet of impervious area.

4. Downstream Analysis

The CWS Manual stipulates one quarter mile of downstream analysis be calculated for the increased strain on the stormwater facility. The following map and table lay out each pipe run, the flow capacity, peak flow and adequacy. Runoff leaving the interim access road is proposed to flow approximately 600 feet across the western adjacent property, TL 2S132DC01100, following its natural path of drainage and enter the storm sewer system at curb inlet 297405. The downstream analysis concluded at pipe 309842 within SW Sunset Blvd after the first 1,320ft, quarter mile, of discharge from the project site. The analysis includes existing runoff in the system as well as runoff produced from the site and street improvements. All pipes were found to be adequately sized for the additional runoff produced by these improvements.

Table 3: Pipe Flow Summary

Pipe Run	Length/ Size / Slope	Flow Capacity (cfs)	Peak Flow (cfs)	Adequate
Pipe 310664	12" / 112' / 2%	6.42	2.09	✓
Pipe 310661	12" / 52' / 5%	10.15	2.14	✓
Pipe 309979	12" / 8' / 5%	9.08	4.42	✓
Pipe 309978	12" / 15' / 2%	6.42	4.42	✓
Pipe 310822	12" / 39' / 6%	11.12	4.42	✓
Pipe 310820	15" / 278' / 9%	24.69	13.04	✓
Pipe 309843	15" / 132' / 8%	23.28	12.86	✓
Pipe 907842	18" / 172' / 28%	70.83	26.20	✓

This analysis was completed by calculating the maximum flow capacity of each pipe a quarter mile downstream the project location in conjunction with the peak flow through each manhole (upstream each pipe) and compared. The flow through each manhole was an approximation determined by the amount of pervious and impervious area of runoff entering each manhole, additional documents showing these areas may be provided upon request. Flow calculations can be found in the appendix following this report.

5. EPSC Plan

In accordance with Chapter 6 of the CWS Design and Construction Standards an Erosion Plan and Sediment Control Measures must be prepared and taken. However, since less than an acre of land will be disturbed, a NPDS 1200-CN nor a 1200-C permit are not required for this project. as The EPSC plan shall meet all general provisions as outlined in Chapter 6 of the CWS Design and Construction Standards. The BMPs on Sheet C1.1 of the Construction plans and the EPSC Plan in this report's Appendix have been implemented per Sections 6.03.3 and 6.03.4 for erosion prevention and runoff control. Sediment control BMPs have been proposed in accordance with Section 6.03.5. Additional BMPs shall be followed in accordance with Sections 6.03.5-6.03.8 as the need arises on site. Inspections, in accordance with Section 6.04, shall be conducted.

6. Conclusions

In conclusion, the interim access road construction plans and stormwater management have been prepared in accordance with the CWS Design and Construction Standards. A Fee-In-Lieu will be paid for stormwater hydromodification assessment and water quality. It was further found that the proposed improvements do not pose an excessive increase in the stormwater system, determined by downstream analysis. Finally, an ECSP plan has been prepared in accordance with the CWS Design and Construction Standards, specifically Chapter 6.

Appendix

Soil Map—Washington County, Oregon



Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
28B	Laurelwood silt loam, 3 to 7 percent slopes	0.1	5.5%
28C	Laurelwood silt loam, 7 to 12 percent slopes	1.1	94.5%
Totals for Area of Interest		1.2	100.0%

Washington County, Oregon

28B—Laurelwood silt loam, 3 to 7 percent slopes

Map Unit Setting

National map unit symbol: 21yp

Elevation: 200 to 1,500 feet

Mean annual precipitation: 45 to 60 inches

Mean annual air temperature: 52 to 54 degrees F

Frost-free period: 165 to 210 days

Farmland classification: All areas are prime farmland

Map Unit Composition

Laurelwood and similar soils: 85 percent

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

Description of Laurelwood

Setting

Landform: Hills

Landform position (two-dimensional): Summit, toeslope

Landform position (three-dimensional): Interfluvium, base slope

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Loess

Typical profile

H1 - 0 to 11 inches: silt loam

H2 - 11 to 52 inches: silty clay loam

H3 - 52 to 72 inches: silty clay

Properties and qualities

Slope: 3 to 7 percent

Depth to restrictive feature: More than 80 inches

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

Available water supply, 0 to 60 inches: High (about 11.7 inches)

Interpretive groups

Land capability classification (irrigated): 2e

Land capability classification (nonirrigated): 2e

Hydrologic Soil Group: B

Ecological site: F002XB005OR - Loess Hill Group

Forage suitability group: Well drained < 15% Slopes (G002XY002OR)

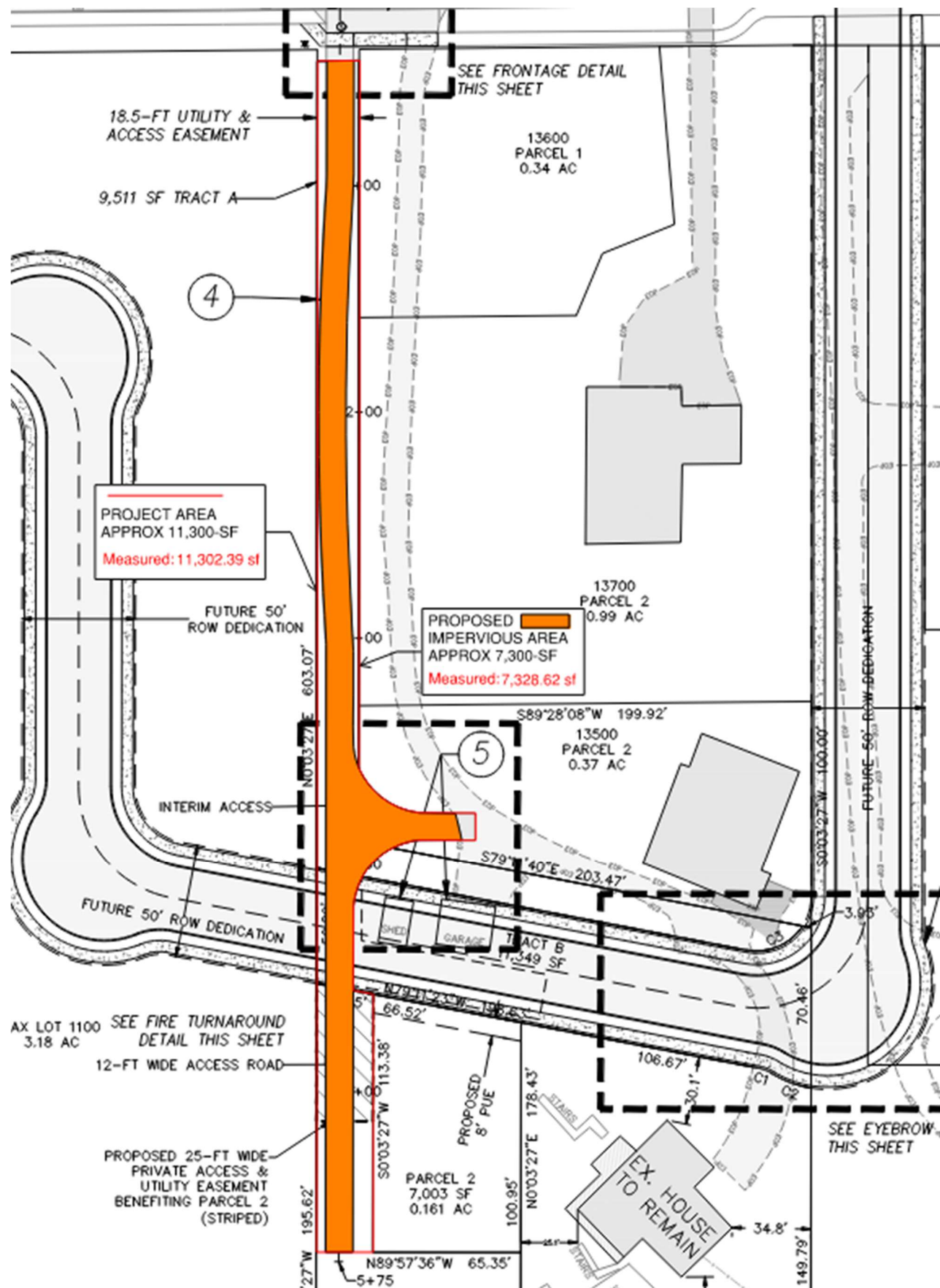
Other vegetative classification: Well drained < 15% Slopes (G002XY002OR)

Hydric soil rating: No

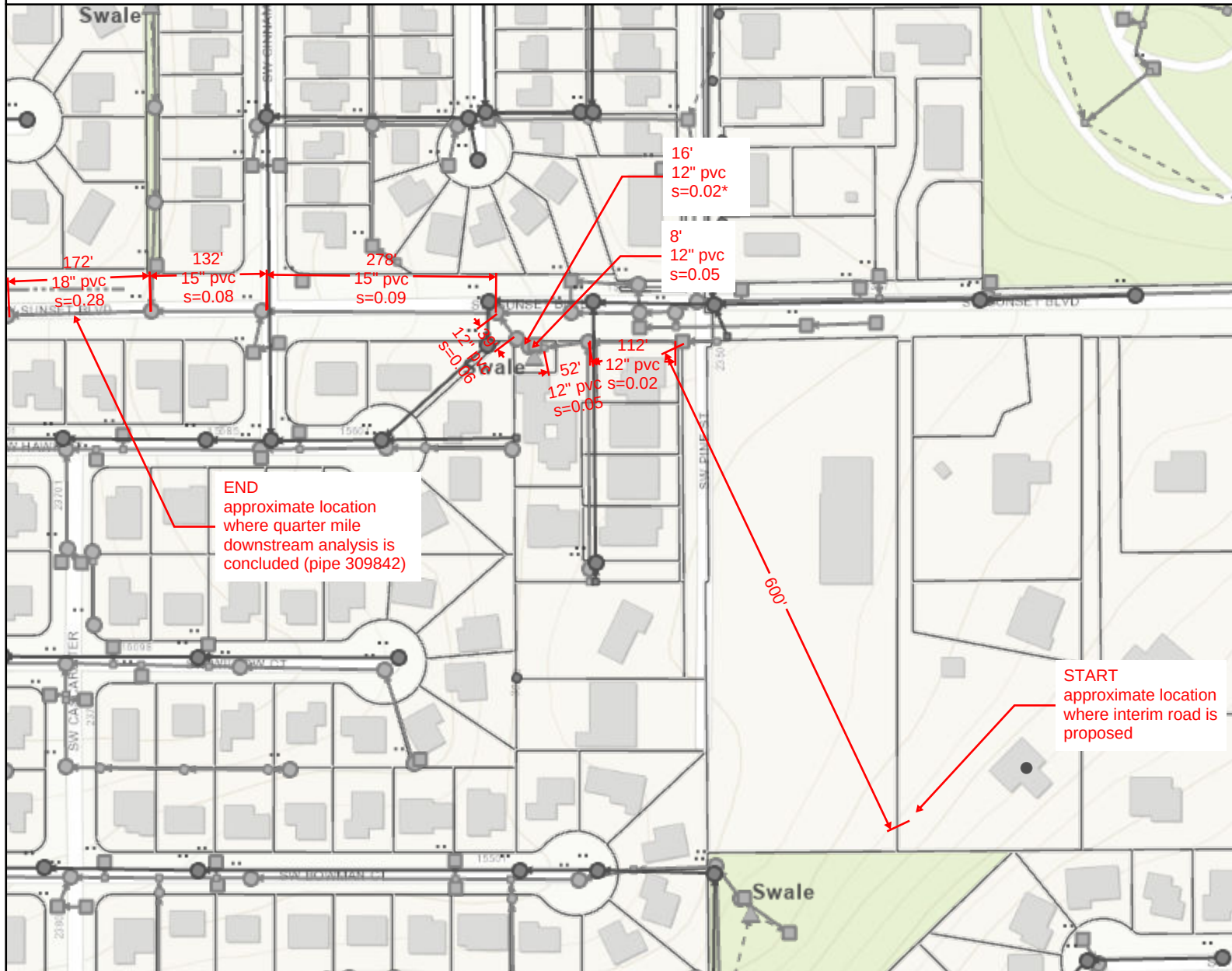
Data Source Information

Soil Survey Area: Washington County, Oregon

Survey Area Data: Version 24, Aug 28, 2024



PrintServiceTemplate



Legend

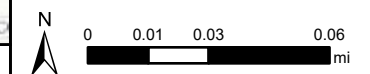
- Cleanout
- Fitting
- ⊕ Valve
- Manhole
- Inlet
- △ Pond
- Vault
- ☆ Treatment Plant
- [P] Pump Station
- Gravity Line
- Pressure Line
- Open Channel
- Virtual Flow
- [] Pond Outline
- [] CWS Boundary
- [] County Boundary
- [] Urban Growth Boundary

ENGINEER'S NOTE:

*CWS Sanitary and Storm GIS report this pipe as having a zero slope. This seems likely to be an error. The upstream pipe has an outlet elevation of 291.79' and the upstream pipe shows an elevation of 291.43, assuming the pipe length has been reported as correct (16'), this would indicate a slope of 2%. Therefore 2% slope was used for this analysis.

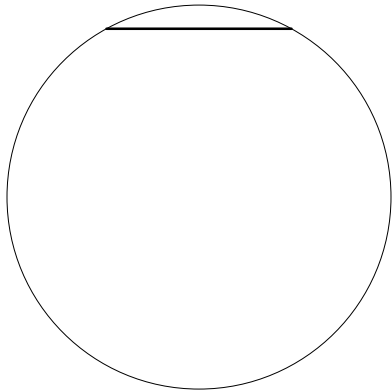
X Abandoned

- CWS Sani
- CWS Storm
- Partner Sani
- Partner Storm



Disclaimer: This product and its associated data is for informational purposes only and was derived from several databases. It was not prepared for, and is not suitable for legal, engineering or surveying purposes. Users of this information should review or consult the primary data and information sources to ensure accuracy. Clean Water Services cannot accept any responsibility for errors, omissions or positional accuracy. There are no warranties for this product. Mainline and service lateral locations are depicted using best available information but must be field verified and located before digging. Service laterals are marked in the field as "Unlocatable underground facilities" as defined in OAR 952-001-0010 (20). Easement data is not currently completed District-wide and should be used for general reference only. All sanitary or storm sewer data, with the exception of sanitary lines 24" and larger located within the city limits of Beaverton, Cornelius, Forest Grove, Hillsboro, Lake Oswego, Portland, Sherwood, Tigard or Tualatin, need to be verified by contacting the individual city. Notification of any errors would be appreciated. Clean Water Services, Development Services, 2550 SW Hillsboro Highway, Hillsboro OR 97123, (503) 681-5100.

GRAVITY PIPE FLOW (Chezy-Manning)
EdgeID 310664

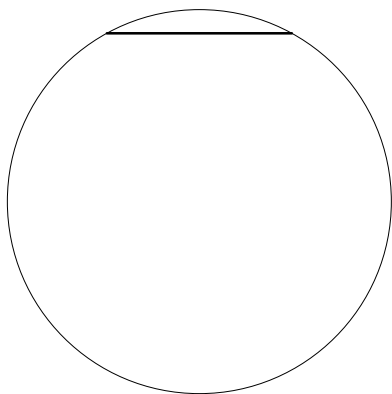


12"

diameter = 12.0"
slope = 2.00%
material: ABS, PVC
Manning's n = 0.011
depth of flow = 93.82% of diameter (max)

wetted perimeter = 2.64'
area = 0.77 s.f.
hydraulic radius = 0.29'
velocity = 8.39 fps
flow = 6.42 cfs

GRAVITY PIPE FLOW (Chezy-Manning)
EdgeID 309979



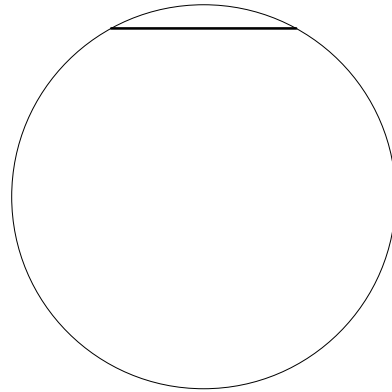
12"

diameter = 12.0"
slope = 4.00%
material: ABS, PVC
Manning's n = 0.011
depth of flow = 93.82% of diameter (max)

wetted perimeter = 2.64'
area = 0.77 s.f.
hydraulic radius = 0.29'
velocity = 11.86 fps
flow = 9.08 cfs

ENGINEER'S NOTE:
HIGHLIGHTED FLOW VALUES INDICATE THE
FLOW CAPACITY OF EACH PIPE

GRAVITY PIPE FLOW (Chezy-Manning)
EdgeID 310661

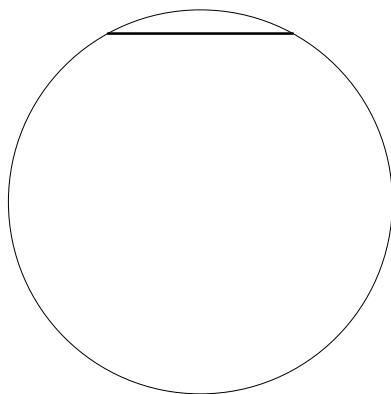


12"

diameter = 12.0"
slope = 5.00%
material: ABS, PVC
Manning's n = 0.011
depth of flow = 93.82% of diameter (max)

wetted perimeter = 2.64'
area = 0.77 s.f.
hydraulic radius = 0.29'
velocity = 13.26 fps
flow = 10.15 cfs

GRAVITY PIPE FLOW (Chezy-Manning)
EdgeID 309978



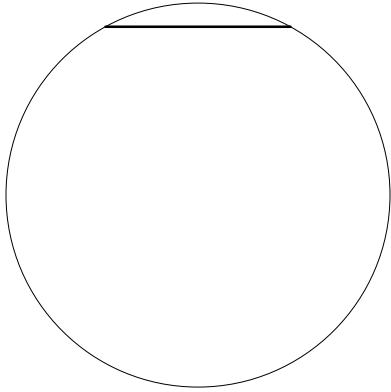
12"

diameter = 12.0"
slope = 2.00%
material: ABS, PVC
Manning's n = 0.011
depth of flow = 93.82% of diameter (max)

wetted perimeter = 2.64'
area = 0.77 s.f.
hydraulic radius = 0.29'
velocity = 8.39 fps
flow = 6.42 cfs

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GRAVITY PIPE FLOW (Chezy-Manning)
EdgeID 310822

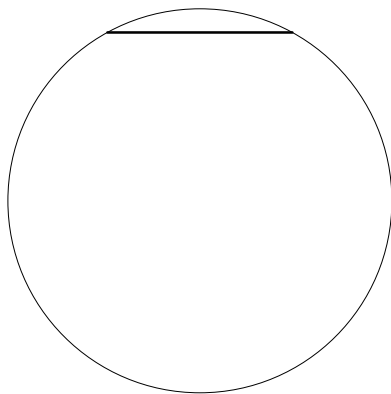


12"

diameter = 12.0"
slope = 6.00%
material: ABS, PVC
Manning's n = 0.011
depth of flow = 93.82% of diameter (max)

wetted perimeter = 2.64'
area = 0.77 s.f.
hydraulic radius = 0.29'
velocity = 14.53 fps
flow = 11.12 cfs

GRAVITY PIPE FLOW (Chezy-Manning)
EdgeID 309843

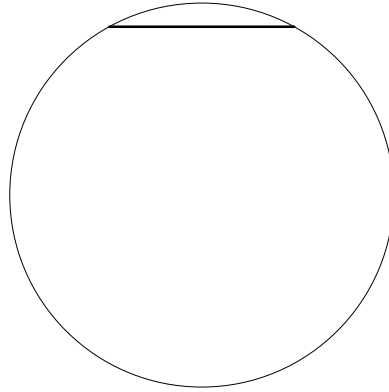


15"

diameter = 15.0"
slope = 8.00%
material: ABS, PVC
Manning's n = 0.011
depth of flow = 93.82% of diameter (max)

wetted perimeter = 3.30'
area = 1.20 s.f.
hydraulic radius = 0.36'
velocity = 19.47 fps
flow = 23.28 cfs

GRAVITY PIPE FLOW (Chezy-Manning)
EdgeID 310820

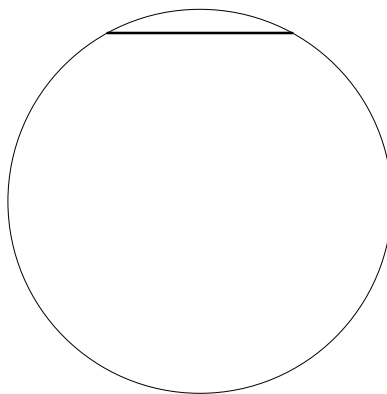


15"

diameter = 15.0"
slope = 9.00%
material: ABS, PVC
Manning's n = 0.011
depth of flow = 93.82% of diameter (max)

wetted perimeter = 3.30'
area = 1.20 s.f.
hydraulic radius = 0.36'
velocity = 20.65 fps
flow = 24.69 cfs

GRAVITY PIPE FLOW (Chezy-Manning)
EdgeID 309842



18"

diameter = 18.0"
slope = 28.00%
material: ABS, PVC
Manning's n = 0.011
depth of flow = 93.82% of diameter (max)

wetted perimeter = 3.96'
area = 1.72 s.f.
hydraulic radius = 0.43'
velocity = 41.14 fps
flow = 70.83 cfs

Welkin Engineering

Project 24-500.12 Cottle
Cottle Interim Road

RUNOFF by the SANTA BARBARA URBAN HYDROGRAPH

JunctionID 297405

FLOWS INTO PIPE 310664

2-year, 24-hour rainfall = 2.00"

flow type	description	coeff.	distance	fall	slope	T/C
1 overland sheet	short.grass,lawns	n=0.15	300.0	50.0'	16.67%	12.8'

total Time of Concentration = 12.8'

storm hyetograph: SCS TypeII

return period = 25 years

storm duration = 24 hr.

total rainfall = 3.72 in.

pervious area = 2.60 A CN = 61 GpB:Open.space,gd.cnd

impervious area = 0.50 A CN = 98

total site area = 3.10 A

hydrograph file: c:\users\melan\onedrive\desktop\tractor developed.hyd

peak flow = 2.09cfs @ 12.17 hr.

runoff volume = 12,692 cu.ft.

RUNOFF by the SANTA BARBARA URBAN HYDROGRAPH

JunctionID 295480

FLOWS INTO PIPE 310661

2-year, 24-hour rainfall = 2.00"

flow type	description	coeff.	distance	fall	slope	T/C
1 overland sheet	short.grass,lawns	n=0.15	300.0	50.0'	16.67%	12.8'
2 pipe	plastic.pipe	n=0.010	397.0	3.0'	0.76%	1.1'

total Time of Concentration = 13.9'

storm hyetograph: SCS TypeII

return period = 25 years

storm duration = 24 hr.

total rainfall = 3.72 in.

pervious area = 2.60 A CN = 61 GpB:Open.space,gd.cnd

impervious area = 0.55 A CN = 98

total site area = 3.15 A

hydrograph file: c:\users\melan\onedrive\desktop\tractor developed.hyd

peak flow = 2.14cfs @ 12.17 hr.

runoff volume = 13,325 cu.ft.

Melanie Plenert 21:19 22-Feb-25

ENGINEER'S NOTE:

HIGHLIGHTED VALUES ARE AN APPROXIMATION OF THE FLOW THROUGH THE MANHOLE AND ENTERING THE DOWNSTREAM PIPE. THESE VALUES WERE ESTIMATED BY EVALUATING THE PERVIOUS AND IMPERVIOUS AREAS OF RUNOFF CONTRIBUTING TO THE MANHOLE USING THE CWS GIS STORM & SANITARY MAPS. VALUES ARE AN APPROXIMATION.

Project 24-500.12 Cottle
Cottle Interim Road

RUNOFF by the SANTA BARBARA URBAN HYDROGRAPH

JunctionID 296827

FLOWS INTO PIPE 309979

2-year, 24-hour rainfall = 2.00"

flow type	description	coeff.	distance	fall	slope	T/C
1 shallow concentrated	high.grass	K=9	20.0	10.0'	50.00%	0.1'
total Time of Concentration =						1.0'

storm hyetograph: SCS TypeII
return period = 25 years
storm duration = 24 hr.
total rainfall = 3.72 in.

pervious area = 3.01 A CN = 61 GpB:Open.space,gd.cnd
impervious area = 0.80 A CN = 98
total site area = 3.81 A

hydrograph file: c:\users\melan\onedrive\desktop\tractor developed.hyd

peak flow = 4.42cfs @ 12.00 hr.

runoff volume = 17,491 cu.ft.

RUNOFF by the SANTA BARBARA URBAN HYDROGRAPH

JunctionID 295531

FLOWS INTO PIPE 309978

2-year, 24-hour rainfall = 2.00"

flow type	description	coeff.	distance	fall	slope	T/C
1 shallow concentrated	high.grass	K=9	20.0	10.0'	50.00%	0.1'
2 pipe	plastic.pipe	n=0.010	10.0	1.5'	15.00%	0.0'
total Time of Concentration =						1.0'

storm hyetograph: SCS TypeII
return period = 25 years
storm duration = 24 hr.
total rainfall = 3.72 in.

pervious area = 3.01 A CN = 61 GpB:Open.space,gd.cnd
impervious area = 0.80 A CN = 98
total site area = 3.81 A

hydrograph file: c:\users\melan\onedrive\desktop\tractor developed.hyd

peak flow = 4.42cfs @ 12.00 hr.

runoff volume = 17,491 cu.ft.

NOTE:
PIPE LENGTH IS SHOWN AS
8.84', HOWEVER THE MIN
MODELING LENGTH IS 10',
THIS MAKES THE FLOW A
MORE CONSERVATIVE VALUE
SO IT WAS DETERMINED
OKAY TO UPSIZE THE
LENGTH FOR THIS ANALYSIS.

Project 24-500.12 Cottle
Cottle Interim Road

RUNOFF by the SANTA BARBARA URBAN HYDROGRAPH

JunctionID 295479

FLOWS INTO PIPE 310822

2-year, 24-hour rainfall = 2.00"

	flow type	description	coeff.	distance	fall	slope	T/C
1	shallow concentrated	high.grass	K=9	50.0	10.0'	20.00%	0.2'
2	pipe	concrete.pipe	n=0.013	24.0	2.5'	10.42%	0.0'
total Time of Concentration =							1.0'

storm hyetograph: SCS TypeII
return period = 25 years
storm duration = 24 hr.
total rainfall = 3.72 in.

pervious area = 3.01 A CN = 61 GpB:Open.space,gd.cnd
impervious area = 0.80 A CN = 98
total site area = 3.81 A

hydrograph file: c:\users\melan\onedrive\desktop\tractor developed.hyd

peak flow = 4.42cfs @ 12.00 hr.

runoff volume = 17,491 cu.ft.

RUNOFF by the SANTA BARBARA URBAN HYDROGRAPH

JunctionID 295534

FLOWS INTO PIPE 310820

2-year, 24-hour rainfall = 2.00"

	flow type	description	coeff.	distance	fall	slope	T/C
1	shallow concentrated	high.grass	K=9	50.0	10.0'	20.00%	0.2'
2	pipe	plastic.pipe	n=0.010	63.0	3.0'	4.76%	0.1'
3	pipe	plastic.pipe	n=0.010	1679.0	53.0'	3.16%	2.2'
total Time of Concentration =							2.5'

storm hyetograph: SCS TypeII
return period = 25 years
storm duration = 24 hr.
total rainfall = 3.72 in.

pervious area = 1.31 A CN = 61 GpB:Open.space,gd.cnd
impervious area = 4.01 A CN = 98
total site area = 5.32 A

hydrograph file: c:\users\melan\onedrive\desktop\tractor developed.hyd

peak flow = 13.04cfs @ 12.00 hr.

runoff volume = 53,945 cu.ft.

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RUNOFF by the SANTA BARBARA URBAN HYDROGRAPH

JunctionID 294718

FLOWS INTO PIPE 309843

2-year, 24-hour rainfall = 2.00"

<i>flow type</i>	<i>description</i>	<i>coeff.</i>	<i>distance</i>	<i>fall</i>	<i>slope</i>	<i>T/C</i>
1 shallow concentrated	high.grass	K=9	50.0	10.0'	20.00%	0.2'
2 pipe	plastic.pipe	n=0.010	1742.0	56.0'	3.21%	2.3'
3 pipe	plastic.pipe	n=0.010	278.0	23.0'	8.27%	0.2'
4 pipe	CMP	n=0.028	70.0	8.0'	11.43%	0.1'

total Time of Concentration = 2.9'

storm hyetograph: SCS TypeII

return period = 25 years

storm duration = 24 hr.

total rainfall = 3.72 in.

pervious area = 1.35 A CN = 61 GpB:Open.space,gd.cnd

impervious area = 4.05 A CN = 98

total site area = 5.40 A

hydrograph file: c:\users\melan\onedrive\desktop\tractor developed.hyd

peak flow = 12.86cfs @ 12.00 hr.

runoff volume = 54,550 cu.ft.

RUNOFF by the SANTA BARBARA URBAN HYDROGRAPH

JunctionID 294719

FLOWS INTO PIPE 309842

2-year, 24-hour rainfall = 2.00"

<i>flow type</i>	<i>description</i>	<i>coeff.</i>	<i>distance</i>	<i>fall</i>	<i>slope</i>	<i>T/C</i>
1 shallow concentrated	high.grass	K=9	50.0	10.0'	20.00%	0.2'
2 pipe	plastic.pipe	n=0.010	2020.0	89.0'	4.41%	2.3'
3 pipe	CMP	n=0.028	70.0	8.0'	11.43%	0.1'
4 pipe	plastic.pipe	n=0.010	2564.0	86.0'	3.35%	3.3'

total Time of Concentration = 5.9'

storm hyetograph: SCS TypeII

return period = 25 years

storm duration = 24 hr.

total rainfall = 3.72 in.

pervious area = 6.35 A CN = 61 GpB:Open.space,gd.cnd

impervious area = 9.05 A CN = 98

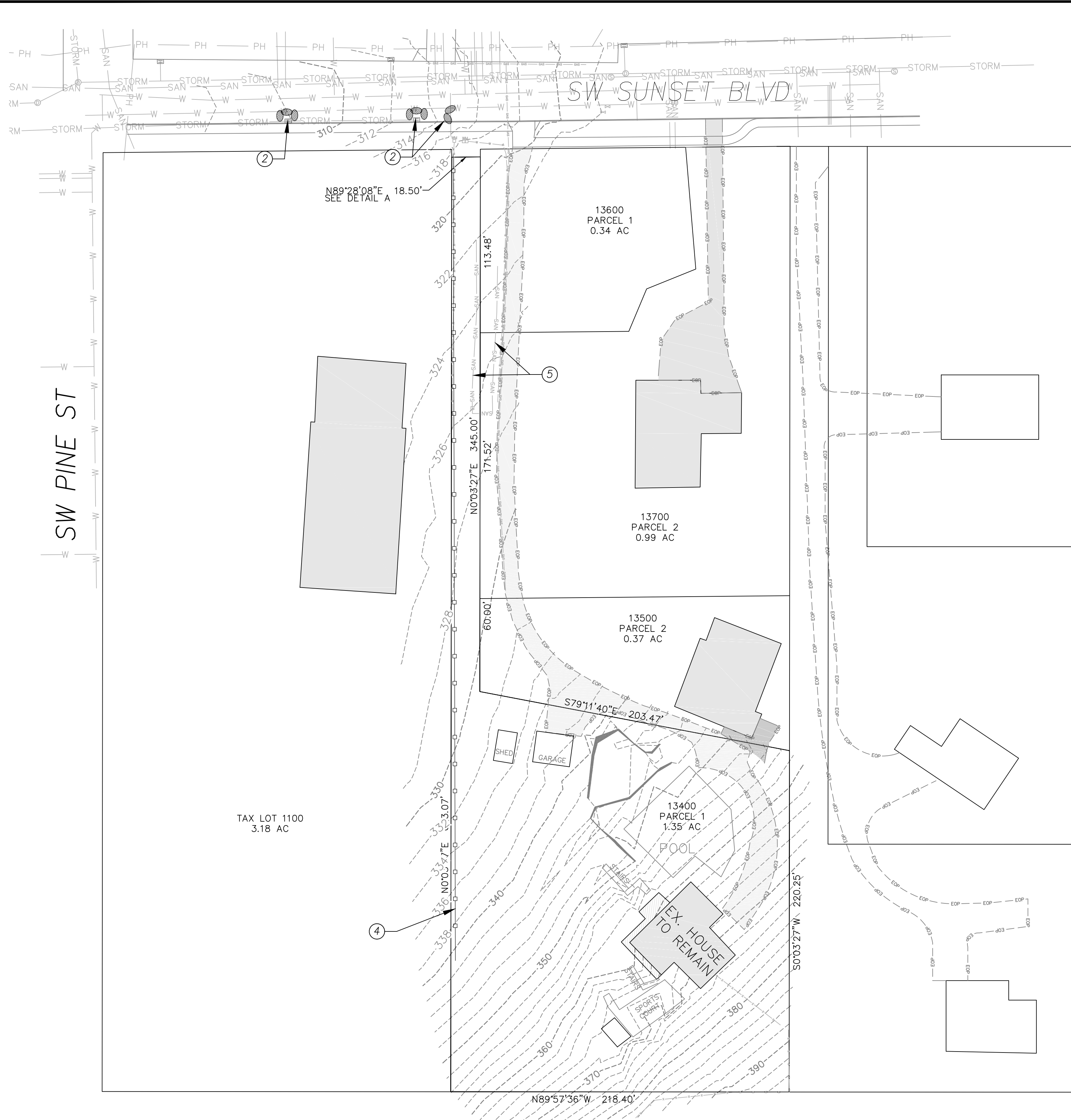
total site area = 15.40 A

hydrograph file: c:\users\melan\onedrive\desktop\tractor developed.hyd

peak flow = 26.20cfs @ 12.17 hr.

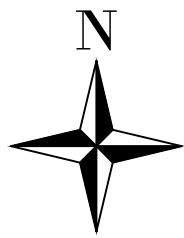
runoff volume = 130,065 cu.ft.

DATE PLOTTED: Aug 25, 2025 - 2:09pm
WPC: DRAWING FILE: P:\Protect Data\24-500.12 Cattle Civil Sheets\24-500.12 Cattle Civil.dwg



EXISTING CONDITIONS

1" = 40'
SCALE
40 0 40
IN FEET



EROSION CONTROL & DEMOLITION NOTES

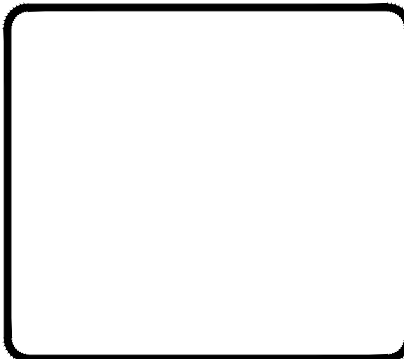
DEMOLITION

- 1 SEE TREE PLAN ON SHEET 009 FOR TREES TO REMOVE

EROSION CONTROL

- 2 INSTALL BIO-BAGS TO PROTECT CATCH BASIN, SEE DETAIL THIS SHEET
- 3 SEE TREE PLAN ON SHEET 009 FOR TREES TO PROTECT
- 4 INSTALL SEDIMENT FENCING, SEE DETAIL THIS SHEET
- 5 AVOID DISTURBANCE OF EXISTING SEPTIC TRENCH

REVISION	
NO.	DATE



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EROSION CONTROL PLAN

COTTLE

15379 SW SUNSET BLVD
SHERWOOD, OR 97140

WASHINGTON COUNTY

DESIGNED BY:	EKC
DRAWN BY:	AR
CHECKED BY:	EKC
DATE:	8/25/25
SCALE:	1" = 40'
	HORIZONTAL
	N/A
	VERTICAL
PROJECT NO:	24-500.12
SHEET	004

