7154

PRELIMINARY DRAINAGE REPORT
FOR

Oak Grove Subdivision
Salem, Oregon

Prepared For:
R & S Kamineni
2500 Gleneagles Road
Lake Oswego, Oregon 97034

December 3, 2021

MULTI/TECH
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INTRODUCTION

The Oak Grove Subdivision is a proposed 57-lot subdivision located east of Lone Oak Road SE and south of La Cresta Drive SE. The parcel of land to be developed is Tax Lots 1900 through 2200 of Marion County Assessor's Map 08 3W 15CB. A vicinity map and supporting maps are in Appendix A of this report. An aerial image is below.

Project Site

Green Stormwater Infrastructure (GSI) to the Maximum Extent Feasible (MEF) is being used for the new developed areas per City of Salem Administrative Rules, Chapter 109, Division 004, Stormwater System, Appendix 4E and Ordinance No. 8-20 (Standards). All facilities will be constructed to meet the City of Salem Standards.

EXISTING CONDITIONS

The 12.2-acre site is irregular in the shape. Surface conditions consist of grassy meadow and Wooded areas. There are no identified wetlands or sensitive areas located on the property. A topographical high point ridge is located on the southerly property line near the terminus of the existing Sarah Renee Avenue SE. Drainage from this high point flows north, east, and west. The maximum relief is approximately 65.5-feet with a high point elevation of 561.5-feet. The abutting properties are zoned

single family residential with public improvements that include storm water conveyance systems. Appendix A contains multiple maps of the site.

Soils

The Natural Resources Conservation Service (NRCS) Soil Resource Report for Marion County was used to determine the Hydrological Soil Group classifications for runoff calculations. The report identifies the site soils to be Jory and Nekia soils. All the soils are in the hydrologic soil group C. The report is in Appendix B.

Infiltration

Infiltration testing will be performed at the site to determine percolation rates of the soils. It is anticipated that test results will indicate rates below 0.5 inches.

Water Quality Methodology

Because of anticipated poor percolation rates of the soils and natural steep slopes that dominate the site, green stormwater facilities are designed as combination facilities.

Water Quality Analysis

Water quality flow rates will be calculated with HydroCAD 10.00. The SCS TR-20 Unit Hydrograph method will be used to generate the hydrographs. A Type 1A storm and a 24-hour rainfall depth of 1.38 inches per hour will be used to determine the water quality flow rate.

Water Quality Design

The multiple combination facilities will provide water quality treatment by allowing for the removal of pollutants through sedimentation, adsorption onto surrounding vegetation, filtration, and biological uptake. The facilities will be designed per the City of Salem designed standards.

Stormwater Quantity Analysis

Stormwater quantity (Flow Control) is proposed to be handled by on-site detention. Runoff from the developed site will be routed to the facilities that ultimately controls runoff to pre-developed flow rates. Approximately 12.6-acres of land are being disturbed and developed.

Per Subsection 4.2(p)(3)(A) of the standards, one-half of the post development peak runoff rate of the two-year storm must be equal to or less than one-half of the peak runoff rate of the pre-developed two-year, 24-hour storm. This also applies to the 10, 25 and 100-year, 24-hour storm events.

The pre-developed flow rates were calculated using HydroCAD 10.00. Table 1 below lists the 24-hour rainfall depths used for the analysis of each storm event. Please note that the 2-year event was halved and then analyzed.

Table 1

Storm Event	24-hour Rainfall Depth (in)
2	2.2
10	3.2
25	3.6
100	4.4

For the pre-developed conditions, a time of concentration of 62 minutes was calculated for the Basin. The time of concentration data is in Appendix C. The calculations are incorporated in the HydroCAD output located in Appendix D. The entire area was classified as "City of Salem Pre-Development, HSG C" with a Curve Number (CN) of 72. A pre-developed basin map is in Appendix A.

The SCS TR-20 Unit Hydrograph method was used to generate the hydrographs. A Type 1A rainfall distribution was used with the above rainfall depths. Table 2 below identifies the allowable pre-developed release rate for each storm event.

Table 2

Storm Event	Basin Allowable Release Rate (cfs)
Half of 2-year	0.04
10-year	1.26
25-year	1.79
100-year	3.01

The post-developed flow rates were calculated using HydroCAD 10.00. A time of concentration of 10 minutes was assumed for the developed site. The calculations are incorporated in the HydroCAD output located in Appendix D. Because of existing surrounding streets and large lot areas, the site was classified as 40 percent "Impervious, HSG C" with a CN of 98 and 60 percent “> 75% Grass cover, HSG C” with a CN of 74. Table 3 below lists the CN values for the developed areas that will contribute storm water runoff to the detention systems. A developed basin map is in Appendix A.

Table 3

Basin	Impervious Area (Ac) CN = 98	Landscape Area (Ac) CN = 74	TOTAL Area (Ac)	Composite CN
Site	5.04	7.56	12.60	84

Table 4 below identifies the calculated detention volume requirements for each storm event. The required detention was determined by using HydroCAD and taking the differential runoff volume between predeveloped and developed conditions.

Table 4

Storm Event	Basin Detention Volume (cf)
1/2 of 2-year	7,900
10-year	34,425
25-year	38,200
100-year	44,825

The proposed four detention systems will be located near the lowest corners to maximize the capture of runoff. A basin map has been provided in Appendix A showing the location of the detention ponds/combination facilities. Allowable flow rates for the entire site are identified in Table 2 above.

STORMWATER QUALITY ANALYSIS

Water quality flow rates were calculated using HydroCAD 10.00. The SCS TR-20 Unit Hydrograph method was used to generate the hydrographs. A Type 1A rainfall distribution was used with a 1.38 rainfall depth. Appendix D contains the analysis.

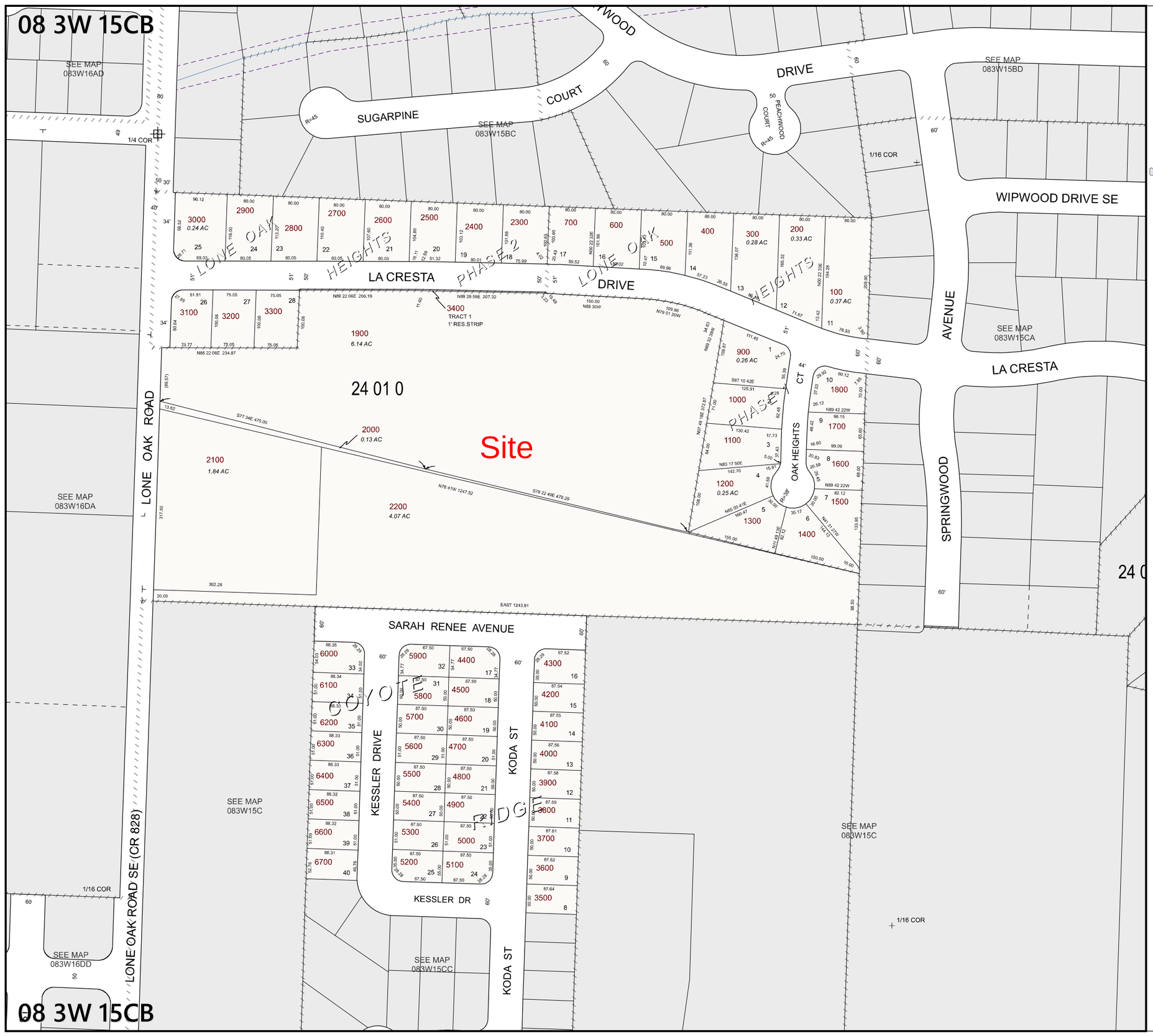
The detention facilities will incorporate combination facility sections and will be constructed per City of Salem standards.

CONCLUSION

Based on the presented information, the proposed design will meet the water quality and quantity standards. If there are any questions regarding this analysis or the design, please contact Matthew

Hendrick at Multi/Tech Engineering by phone at (503) 363-9227 or via e-mail at mhendrick@mtengineering.net.

Appendix A



08 3W 15CB
SALEM

MARION COUNTY, OREGON
NW1/4 SW1/4 SEC15 T8S R3W W.M.
SCALE 1" = 100'

LEGEND

LINE TYPES

- Taxlot Boundary
- Historical Boundary
- Road Right-of-Way
- Easement
- Railroad Right-of-Way
- Railroad Centerline
- Private Road ROW
- Taxcode Line
- Subdivision/Plat Bndry
- Map Boundary
- Waterline - Taxlot Bndry
- Waterline - Non Bndry

CORNER TYPES

- + 1/16TH Section Cor.
- 1/4 Section Cor.
- DLC Corner
- 16 15 / 21 22 Section Corner

NUMBERS

Tax Code Number
00 00 0

Acreage
0.25 AC

All acres listed are Net Acres, excluding any portions of the taxlot within public ROWs

NOTES

Tick Marks: A tick mark in the road indicates that the labeled dimension extends into the public ROW

200.00 / 175.00

CANCELLED NUMBERS

800

DISCLAIMER: THIS MAP WAS PREPARED FOR ASSESSMENT PURPOSES ONLY

Marion County OREGON — Assessors Office Cartography Dept

FOR ADDITIONAL MAPS VISIT OUR WEBSITE AT
www.co.marion.or.us

PLOT DATE: 10/16/2020

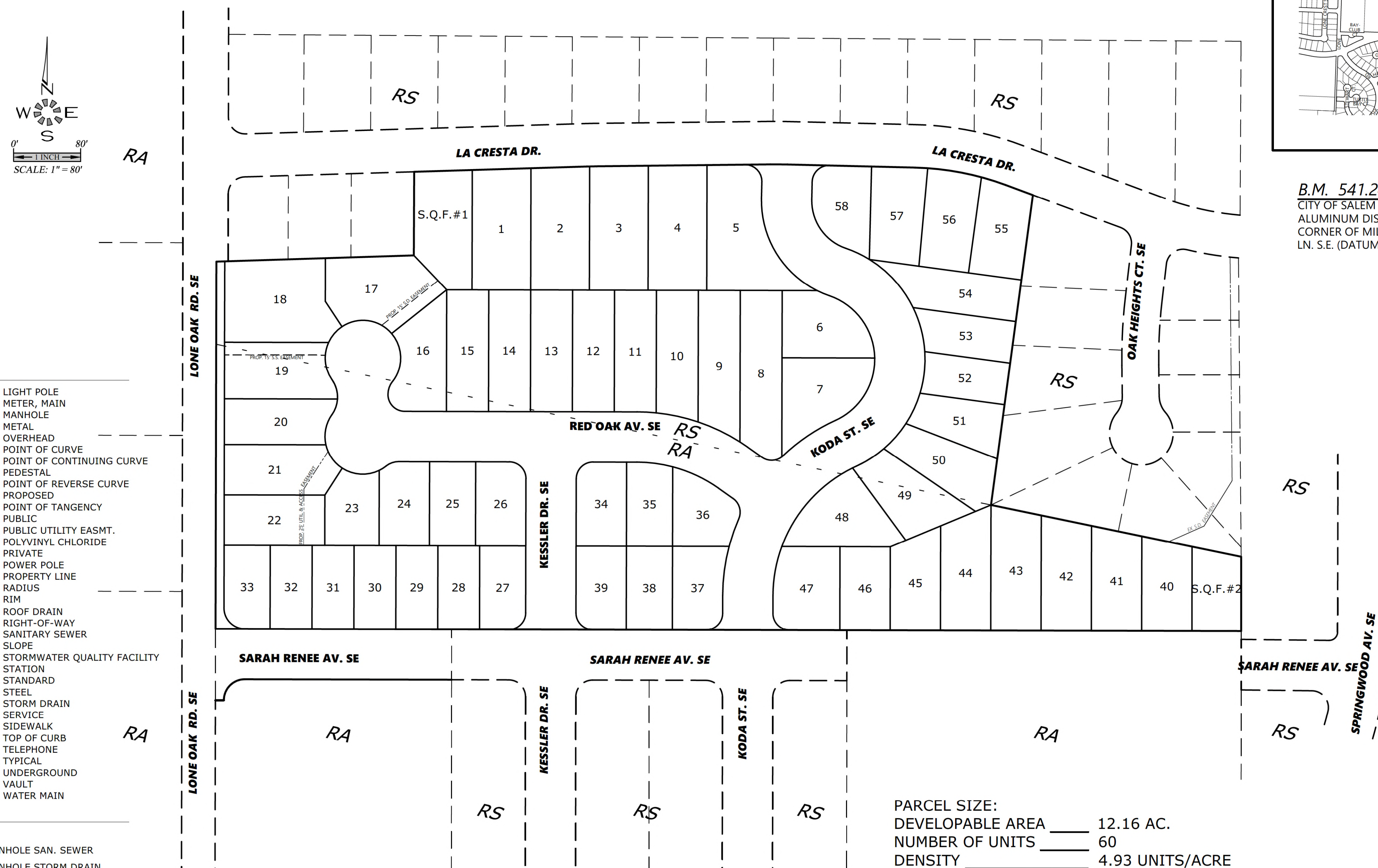
SALEM
08 3W 15CB

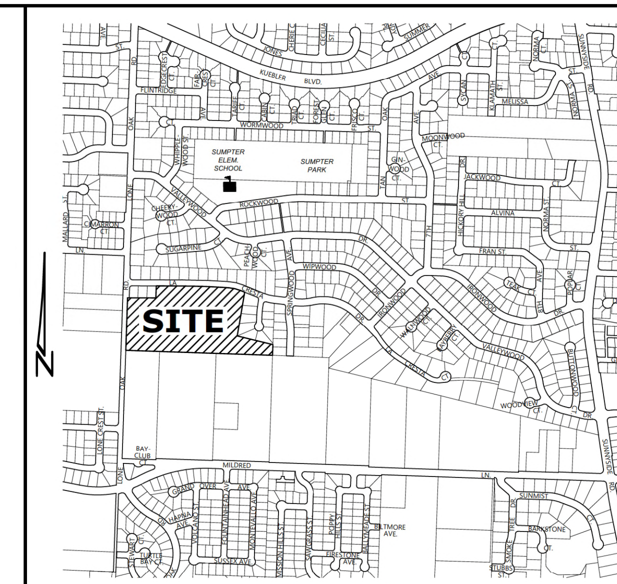
OAK GROVE

SEC. 15, T. 8 S., R. 3 W., W.M.
CITY OF SALEM
MARION COUNTY, OREGON

Owner / Developer:

Dr. Raghu Kamineni
2500 GLENEAGLES RD.
LAKE OSWEGO, OREGON 97034





VICINITY MAP
1" = 800'

B.M. 541.24
CITY OF SALEM BENCHMARK. A 2 INCH ALUMINUM DISK SET IN CURB AT THE S.E. CORNER OF MILDRED LN. S.E. & SAWGRASS LN. S.E. (DATUM: NGVD 29)

ABBREVIATIONS

A.C.	ASPHALTIC CONCRETE	L.P.	LIGHT POLE
ACMP	ALUMINIZED CMP	M	METER, MAIN
ASSY.	ASSEMBLY	M.H.	MANHOLE
B.O.	BLOW OFF	MTL.	METAL
B.F.V.	BUTTERFLY VALVE	O.H.	OVERHEAD
C & G	CURB & GUTTER	PC	POINT OF CURVE
CATV	CABLE TELEVISION	PCC	POINT OF CONTINUING CURVE
C.B.	CATCH BASIN	PED.	PEDESTAL
C.B.C.O.	CATCH BASIN CLEANOUT	PRC	POINT OF REVERSE CURVE
C.B.I.	CATCH BASIN INLET	PROP.	PROPOSED
C.L.	CENTERLINE	PT	POINT OF TANGENCY
CMP	CORRUGATED METAL PIPE	PUB.	PUBLIC
C.O.	CLEANOUT	PUE	PUBLIC UTILITY EASMT.
CONC.	CONCRETE	PVC	POLYVINYL CHLORIDE
CONST.	CONSTRUCT	PVT.	PRIVATE
CPP	CORRUGATED PLASTIC PIPE	P.P.	POWER POLE
D.I.	DUCTILE IRON	P.L.	PROPERTY LINE
DIA.	DIAMETER	R	RADIUS
DWG.	DRAWING	R-	RIM
EASMT.	EASEMENT	RD	ROOF DRAIN
E.G.	EXIST. GRADE / GROUND	R.O.W.	RIGHT-OF-WAY
EOP, E.P.	EDGE OF PAVEMENT	SAN.S. or S.S.	SANITARY SEWER
ELEC.	ELECTRIC	S	SLOPE
ELEV. or EL.	ELEVATION	S.Q.F.	STORMWATER QUALITY FACILITY
EX. or EXIST.	EXISTING	STA.	STATION
FT.	FEET	STD.	STANDARD
F.F.	FINISH FLOOR	STL.	STEEL
F.G.	FINISH GRADE	STM.DRN. or S.D.	STORM DRAIN
F.H.	FIRE HYDRANT	SVC.	SERVICE
F.M.	FORCE MAIN	SW	SIDEWALK
GUT. or GTR.	GUTTER	T.C.	TOP OF CURB
G.V.	GATE VALVE	TEL.	TELEPHONE
IMP.	IMPROVEMENT	TYP.	TYPICAL
INST.	INSERT	U.G.	UNDERGROUND
INV. or I-	INVERT	VLT.	VAULT
L	LENGTH, LINE	W.M.	WATER MAIN

SYMBOLS

EXIST. PROP.		EXIST. PROP.	
	BLOW OFF ASSY.		MANHOLE SAN. SEWER
	CATCH BASIN		MANHOLE STORM DRAIN
	CATCH BASIN CLEANOUT		2' DIA. C.O. / M.H.
	CATCH BASIN INLET		MANHOLE TELEPHONE
	CATV PED. / BOX		MANHOLE WATER
	CLEANOUT		REDUCER / INCREASER
	ELEC. PED. / BOX		TEL. PED. / BOX
	FIRE HYDRANT		TRAFFIC PED. / BOX
	GAS LOCATION MARKER		UTILITY / POWER POLE
	GAS VALVE		WATER METER
	MAIL BOX		WATER VALVE

CABLE TELEVISION	SANITARY SEWER EXIST.
CENTERLINE	SANITARY SEWER PROP.
DITCH C.L.	STORM DRAIN EXIST.
ELECTRICAL LINE	STORM DRAIN PROP.
GAS MAIN	WATER MAIN EXIST.
TELEPHONE LINE	WATER MAIN PROP.

Drawing is NOT to scale

PARCEL SIZE:

DEVELOPABLE AREA	12.16 AC.
NUMBER OF UNITS	60
DENSITY	4.93 UNITS/ACRE
LARGEST	12,327 SQ. FT.
SMALLEST	5,000 SQ. FT.
AVERAGE	8,827 SQ. FT.

UTILITIES:

CABLE	COMCAST CABLE SERVICES
POWER	P.G.E.
PHONE	CENTURY LINK
GAS	N.W. NATURAL
STORM DRAIN, SANITARY SEWER, WATER.	CITY OF SALEM

SHEET INDEX

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SHEET P4	STREET PLAN — KODA ST.
SHEET P5	STREET PLAN — WHITE OAK AV.
SHEET P6	STREET PLAN — RED OAK ST.
SHEET P7	STREET PLAN — SARAH RENEE AV.
SHEET P8	STREET PLAN — LONE OAK RD.
SHEET P9	LOT GRADING PLAN
SHEET P10	LOT LAYOUT PLAN
SHEET P11	TREE CONSERVATION OVERALL PLAN
SHEET P12	TREE CONSERVATION N.W. QUADRANT
SHEET P13	TREE CONSERVATION N.E. QUADRANT
SHEET P14	TREE CONSERVATION S.W. QUADRANT
SHEET P15	TREE CONSERVATION S.E. QUADRANT

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COVER SHEET

OAK GROVE

NO CHANGES, MODIFICATIONS OR REPRODUCTIONS TO BE MADE TO THESE DRAWINGS WITHOUT WRITTEN AUTHORIZATION FROM THE DESIGN ENGINEER.

DIMENSIONS & NOTES TAKE PRECEDENCE OVER GRAPHICAL REPRESENTATION.

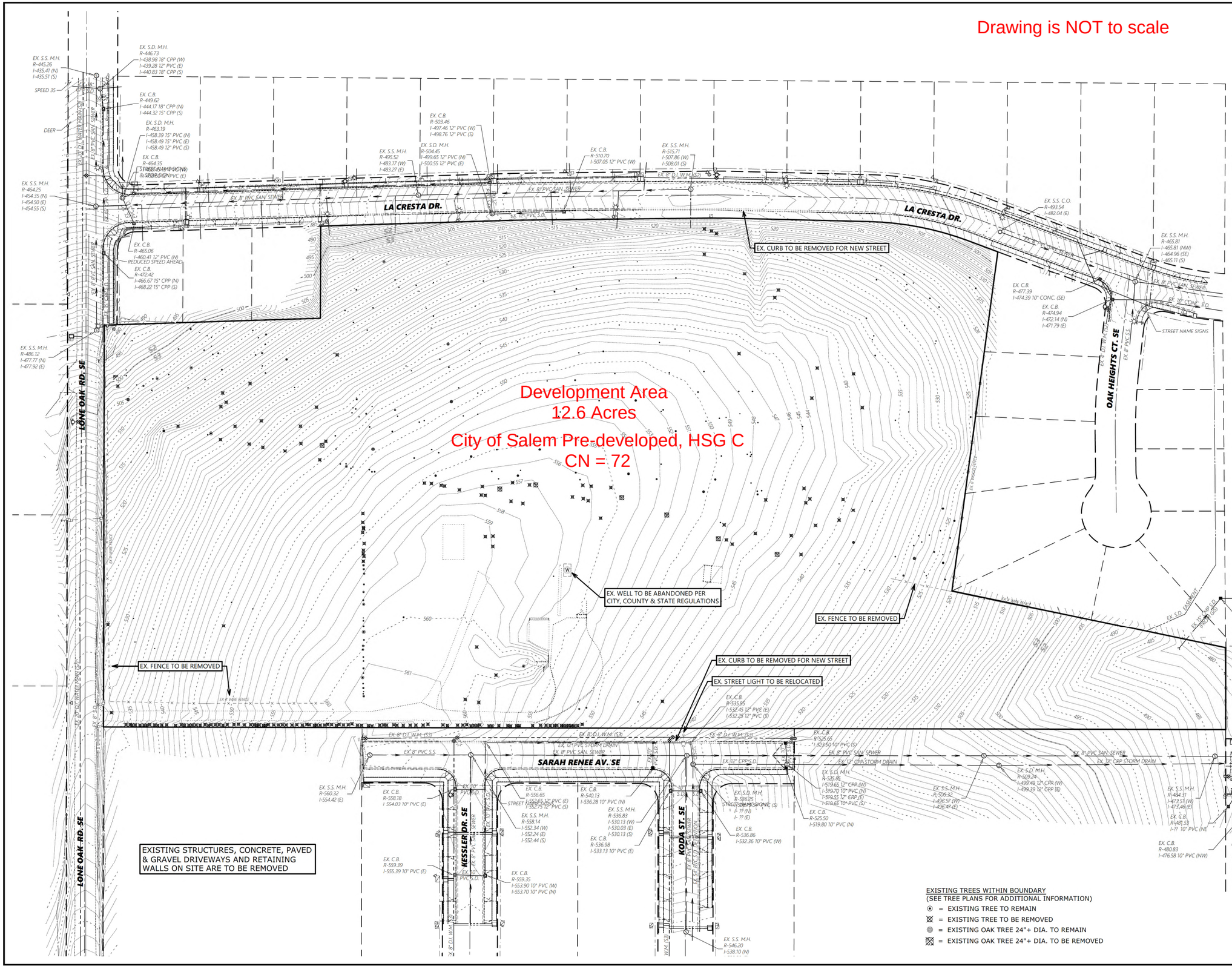
Design: M.D.G.
Drawn: D.G.G.
Checked: J.J.G.
Date: JUNE 2021
Scale: AS SHOWN
As-Built:

REGISTERED PROFESSIONAL ENGINEER OREGON MARK D. GRENZ
EXPIRES: 06-30-2021

JOB # 7154

P1

Drawing is NOT to scale



Development Area
12.6 Acres

City of Salem Pre-developed, HSG C
CN = 72

EXISTING STRUCTURES, CONCRETE, PAVED & GRAVEL DRIVEWAYS AND RETAINING WALLS ON SITE ARE TO BE REMOVED

EXISTING TREES WITHIN BOUNDARY
(SEE TREE PLANS FOR ADDITIONAL INFORMATION)
⦿ = EXISTING TREE TO REMAIN
⊠ = EXISTING TREE TO BE REMOVED
◎ = EXISTING OAK TREE 24"+ DIA. TO REMAIN
☒ = EXISTING OAK TREE 24"+ DIA. TO BE REMOVED

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EXISTING CONDITIONS PLAN

OAK GROVE

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7154p P2-XCOND
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Date: JUNE 2021
Scale: AS SHOWN
As-Built: ----

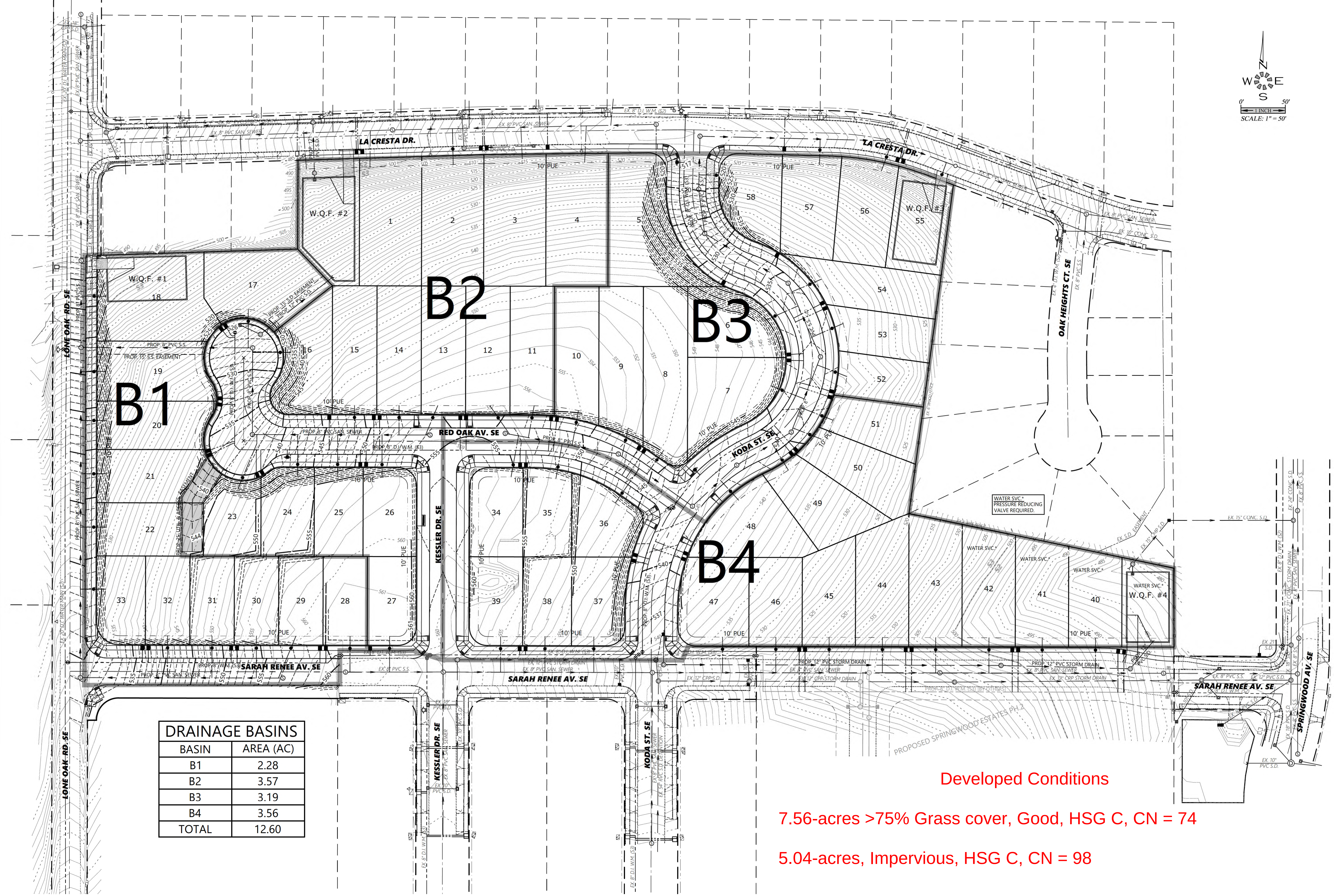
REGISTERED PROFESSIONAL ENGINEER
OREGON
JULY 14, 1978
MARK D. GRENZ
EXPIRES: 06-30-2021

JOB # 7154

P2

W.Q.F. # = Proposed Combination Facility Location

Drawing is NOT to scale



DRAINAGE BASINS	
BASIN	AREA (AC)
B1	2.28
B2	3.57
B3	3.19
B4	3.56
TOTAL	12.60

Developed Conditions

7.56-acres >75% Grass cover, Good, HSG C, CN = 74

5.04-acres, Impervious, HSG C, CN = 98

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BASIN MAP

OAK GROVE

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EXPIRES: 06-30-2021

JOB # 7154

1 OF 1

Appendix B

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Marion County Area, Oregon

Oak Grove

December 2, 2021

Map Scale: 1:2,080 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 30 60 120 180

Feet
0 100 200 400 600

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 19, Oct 27, 2021

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
JoD	Jory silty clay loam, 12 to 20 percent slopes	C	6.0	49.6%
JoE	Jory silty clay loam, 20 to 30 percent slopes	C	4.2	34.4%
NeB	Nekia silty clay loam, 2 to 7 percent slopes	C	1.9	16.0%
Totals for Area of Interest			**12.1**	**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.

Appendix C

Time of Concentration Map

Drawing is NOT to scale

Point C
Elev. 496

L = 510'

Point B
Elev. 566

L = 300'

Point A
Elev. 561.5

EX. CURB TO BE REMOVED FOR NEW STREET

EX. WELL TO BE ABANDONED PER CITY, COUNTY & STATE REGULATIONS

EX. FENCE TO BE REMOVED

EX. FENCE TO BE REMOVED

EX. CURB TO BE REMOVED FOR NEW STREET

EX. STREET LIGHT TO BE RELOCATED

EXISTING STRUCTURES, CONCRETE, PAVED & GRAVEL DRIVEWAYS AND RETAINING WALLS ON SITE ARE TO BE REMOVED

LA CRESTA DR.

LONE OAK RD. SE

KESSLER DR. SE

KODA ST. SE

SARAH RENEE AV. SE

OAK HEIGHTS CT. SE

SPRINGWOOD AV. SE

EXISTING TREES WITHIN BOUNDARY
(SEE TREE PLANS FOR ADDITIONAL INFORMATION)

- = EXISTING TREE TO REMAIN
- = EXISTING TREE TO BE REMOVED
- = EXISTING OAK TREE 24"+ DIA. TO REMAIN
- = EXISTING OAK TREE 24"+ DIA. TO BE REMOVED

SCALE: 1" = 50'

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EXISTING CONDITIONS PLAN

OAK GROVE

Design: M.D.G.
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Checked: J.J.G.
Date: JUNE 2021
Scale: AS SHOWN
As-Built: ----

REGISTERED PROFESSIONAL ENGINEER
OREGON
JULY 14, 1978
MARK D. GRENZ
EXPIRES: 06-30-2021

JOB # 7154

P2

Worksheet 3: Time of Concentration (T_c) or travel time (T_t)

Project	By	Date
Oak Grove	M. Hendrick	12/2021
Location	**Checked**	**Date**
Salem, Oregon		

Check one: ☑ Present ☐ Developed

Check one: ☑ T_c ☑ T_t through subarea

Notes: Space for as many as two segments per flow type can be used for each worksheet.
Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to Tc only)

	Segment ID	A-B	
1.	Surface description (Table 4D-4)	Mixed	
2.	Manning's roughness coefficient, n (Table 4D-4)	0.30	
3.	Flow length, L (total L † 300 ft) ft	300	
4.	Two-year 24-hour rainfall, P_2 in	2.2	
5.	Land slope, s ft/ft	0.018	
6.	$T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t hr	0.861 +	= 0.861

Shallow concentrated flow

	Segment ID	B-C	
7.	Surface description (paved or unpaved)	Forest	
8.	Flow length, L ft	510	
9.	Watercourse slope, s ft/ft	0.118	
10.	Average velocity, V (figure 3-1) ft/s	0.8	
11.	$T_t = \frac{L}{3600\ V}$ Compute T_t hr	0.177 +	= 0.177

Channel flow

	Segment ID		
12.	Cross sectional flow area, a ft^2		
13.	Wetted perimeter, p_w ft		
14.	Hydraulic radius, $r = \frac{a}{p_w}$ Compute r ft		
15	Channel slope, s ft/ft		
16.	Manning's roughness coefficient, n		
17.	$V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V ft/s		
18.	~~Flow~~ length, L ft		
19.	$T_t = \frac{L}{3600\ V}$ Compute T_t hr	+	=
20.	Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) Hr		1.04

1.04 Hrs = 62 Minutes

Manning's Roughness Coefficients for Overland Sheet Flow	
Surface Types:	**n**
Impervious Areas	0.014
Gravel Pavement	0.02
Developed: Landscape Areas (Except Lawns)	0.08
Undeveloped: Meadow, Pasture, or Farm	0.15
Developed: Lawns	0.24
Pre-developed: Mixed	0.30
Pre-developed: Woodland and Forest	0.40
Development Types:	**n**
Commercial Development	0.015
Industrial Development, Heavy	0.04
Industrial Development, Light	0.05
Dense Residential (over 6 units/acre)	0.08
Normal Residential (3 to 6 units/acre)	0.20
Light Residential (1 to 3 units/acre)	0.30
Parks	0.40

Table 4D-4. Manning's Roughness Coefficients for Overland Sheet Flow

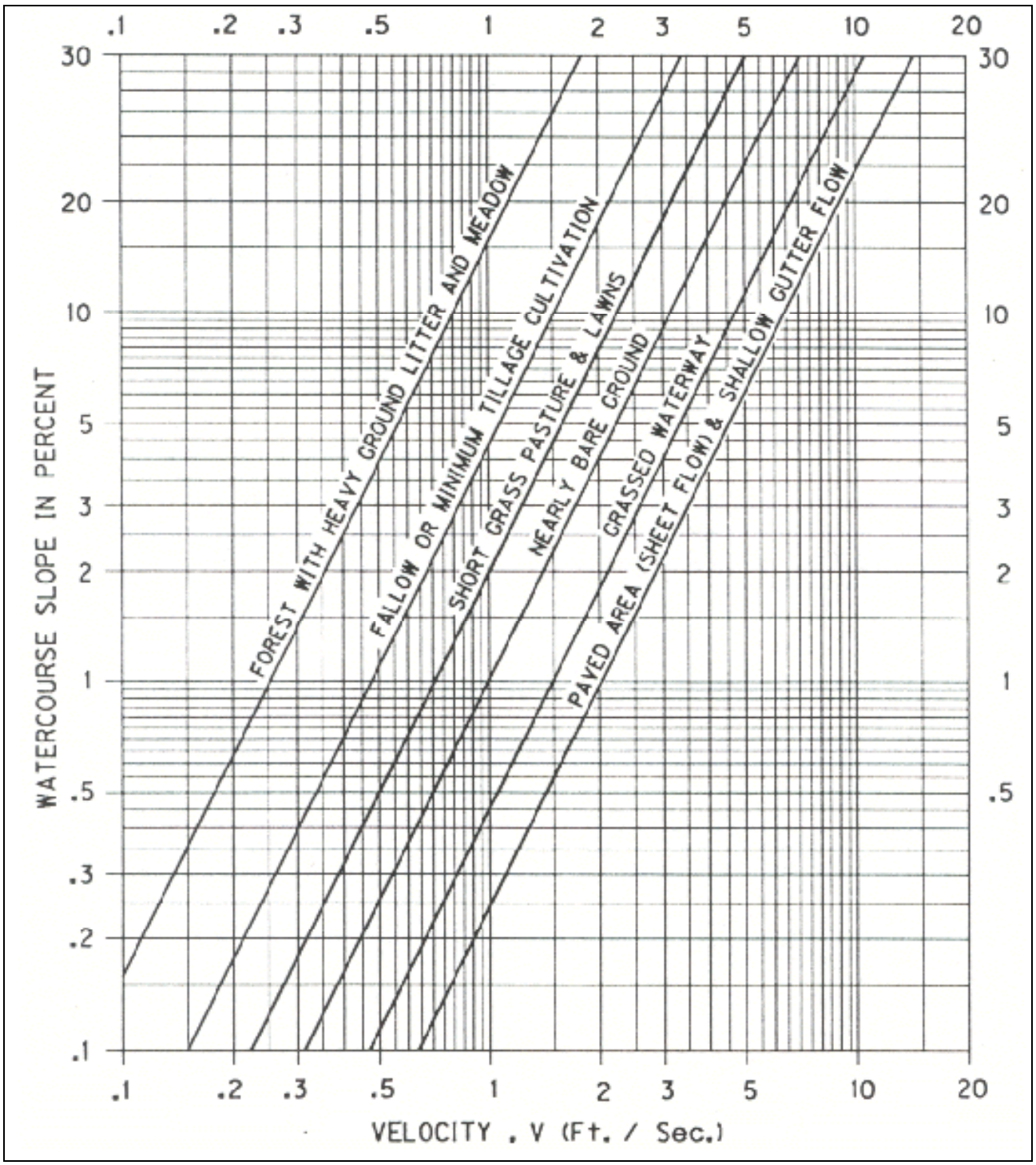
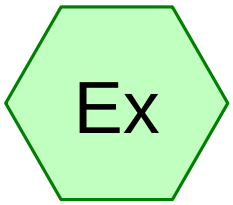
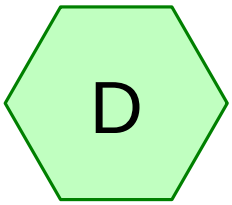


Figure 4D-2. Average Velocity of Shallow Concentrated Flow

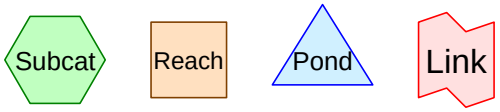
Appendix D



Existing Conditions



Developed Conditions



Routing Diagram for 20211203 Hydrology Master
Prepared by Multitech Engineering Services, Inc., Printed 12/3/2021
HydroCAD® 10.10-6a s/n 09412 © 2020 HydroCAD Software Solutions LLC

Summary for Subcatchment Ex: Existing Conditions

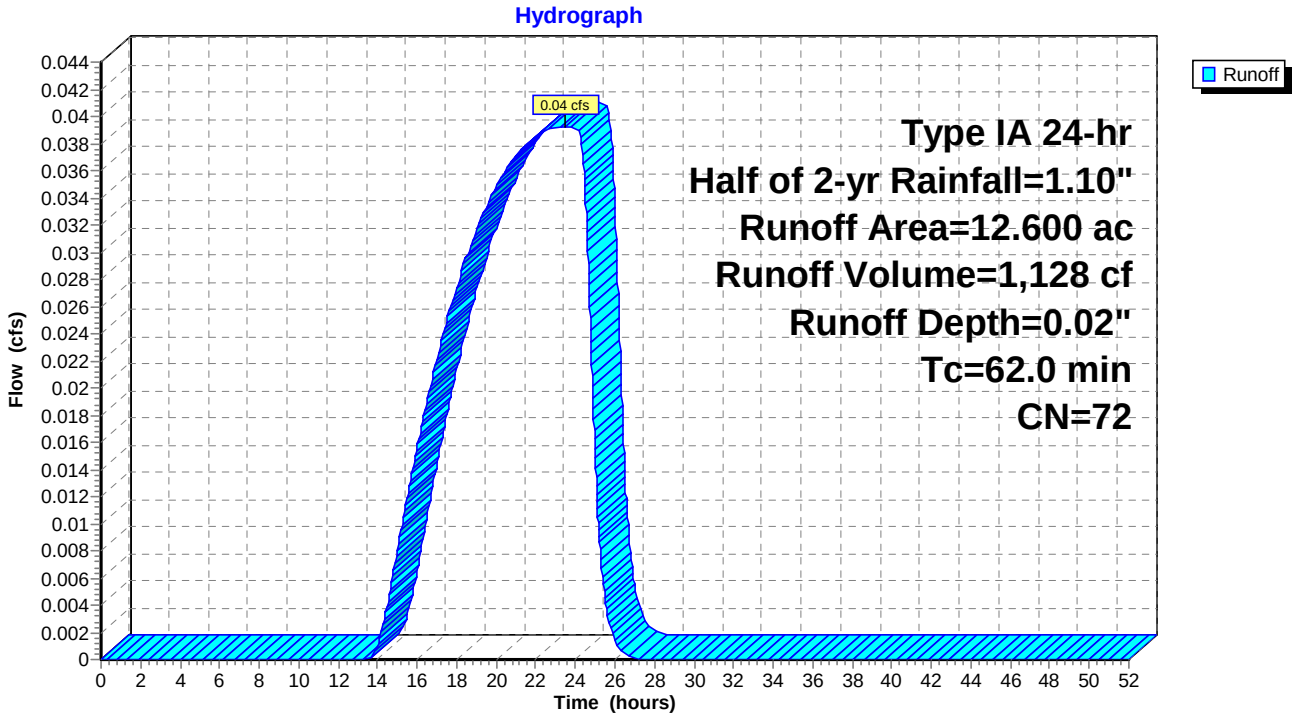
Runoff = 0.04 cfs @ 23.49 hrs, Volume= 1,128 cf, Depth= 0.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-52.00 hrs, dt= 0.02 hrs
Type IA 24-hr Half of 2-yr Rainfall=1.10"

	Area (ac)	CN	Description
*	12.600	72	City of Salem Pre-developed, HSG C
	12.600		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
62.0					**Direct Entry, TR-55 Worksheet**

Subcatchment Ex: Existing Conditions



Summary for Subcatchment D: Developed Conditions

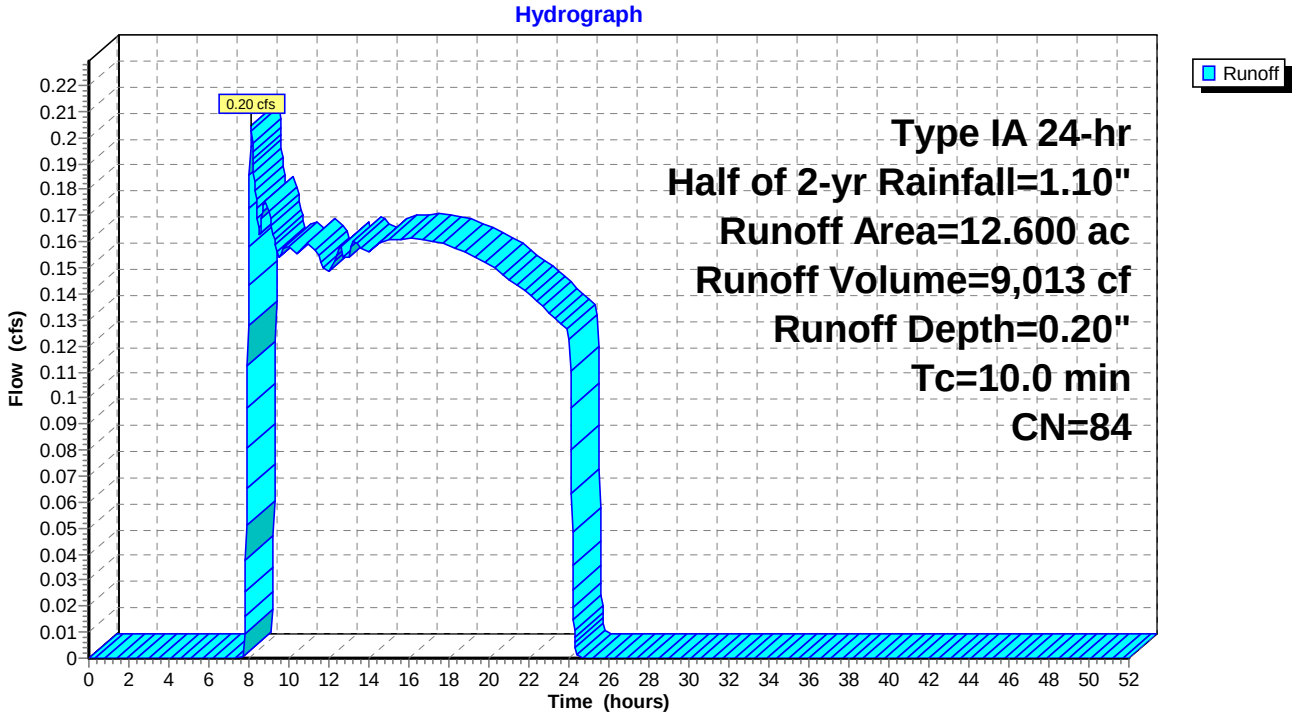
Runoff = 0.20 cfs @ 8.10 hrs, Volume= 9,013 cf, Depth= 0.20"
Routed to nonexistent node CMH

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-52.00 hrs, dt= 0.02 hrs
Type IA 24-hr Half of 2-yr Rainfall=1.10"

Area (ac)	CN	Description
5.040	98	Paved parking, HSG C
7.560	74	>75% Grass cover, Good, HSG C
12.600	84	Weighted Average
7.560		60.00% Pervious Area
5.040		40.00% Impervious Area

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

Subcatchment D: Developed Conditions



Summary for Subcatchment Ex: Existing Conditions

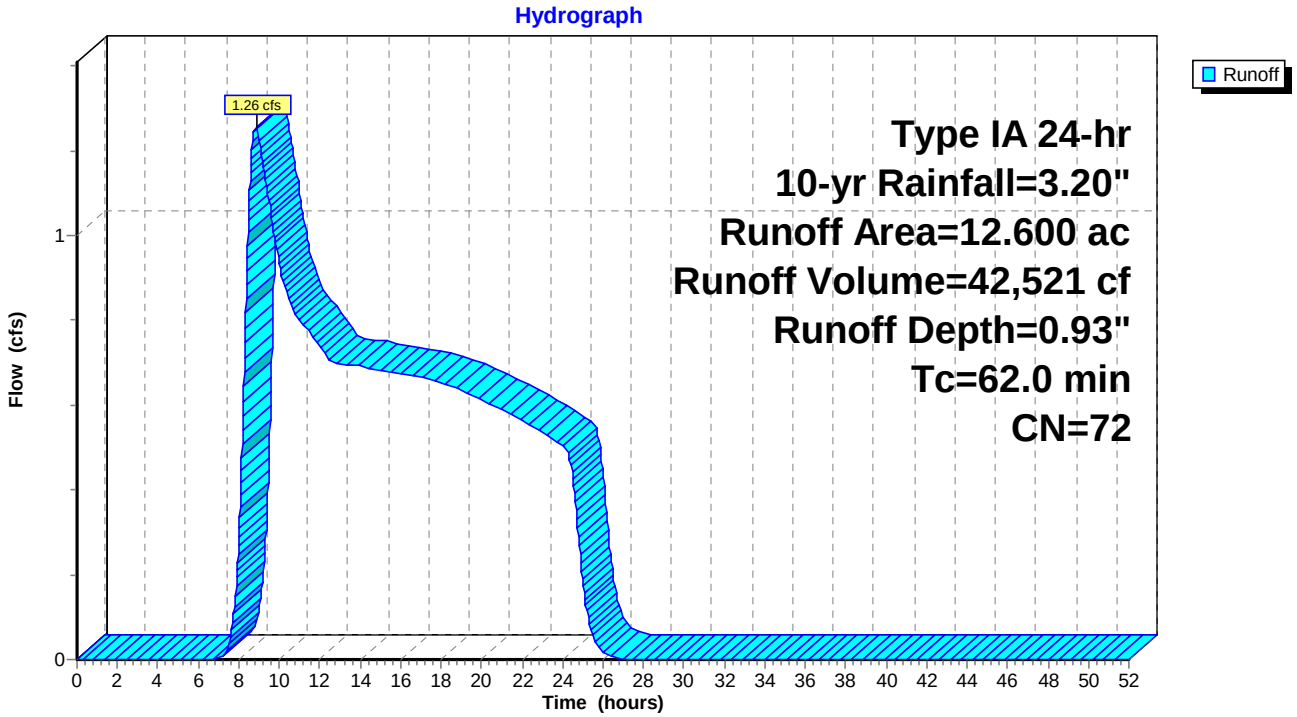
Runoff = 1.26 cfs @ 8.85 hrs, Volume= 42,521 cf, Depth= 0.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-52.00 hrs, dt= 0.02 hrs
Type IA 24-hr 10-yr Rainfall=3.20"

	Area (ac)	CN	Description
*	12.600	72	City of Salem Pre-developed, HSG C
	12.600		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
62.0					**Direct Entry, TR-55 Worksheet**

Subcatchment Ex: Existing Conditions



Summary for Subcatchment D: Developed Conditions

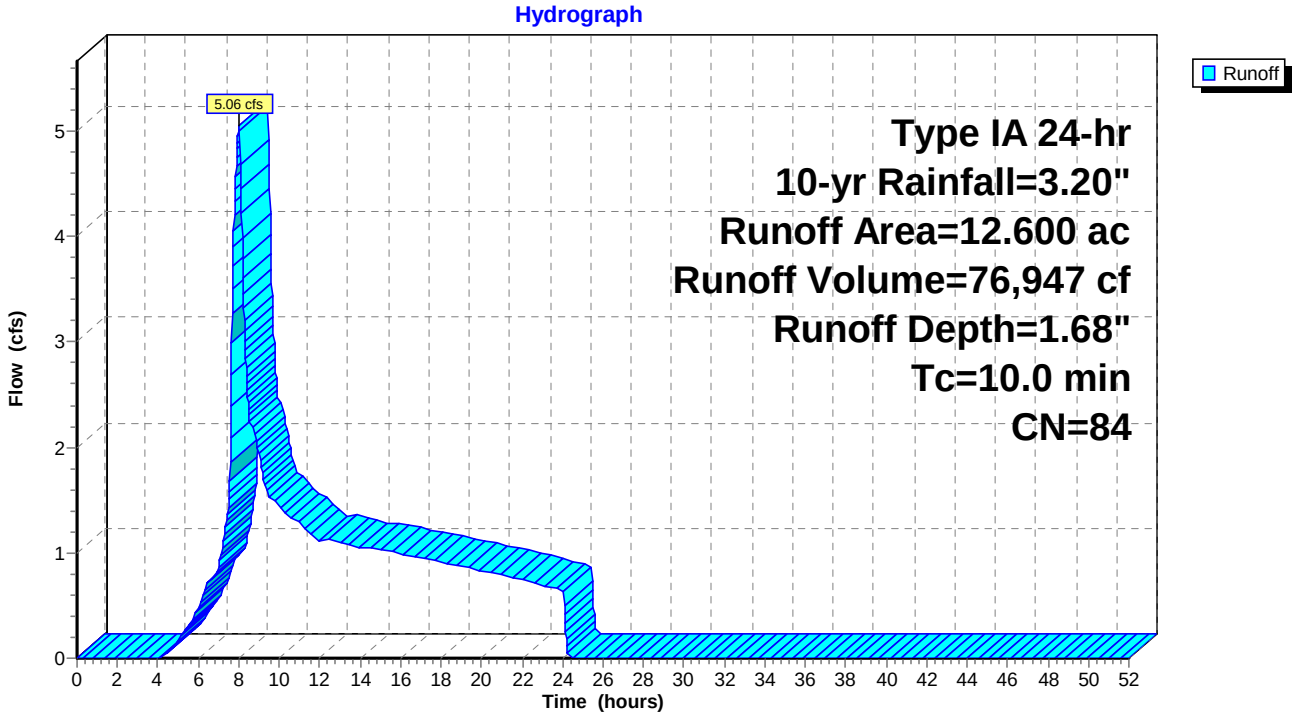
Runoff = 5.06 cfs @ 8.02 hrs, Volume= 76,947 cf, Depth= 1.68"
Routed to nonexistent node CMH

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-52.00 hrs, dt= 0.02 hrs
Type IA 24-hr 10-yr Rainfall=3.20"

Area (ac)	CN	Description
5.040	98	Paved parking, HSG C
7.560	74	>75% Grass cover, Good, HSG C
12.600	84	Weighted Average
7.560		60.00% Pervious Area
5.040		40.00% Impervious Area

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

Subcatchment D: Developed Conditions



Summary for Subcatchment Ex: Existing Conditions

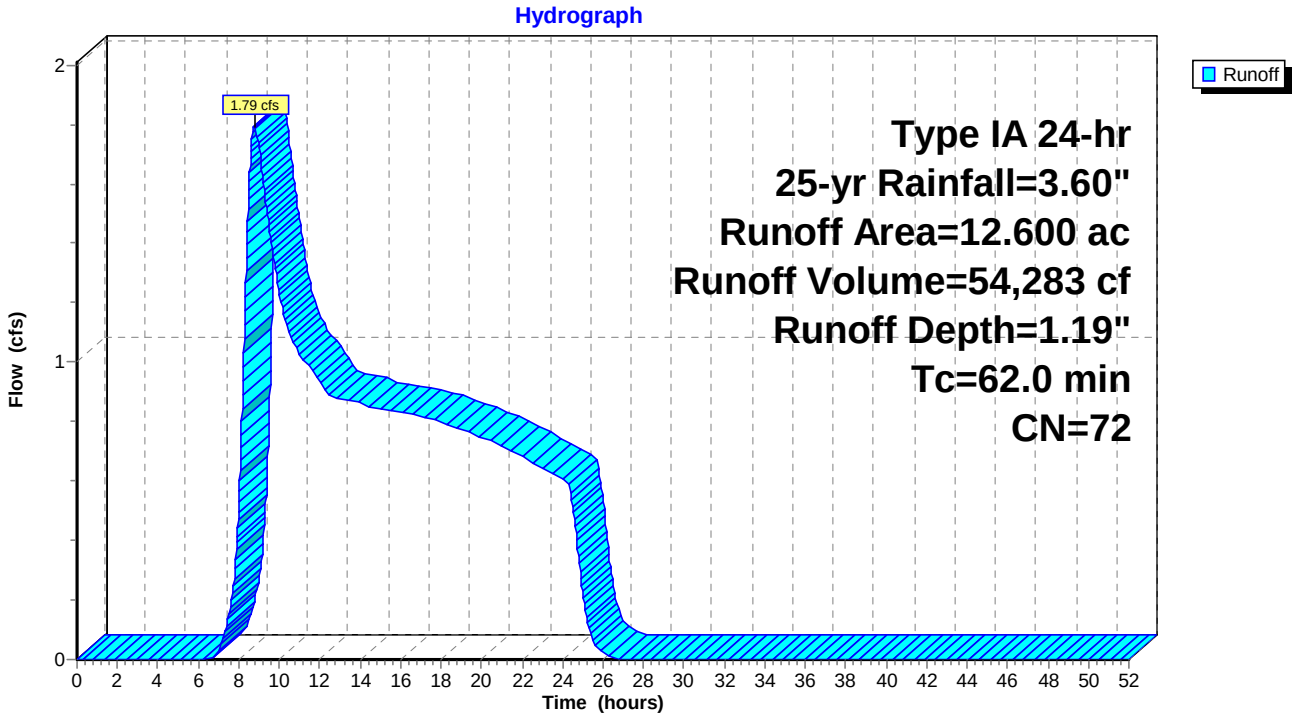
Runoff = 1.79 cfs @ 8.76 hrs, Volume= 54,283 cf, Depth= 1.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-52.00 hrs, dt= 0.02 hrs
Type IA 24-hr 25-yr Rainfall=3.60"

	Area (ac)	CN	Description
*	12.600	72	City of Salem Pre-developed, HSG C
	12.600		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
62.0					**Direct Entry, TR-55 Worksheet**

Subcatchment Ex: Existing Conditions



Summary for Subcatchment D: Developed Conditions

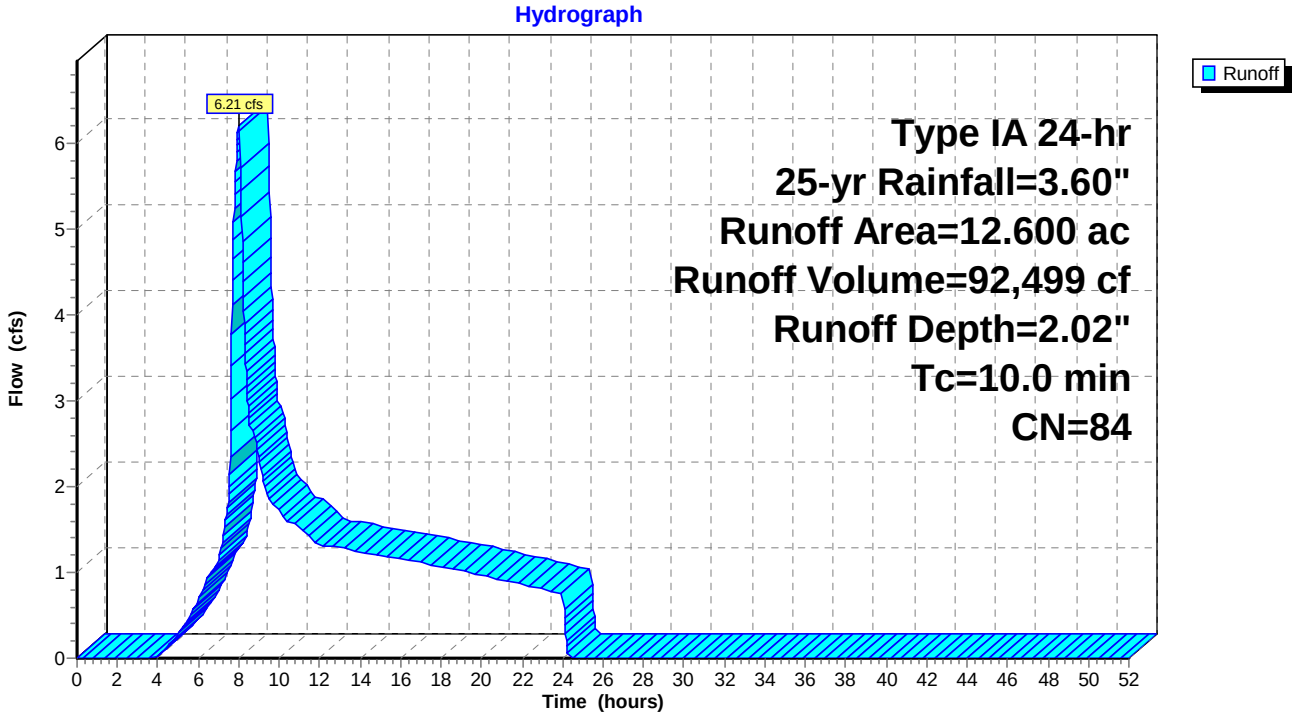
Runoff = 6.21 cfs @ 8.01 hrs, Volume= 92,499 cf, Depth= 2.02"
Routed to nonexistent node CMH

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-52.00 hrs, dt= 0.02 hrs
Type IA 24-hr 25-yr Rainfall=3.60"

Area (ac)	CN	Description
5.040	98	Paved parking, HSG C
7.560	74	>75% Grass cover, Good, HSG C
12.600	84	Weighted Average
7.560		60.00% Pervious Area
5.040		40.00% Impervious Area

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

Subcatchment D: Developed Conditions



Summary for Subcatchment Ex: Existing Conditions

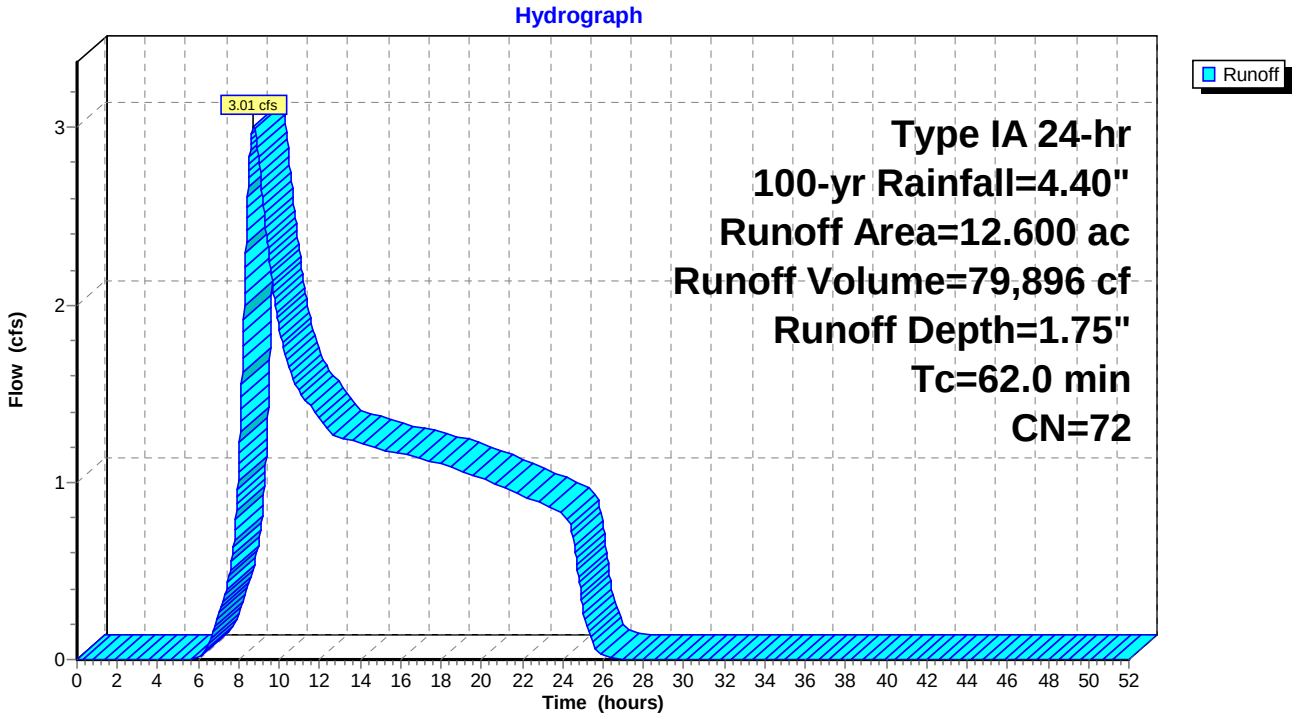
Runoff = 3.01 cfs @ 8.74 hrs, Volume= 79,896 cf, Depth= 1.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-52.00 hrs, dt= 0.02 hrs
Type IA 24-hr 100-yr Rainfall=4.40"

	Area (ac)	CN	Description
*	12.600	72	City of Salem Pre-developed, HSG C
	12.600		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
62.0					**Direct Entry, TR-55 Worksheet**

Subcatchment Ex: Existing Conditions



Summary for Subcatchment D: Developed Conditions

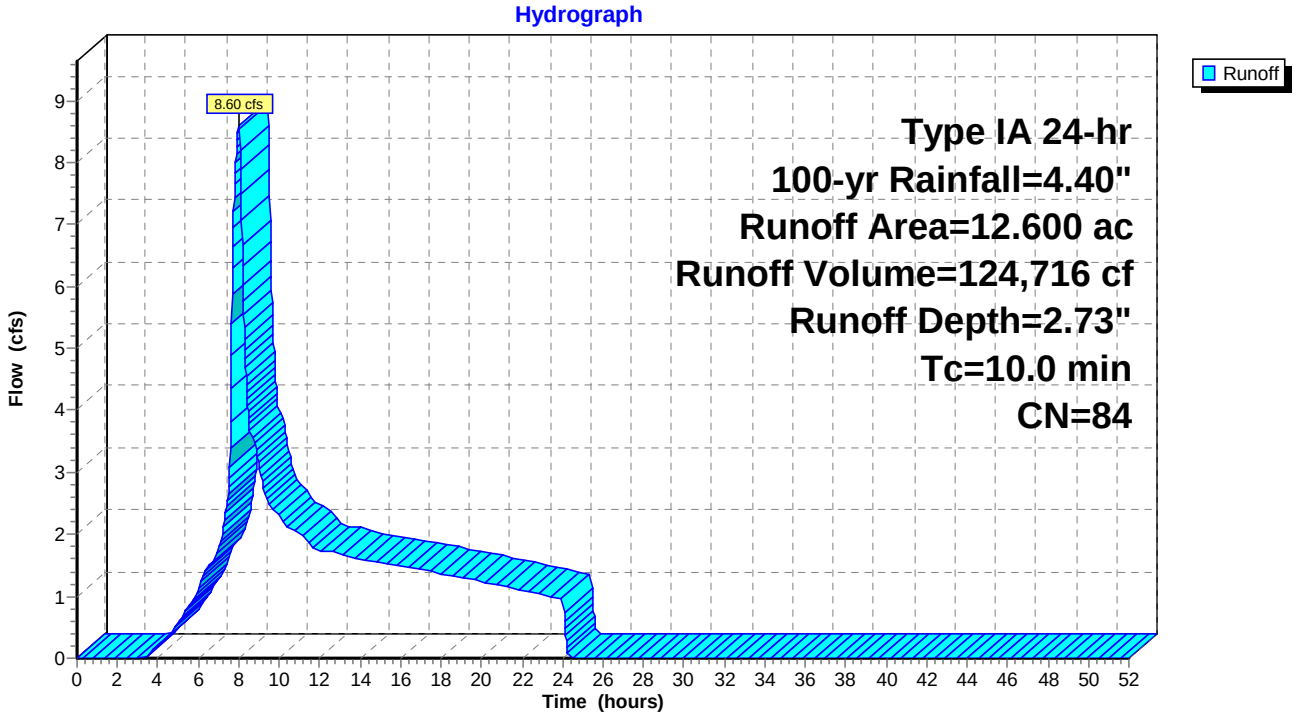
Runoff = 8.60 cfs @ 8.00 hrs, Volume= 124,716 cf, Depth= 2.73"
Routed to nonexistent node CMH

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-52.00 hrs, dt= 0.02 hrs
Type IA 24-hr 100-yr Rainfall=4.40"

Area (ac)	CN	Description
5.040	98	Paved parking, HSG C
7.560	74	>75% Grass cover, Good, HSG C
12.600	84	Weighted Average
7.560		60.00% Pervious Area
5.040		40.00% Impervious Area

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

Subcatchment D: Developed Conditions



Summary for Subcatchment D: Developed Conditions

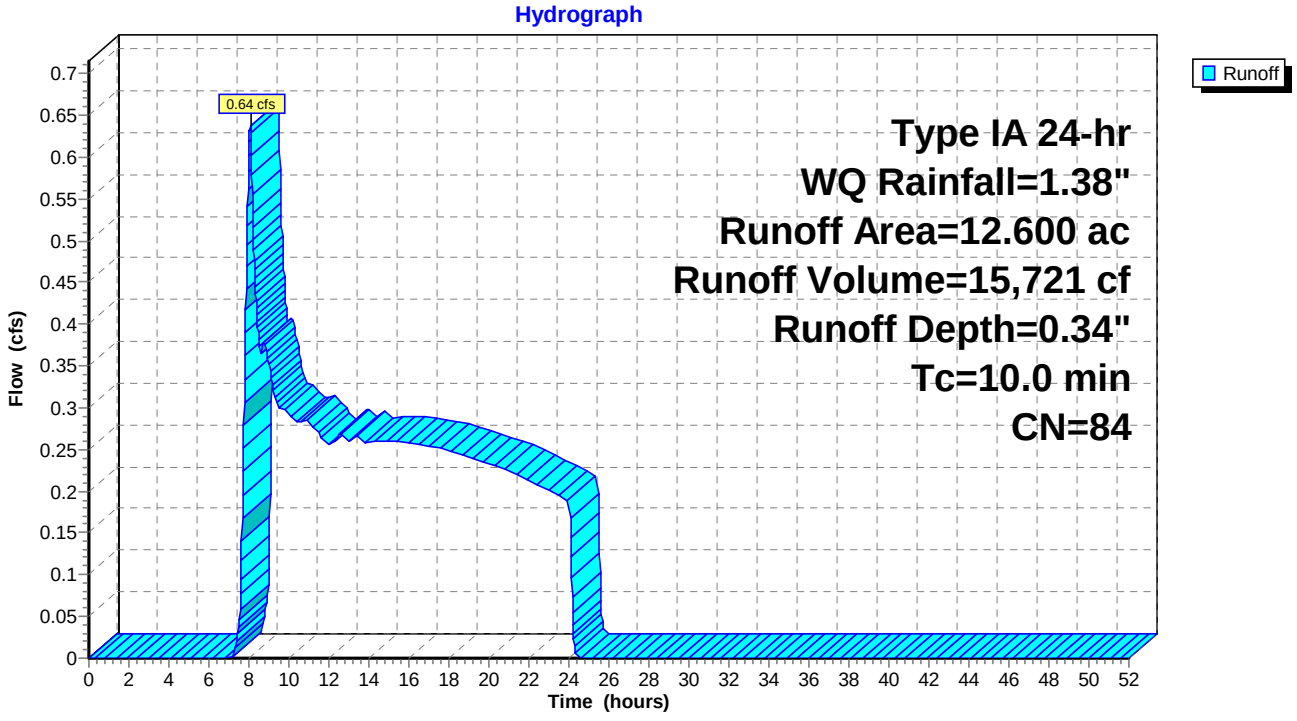
Runoff = 0.64 cfs @ 8.06 hrs, Volume= 15,721 cf, Depth= 0.34"
Routed to nonexistent node CMH

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-52.00 hrs, dt= 0.02 hrs
Type IA 24-hr WQ Rainfall=1.38"

Area (ac)	CN	Description
5.040	98	Paved parking, HSG C
7.560	74	>75% Grass cover, Good, HSG C
12.600	84	Weighted Average
7.560		60.00% Pervious Area
5.040		40.00% Impervious Area

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

Subcatchment D: Developed Conditions



Summary for Subcatchment Ex: Existing Conditions

Runoff = 0.09 cfs @ 20.87 hrs, Volume= 3,693 cf, Depth= 0.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-52.00 hrs, dt= 0.02 hrs
Type IA 24-hr WQ Rainfall=1.38"

	Area (ac)	CN	Description
*	12.600	72	City of Salem Pre-developed, HSG C
	12.600		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
62.0					**Direct Entry, TR-55 Worksheet**

Subcatchment Ex: Existing Conditions