Replat
1800 & 1861 Park Avenue NE
Salem Oregon

PLANNING STORMWATER REPORT

August 15, 2023

RENEWAL JUNE 30, 2024

PREPARED BY:

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Contents

1.0 Purpose of Report

Udell Engineering and Land Surveying, LLC, abbreviated UELS, was consulted by Jenrae Properties, LLC to develop this stormwater report which includes stormwater quality and quantity per City of Salem design standards for the proposed replat development. The proposed development is the replat of two tax lots; TL:8000 & 8100, located at 1800 & 1861 Park Avenue NE. The purpose of this report is to develop and demonstrate stormwater design which complies with the City of Salem Stormwater Design Standards with respect to providing adequate pollutant removal from stromwater runoff generated by the water quality design storm of 1.38 inches of rainfall in 24 hours and providing adequate flow control and detention for stormwater generated by all storm events up to the 100-year design storm event. The following documents were used as guidance in developing this report and the associated design:

Salem Revised Code, Chapter 071 Stormwater
Administrative Rules Chapter 109, Division 004 Stormwater System
Administrative Rules Chapter 109, Division 011 Operation and Maintenance of Stormwater Facilities
Administrative Rules Chapter 109, Division 012 Stormwater Source Control
Stormwater Design Handbook for developers and large projects

2.0 Site Description

The property is a total of 0.82 acres between the two tax lots. Current use is single family residential with existing public sewer and water located in the frontage right of way. Existing utilities located in Park Avenue NE serve the existing dwelling. The existing dwelling is planned to remain as a single family dwelling on lot 6 of the proposed six lot replat with this development. The site has no existing water quality or water quantity facilities in place. The existing stormwater runoff sheet flows across the property to the west where it drains into a public stormwater catch basin on the east side of Evergreen Avenue NE. The site topography gently slopes from Park Avenue to the west toward Evergreen Avenue NE. The site is bordered on the north, south and west by single family lots, bordered to the east by Park Avenue NE right of way. Park Avenue NE does not have public storm drainage infrastructure available for this development to connect a piped system to and discharge.

A summary of the pervious and impervious areas within the developed area of this project is as follows:

	Pervious (s.f.)	Impervious (s.f.)	Total
Pre-Developed Area	30,808	0	30,808
Developed Area	11,801	19,007	30,808

The proposed replat will provide appropriate private access, utilities and maintenance easement for a paved 20.0’ driveway, with private utilities serving the four westerly lots. The northeast lot created with this proposal will be provided access and utilities directly from Park Avenue NE, as this lot has frontage adjacent to Park Avenue NE.

The site stormwater design will satisfy the City of Salem’s stormwater management plans water quality and water quantity requirements. Stormwater will be piped and routed to a rain garden facility onsite where the 100 year event will be retained, treated and fully infiltrated per design standards. Storm events that exceed this will overtop the rain garden top of bank and sheet flow off the site along its historical route as it did in the pre-developed condition. Stormwater runoff

will be reduced by utilizing the sites ability to infiltrate stormwater into the ground as well as the use of Green Stormwater Infrastructure (GSI) to the Maximum Extent Feasible (MEF). Two existing trees onsite are expected to be removed, all others will remain. The lots will be required to be landscaped with building permits per City of Salems development code landscaping requirements. This is expected to provide additional treatment and protection to the sites stormwater system lifecycle.

The proposed development will direct 30,808 square feet of pervious and impervious area into the private stormwater system which will be treated and 100% detained onsite for all stormwater events up to the 100 year design storm. The stormwater will be released into the ground through infiltration.

See Appendix A for NRCS websoil survey data and Appendix B for the Existing Conditions Map.

The project meets the “Discretionary” GSI requirement as described in Appendix 4E of Division 004 of Chapter 109 Stormwater System. The areas designed for GSI are equal to an area required to infiltrate 100% of the stormwaters generated by storm events from the WQ design storm up to the 100 year design storm. A summary of this is included in Section 4.2 of this report.

3.0 Proposed Stormwater Facility Methodology

The proposed development will be increasing impervious areas thus increasing the sites potential for pollutants and stormwater runoff. The impervious areas generating pollutants and runoff include the shared access road, driveways, and proposed building roof.

The sites topography and lack of access to an approved public storm discharge location helped in the determination of the proposed location and facility type to mitigate stormwater for the proposed development. The proposed location is considered to most closely mimic the natural flow paths and historic runoff direction.

Redmond Geotechnical Services performed infiltration testing to determine soil classification as well as infiltration rates for the site. A copy of this report is included in Appendix F of this report. The existing soils were tested to infiltrate at rates ranging between 2.0 and 3.0 inches per hour. Following infiltration testing, test holes were advanced to a depth of approximately eight (8) feet to check for the presence of ground water and none was found. There is no known evidence of any hazardous materials being present on the site that would limit stormwater design.

Based on site planning, assessment and geotechnical explorations the development will be designed with single Rain Garden filtration facility to provide 100% water quality treatment and water quantity retention per City of Salem’s public works stormwater design standards. Stormwater will percolate the growing medium within the rain garden and then infiltrate into the ground at the native infiltration rate. Upon the water quality rain event being exceeded the stormwater will begin to fill the void spaces within the constructed rock section of the rain garden and then pond within the depression of the rain garden to the maximum ponding depth found in the post-developed hydrologic model, Appendix E as well as the drainage plans, Appendix D of the report.

3.1 Stormwater Detention and Flow Control Facilities

The design of the proposed rain garden provides stormwater detention volume for the design rain events to fully infiltrate onsite and not discharge off-site. No stormwater will leave the site for the design storm events, up to the 100 year event per division 004 City of Salem design standards (division 004 (p) (3), Flow Control). In the case that the 100 year storm event is exceeded the stormwater will over top the rain garden on the low side of the property where excess stormwater will disperse and sheet flow across its historical path.

See section 4.1 Detention Calculations for more information on the hydrology of the detention system.

3.2 Stormwater Quality Facility

The use of a rain garden as a combined stormwater flow control and treatment facilities was chosen for two reasons. One, the lack of availability of an approved stormwater discharge location, and Two, to take advantage of the sites ability to infiltrate water back into the ground and provide natural treatment of any pollutants that enter the facility. A hydrologic model was prepared utilizing Hydrocad software to demonstrate that 100% of the stormwaters generated by the water quality storm event equal to 1.38 inches of rainfall in 24 hours will infiltrate through the rain gardens growing media and into the ground.

4.0 Design Calculations

4.1 Detention Calculations

In order to determine the capacity of the proposed stormwater detention volume, UELS used the Santa Barbara Unit Hydrograph (SBUH) method to build two hydrologic models using Hydrocad 10.0 software: one model for pre-development drainage basin, and one for post-development drainage basin. The software model is comprised of 2 types of nodes: subcatchments and a ponds.

Subcatchments model the areas of land that receive rainfall during a storm. Subcatchments generate runoff hydrographs based on several factors, including the areas, modified surface runoff curve numbers, time of concentration, and design storm events. For this model, UELS used curve numbers based on Table 4D-6 in Appendix D of Division 004, Chapter 109 of City of Salem Administrative Rules. The Hydrologic Soil Group was assumed to be fair, group C, for native conditions, based on NRCS Soil Survey data. For the Pre-development runoff model, the time of concentration was modeled by tracing the longest flow-path of runoff through the basin (see Appendix B for map). For the post-development basin, UELS generally assumed a 10 minute time of concentration for impervious surfaces due to the size of the site. The 24hr design storm values used in the model were taken from Table 4D-3 in Appendix D of Division 004, Chapter 109 of City of Salem Administrative Rules.

UELS used a pond node to model the rain garden. The pond node is comprised of three main components. The lowest component is an open graded rock section with 40% void space allowing detention volume and stormwater to pass through freely. The next component is the amended soil section which has a design infiltration rate of 2.0 in/hr allowing pollutants to settle and water to percolate through. The remaining space or volume in the pond node models the depression of the rain garden and provides additional detention volume for the required storm events.

The following tables display the input parameters that UELS used in both the pre-development and post-development Hydrocad models. See Appendix D for a basin map of the post-construction site.

Pre-Development Model:

Parameter	Value	Source
Modified Curve Numbers	72 Woods/Grass	Table 4D-6
Rainfall Distribution	Type 1A	Salem Standards
Native Hydrologic Soil Group	C	NRCS Web Soil Survey
24 Hr Design Storm	50% of 2-yr 24hr	Salem Design Standards
	10-yr 24hr	Salem Design Standards
	100-yr 24hr	Salem Design Standards

Post-Development Model:

Parameter	Value	Source
Modified Curve Numbers	98 Impervious Areas	Table 4D-6
	79 Landscaped Areas	Table 4D-6
Rainfall Distribution	Type 1A	Salem Standards
Native Hydrologic Soil Group	C	NRCS Web Soil Survey
24 Hr Design Storm	50% of 2-yr 24hr	Salem Standards
	10-yr 24hr	Salem Standards
	100-yr 24hr	Salem Standards
*Exfiltration	1.25 in/hr per geotechnical investigation report	

**The exfiltration rate for the bottom of the rain garden was taken to be 1.25 in/hr based on the geotechnical investigation tested rate of 2.0 and 3.0 in/hr and applying a 2.0 factor of safety. The rain gardens are designed without liner to allow for exfiltration into the native subgrade soils below.*

UELS ran both the pre-development and post-development basin models. The pre-development basin model was determined to be 30,808 square feet which is consistent with the developed basin of 30,808 square feet that will be piped and directed into the proposed rain garden. The post developed model was analyzed for both scenarios, pervious and impervious areas combined, and impervious only areas for this development. The model that generated the greatest runoff rates and detention volumes was used for designing the size of the rain garden per design standards. The rain garden was sized to fully infiltrate the design storm events up to the 100 year event. Events that exceed this will overflow the rain garden and sheet flow across its historical path.

See the proposed development plan in Appendix D for illustration of the proposed stormwater system and facilities.

The following table compares pre-development and post-development runoff rates.

Comparison Table of Pre-Development to Post-Development Release Rates		
Storm Event	**Pre-Development (cfs)**	**Post-Development (cfs)**
50% of 2yr. 24hr.	0.002	0.000
10yr. 24hr.	0.096	0.000
100yr. 24hr.	0.230	0.000

The following table displays the results of the hydrologic calculations. See Appendices E to review the Hydrocad Post-Development hydrologic model.

Summary of Hydrologic Analysis One-Half of 2yr. 24hr. Storm Event	
Required Detention Volume (c.f.)	97
Provided Detention Volume (c.f.)	5,070
Peak Release Rate (cfs)	0.000
Peak Storage Elevation (ft)	190.75

Summary of Hydrologic Analysis 100yr. 24hr. Storm Event	
Required Detention Volume (c.f.)	4,630
Provided Detention Volume (c.f.)	5,070
Peak Release Rate (cfs)	0.000
Peak Storage Elevation (ft)	195.27

4.2 Stormwater Water Quality Calculations

Division 004, Chapter 109 of The City of Salem Administrative Rules dictates that the water quality storm event of 1.38 inches distributed over 24 hours based on the NRCS Type 1A rainfall distribution be used to determine the peak water quality flow rate and volume necessary to be treated. Due to the sites native soil infiltration rates and absence of ground water table discovered by the Redmond Geotechnical Services, UELS chose to use a filtration rain garden without an impermeable liner or underdrain pipe as the GSI facility to meet the City of Salem requirements. The rain gardens were sized to meet the “Maximum Extent Feasible” (MEF) requirement of Appendix E in Division 004, Chapter 109 of the City of Salem Administrative Rules based on the discretionary approach. Therefore, the GSI facility area was sized to fully infiltrate the run-off generated by the water quality storm event of 1.38 in over a 24 hour period for the impervious area contributing to the facility. Water quality stormwater model was ran using Hydrocad Version 10.0 utilizing the Santa Barbara Unit Hydrograph method with a Type 1A rainfall distribution to prove the proposed GSI area would infiltrate 100% of the stormwater run-off generated by the water quality rainfall event. The design infiltration rate of the growing media is 2.0in/hr which will allow stormwater to pass through freely being regulated by the native infiltration rate of 1.25in/hr.

The water quality model using Hydrocad 10.0 can be viewed in Appendix E.

4.3 GSI Analysis

The project meets the Maximum Extent Feasible (MEF) requirements per Appendix 4E based on the "Discretionary" method. The storm modeling in Appendix E can be viewed for confirmation that the rain garden is sized to fully infiltrate 100% of the impervious area contributing stormwater run-off to the facility without overflowing up to the 100 year event.

4.4 Stormwater Facility Details/Exhibits

See Appendix B - Existing Conditions Map that illustrates pre-development contours
See Appendix D – Proposed development plans and Basin Map

4.5 Stormwater Source Control

No source control threats were identified for the proposed development.

4.6 Downstream Analysis Report

Stormwater generated from the proposed development will be treated and mitigated 100 percent onsite up to the 100 year event. No downstream analysis is necessary.

4.7 Open Channel Hydraulic Modeling

No open channels are proposed.

4.8 Floodway and Floodplain Analysis

The project is not located in a floodway or floodplain.

4.9 Pipe Conveyance Calculations

To calculate the capacity of the proposed stormwater conveyance facilities UELS used the Rational Method for a 10-yr design storm event.

$Q10 = (Cy)CIA$

C= 0.90 for impervious
C = 0.35 for landscaping
Cy =1.00 for 10-year event

The calculations assume to allow all areas to contribute and be concentrated that a time to concentration of 5 minutes would be sufficient for the very small contributing areas.

Appendix G illustrates the flows generated based on the above Rational Method and the capacity for each pipe selected.

The IDF curve used for the calculations was taken from Figure 4D-1 of Appendix D in Division 004, Chapter 109 of the City of Salem Administrative Rules.

5.0 Engineering Conclusions

UELS designed the Stormwater Management Plan in accordance with and exceed the applicable standards of the City of Salem. The previous discussions demonstrate the following:

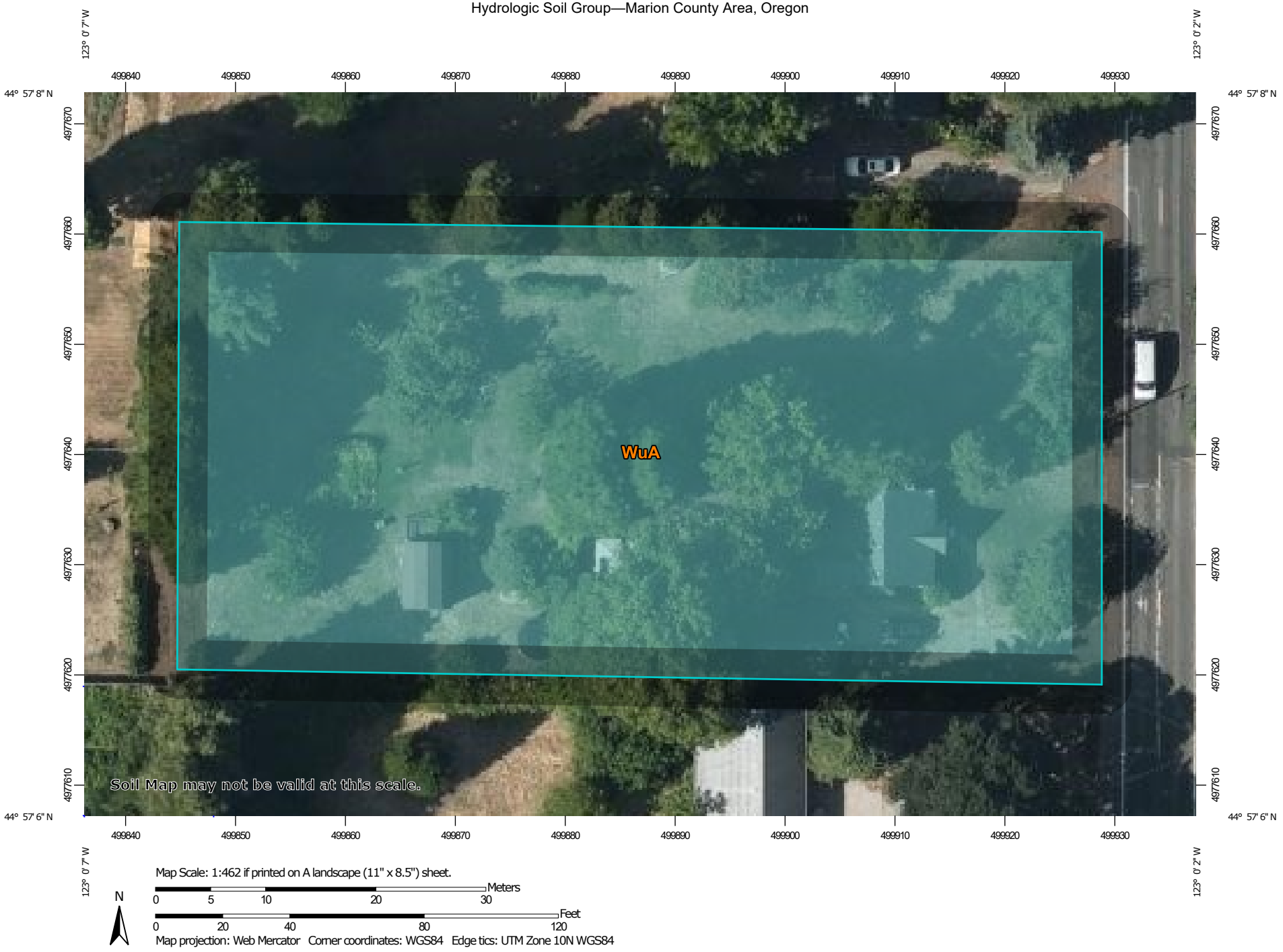
The Stormwater Quality Design provides effective pollutant removal by utilizing a Filtration Rain Garden sized to satisfy the MEF requirements and proven to infiltrate 100% of the stormwaters generated by the water quality storm event of 1.38 inches in 24 hours.

The storage volume provided by the rock chamber and depression of the proposed rain garden is adequately designed and sized to infiltrate 100% of the 100 year storm event which exceeds the City of Salems stormwater design standards. By doing so, UELS feels that this report should adequately demonstrate that no adverse effects will be created by the proposed development on the downstream receiving stormwater system.

Based on the information provided in this report and in the design documents UELS has demonstrated the Stormwater Management Plan for the proposed replat of two tax lots; TL:8000 & 8100, located at 1800 & 1861 Park Avenue NE is in compliance with the guidelines set forth by the City of Salem stormwater design standards.

APPENDIX A

NRCS Websoil Survey Data



Map Scale: 1:462 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 5 10 20 30

Feet: 0 20 40 80 120

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

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: Marion County Area, Oregon
Survey Area Data: Version 20, Sep 14, 2022

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

Date(s) aerial images were photographed: Aug 1, 2018—Aug 31, 2018

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.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
WuA	Woodburn silt loam, 0 to 3 percent slopes	C	0.9	100.0%
Totals for Area of Interest			**0.9**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

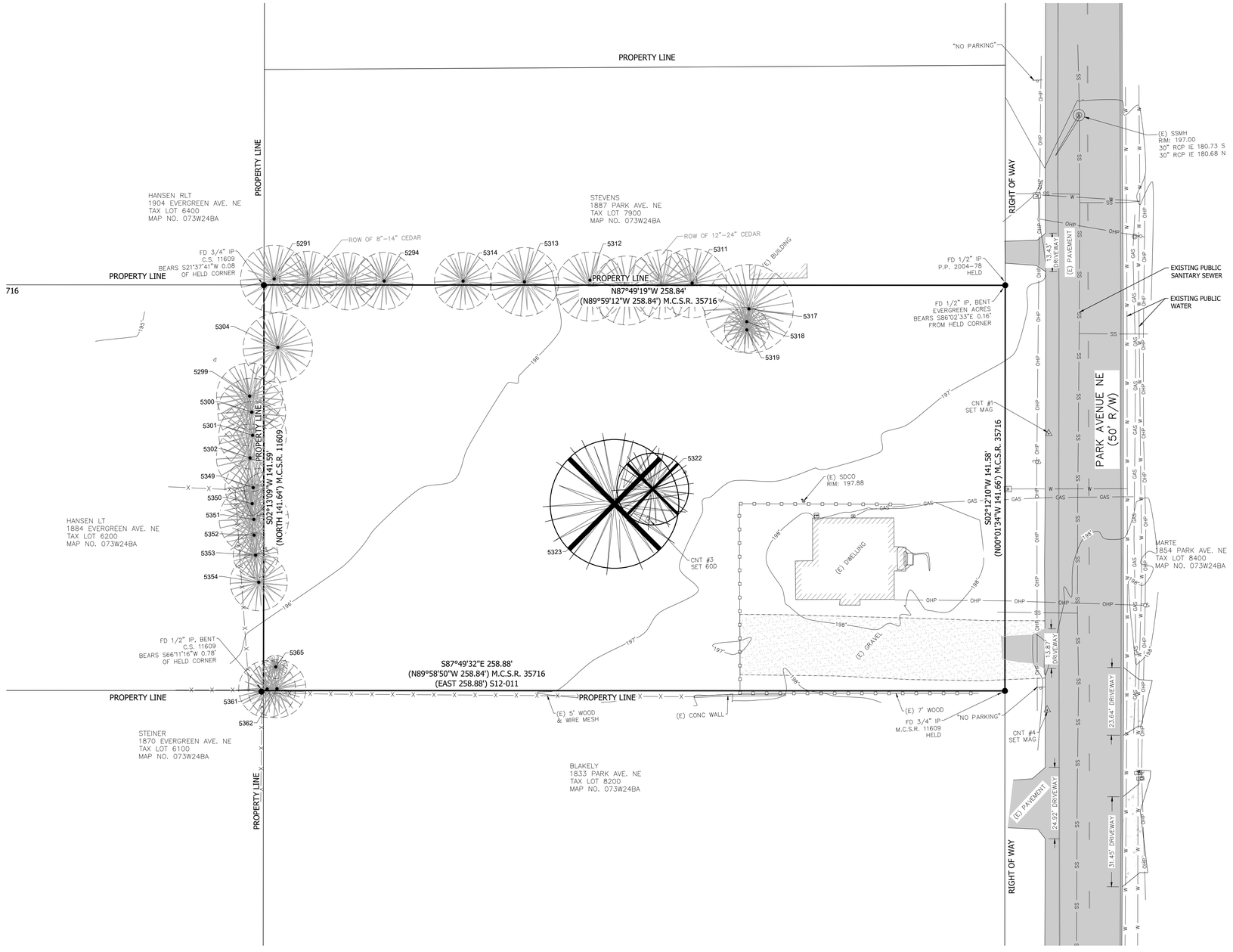
Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

APPENDIX B

Existing Conditions Map



TREE TABLE		
TREE #	TREE SIZE & TYPE	STATUS
5291	TR1 B ROW CEDARS 14"-8" 12D	RETAIN
5294	TR1 E	RETAIN
5299	TR 11" CEDAR 12D	RETAIN
5300	TR 17" CEDAR 12D	RETAIN
5301	TR 19" CEDAR 12D	RETAIN
5302	TR 17" CEDAR X2 12D	RETAIN
5304	TR 32" CEDAR 12D	RETAIN
5311	TR2 B 24"-12" +/- CEDAR 12D	RETAIN
5312	TR2 E	RETAIN
5313	TR 30" CEDAR 12D	RETAIN
5314	TR 15" CEDAR 10D	RETAIN
5317	TR 12" CEDAR 15D	RETAIN
5318	TR 12" CEDAR 8D	RETAIN
5319	TR 12" CEDAR 8D	RETAIN
5322	TR 24" CEDAR 15D	REMOVE
5323	TR 42" CEDAR 25D	REMOVE
5349	TR 18" CEDAR 10D	RETAIN
5350	TR 18" CEDAR 10D	RETAIN
5351	TR 18" CEDAR 12D	RETAIN
5352	TR 14" CEDAR 10D	RETAIN
5353	TR 6" HEMLOCK 8D	RETAIN
5354	TR 12" CEDAR 10D	RETAIN
5361	TR 22" CEDAR 10D	RETAIN
5362	TR 10" CEDAR 10D	RETAIN
5365	TR 6" YUEW 4D	RETAIN

TREE LEGEND

EXISTING TREE TO BE REMOVED

EXISTING TREE SYMBOL

CRITICAL ROOT ZONE

1 INCH
0 20'

PROJECT VERTICAL DATUM -- NGVD 29

ALL ELEVATIONS ARE SHOWN ON THE VERTICAL DATUM OF NGVD 29. THE VERTICAL BENCHMARK USED FOR ESTABLISHING ELEVATIONS WAS A GPS STATIC OBSERVATION POST-PROCESSED USING OPUS AND THEN ADJUSTED DOWN 3.37' PER VERTCON, THE NGS ONLINE APPLICATION. CONTRACTOR IS TO NOTIFY ENGINEER/SURVEYOR TWO WORKING DAYS PRIOR TO DISTURBING EXISTING SURVEY MONUMENT(S). SURVEYOR IS TO RESTORE PER COUNTY SURVEYOR REQUIREMENTS AND ORS 209.150.

ATTENTION: OREGON LAW REQUIRES YOU TO FOLLOW RULES ADOPTED BY THE OREGON UTILITY NOTIFICATION CENTER. THOSE RULES ARE SET FORTH IN OAR 952-001-0010 THROUGH OAR 952-001-0090. YOU MAY OBTAIN COPIES OF THE RULES BY CALLING THE CENTER. (NOTE: THE TELEPHONE NUMBER FOR THE OREGON UTILITY NOTIFICATION CENTER IS (503) 232-1987).

THE LOCATION AND DESCRIPTIONS OF EXISTING UTILITIES SHOWN ON THE DRAWINGS ARE COMPILED FROM AVAILABLE RECORDS AND/OR FIELD SURVEYS. THE ENGINEER OR UTILITY COMPANIES DO NOT GUARANTEE THE ACCURACY OR THE COMPLETENESS OF SUCH RECORDS. CONTRACTOR SHALL FIELD VERIFY LOCATIONS OF ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION.

THIS MAP WAS PREPARED FOR PLANNING PURPOSES ONLY

PLAN REVISIONS	DATE

Sheet C102

SCALE: SEE BARSCALE

CLIENT:
JENRAE PROPERTIES, LLC
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AND
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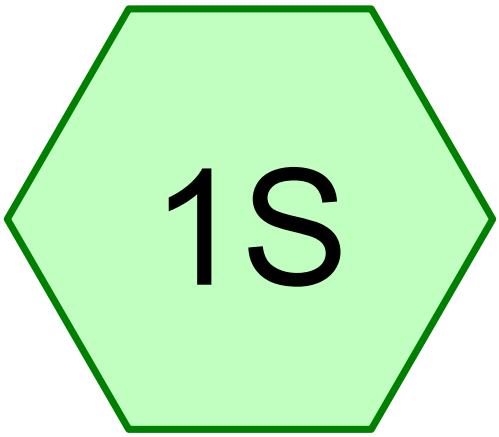
(541) 451-5125 PH.
(541) 451-1366 FAX

PRELIMINARY EX. COND./DEMO PLAN
AVA JENE ESTATES
073W24BA TAX LOTS 8000 & 8100
1861 PARK AVE. NE
SALEM, OR

DATE: APRIL 5, 2023
PROJECT: 22-027 JENSEN PARK AVE. NE
DRAWN BY: LLL MLM
CHECKED BY: BSV

APPENDIX C

Pre-Development Hydrologic Model



Pre-Developed Basin

Subcat Reach Pond Link

Routing Diagram for 23-027 Jensen Park Pre-Dev
Prepared by {enter your company name here}, Printed 8/16/2023

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.707	72	Woods/grass comb., Good, HSG C (1S)
0.707	**72**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.707	HSG C	1S
0.000	HSG D	
0.000	Other	
0.707		**TOTAL AREA**

Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Pre-Developed Basin Runoff Area=30,803 sf 0.00% Impervious Runoff Depth=0.93"
Flow Length=176' Slope=0.0100 '/' Tc=24.5 min CN=72 Runoff=0.096 cfs 0.055 af

Total Runoff Area = 0.707 ac Runoff Volume = 0.055 af Average Runoff Depth = 0.93"
100.00% Pervious = 0.707 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: Pre-Developed Basin

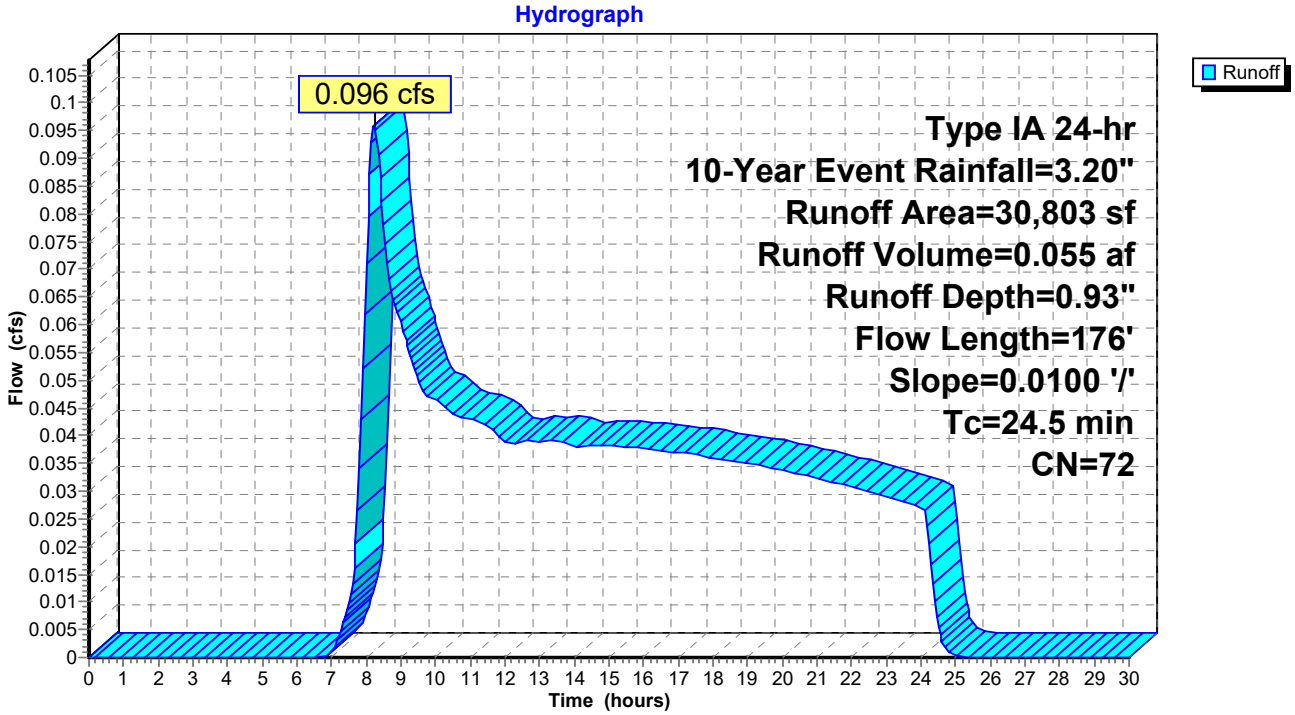
Runoff = 0.096 cfs @ 8.23 hrs, Volume= 0.055 af, Depth= 0.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10-Year Event Rainfall=3.20"

Area (sf)	CN	Description
30,803	72	Woods/grass comb., Good, HSG C
30,803		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.5	176	0.0100	0.12		**Sheet Flow, Sheet Flow Ex. Cond** Grass: Short n= 0.150 P2= 2.20"

Subcatchment 1S: Pre-Developed Basin



Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Pre-Developed Basin Runoff Area=30,803 sf 0.00% Impervious Runoff Depth=0.02"
Flow Length=176' Slope=0.0100 '/' Tc=24.5 min CN=72 Runoff=0.002 cfs 0.001 af

Total Runoff Area = 0.707 ac Runoff Volume = 0.001 af Average Runoff Depth = 0.02"
100.00% Pervious = 0.707 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: Pre-Developed Basin

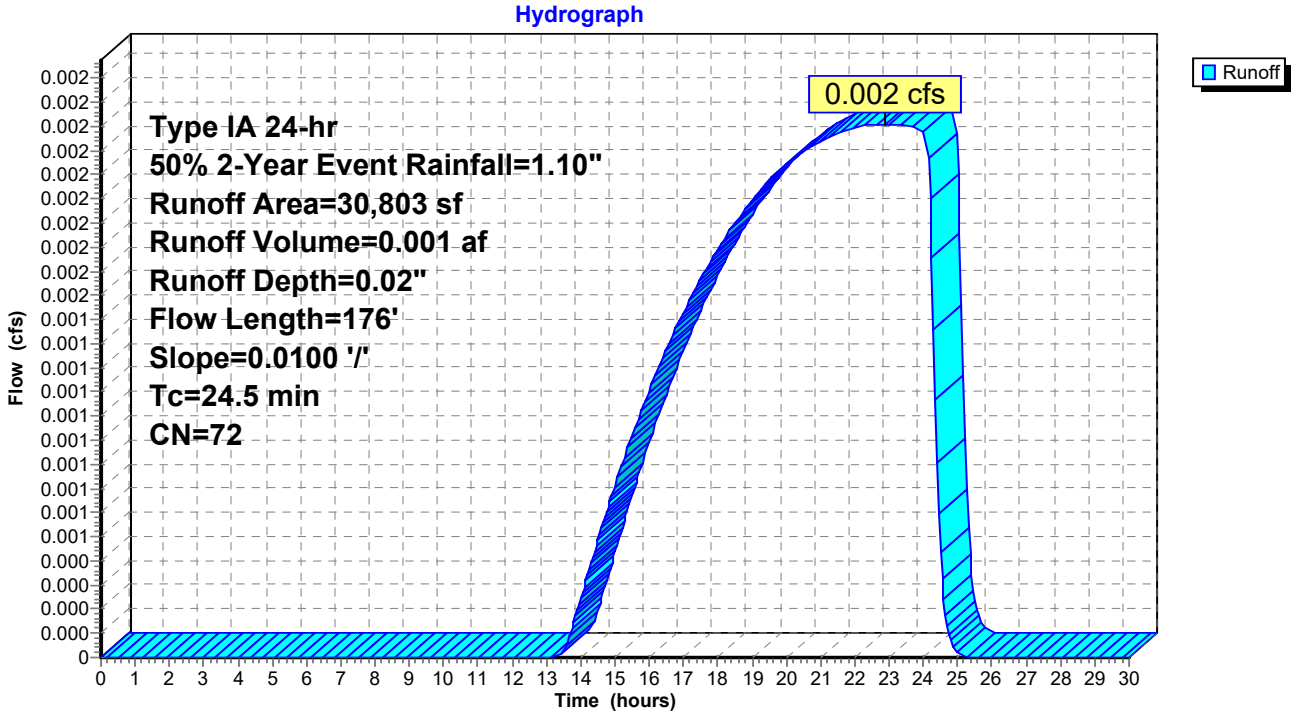
Runoff = 0.002 cfs @ 22.90 hrs, Volume= 0.001 af, Depth= 0.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type IA 24-hr 50% 2-Year Event Rainfall=1.10"

Area (sf)	CN	Description
30,803	72	Woods/grass comb., Good, HSG C
30,803		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.5	176	0.0100	0.12		**Sheet Flow, Sheet Flow Ex. Cond** Grass: Short n= 0.150 P2= 2.20"

Subcatchment 1S: Pre-Developed Basin



Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Pre-Developed Basin Runoff Area=30,803 sf 0.00% Impervious Runoff Depth=1.75"
Flow Length=176' Slope=0.0100 '/' Tc=24.5 min CN=72 Runoff=0.230 cfs 0.103 af

Total Runoff Area = 0.707 ac Runoff Volume = 0.103 af Average Runoff Depth = 1.75"
100.00% Pervious = 0.707 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: Pre-Developed Basin

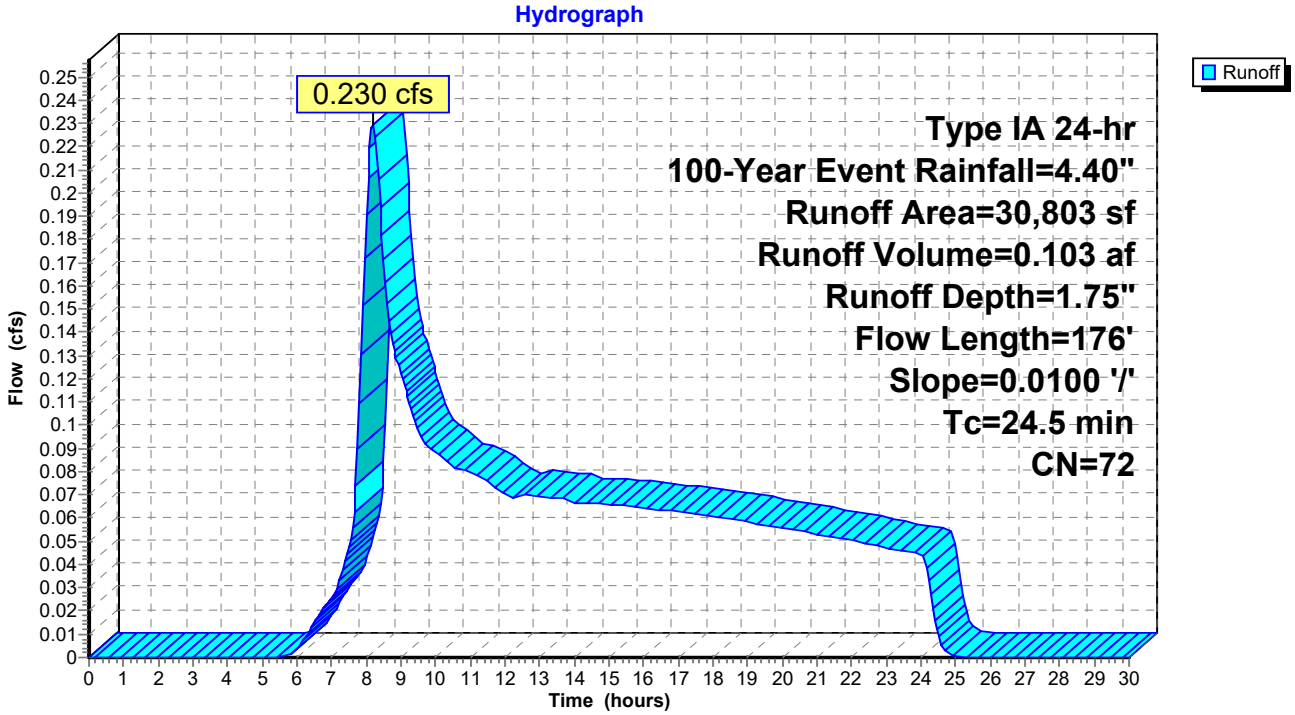
Runoff = 0.230 cfs @ 8.19 hrs, Volume= 0.103 af, Depth= 1.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100-Year Event Rainfall=4.40"

Area (sf)	CN	Description
30,803	72	Woods/grass comb., Good, HSG C
30,803		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.5	176	0.0100	0.12		**Sheet Flow, Sheet Flow Ex. Cond** Grass: Short n= 0.150 P2= 2.20"

Subcatchment 1S: Pre-Developed Basin



Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Pre-Developed Basin Runoff Area=30,803 sf 0.00% Impervious Runoff Depth=0.08"
Flow Length=176' Slope=0.0100 '/' Tc=24.5 min CN=72 Runoff=0.005 cfs 0.005 af

Total Runoff Area = 0.707 ac Runoff Volume = 0.005 af Average Runoff Depth = 0.08"
100.00% Pervious = 0.707 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: Pre-Developed Basin

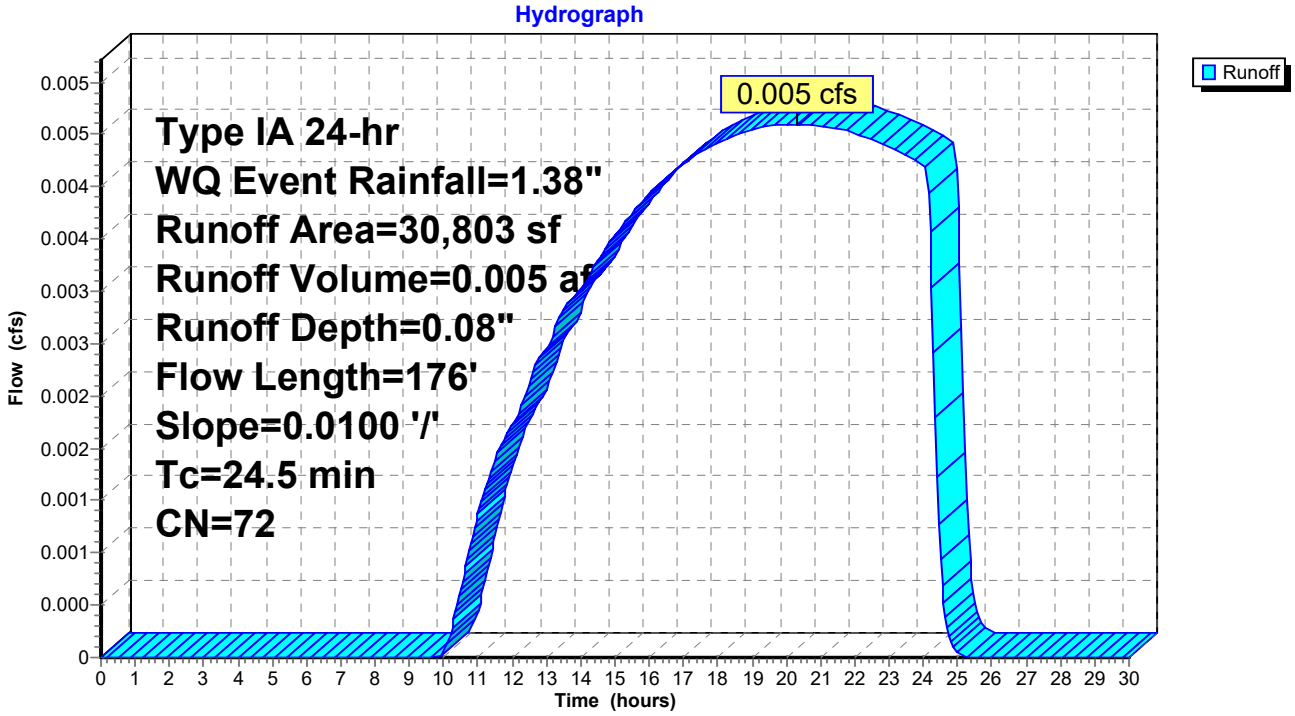
Runoff = 0.005 cfs @ 20.31 hrs, Volume= 0.005 af, Depth= 0.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type IA 24-hr WQ Event Rainfall=1.38"

Area (sf)	CN	Description
30,803	72	Woods/grass comb., Good, HSG C
30,803		100.00% Pervious Area

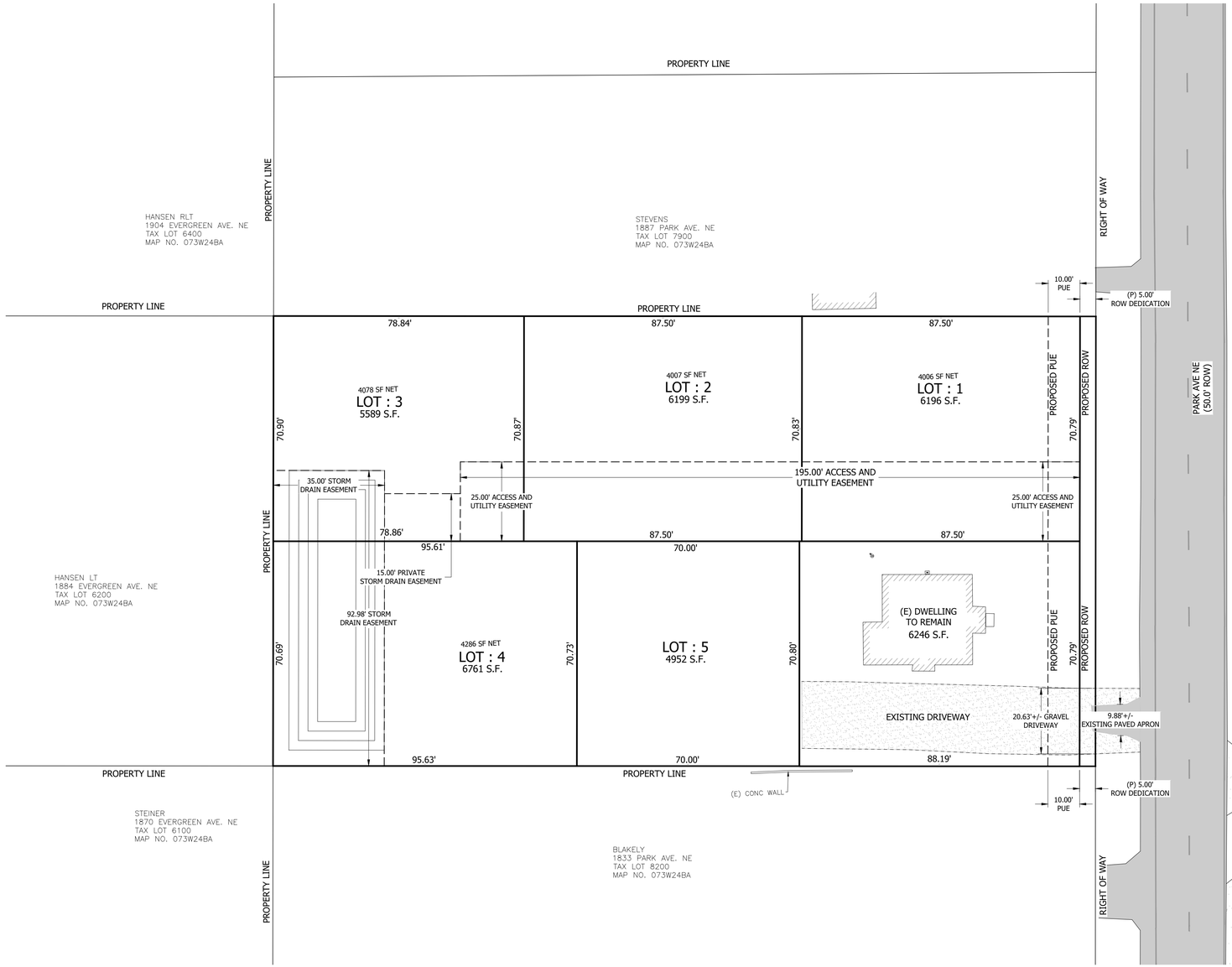
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.5	176	0.0100	0.12		**Sheet Flow, Sheet Flow Ex. Cond** Grass: Short n= 0.150 P2= 2.20"

Subcatchment 1S: Pre-Developed Basin



APPENDIX D

Proposed Development Plans and Basin Maps



PROPERTY

TAX MAP: 07S-02W-24BA
TAX LOTS:8000 & 8100

SITE ADDRESS:1800 & 1861 PARK AVENUE NE
SALEM, OR 97305

DEVELOPER

JENRAE PROPERTIES, LLC
P.O. BOX 20756
KEIZER, OREGON 9303
DON.JENSEN@JENSENCOLLC
(503) 932-2259

OWNER

JENSEN CONSTRUCTION, LLC
C/O DON JENSEN
5190 KALE STREET
SALEM, OREGON 97305
(503) 932-2259

DESIGN TEAM

CIVIL ENGINEER

UDELL ENGINEERING AND LAND SURVEYING, LLC
63 E. ASH STREET
LEBANON, OREGON 97355
(541) 451-5125

SURVEYOR

UDELL ENGINEERING AND LAND SURVEYING, LLC
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LEBANON, OREGON 97355
(541) 451-5125

CLIENT:
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(503) 932-2259

UDELL ENGINEERING AND LAND SURVEYING, LLC
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LEBANON, OREGON 97355
(541) 451-5125 PH.
(541) 451-1366 FAX

TENTATIVE PLAT
AVA JENE ESTATES
073W24BA TAX LOTS 8000 & 8100
1861 PARK AVE. NE
SALEM, OR

DATE: APRIL 5, 2023
PROJECT: 22-027 JENSEN PARK AVE. NE
DRAWN BY: LLL, MLM
CHECKED BY: BSV

N

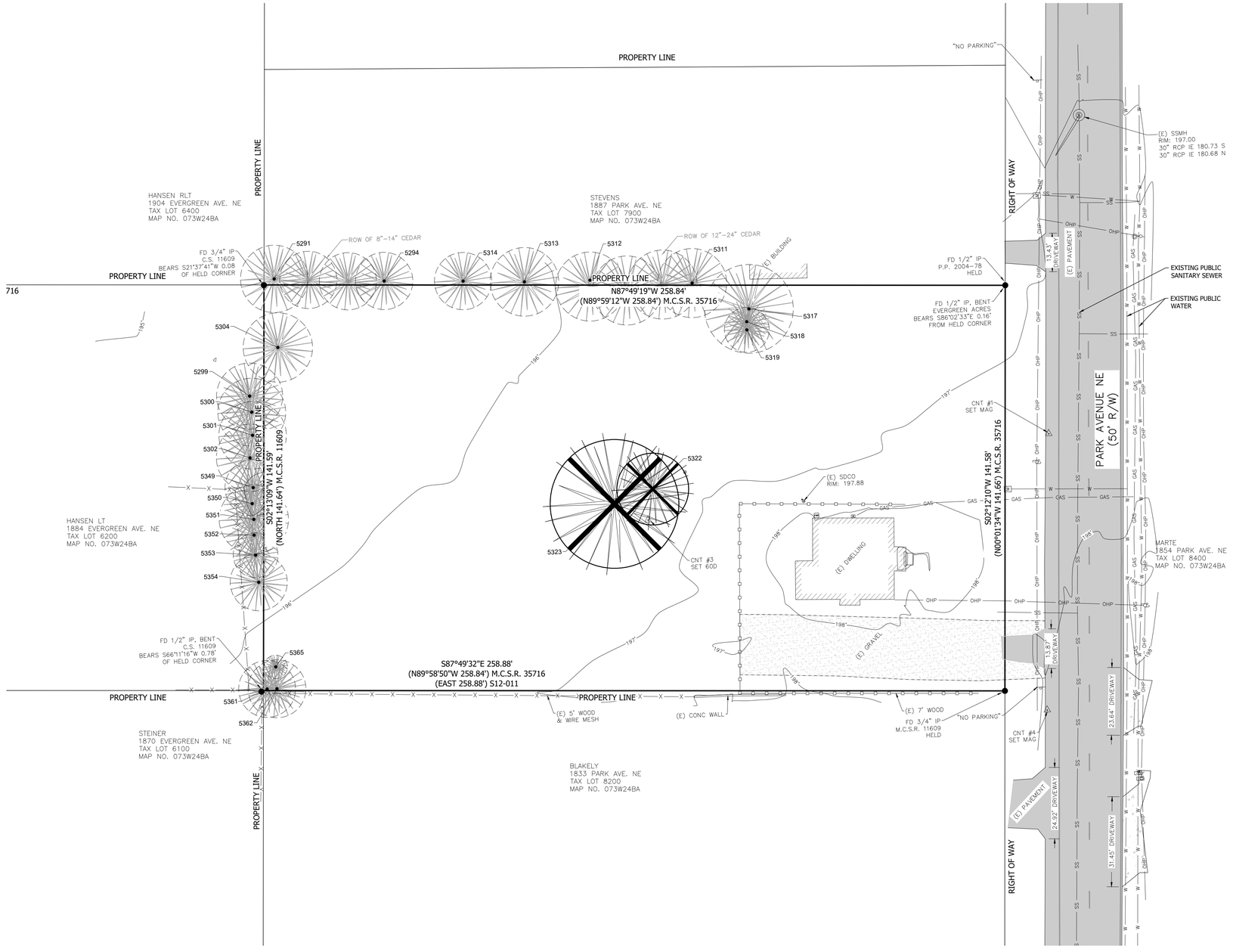
1 INCH
0 20'

THIS MAP WAS PREPARED FOR PLANNING PURPOSES ONLY

PLAN REVISIONS	DATE

Sheet C100

SCALE: SEE BARSCALE



TREE TABLE		
TREE #	TREE SIZE & TYPE	STATUS
5291	TR1 B ROW CEDARS 14"-8" 12D	RETAIN
5294	TR1 E	RETAIN
5299	TR 11" CEDAR 12D	RETAIN
5300	TR 17" CEDAR 12D	RETAIN
5301	TR 19" CEDAR 12D	RETAIN
5302	TR 17" CEDAR X2 12D	RETAIN
5304	TR 32" CEDAR 12D	RETAIN
5311	TR2 B 24"-12" +/- CEDAR 12D	RETAIN
5312	TR2 E	RETAIN
5313	TR 30" CEDAR 12D	RETAIN
5314	TR 15" CEDAR 10D	RETAIN
5317	TR 12" CEDAR 15D	RETAIN
5318	TR 12" CEDAR 8D	RETAIN
5319	TR 12" CEDAR 8D	RETAIN
5322	TR 24" CEDAR 15D	REMOVE
5323	TR 42" CEDAR 25D	REMOVE
5349	TR 18" CEDAR 10D	RETAIN
5350	TR 18" CEDAR 10D	RETAIN
5351	TR 18" CEDAR 12D	RETAIN
5352	TR 14" CEDAR 10D	RETAIN
5353	TR 6" HEMLOCK 8D	RETAIN
5354	TR 12" CEDAR 10D	RETAIN
5361	TR 22" CEDAR 10D	RETAIN
5362	TR 10" CEDAR 10D	RETAIN
5365	TR 6" YUEW 4D	RETAIN

TREE LEGEND

EXISTING TREE TO BE REMOVED

EXISTING TREE SYMBOL

CRITICAL ROOT ZONE

1 INCH
0 20'

PROJECT VERTICAL DATUM -- NGVD 29

ALL ELEVATIONS ARE SHOWN ON THE VERTICAL DATUM OF NGVD 29. THE VERTICAL BENCHMARK USED FOR ESTABLISHING ELEVATIONS WAS A GPS STATIC OBSERVATION POST-PROCESSED USING OPUS AND THEN ADJUSTED DOWN 3.37' PER VERTCON, THE NGS ONLINE APPLICATION. CONTRACTOR IS TO NOTIFY ENGINEER/SURVEYOR TWO WORKING DAYS PRIOR TO DISTURBING EXISTING SURVEY MONUMENT(S). SURVEYOR IS TO RESTORE PER COUNTY SURVEYOR REQUIREMENTS AND ORS 209.150.

ATTENTION: OREGON LAW REQUIRES YOU TO FOLLOW RULES ADOPTED BY THE OREGON UTILITY NOTIFICATION CENTER. THOSE RULES ARE SET FORTH IN OAR 952-001-0010 THROUGH OAR 952-001-0090. YOU MAY OBTAIN COPIES OF THE RULES BY CALLING THE CENTER. (NOTE: THE TELEPHONE NUMBER FOR THE OREGON UTILITY NOTIFICATION CENTER IS (503) 232-1987).

THE LOCATION AND DESCRIPTIONS OF EXISTING UTILITIES SHOWN ON THE DRAWINGS ARE COMPILED FROM AVAILABLE RECORDS AND/OR FIELD SURVEYS. THE ENGINEER OR UTILITY COMPANIES DO NOT GUARANTEE THE ACCURACY OR THE COMPLETENESS OF SUCH RECORDS. CONTRACTOR SHALL FIELD VERIFY LOCATIONS OF ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION.

THIS MAP WAS PREPARED FOR PLANNING PURPOSES ONLY

PLAN REVISIONS	DATE

Sheet C102

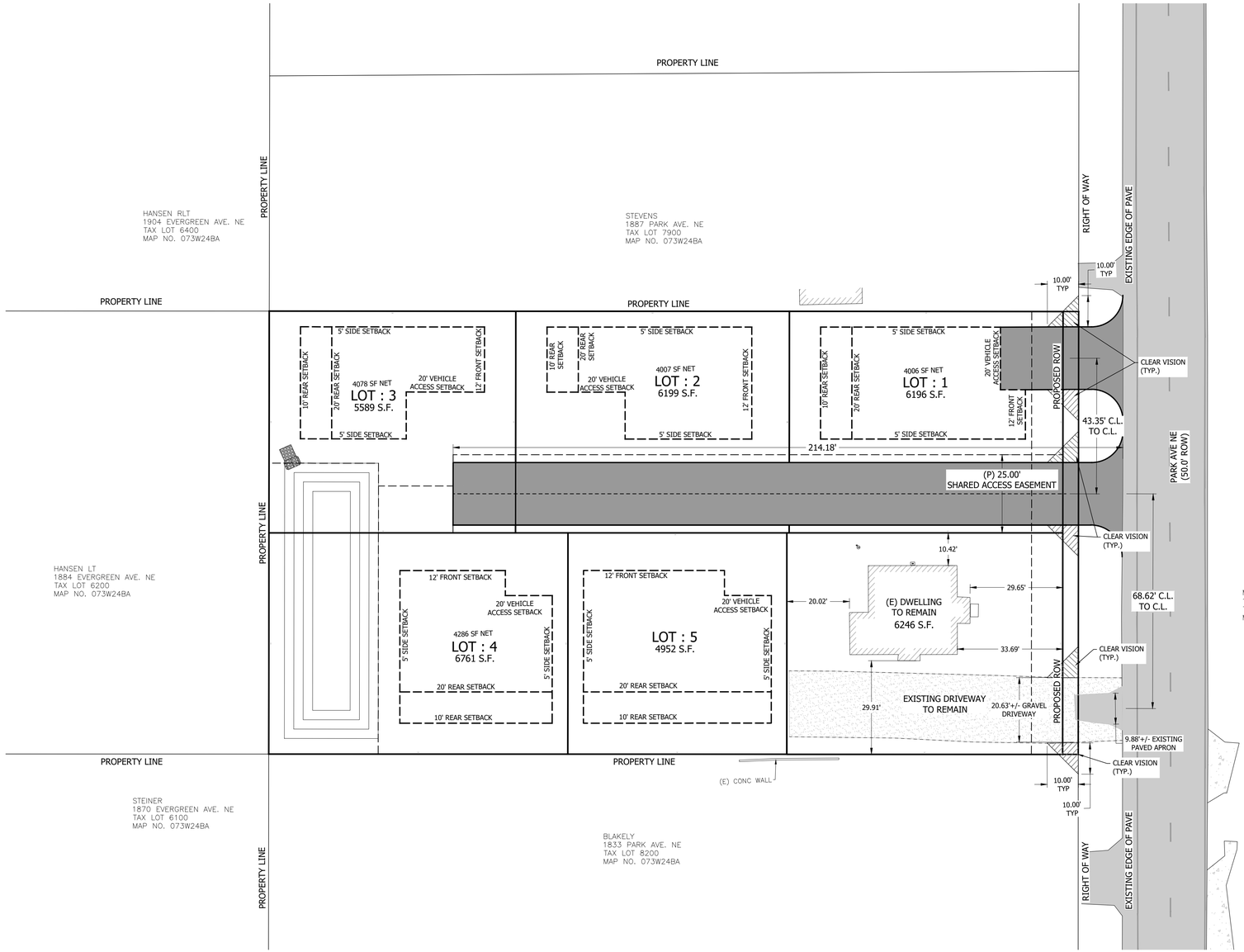
SCALE: SEE BARSCALE

CLIENT:
JENRAE PROPERTIES, LLC
P.O. BOX 20756
KEIZER, OR 97303
DON.JENSEN@JENSENCOLLC
(503) 932-2259

UDELL ENGINEERING
AND
LAND SURVEYING, LLC
63 EAST ASH ST.
LEBANON, OREGON 97355
(541) 451-5125 PH.
(541) 451-1366 FAX

PRELIMINARY EX. COND./DEMO PLAN
AVA JENE ESTATES
073W24BA TAX LOTS 8000 & 8100
1861 PARK AVE. NE
SALEM, OR

DATE: APRIL 5, 2023
PROJECT: 22-027 JENSEN PARK AVE. NE
DRAWN BY: LLL MLM
CHECKED BY: BSV



PROPERTY

TAX MAP: 7S-2W-24BA
TAX LOTS:8000 & 8100

SITE ADDRESS: 1861 PARK AVENUE NE
SALEM, OR 97305

DEVELOPER

JENRAE PROPERTIES, LLC
P.O. BOX 20756
KEIZER, OREGON 9303
DON.JENSEN@JENSENCOLLC
(503) 932-2259

OWNER

JENSEN CONSTRUCTION, LLC
C/O DON JENSEN
5190 KALE STREET
SALEM, OREGON 97305
(503) 932-2259

DESIGN TEAM

CIVIL ENGINEER

UDELL ENGINEERING AND LAND SURVEYING, LLC
63 E. ASH STREET
LEBANON, OREGON 97355
(541) 451-5125

SURVEYOR

UDELL ENGINEERING AND LAND SURVEYING, LLC
63 E. ASH STREET
LEBANON, OREGON 97355
(541) 451-5125

CLIENT:
JENRAE PROPERTIES, LLC
P.O. BOX 20756
KEIZER, OR 97303
DON.JENSEN@JENSENCOLLC
(503) 932-2259

UDELL ENGINEERING AND LAND SURVEYING, LLC
63 EAST ASH ST.
LEBANON, OREGON 97355
(541) 451-5125 PH.
(541) 451-1366 FAX

PRELIMINARY SITE PLAN
AVA JENE ESTATES
073W24BA TAX LOTS 8000 & 8100
1861 PARK AVE. NE
SALEM, OR

DATE: APRIL 5, 2023
PROJECT: 22-027 JENSEN PARK AVE. NE
DRAWN BY: LLL MLM
CHECKED BY: BSV

N

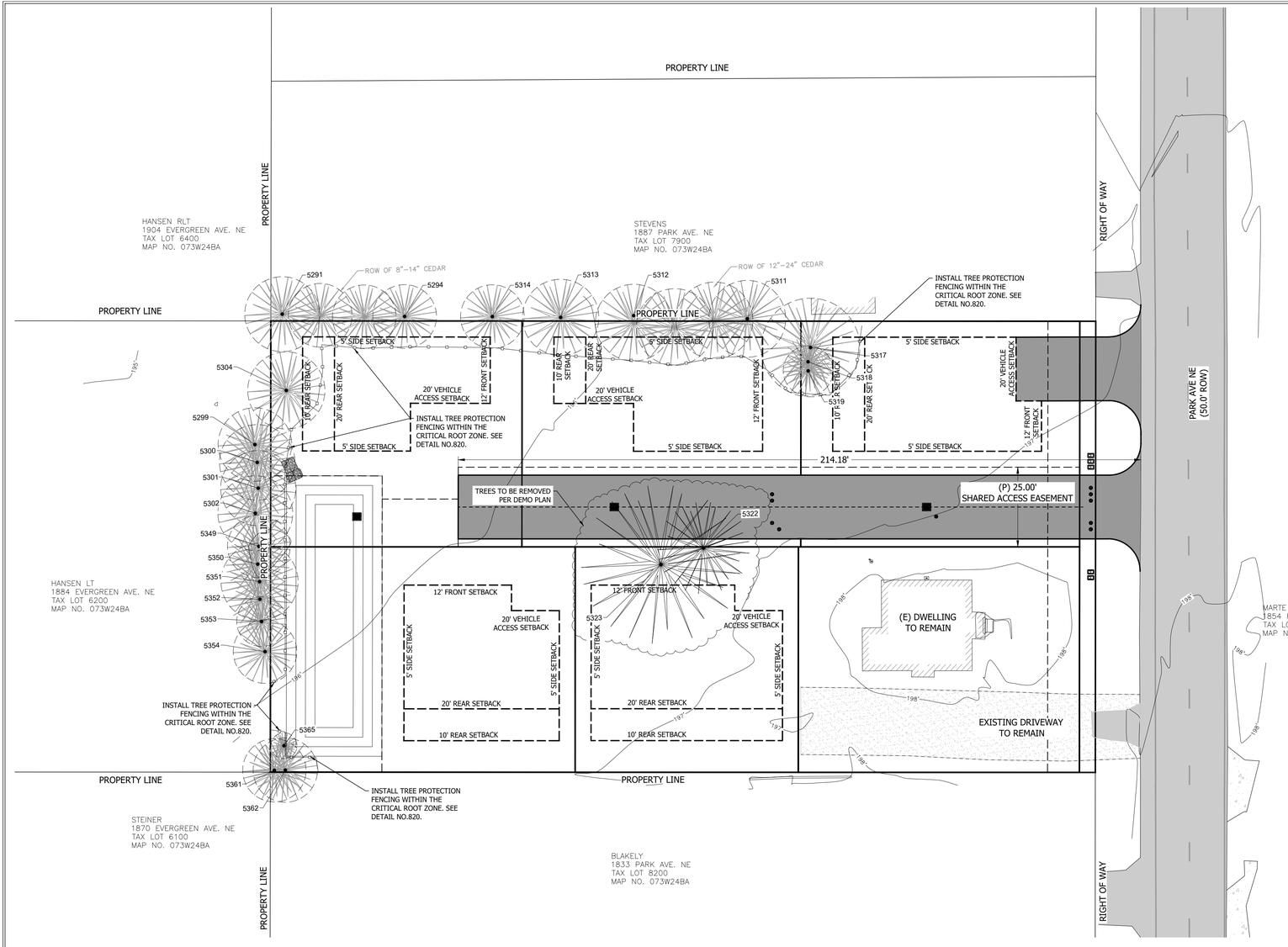
1 INCH
0 20'

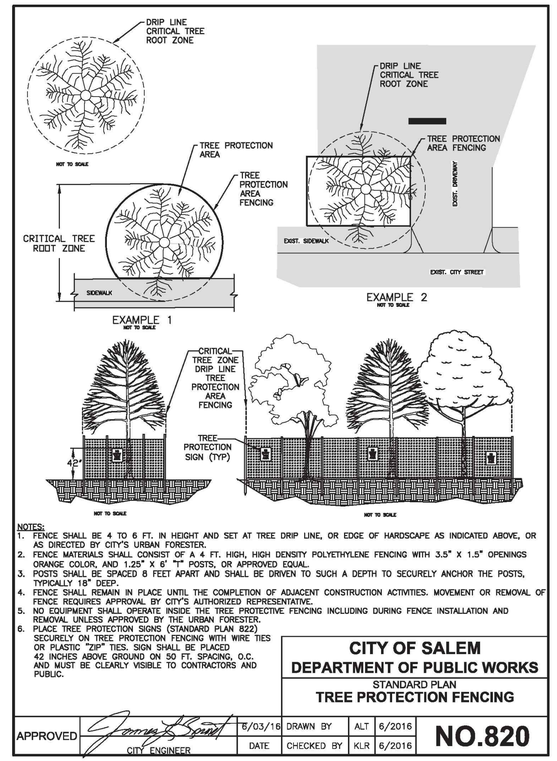
THIS MAP WAS PREPARED FOR PLANNING PURPOSES ONLY

PLAN REVISIONS	DATE

Sheet C103

SCALE: SEE BARSCALE





NOTES:
1. FENCE SHALL BE 4 TO 6 FT. IN HEIGHT AND SET AT TREE DRIP LINE, OR EDGE OF HARDSCAPE AS INDICATED ABOVE, OR AS DIRECTED BY CITY'S URBAN FORESTER.
2. FENCE MATERIALS SHALL CONSIST OF A 4 FT. HIGH, HIGH DENSITY POLYETHYLENE FENCING WITH 3.5" X 1.5" OPENINGS ORANGE COLOR, AND 1.25" X 6' "T" POSTS, OR APPROVED EQUAL.
3. POSTS SHALL BE SPACED 8 FEET APART AND SHALL BE DRIVEN TO SUCH A DEPTH TO SECURELY ANCHOR THE POSTS, TYPICALLY 18" DEEP.
4. FENCE SHALL REMAIN IN PLACE UNTIL THE COMPLETION OF ADJACENT CONSTRUCTION ACTIVITIES. MOVEMENT OR REMOVAL OF FENCE REQUIRES APPROVAL BY CITY'S AUTHORIZED REPRESENTATIVE.
5. NO EQUIPMENT SHALL OPERATE INSIDE THE TREE PROTECTIVE FENCING INCLUDING DURING FENCE INSTALLATION AND REMOVAL UNLESS APPROVED BY THE URBAN FORESTER.
6. PLACE TREE PROTECTION SIGNS (STANDARD PLAN 822) SECURELY ON TREE PROTECTION FENCING WITH WIRE TIES OR PLASTIC "ZIP" TIES. SIGN SHALL BE PLACED 42 INCHES ABOVE GROUND ON SO FT. SPACING, O.C. AND MUST BE CLEARLY VISIBLE TO CONTRACTORS AND PUBLIC.

CITY OF SALEM
DEPARTMENT OF PUBLIC WORKS
STANDARD PLAN
TREE PROTECTION FENCING

APPROVED	CITY ENGINEER	6/03/16	DRAWN BY	ALT	6/2016	NO.820
		DATE	CHECKED BY	KLR	6/2016	

TREE TABLE		
TREE #	TREE SIZE & TYPE	STATUS
5291	TR1 B ROW CEDARS 14"-8" 12D	RETAIN
5294	TR1 E	RETAIN
5299	TR 11" CEDAR 12D	RETAIN
5300	TR 17" CEDAR 12D	RETAIN
5301	TR 19" CEDAR 12D	RETAIN
5302	TR 17" CEDAR X2 12D	RETAIN
5304	TR 32" CEDAR 12D	RETAIN
5311	TR2 B 24"-12" +/- CEDAR 12D	RETAIN
5312	TR2 E	RETAIN
5313	TR 30" CEDAR 12D	RETAIN
5314	TR 15" CEDAR 10D	RETAIN
5317	TR 12" CEDAR 15D	RETAIN
5318	TR 12" CEDAR 8D	RETAIN
5319	TR 12" CEDAR 8D	RETAIN
5322	TR 24" CEDAR 15D	REMOVE
5323	TR 42" CEDAR 25D	REMOVE
5349	TR 18" CEDAR 10D	RETAIN
5350	TR 18" CEDAR 10D	RETAIN
5351	TR 18" CEDAR 12D	RETAIN
5352	TR 14" CEDAR 10D	RETAIN
5353	TR 6" HEMLOCK 8D	RETAIN
5354	TR 12" CEDAR 10D	RETAIN
5361	TR 22" CEDAR 10D	RETAIN
5362	TR 10" CEDAR 10D	RETAIN
5365	TR 6" YUEW 4D	RETAIN

TREES TO BE REMOVED PER DEMO PLAN

N

1 INCH
0 20'

PLAN REVISIONS	DATE

THIS MAP WAS PREPARED FOR PLANNING PURPOSES ONLY

Sheet C104

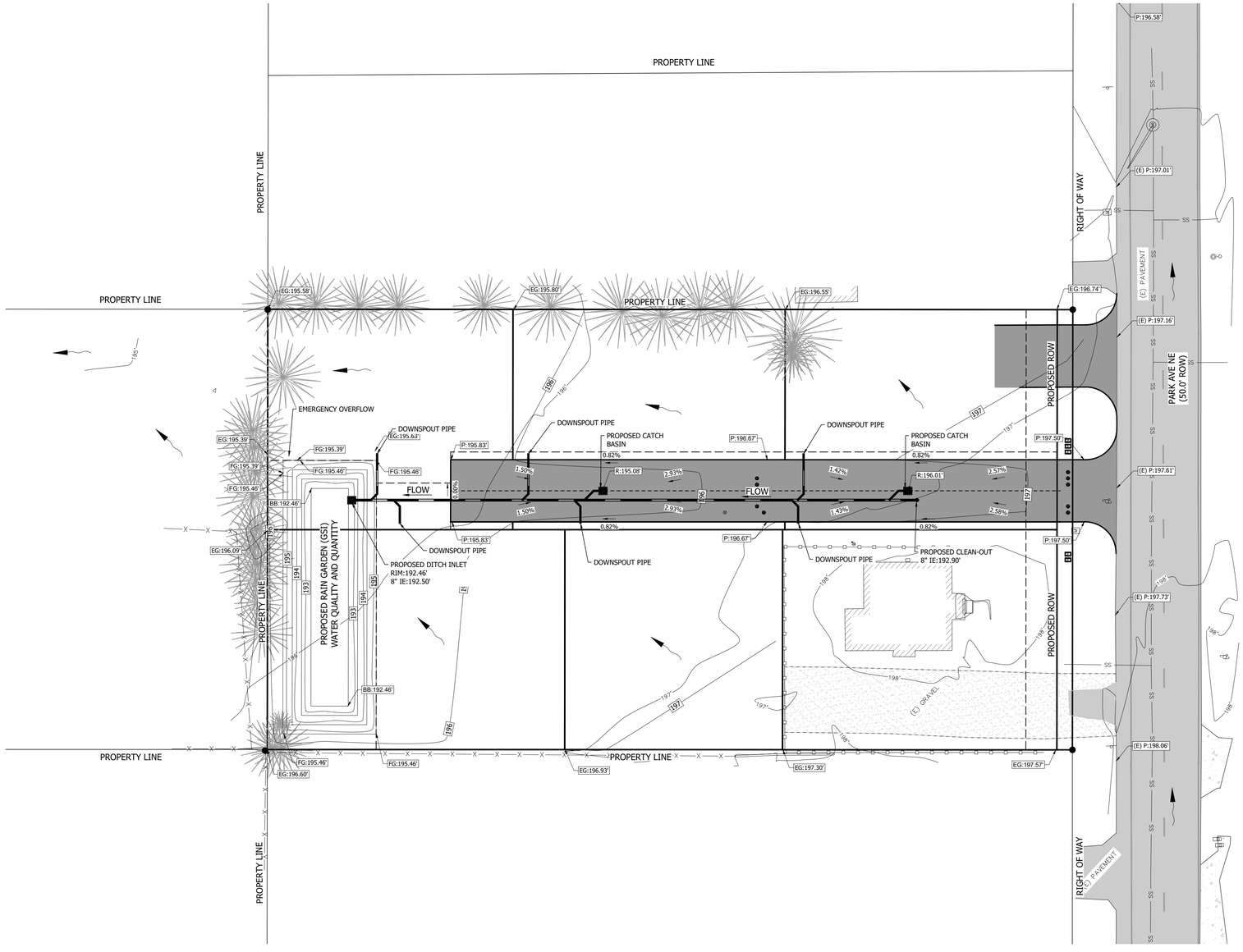
SCALE: SEE BARSCALE

CLIENT:
JENRAE PROPERTIES, LLC
P.O. BOX 20756
KEIZER, OR 97303
DON.JENSEN@JENSENCOLLC
(503) 932-2259

UDELL ENGINEERING AND LAND SURVEYING, LLC
63 EAST ASH ST.
LEBANON, OREGON 97355
(541) 451-5125 PH.
(541) 451-1366 FAX

PRELIMINARY TREE CONSERVATION PLAN
AVA JENE ESTATES
073W24BA TAX LOTS 8000 & 8100
1861 PARK AVE. NE
SALEM, OR

DATE: APRIL 5, 2023
PROJECT: 22-027 JENSEN PARK AVE. NE
DRAWN BY: LLL, MLM
CHECKED BY: MSV



GRADING LEGEND

- 362 - EXISTING SURFACE CONTOUR ELEVATION
- 362 - DESIGN SURFACE CONTOUR ELEVATION
- EXISTING SURFACE DRAIN DIRECTION
- DESIGN SURFACE DRAIN DIRECTION

(E)P 000.00	EXISTING TOP OF PAVEMENT ELEVATION
EG 000.00	EXISTING GROUND ELEVATION
P 000.00	DESIGN TOP OF ASPHALT PAVE ELEVATION
FG 000.00	DESIGN FINISHED GROUND ELEVATION

N

1 INCH

0 20'

THIS MAP WAS PREPARED FOR PLANNING PURPOSES ONLY

PLAN REVISIONS	DATE

Sheet C200

SCALE: SEE BARSCALE

CLIENT:

JENRAE PROPERTIES, LLC
P.O. BOX 20756
KEIZER, OR 97303
DON.JENSEN@JENSENCOLLC
(503) 932-2259

UDELL ENGINEERING AND LAND SURVEYING, LLC
63 EAST ASH ST.
LEBANON, OREGON 97355
(541) 451-5125 PH.
(541) 451-1366 FAX

PRELIMINARY GRADING & DRAINAGE

AVA JENE ESTATES

073W24BA TAX LOTS 8000 & 8100

1861 PARK AVE. NE

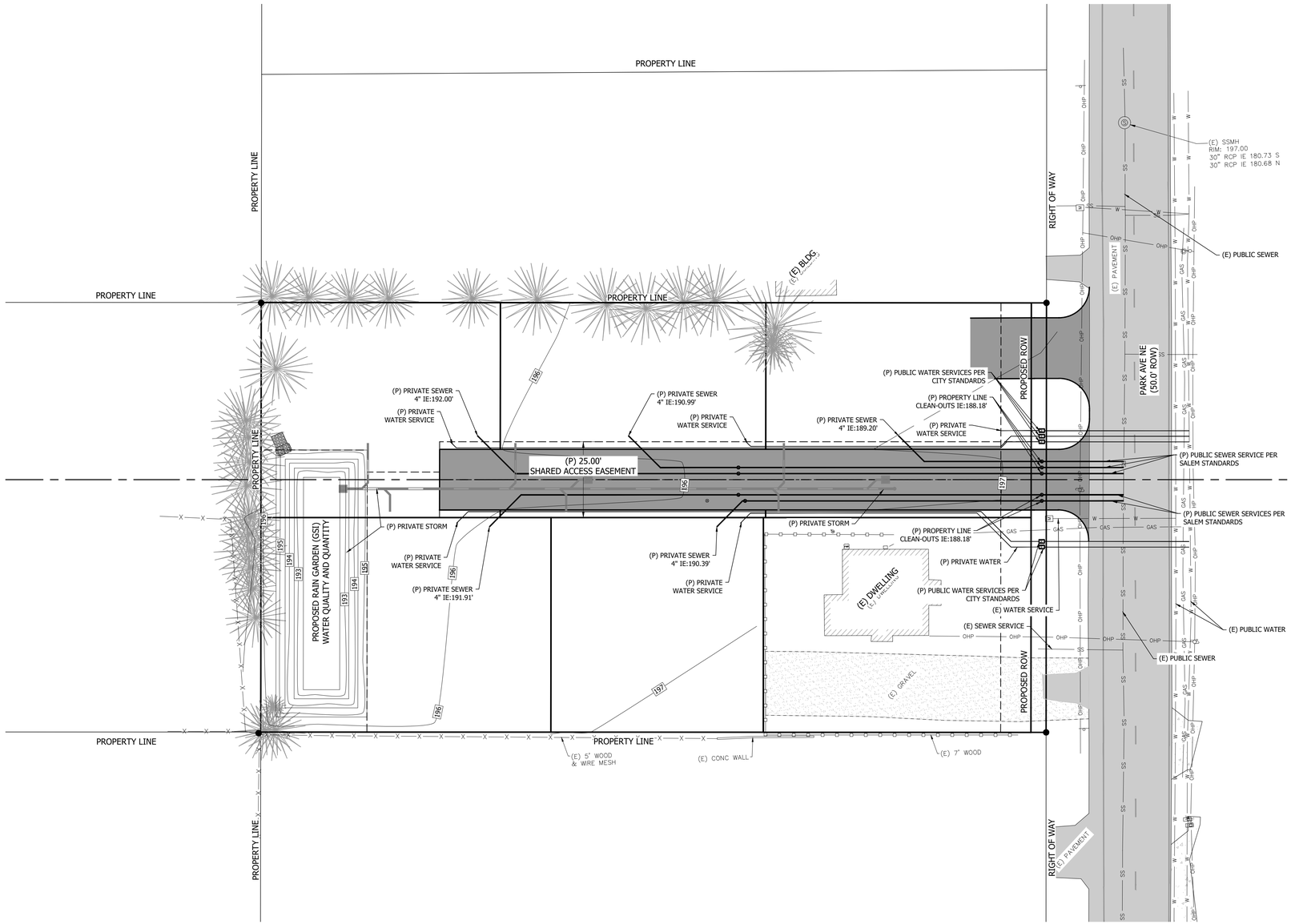
SALEM, OR

DATE: APRIL 5, 2023

PROJECT: 22-027 JENSEN PARK AVE. NE

DRAWN BY: LLL, MLM

CHECKED BY: BSV



CLIENT:
JENRAE PROPERTIES, LLC
P.O. BOX 20756
KEIZER, OR 97303
DON.JENSEN@JENSENCOLLC
(503) 932-2259

UDELL ENGINEERING AND LAND SURVEYING, LLC
63 EAST ASH ST.
LEBANON, OREGON 97355
(541) 451-5125 PH.
(541) 451-1366 FAX

PRELIMINARY UTILITY PLAN
AVA JENE ESTATES
073W24BA TAX LOTS 8000 & 8100
1861 PARK AVE. NE
SALEM, OR

DATE: APRIL 5, 2023
PROJECT: 22-027 JENSEN PARK AVE. NE
DRAWN BY: LLL, MLM
CHECKED BY: BSV

N

1 INCH
0 20'

THIS MAP WAS PREPARED FOR PLANNING PURPOSES ONLY

ATTENTION
CONTRACTOR SHALL POTHOLE EXISTING UTILITIES PRIOR TO BEGINNING CONSTRUCTION. REPORT FINDINGS TO ENGINEER.

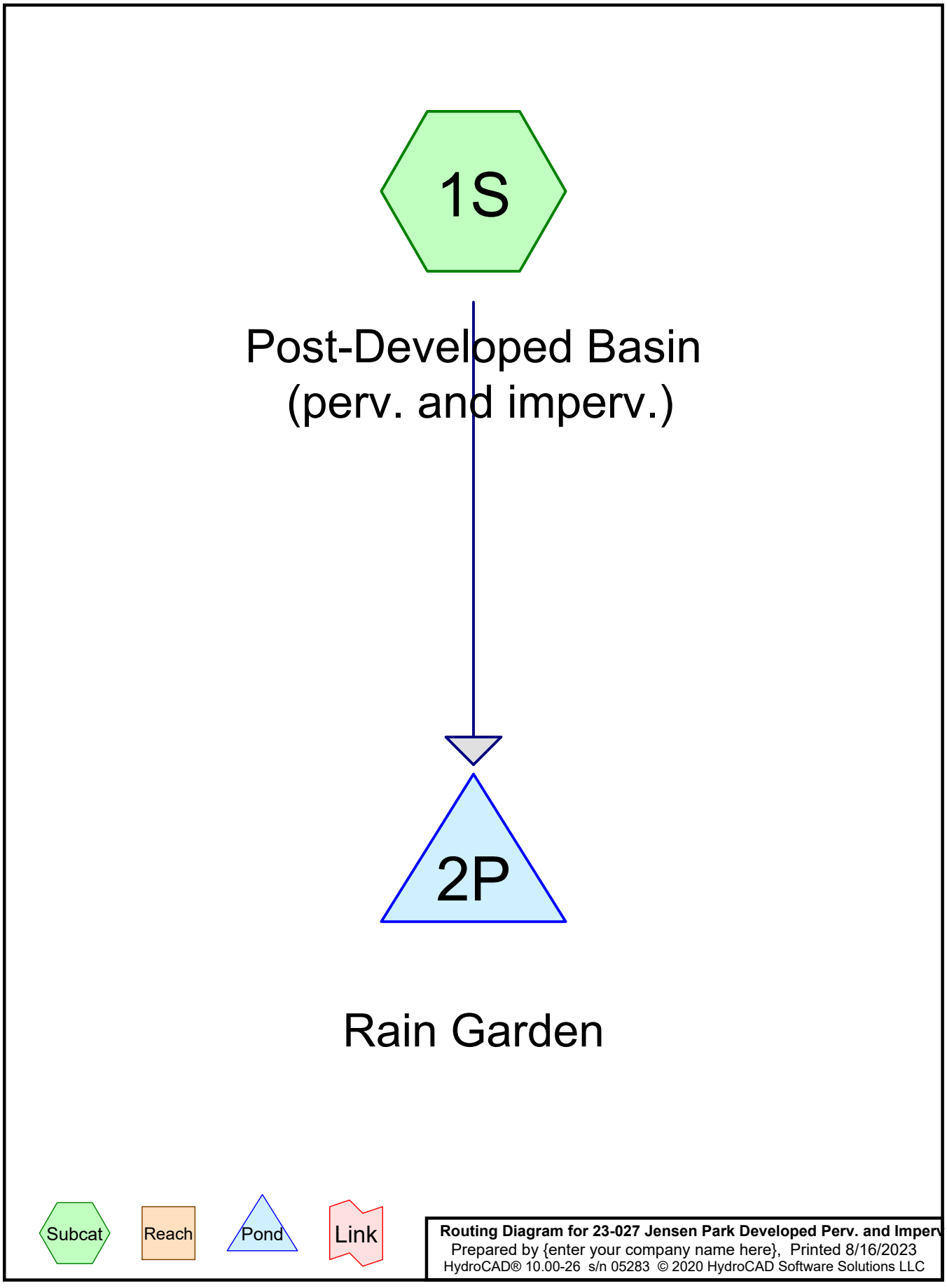
PLAN REVISIONS	DATE

Sheet C400

SCALE: SEE BARSCALE

APPENDIX E

Post-Development Hydrologic Models


1S
Post-Developed Basin
(perv. and imperv.)
2P
Rain Garden
Subcat
Reach
Pond
Link
Routing Diagram for 23-027 Jensen Park Developed Perv. and Imperv
Prepared by {enter your company name here}, Printed 8/16/2023
HydroCAD® 10.00-26 s/n 05283 © 2020 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.271	79	50-75% Grass cover, Fair, HSG C (1S)
0.436	98	Paved parking, HSG C (1S)
0.707	**91**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.707	HSG C	1S
0.000	HSG D	
0.000	Other	
0.707		**TOTAL AREA**

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Post-Developed Basin Runoff Area=30,808 sf 61.70% Impervious Runoff Depth=2.26"
Tc=10.0 min CN=91 Runoff=0.411 cfs 0.133 af

Pond 2P: Rain Garden Peak Elev=194.31' Storage=2,693 cf Inflow=0.411 cfs 0.133 af
Outflow=0.050 cfs 0.133 af

Total Runoff Area = 0.707 ac Runoff Volume = 0.133 af Average Runoff Depth = 2.26"
38.30% Pervious = 0.271 ac 61.70% Impervious = 0.436 ac

Summary for Subcatchment 1S: Post-Developed Basin (perv. and imperv.)

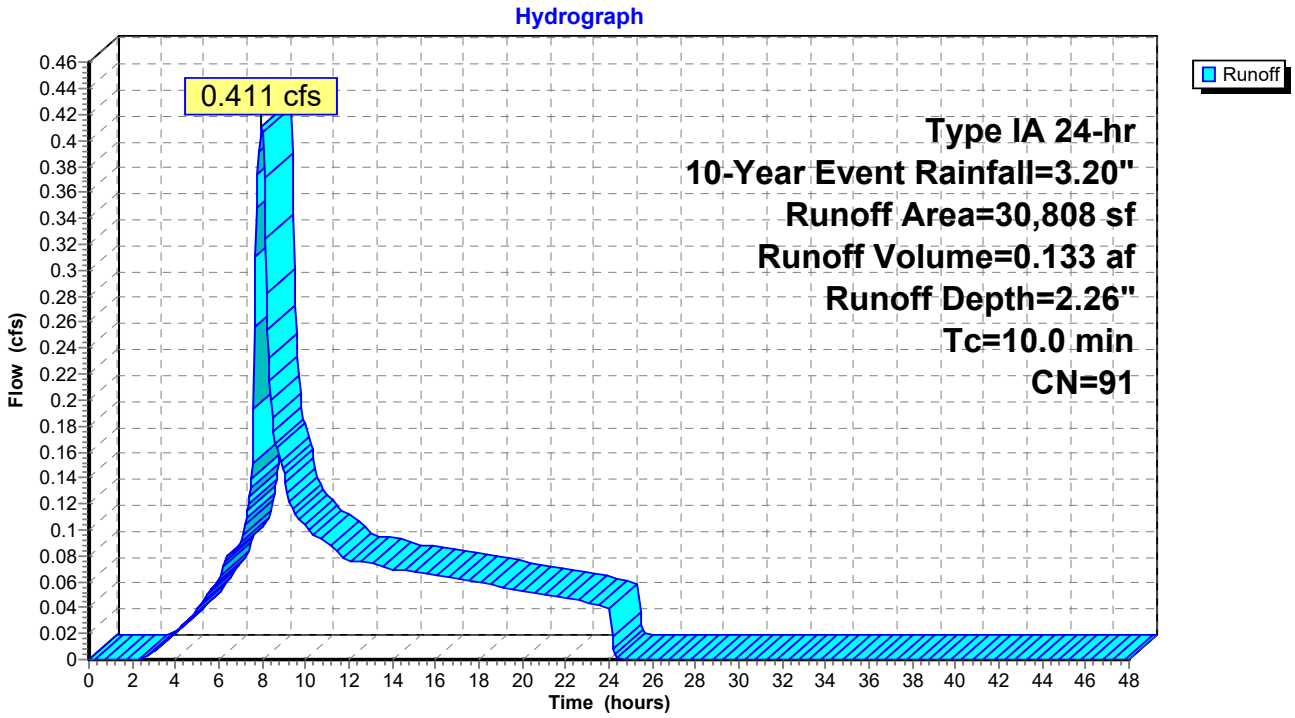
Runoff = 0.411 cfs @ 7.98 hrs, Volume= 0.133 af, Depth= 2.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10-Year Event Rainfall=3.20"

Area (sf)	CN	Description
19,007	98	Paved parking, HSG C
11,801	79	50-75% Grass cover, Fair, HSG C
30,808	91	Weighted Average
11,801		38.30% Pervious Area
19,007		61.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, Direct**

Subcatchment 1S: Post-Developed Basin (perv. and imperv.)



Summary for Pond 2P: Rain Garden

Inflow Area = 0.707 ac, 61.70% Impervious, Inflow Depth = 2.26" for 10-Year Event event
Inflow = 0.411 cfs @ 7.98 hrs, Volume= 0.133 af
Outflow = 0.050 cfs @ 20.91 hrs, Volume= 0.133 af, Atten= 88%, Lag= 775.8 min
Discarded = 0.050 cfs @ 20.91 hrs, Volume= 0.133 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 194.31' @ 20.91 hrs Surf.Area= 1,743 sf Storage= 2,693 cf

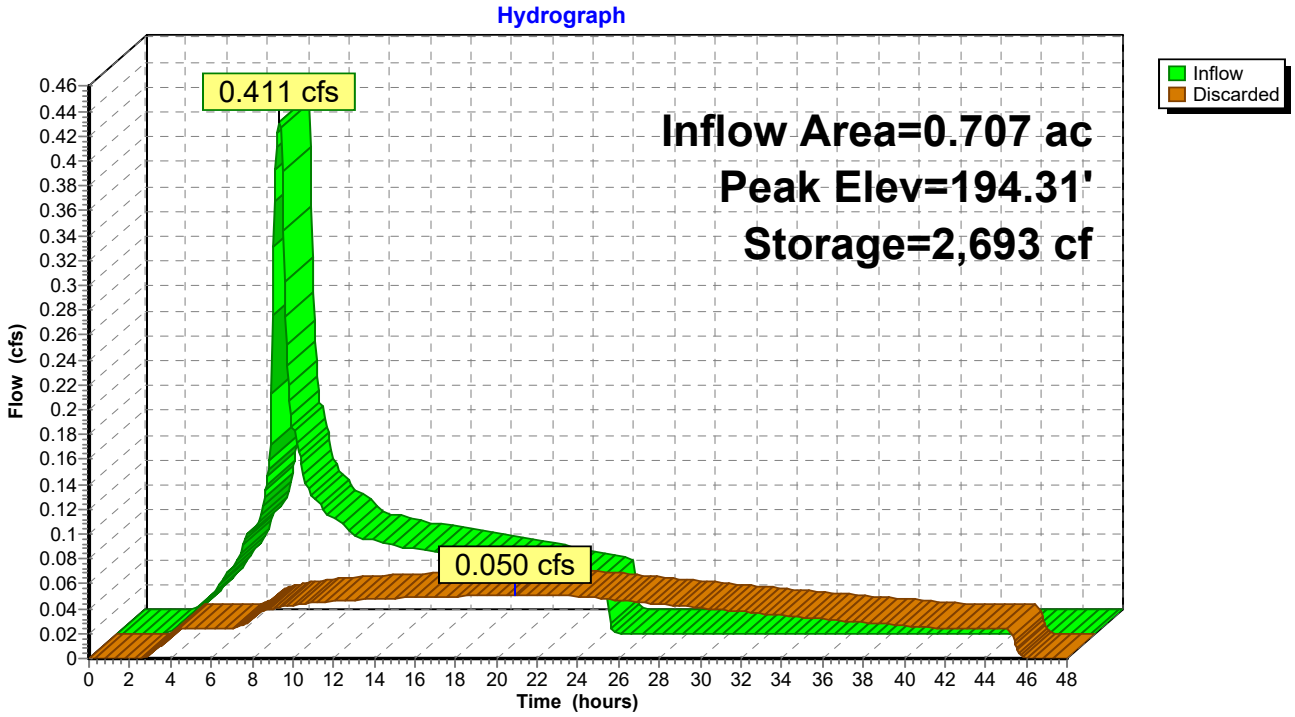
Plug-Flow detention time= 659.7 min calculated for 0.133 af (100% of inflow)
Center-of-Mass det. time= 660.3 min (1,403.0 - 742.7)

Volume	Invert	Avail.Storage	Storage Description
#1	190.46'	2,520 cf	**12.00'W x 70.00'L x 5.00'H Prismatoid** 4,200 cf Overall - 1,680 cf Embedded = 2,520 cf
#2	190.46'	336 cf	**12.00'W x 70.00'L x 1.00'H Rock Section** Inside #1 840 cf Overall x 40.0% Voids
#3	191.46'	0 cf	**12.00'W x 70.00'L x 1.00'H Amended Soil** Inside #1 840 cf Overall x 0.0% Voids
#4	192.46'	2,214 cf	**70.00'L x 3.00'H Swale Z=3.0**
		5,070 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	190.46'	**1.250 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.050 cfs @ 20.91 hrs HW=194.31' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.050 cfs)

Pond 2P: Rain Garden



Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Post-Developed Basin Runoff Area=30,808 sf 61.70% Impervious Runoff Depth=0.43"
Tc=10.0 min CN=91 Runoff=0.064 cfs 0.025 af

Pond 2P: Rain Garden Peak Elev=190.75' Storage=97 cf Inflow=0.064 cfs 0.025 af
Outflow=0.024 cfs 0.025 af

Total Runoff Area = 0.707 ac Runoff Volume = 0.025 af Average Runoff Depth = 0.43"
38.30% Pervious = 0.271 ac 61.70% Impervious = 0.436 ac

Summary for Subcatchment 1S: Post-Developed Basin (perv. and imperv.)

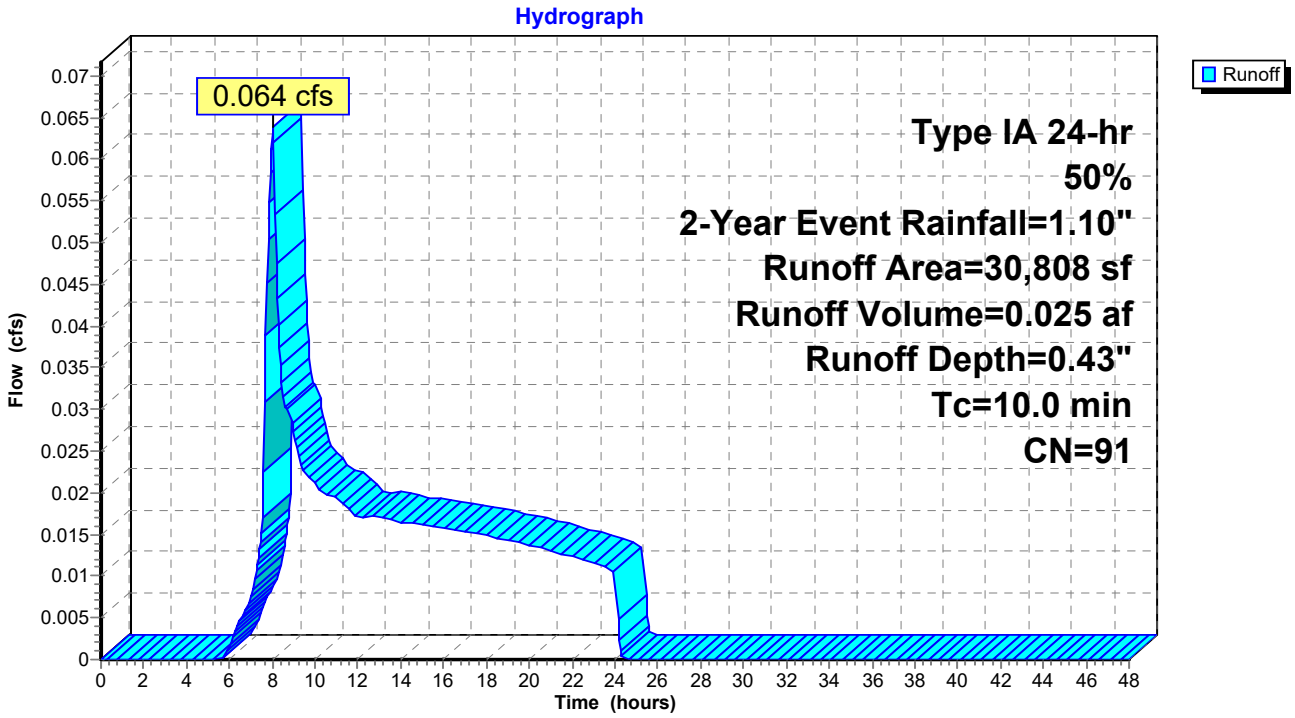
Runoff = 0.064 cfs @ 8.03 hrs, Volume= 0.025 af, Depth= 0.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type IA 24-hr 50% 2-Year Event Rainfall=1.10"

Area (sf)	CN	Description
19,007	98	Paved parking, HSG C
11,801	79	50-75% Grass cover, Fair, HSG C
30,808	91	Weighted Average
11,801		38.30% Pervious Area
19,007		61.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, Direct**

Subcatchment 1S: Post-Developed Basin (perv. and imperv.)



Summary for Pond 2P: Rain Garden

Inflow Area = 0.707 ac, 61.70% Impervious, Inflow Depth = 0.43" for 50% 2-Year Event event
Inflow = 0.064 cfs @ 8.03 hrs, Volume= 0.025 af
Outflow = 0.024 cfs @ 7.75 hrs, Volume= 0.025 af, Atten= 62%, Lag= 0.0 min
Discarded = 0.024 cfs @ 7.75 hrs, Volume= 0.025 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 190.75' @ 9.24 hrs Surf.Area= 840 sf Storage= 97 cf

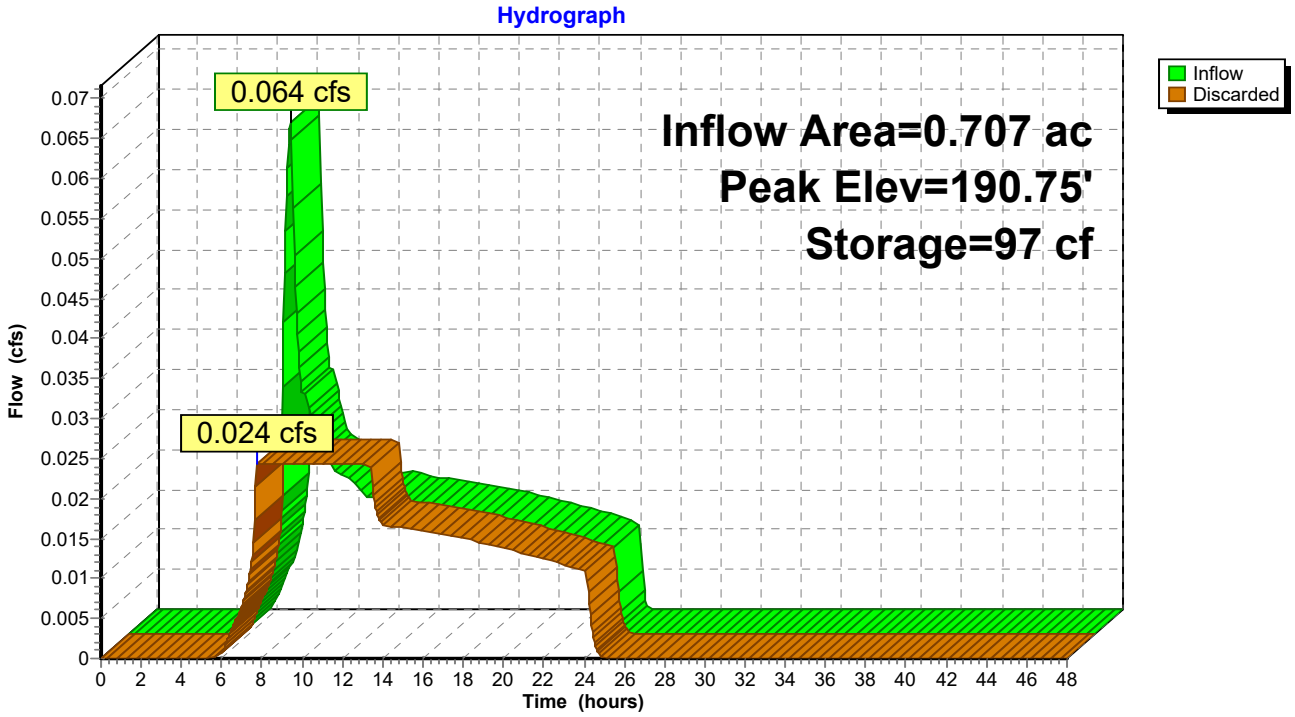
Plug-Flow detention time= 27.1 min calculated for 0.025 af (100% of inflow)
Center-of-Mass det. time= 27.1 min (868.2 - 841.1)

Volume	Invert	Avail.Storage	Storage Description
#1	190.46'	2,520 cf	**12.00'W x 70.00'L x 5.00'H Prismatoid** 4,200 cf Overall - 1,680 cf Embedded = 2,520 cf
#2	190.46'	336 cf	**12.00'W x 70.00'L x 1.00'H Rock Section** Inside #1 840 cf Overall x 40.0% Voids
#3	191.46'	0 cf	**12.00'W x 70.00'L x 1.00'H Amended Soil** Inside #1 840 cf Overall x 0.0% Voids
#4	192.46'	2,214 cf	**70.00'L x 3.00'H Swale Z=3.0**
		5,070 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	190.46'	**1.250 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.024 cfs @ 7.75 hrs HW=190.51' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.024 cfs)

Pond 2P: Rain Garden



Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Post-Developed Basin Runoff Area=30,808 sf 61.70% Impervious Runoff Depth=3.40"
Tc=10.0 min CN=91 Runoff=0.625 cfs 0.200 af

Pond 2P: Rain Garden Peak Elev=195.27' Storage=4,630 cf Inflow=0.625 cfs 0.200 af
Outflow=0.067 cfs 0.186 af

Total Runoff Area = 0.707 ac Runoff Volume = 0.200 af Average Runoff Depth = 3.40"
38.30% Pervious = 0.271 ac 61.70% Impervious = 0.436 ac

Summary for Subcatchment 1S: Post-Developed Basin (perv. and imperv.)

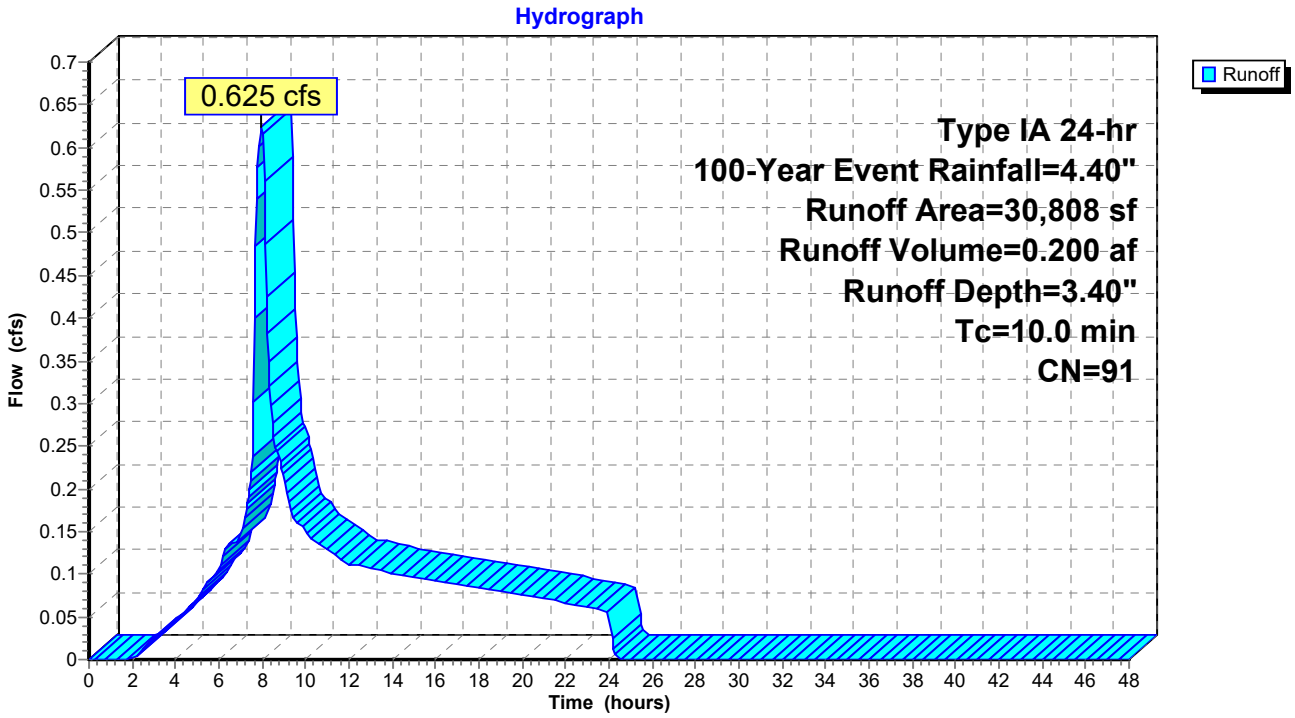
Runoff = 0.625 cfs @ 7.97 hrs, Volume= 0.200 af, Depth= 3.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100-Year Event Rainfall=4.40"

Area (sf)	CN	Description
19,007	98	Paved parking, HSG C
11,801	79	50-75% Grass cover, Fair, HSG C
30,808	91	Weighted Average
11,801		38.30% Pervious Area
19,007		61.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, Direct**

Subcatchment 1S: Post-Developed Basin (perv. and imperv.)



Summary for Pond 2P: Rain Garden

Inflow Area = 0.707 ac, 61.70% Impervious, Inflow Depth = 3.40" for 100-Year Event event
Inflow = 0.625 cfs @ 7.97 hrs, Volume= 0.200 af
Outflow = 0.067 cfs @ 21.96 hrs, Volume= 0.186 af, Atten= 89%, Lag= 839.2 min
Discarded = 0.067 cfs @ 21.96 hrs, Volume= 0.186 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 195.27' @ 21.96 hrs Surf.Area= 2,307 sf Storage= 4,630 cf

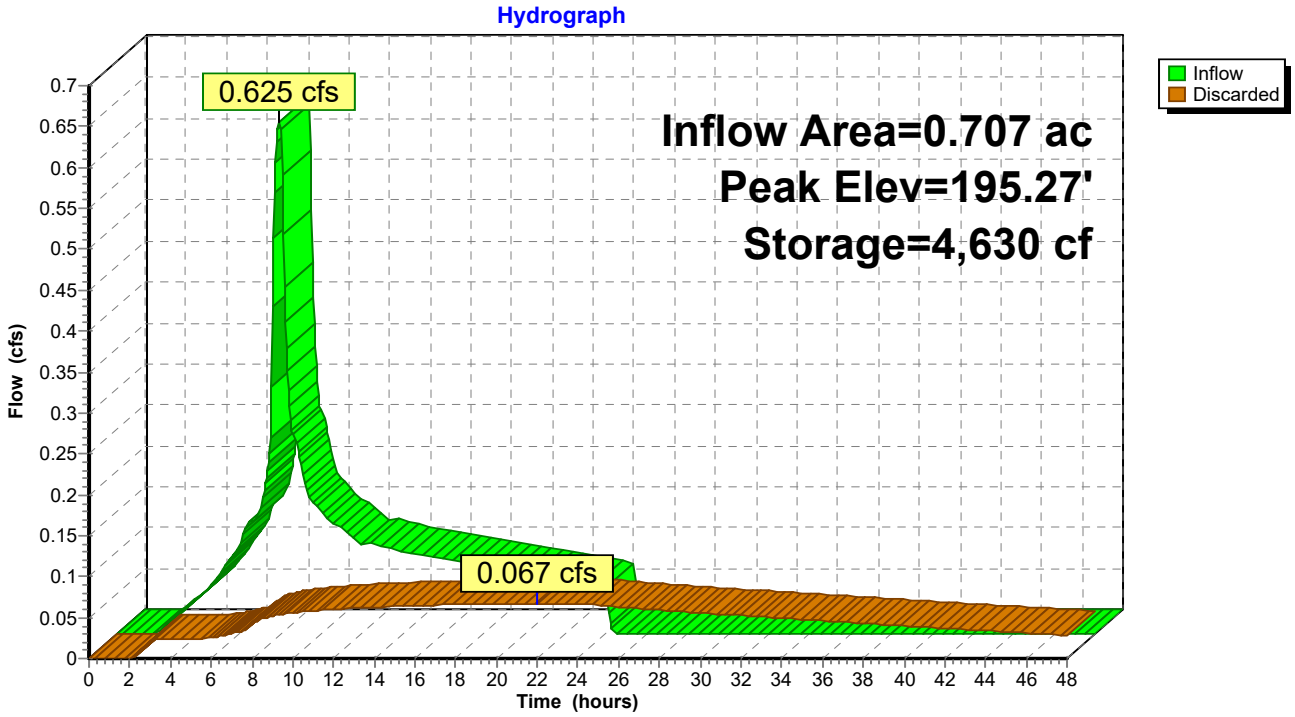
Plug-Flow detention time= 800.1 min calculated for 0.186 af (93% of inflow)
Center-of-Mass det. time= 751.2 min (1,473.4 - 722.2)

Volume	Invert	Avail.Storage	Storage Description
#1	190.46'	2,520 cf	**12.00'W x 70.00'L x 5.00'H Prismatoid** 4,200 cf Overall - 1,680 cf Embedded = 2,520 cf
#2	190.46'	336 cf	**12.00'W x 70.00'L x 1.00'H Rock Section** Inside #1 840 cf Overall x 40.0% Voids
#3	191.46'	0 cf	**12.00'W x 70.00'L x 1.00'H Amended Soil** Inside #1 840 cf Overall x 0.0% Voids
#4	192.46'	2,214 cf	**70.00'L x 3.00'H Swale Z=3.0**
		5,070 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	190.46'	**1.250 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.067 cfs @ 21.96 hrs HW=195.27' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.067 cfs)

Pond 2P: Rain Garden



Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Post-Developed Basin Runoff Area=30,808 sf 61.70% Impervious Runoff Depth=0.64"
Tc=10.0 min CN=91 Runoff=0.103 cfs 0.038 af

Pond 2P: Rain Garden Peak Elev=191.33' Storage=292 cf Inflow=0.103 cfs 0.038 af
Outflow=0.024 cfs 0.038 af

Total Runoff Area = 0.707 ac Runoff Volume = 0.038 af Average Runoff Depth = 0.64"
38.30% Pervious = 0.271 ac 61.70% Impervious = 0.436 ac

Summary for Subcatchment 1S: Post-Developed Basin (perv. and imperv.)

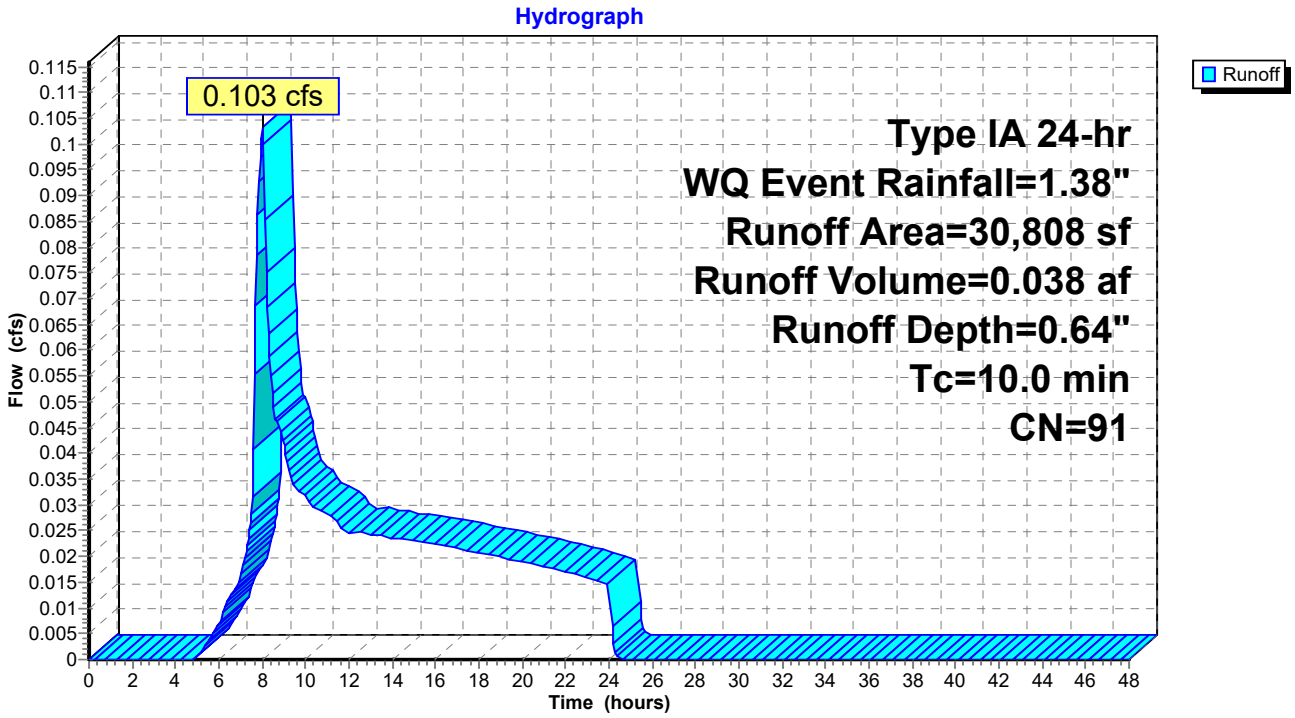
Runoff = 0.103 cfs @ 8.02 hrs, Volume= 0.038 af, Depth= 0.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type IA 24-hr WQ Event Rainfall=1.38"

Area (sf)	CN	Description
19,007	98	Paved parking, HSG C
11,801	79	50-75% Grass cover, Fair, HSG C
30,808	91	Weighted Average
11,801		38.30% Pervious Area
19,007		61.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, Direct**

Subcatchment 1S: Post-Developed Basin (perv. and imperv.)



Summary for Pond 2P: Rain Garden

Inflow Area = 0.707 ac, 61.70% Impervious, Inflow Depth = 0.64" for WQ Event event
Inflow = 0.103 cfs @ 8.02 hrs, Volume= 0.038 af
Outflow = 0.024 cfs @ 7.55 hrs, Volume= 0.038 af, Atten= 77%, Lag= 0.0 min
Discarded = 0.024 cfs @ 7.55 hrs, Volume= 0.038 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 191.33' @ 13.41 hrs Surf.Area= 840 sf Storage= 292 cf

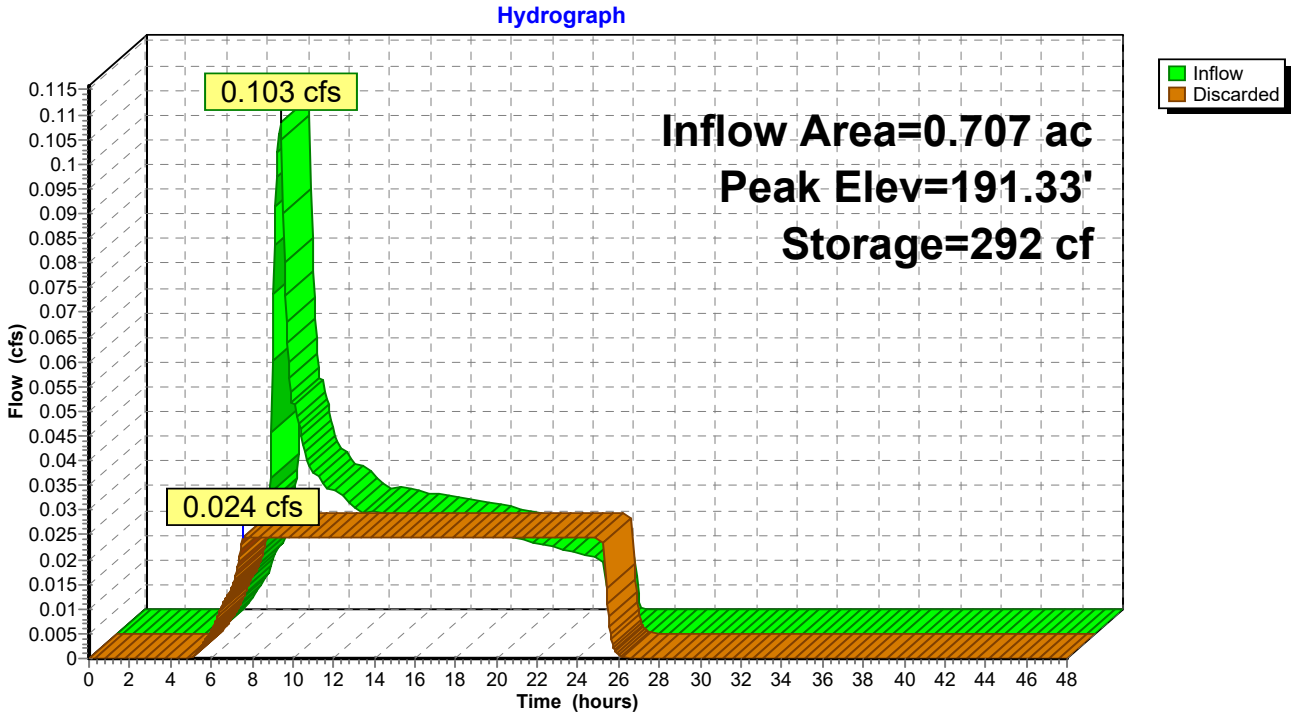
Plug-Flow detention time= 146.7 min calculated for 0.038 af (100% of inflow)
Center-of-Mass det. time= 146.7 min (962.1 - 815.4)

Volume	Invert	Avail.Storage	Storage Description
#1	190.46'	2,520 cf	**12.00'W x 70.00'L x 5.00'H Prismatoid** 4,200 cf Overall - 1,680 cf Embedded = 2,520 cf
#2	190.46'	336 cf	**12.00'W x 70.00'L x 1.00'H Rock Section** Inside #1 840 cf Overall x 40.0% Voids
#3	191.46'	0 cf	**12.00'W x 70.00'L x 1.00'H Amended Soil** Inside #1 840 cf Overall x 0.0% Voids
#4	192.46'	2,214 cf	**70.00'L x 3.00'H Swale Z=3.0**
		5,070 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	190.46'	**1.250 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.024 cfs @ 7.55 hrs HW=190.51' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.024 cfs)

Pond 2P: Rain Garden



APPENDIX F

Geotechnical Report

June 28, 2023

Mr. Don Jensen
Jensen Construction, LLC
5190 Kale Street NE
Salem, Oregon 97305

Dear Mr. Jensen:

**Re: Geotechnical Consultation and Field Infiltration Testing Services,
Proposed Single-Family Residential Development Site, Tax Lot No's. 8000 and 8100,
1861 Park Avenue NE, Salem (Marion County), Oregon**

In accordance with the request of Mr. Don Jensen of Jensen Construction, LLC, we have completed our evaluation of the soil infiltration rate at the above subject property. The scope of our work was outlined in our discussions with Mr. Don Jensen of Jensen Construction, LLC on June 1, 2023. The subject property is located to the west of Park Avenue NE and north of Market Street NE in Salem (Marion County), Oregon (see Site Vicinity Map, Figure No. 1).

Project Background

We understand that present plans are to construct five (5) new single-family residential homes at the site. Additionally, we understand that storm water from hard surfaces (i.e., roofs and/or pavements) is to be collected and disposed of on-site through a suitable storm water collection/recirculation and settling pond system located within the northwesterly and southeasterly portions of the site.

Infiltration Testing

To evaluate the feasibility of subsurface disposal of storm water, we were present at the site on June 9, 2023 and performed two (2) field infiltration tests within the northwesterly and southeasterly portions of the subject property (see Site Exploration Plan, Figure No. 2).

The testing consisted of an encased single-ring falling head infiltration test in accordance with current EPA standards and/or the City of Salem Department of Public Works test method.

Specifically, two (2) test holes were excavated with tracked excavation equipment to depths of about three (3) and/or four (4) feet beneath the existing site and/or surface grades. The subgrade soils encountered within the test holes excavated at the site consisted of an approximate 8-inch surficial layer of topsoil inturn underlain by medium to olive-brown, moist to very moist, medium stiff, sandy, clayey silt soils (ML).

Following the excavation of the test holes, a 6-inch diameter PVC pipe was inserted into the bottom of each test hole and/or to a depth of between three (3) and four (4.0) feet. Water was then placed into the plastic pipe and the sandy, clayey silt subgrade soils were presoaked and allowed to saturate over time. Following the required saturation period, the plastic pipe was again filled with approximately 12 inches of water and the rate at which the water level dropped was monitored and recorded. The test was repeated until consistent infiltration test results were obtained.

Infiltration Testing Results

The results of the field infiltration testing at the site revealed that the ultimate soil infiltration rate of the underlying sandy, clayey silt subgrade soil was between about 2.0 and 3.0 inches per hour (in/hr). As such, an allowable design infiltration rate of about 1.0 to1.5 inches per hour (in/hr) is recommended.

Following the completion of the field infiltration testing, one (1) of the infiltration test holes (FITH-#1) was advanced to a depth of approximately eight (8) feet below the existing site and/or surface grades to check for the presence of groundwater. Groundwater was not observed at the time of the field infiltration testing to a depth of at least eight (8) feet beneath the existing site and/or surface grades.

The above field infiltration rate(s) is/are based on Redmond Geotechnical Services, LLC observations during our limited subsurface exploration work at the site and may not be representative of other locations across and/or beneath the subject property. Additionally, it should be noted that site soil conditions and localized infiltration rates may vary with time and/or with changes in site utilization. As such, additional infiltration capacity may be required if future conditions indicate that the infiltration system is not functioning based on the original field infiltration testing and design parameters. Further, we recommend that any infiltration system(s) constructed at the site be field tested following construction to verify that the infiltration system functions at the rate of infiltration that it was designed for.

We appreciate this opportunity to be of service to you at this time and trust that the above information is suitable to your present needs. Should you have any questions regarding the above information or if you require any additional information and/or assistance with this project, please do not hesitate to call.

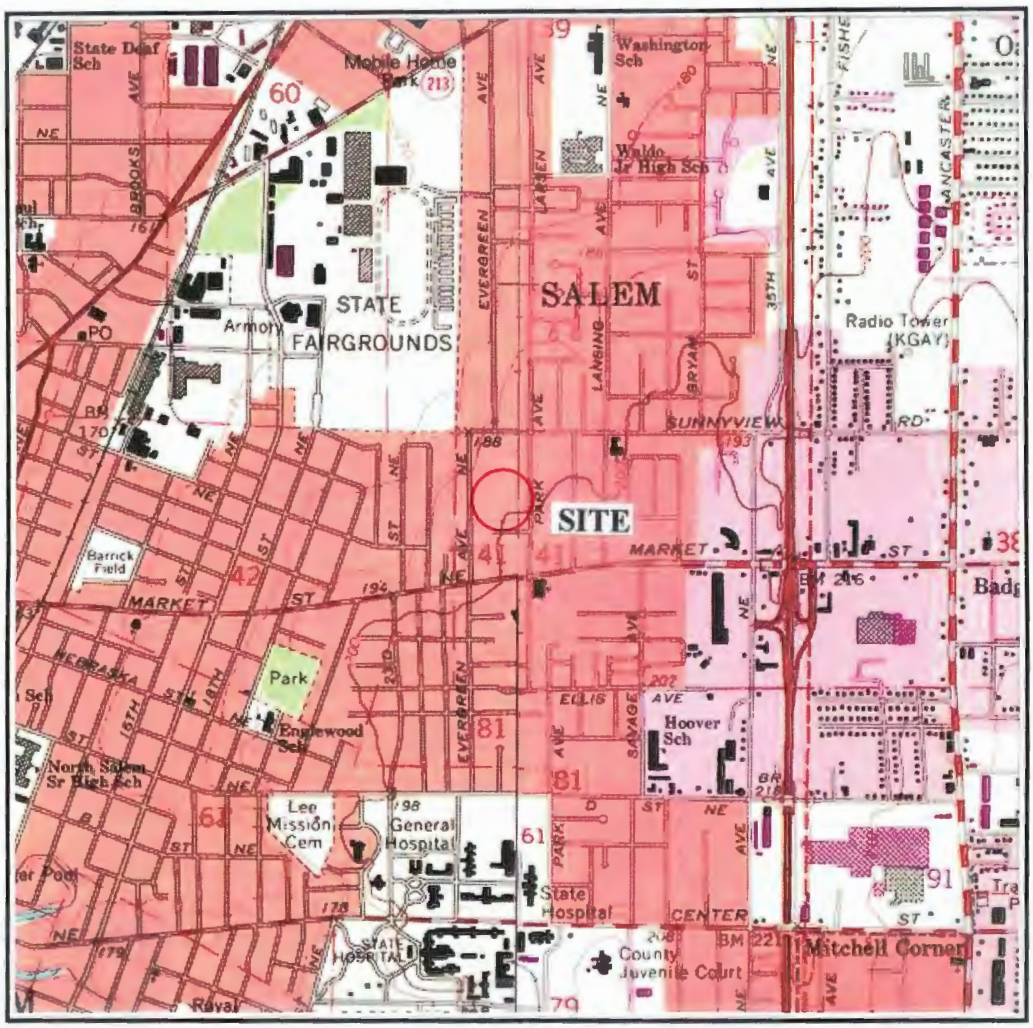
Sincerely,

Daniel M. Redmond, P.E., G.E.
President/Principal Engineer

Cc: Mr. Brian Vandetta
Udell Engineering & Land Surveying, LLC

Attachments:

Figure No. 1 - Site Vicinity Map
Figure No. 2 - Site Exploration Plan
Figure No's. 3 and 4 - Infiltration Test Data Tables



SALEM EAST QUADRANGLE
OREGON - MARION COUNTY
7.5-MINUTE SERIES

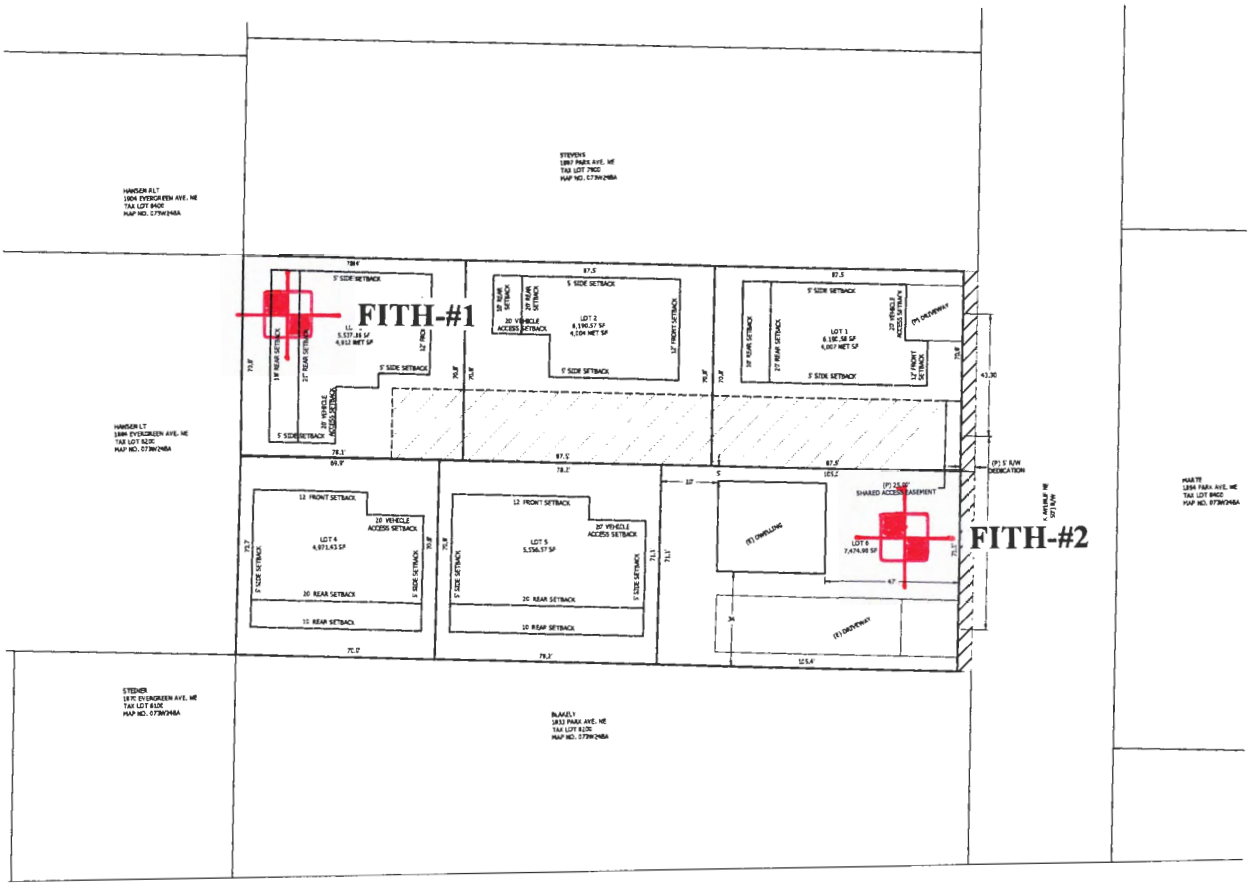
SCALE 1:24 000

1 0.5 0 KILOMETERS 1 2
1000 500 0 METERS 1000 2000
1 0.5 0 1
MILES
1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000
FEET

CONTOUR INTERVAL 10 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

SITE VICINITY MAP

Project No. 1784.004.G	**1861 PARK AVENUE NE**	Figure No. 1



LEGEND

FITH-#2 Indicates approximate location of field infiltration test hole

SITE EXPLORATION PLAN

Project No. 1784.004.G	1861 PARK AVENUE NE	Figure No. 2

Field Infiltration Test Results

Location: 1861 Park Avenue NE	**Date:** June 6, 2023	**Test Hole:** FITH-#1
Depth to Bottom of Hole: 4.0 feet	**Hole Diameter:** 6 inches	**Test Method:** Encased Falling Head
Tester's Name: Daniel M. Redmond, P.E., G.E. **Tester's Company:** Redmond Geotechnical Services, LLC		**Tester's Contact Number:** 503-285-0598

Depth (feet)	Soil Characteristics
0.0-1.0	Dark brown, sandy, clayey SILT (TOPSOIL)
1.0-4.0	Medium to olive-brown, sandy, clayey SILT (ML)

Time	Time Interval (Minutes)	Measurement (inches)	Drop in Water (inches)	Infiltration Rate (inches/hour)	Remarks
10:00	0	36.00	----		Filled w/12" water
10:10	10	36.45	0.45	2.70	
10:20	10	36.85	0.40	2.40	
10:30	10	37.22	0.37	2.22	
10:40	10	37.57	0.35	2.10	
10:50	10	37.91	0.34	2.04	
11:00	10	38.24	0.33	2.00	
11:10	10	38.57	0.33	2.00	
11:20	10	38.90	0.33	2.00	

Infiltration Test Data Table

Figure No. A-3

Field Infiltration Test Results

Location: 1861 Park Avenue NE	**Date:** June 6, 2023	**Test Hole:** FITH-#2
Depth to Bottom of Hole: 3.0 feet	**Hole Diameter:** 6 inches	**Test Method:** Encased Falling Head
Tester's Name: Daniel M. Redmond, P.E., G.E. **Tester's Company:** Redmond Geotechnical Services, LLC		**Tester's Contact Number:** 503-285-0598

Depth (feet)	Soil Characteristics
0.0-1.0	Dark brown, sandy, clayey SILT (TOPSOIL)
1.0-3.0	Medium to olive-brown, sandy, clayey SILT (ML)

Time	Time Interval (Minutes)	Measurement (inches)	Drop in Water (inches)	Infiltration Rate (inches/hour)	Remarks
10:05	0	24.00	----		Filled w/12" water
10:15	10	24.66	0.66	3.96	
10:25	10	25.27	0.61	3.66	
10:35	10	25.84	0.57	3.42	
10:45	10	26.38	0.54	3.24	
10:55	10	26.90	0.52	3.12	
11:05	10	27.41	0.51	3.06	
11:15	10	27.91	0.50	3.00	
11:25	10	28.41	0.50	3.00	

Infiltration Test Data Table

Figure No. A-4

APPENDIX G

Pipe Conveyance Calcs

10 YEAR EVENT - RATIONAL METHOD HYDROLOGY
Project: 23-027 Jensen Replat
City: Salem, Oregon
Prepared by: Udell Engineering & Land Surveying

BP 20230817

Impervious C = 0.90
Pervious C = 0.35

Default n = 0.013 (DI Pipe, Div.4 Table 4-5)
Default n = 0.010 (PVC Pipe, Div.4 Table 4-5)

Rational Hydrology										Pipe Sizing using Manning's Equation							
Pipe	Initial Subarea Tc	Total Tc	I	Basin	A IMPERV.	A PERV.	C*A incr.	TOTAL C*A	Q CIA	Length	Slope	Dia.	n	Q Cap.	V	Flow Time	This Reach's Tc at Downstream Node
	(min)	(min)	(in/hr)	-	(sf)	(sf)	(acre)	(acre)	(cfs)	(ft)	%	(in)		(cfs)	(fps)	(min)	(min)	
1	10	0.00	1.60	Downspout Pipe	2,810	2,145	0.08	0.08	0.12	10.00	1.00%	6	0.010	0.73	3.72	0.04	0.04	OK
2	10	0.00	1.60	Pond Pipe	19,007	11,801	0.49	0.49	0.78	180.00	0.40%	8	0.010	0.99	2.85	1.05	1.05	OK

APPENDIX H

Operations and Maintenance Plan

Appendix B to 109-011 – Facility Maintenance Forms

2. Rain Garden

A rain garden is a **vegetated infiltration basin** or depression created by excavation, berms, or small dams to provide for short-term ponding of surface water until it percolates into the soil. The basin should infiltrate stormwater within 24 hours.

Inspections

All facility components and vegetation shall be inspected for proper operations and structural stability. *These inspections shall occur, at a minimum, quarterly for the first two years from the date of installation, and two times per year thereafter.* It is recommended that a visual inspection be made within 48 hours after each major storm event to ensure proper function. The facility owner must keep a log, recording all inspection dates, observations, and maintenance activities. The following items shall be inspected and maintained as stated:

Date: ____/____/_____ Inspector's Name: _____

Basin inlet shall ensure unrestricted stormwater flow to the vegetated basin.

- □ Sources of erosion shall be identified and controlled when native soil is exposed or erosion channels are present.
- □ Inlet shall be kept clear at all times.
- □ Rock splash pads shall be replenished to prevent erosion.

Inspection Comments: _____

Embankment, dikes, berms, and side slopes retain water in the infiltration basin.

- □ Structural deficiencies shall be corrected upon discovery.
- □ Slopes shall be stabilized using appropriate erosion control measures when soil is exposed/flow channels are forming.
- □ Sources of erosion damage shall be identified and controlled.

Inspection Comments: _____

Overflow or emergency spillway conveys flow exceeding reservoir capacity to an approved stormwater receiving system.

- □ Overflow shall be kept clear at all times.
- □ Sources of erosion damage shall be identified and controlled when soil is exposed.
- □ Rocks or other armament shall be replaced when only one layer of rock exists.

Inspection Comments: _____

Amended soils shall allow stormwater to percolate uniformly through the infiltration basin. If water remains 36 hours after a storm, sources of possible clogging shall be identified and corrected.

- □ Basin shall be raked and, if necessary, soil shall be excavated and cleaned or replaced.

Inspection Comments: _____

Appendix B to 109-011 – Facility Maintenance Forms

2. Rain Garden (continued)

Sediment/Basin debris management shall prevent loss of infiltration basin volume caused by sedimentation.

- □ Sediment exceeding 3 inches in depth, or so thick as to damage or kill vegetation, shall be removed.
- □ Sediment accumulation shall be hand-removed with minimum damage to vegetation using proper erosion control measures.

Inspection Comments: _____

Debris and litter shall be removed to ensure stormwater infiltration and to prevent clogging of overflow drains and interference with plant growth.

- □ Restricted sources of sediment and debris, such as discarded lawn clippings, shall be identified and prevented.

Inspection Comments: _____

Vegetation shall be healthy and dense enough to provide filtering while protecting underlying soils from erosion. Proper horticultural practices shall be employed to ensure that plants are vigorous and healthy.

- □ Mulch shall be replenished as needed, but not inhibiting water flow.
- □ Vegetation, large shrubs, or trees that interfere with rain garden operation shall be pruned.
- □ Fallen leaves and debris from deciduous plant foliage shall be raked and removed.
- □ Nuisance or prohibited vegetation from the City of Salem Non-Native Invasive Plant list shall be removed when discovered. Invasive vegetation shall be removed immediately upon discovery.
- □ Dead vegetation shall be removed upon discovery.
- □ Vegetation shall be replaced as soon as possible to maintain cover density and control erosion where soils are exposed.

Inspection Comments: _____

Spill prevention measures shall be exercised when handling substances that contaminate stormwater.

- □ Releases of pollutants shall be corrected as soon as identified.

Inspection Comments: _____

Training and/or written guidance information for operating and maintaining vegetated infiltration basins shall be provided to all property owners and tenants. This Facility Maintenance Form can be used to meet this requirement.

Inspection Comments: _____

Access to the infiltration basin shall be safe and efficient. Egress and ingress routes shall be maintained to design standards. Roadways shall be maintained to accommodate size and weight of vehicles, if applicable.

- □ Obstacles preventing maintenance personnel and/or equipment access to the infiltration basin shall be removed.
- □ Gravel or ground cover shall be added if erosion has occurred.

Inspection Comments: _____

2. Rain Garden (continued)

Nuisance insects and rodents shall not be harbored in the infiltration basin. Pest control measures shall be taken when nuisance insects/rodents are found to be present.

- □ Holes in the ground located in and around the infiltration basin shall be filled.

Inspection Comments: _____

_____

If used at this site, the following will be applicable:

Fences shall be maintained to preserve their functionality and appearance.

- □ Collapsed fences shall be restored to an upright position.
- □ Jagged edges and damaged fences shall be repaired or replaced.

Inspection Comments: _____

_____

Appendix B to 109-011 – Facility Maintenance Forms

13. Conveyance: Piped

Conveyance (pipes) system shall be routinely inspected and cleaned on a scheduled cycle.

Inspection should consist of cleaning main line followed by TV inspection. Manholes and catch basins should be visually inspected annually and cleaned when sediment has reached 12 inches in depth or 50 percent of capacity has been taken.

- □ Structural deficiencies shall be corrected upon discovery:
- □ If cracks exist, repair or replace structure.

Date: ____/____/_____ Inspector's Name: _____

Access to the conveyance system shall be safe and efficient. Egress and ingress routes shall be maintained to design standards. Roadways shall be maintained to accommodate size and weight of vehicles, if applicable.

- □ Obstacles preventing maintenance personnel and/or equipment access to the conveyance system shall be removed.
- □ Gravel or ground cover shall be added if erosion has occurred.

Inspection Comments: _____

_____

Spill prevention measures shall be exercised when handling substances that contaminate stormwater.

- □ Releases of pollutants shall be corrected as soon as identified.

Inspection Comments: _____

Debris and litter shall be removed to prevent clogging.

Inspection Comments: _____

_____

Training and/or written guidance information for operating and maintaining closed channel conveyance systems shall be provided to all property owners and tenants. This Facility Maintenance Form can be used to meet this requirement.

Inspection Comments: _____

Appendix A to 109-011 – Private Stormwater Facilities Agreement

This Agreement is made and entered into this _____ day of _____ 20___, by and between the City of Salem (City) and _____ (Owner) whose address is _____.

RECITALS

A. Owner has developed or will develop property with the stormwater facilities listed below. (List the type of private stormwater facilities on site and the quantity of each type).

Facility type (list each)	Quantity

B. The Facilities enable development of property while mitigating the adverse impacts of stormwater runoff and pollutants associated with stormwater runoff prior to discharge from the property directly or indirectly to the public stormwater system, another private stormwater system, or to receiving waters.

C. The property benefited by the stormwater facilities and subject to the obligation of this Agreement is described below or in Exhibit A (Property) attached hereto and incorporated by reference, with the location of each stormwater facility as indicated.

D. The stormwater facilities are designed by a registered professional engineer in accordance with the requirements of Salem Revised Code Chapter 71 (Stormwater) and the *Public Works Design Standards*.

E. Failure to properly inspect and maintain the stormwater facilities can result in unacceptable impacts to the public stormwater system, receiving waters, the environment, and downstream properties.

Appendix A to 109-011 – Private Stormwater Facilities Agreement

NOW, THEREFORE, it is agreed by and between the parties as follows:

1. MAINTENANCE

Owner agrees to maintain each stormwater facility in accordance with requirements provided by, or approved by, the City so that it is in proper working condition for effective pollutant removal, infiltration, and/or flow control.

2. INSPECTION

Owner agrees to inspect each stormwater facility in accordance with requirements provided by, or approved by, the City.

3. RECORDKEEPING

Owner agrees to maintain a record of the construction of, and all inspections, maintenance, and repair activities to, each stormwater facility and to make plans, records, procedures, and schedules of maintenance available to the Public Works Director during inspection of each stormwater facility, and at other reasonable times upon request of the Public Works Director.

4. REPAIR

Owner agrees to make any repairs as necessary to keep each stormwater facility in continuous working order. All deficiencies shall be corrected at Owner's expense within 30 days after the deficiency has been identified a deficiency, unless more than 30 days is reasonably needed to correct a deficiency. Owner shall have a reasonable period to correct the deficiency so long as the correction is commenced within the 30-day period and is diligently prosecuted to completion.

5. CITY CORRECTIONS

If correction of all Owner- or City-identified deficiencies is not completed within 30 days after Owner's inspection or City notice, City shall have the right to have any deficiencies corrected. In such instances, City:

(i) Shall have access to the stormwater facilities for the purpose of correcting such deficiencies; and

(ii) Shall bill Owner for all costs reasonably incurred by City for work performed to correct the deficiencies following Owner's failure to correct any deficiencies in the Facilities.

Owner shall pay the City within 30 days of the date of the invoice. Owner understands and agrees that upon non-payment, City may place a lien on the property for the amount plus interest and penalties.

6. ACCESS

Owner grants City the right to inspect the stormwater facilities. City will endeavor to give at least 10 days prior notice to Owner, except that no notice shall be required in case of an emergency. City shall determine whether deficiencies need to be corrected. Owner will be notified in writing of the deficiencies.

Appendix A to 109-011 – Private Stormwater Facilities Agreement

7. CHANGE OF OWNERSHIP

If a change of ownership occurs, owner agrees to transfer all records of installation, repair, and maintenance of each stormwater facility to the new property owner. Owner will inform future purchasers and other successors and assignees of the existence of the stormwater facility and of the requirements for continued inspection and maintenance of the stormwater facility.

8. EMERGENCY MEASURES

If, at any time, City reasonably determines that a stormwater facility is creating an imminent threat to public health, safety, or welfare, City may immediately and without prior notice to Owner take measures reasonably designed to remedy the threat. City shall provide notice of the threat and the measures taken to Owner as soon as reasonably practicable. City may charge Owner for the cost of these corrective measures.

9. HOLD HARMLESS

Owner shall indemnify and hold City harmless from any and all claims for damages to persons or property arising from the construction, operation, inspection, maintenance, or use of each stormwater facility.

10. FORCE AND EFFECT

This Agreement has the same force and effect as any deed covenant running with the land and shall benefit and bind all owners of the property present and future, and their heirs, successors and assigns.

11. AMENDMENTS

The terms of this Agreement may be amended only by mutual agreement of the parties. Any amendments shall be in writing, shall refer specifically to this Agreement, and shall be valid only when executed by the owners of the property and the City and recorded in the Official Records of the county where the Property is located.

12. PREVAILING PARTY

In any action brought by either party to enforce the terms of this Agreement, the prevailing party shall be entitled to recover all costs, including reasonable attorney's fees as may be determined by the court having jurisdiction, including any appeal.

13. SEVERABILITY

The invalidity of any section, clause, sentence, or provision of this Agreement shall not affect the validity of any other part of this Agreement, which can be given effect without such invalid part or parts.

After recording, return to:
City of Salem Public Works Department
555 Liberty Street SE, Room 325
Salem OR 97301-3513

Appendix A to 109-011 – Private Stormwater Facilities Agreement

IN WITNESS WHEREOF, the parties hereto have signed this Agreement as of the date below.

By: _____
Owner

_____
Title

STATE OF OREGON)
) ss.
County of _____)

This instrument was acknowledged before me on _____, 20____, by _____.

_____
Notary Public—State of Oregon
My commission expires: _____

Approved:

By: _____
Public Works Director

City of Salem, Oregon

By: _____
City Manager

STATE OF OREGON)
) ss.
County of _____)

This instrument was acknowledged before me on _____, 20____, by _____, as City Manager of the City of Salem, Oregon.

_____
Notary Public—State of Oregon
My commission expires: _____