7071

PRELIMINARY DRAINAGE REPORT
FOR

Crown Point Segment 2 Apartments
Salem, Oregon

Prepared For:
MWSH Boone Road Property, LLC
3425 Boone Road SE
Salem, Oregon 97302

November 9, 2021

MULTI/TECH
ENGINEERING SERVICES, INC.

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Salem OR 97302

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Contents

INTRODUCTION

The Crown Point Segment 2 Apartments is a proposed 192-unit apartment complex located south of Kuebler Blvd and east of Interstate 5 near the terminus of Boone Road SE. The parcel of land to be developed is a portion of Tax Lot 300 of Marion County Assessor's Map 08 3W 13A. 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 Segment 2 site contains approximately 19.92 acres of the 32.42-acre site that is irregular in the shape. Surface conditions consists of grassy meadow with a large area comprising of multiple trees.

There are no identified wetlands or sensitive areas located on the property. A drainage way traverses along the easterly property line. A topographical high point ridge is located on the south westerly corner of the site. Drainage from this high point flows easterly. The maximum relief is approximately 142-feet with a high point elevation of 394-feet. Slopes on the site are predominately hilly. The abutting properties are zoned single family residential, Industrial commercial and general industrial with public improvements that include storm water conveyance systems. In addition, a 1-acre portion of an undeveloped parcel of land drains onto the site from the southwest. 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 a Hydrological Soil Group classification for runoff calculations. The report identifies the site soils to be Silverton, Nekia, Santiam and McBee 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 proposed combination facility will provide water quality treatment by allowing for the removal of pollutants through sedimentation, adsorption onto surrounding vegetation, filtration and biological uptake. The facility 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 facility that ultimately controls runoff to pre-developed flow rates. Approximately 19.92-acres of the 32.2-acre site is being developed in this phase.

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.

It should be noted that a 4.07-acre portion of the site will drain into the Segment 1 drainage facility. That system was designed per the standards prior to the implementation of Ordinance No. 08-20. Since the facility handles approximately 12.48-acres of the Segment 1 runoff, we are requesting that the old standards be allowed for the 4.07-acres flowing into the Segment 1 system that has the capacity to accept the runoff generated from the site.

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 35 minutes was calculated for the Segment 2 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. It should be noted that a 1.54-acre portion of the site will note be developed and will not drain into the drainage facility. That area has been removed from the

analysis as well as the 4.07-acres that will flow into the Segment 1 facility. In addition, the 1.0-acre parcel to the south has been added to the analysis.

Table 2

Storm Event	Basin Allowable Release Rate (cfs)
½ of 2-year	0.05
10-year	1.88
25-year	2.68
100-year	4.50

(Basin A1 & Off-site)

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. Each basin was classified as "Impervious, HSG C" with a CN of 98 and "> 75% Grass cover, HSG C" with a CN of 74. Area percentages were based on AutoCAD analysis. 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	Woods (Ac) CN = 74	TOTAL Area (Ac)	Composite CN
Site	7.87	6.44	1.0	15.31	86

Table 4 below identifies the calculated detention volume requirements for each storm event. The required detention was determined by using HydroCAD to determine the volume differential between existing and developed conditions for all the storm events.

Table 4

Storm Event	Basin Detention Volume (cf)
1/2 of 2-year	10,450
10-year	50,350
25-year	55,600
100-year	64,700

The proposed detention systems will be located near the lowest point in the northeasterly corner to maximize the capture of runoff. A basin map has been provided in Appendix A showing the location of the detention pond. Allowable flow rates are identified in Table 2 above. It is estimated that the proposed system will have a maximum detention capacity of approximately 67,000 cubic feet.

STORMWATER QUALITY ANALYSIS

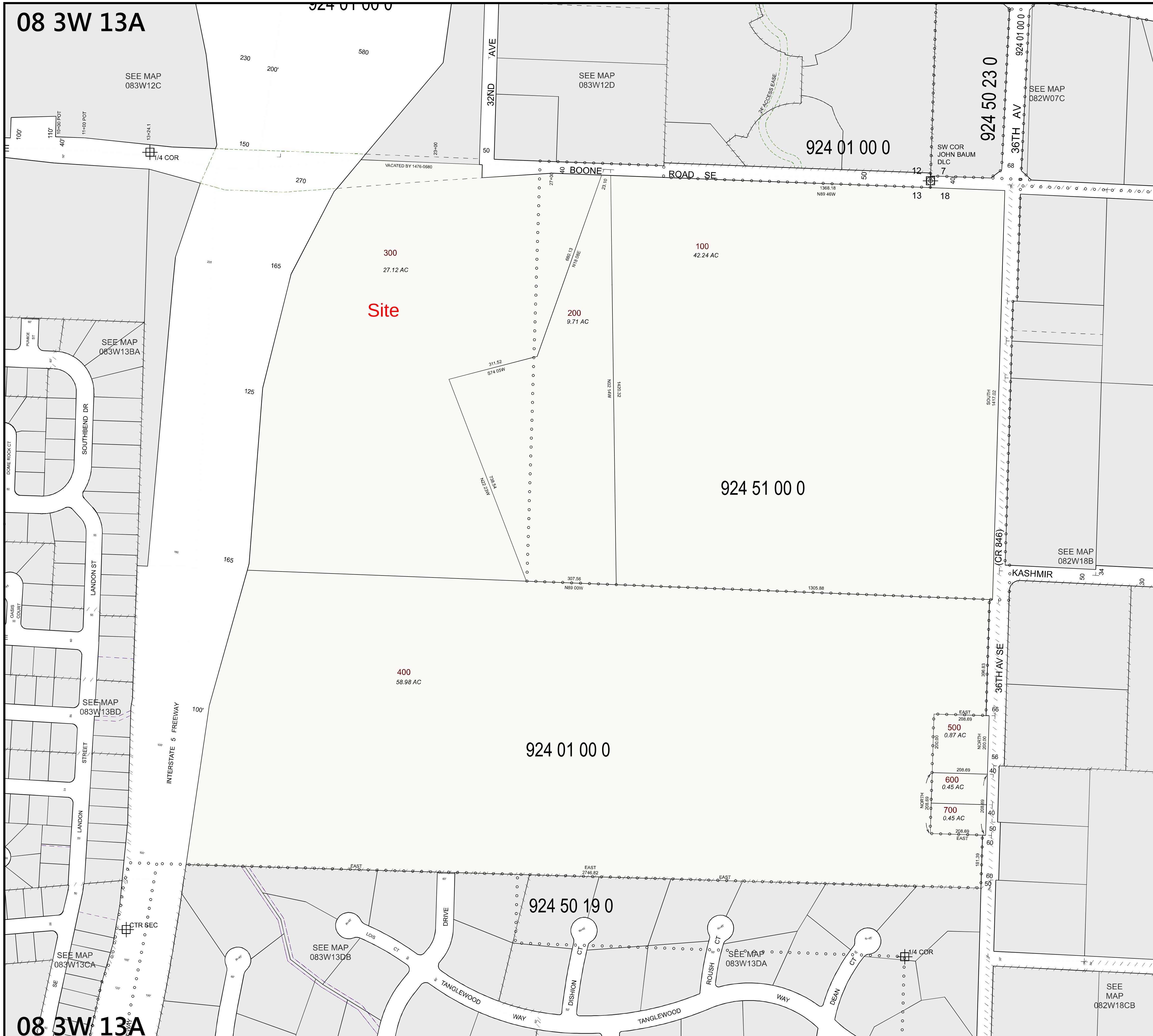
Water quality flow rates were calculated using HydroCAD 10.00. The SCS TR-20 Unit Hydrograph method was used to generate the hydrographs. A Type 1A rainfall distribution was used with a 1.38 rainfall depth. Appendix D contains the analysis.

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

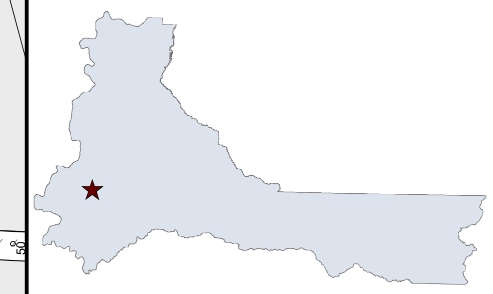
CONCLUSION

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 13A
SALEM



MARION COUNTY, OREGON

NE1/4 SEC13 T8S R3W W.M.

SCALE 1" = 200'

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
000 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

CANCELLED NUMBERS

301
401
402
403

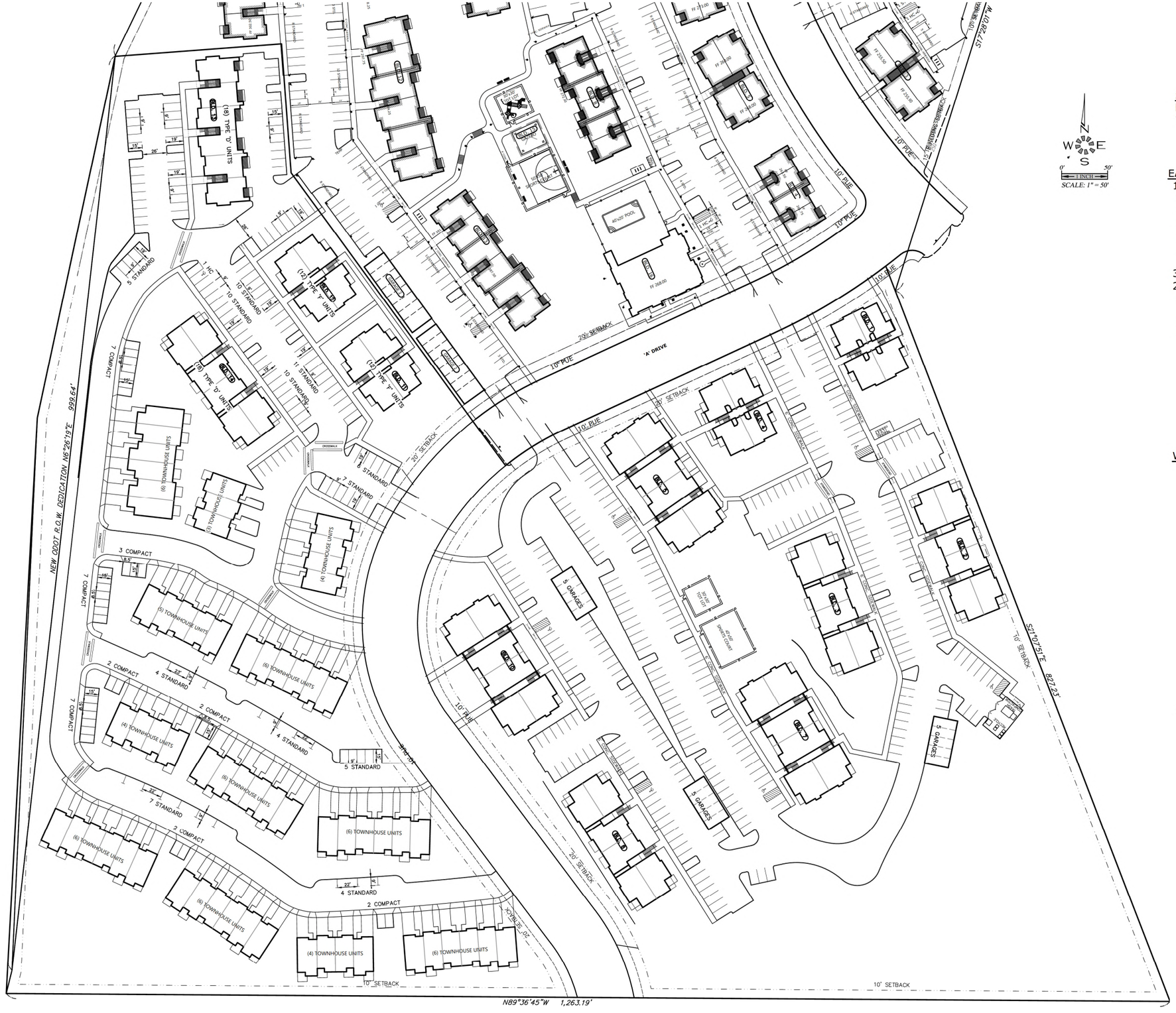
DISCLAIMER: THIS MAP WAS PREPARED FOR ASSESSMENT PURPOSES ONLY

Assessors Office Cartography Dept

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

PLOT DATE: 1/24/2018

SALEM
08 3W 13A



N
W E
S
0' 50'
1 INCH
SCALE: 1" = 50'

SITE AREAS
BOUNDARY _____ 1,412,323 S.F.
TOTAL SITE _____ 851,606 S.F.

EAST SIDE
162 TOTAL APARTMENT UNITS WEST
24 TYPE "C" 2-Bd, 2-Ba (1074 S.F.) UNITS
78 TYPE "D" 2-Bd, 2-Ba (991/1065 S.F.) UNITS
30 TYPE "H" 3-Bd, 2-Ba (1233 S.F.) UNITS
12 TYPE "X" 1-Bd, 1-Ba (742/762 S.F.) UNITS
18 TYPE "X2 1-Bd, 1Ba (742/762 S.F.) UNITS

329 TOTAL PARKING STALLS
272 STANDARD STALLS
29 COMPACT STALLS
8 HANDICAP STALLS
20 GARAGES (1 HANDICAP)
42 BICYCLE SPACES IN 7 RACKS (38 REQUIRED)

1 CLUBHOUSE / MANAGER'S OFFICE
1 50'x50' SPORTS COURT
1 30'x30' TOT LOT
1 TRASH COMPACTOR / RECYCLE
2 PLAY AREAS
1 SWIMMING POOL (42'x22')
1 U.S. MAIL BOX AREA

WEST SIDE
36 TYPE "F" 2-Bd, 2-Ba (1002/1019 S.F.) UNITS
78 TYPE "D" 2-Bd, 2-Ba (991/1065 S.F.) UNITS
62 TOWNHOUSE UNITS

75 TOTAL PARKING STALLS
63 STANDARD STALLS
4 HANDICAP STALLS
8 GARAGES
12 BICYCLE SPACES IN 2 RACKS (12 REQUIRED)

1 TRASH / RECYCLE
1 PLAY AREA
1 U.S. MAIL BOX AREA

✱ THE INDICATED LOWER FLOOR UNITS IN BUILDINGS 5 & 9 ARE TO BE TYPE A UNITS IN ACCORDANCE WITH THE 2014 OSSC SEC. 1107.6.2.1.1 (NOTED ON FLOOR PLANS). ALL OTHER LOWER FLOOR UNITS TO BE TYPE B UNITS IN ACCORDANCE WITH THE 2014 OSSC SEC. 1107.6.2.1.2

Ⓟ – POLE LIGHT MAXIMUM 14' TALL
✸ – POST LIGHT MAXIMUM 5' TALL
– LOCATION OF ELECTRICAL SEPARATION WALL
① – MAXIMUM 1:12 SLOPE ON SIDEWALK END RAMPS
III – 6 BICYCLE SPACES.

ADA HANDICAP ACCESSIBLILITY NOTES:

1. ALL ON-SITE WALKWAYS, PEDESTRIAN CONNECTIONS TO THE PUBLIC SIDEWALK AND ROUTES TO BUILDING ENTRANCES ARE ACCESSIBLE WITH RUNNING SLOPES LESS THAN 5% AND CROSS SLOPE LESS THAN 2% MAX. LANDINGS AT BOTTOM OF STAIRS AND EXT. FACE OF ENTRANCE DOORS SHALL HAVE A SLOPE IN THE DIRECTION OF TRAVEL NOT TO EXCEED 2%.
2. HANDICAP PARKING STALLS AND ACCESS AISLES ARE TO HAVE SLOPES IN ANY DIRECTION OF LESS THAN 2% MAX. GRAPHIC MARKINGS & SIGNAGE FOR HANDICAP AND VAN ACCESSIBLE STALLS WILL BE PER OSSC 2010 CHPTR. 11 AND ORS. REQUIREMENTS.
3. HANDICAP ACCESSIBLE CURB RAMPS SHALL HAVE A RUNNING SLOPE NOT TO EXCEED 1:12 MAX. AND A CROSS SLOPE NOT TO EXCEED 1%.
4. THE COMMUNITY BUILDING & ON-SITE LAUNDRY FACILITIES WILL BE FULLY HANDICAP ACCESSIBLE IN ACCORDANCE WITH ANSI A117.1 AND CHAPTER 11 OF THE 2010 OSSC.
5. 2% OF THE LIVING UNITS OR (3) UNITS WILL BE TYPE 'A' HANDICAP ACCESSIBLE. THESE INCLUDE A 1, 2 AND 3 BEDROOM UNIT AS INDICATED ON THIS SITE PLAN. THE BALANCE OF THE GROUND FLOOR LIVING UNITS WILL BE TYPE 'B' ADAPTABLE UNITS IN ACCORDANCE WITH ANSI A117.1.

Drawing is NOT to scale.

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SITE PLAN

CROWN POINT SEGMENT 2

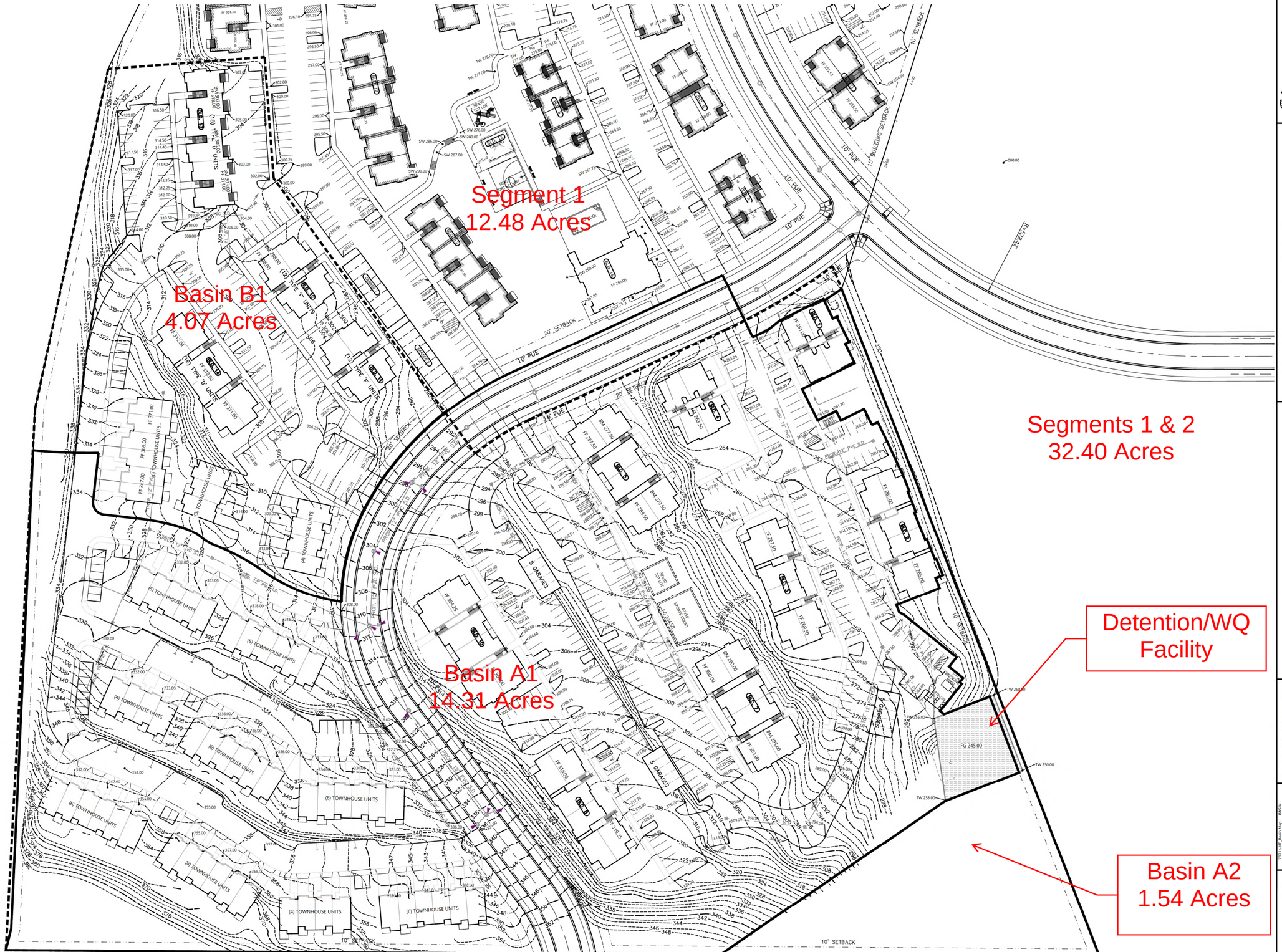
DIMENSIONS & NOTES TAKE PRECEDENCE OVER GRAPHICAL REPRESENTATION.

7071p-SITE SDR3-SITE
Design: M.D.G.
Drawn: C.D.S.
Checked: E.A.H.
Date: AUG. 2020
Scale: AS SHOWN

REGISTERED PROFESSIONAL ENGINEER
9654
OREGON
JULY 14, 1978
MARK D. GRENZ
EXPIRES: 06-30-2023

JOB # 7071

SDR3



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CROWN POINT SEGMENT 2

GRADING PLAN

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.

7071p-pf_Basin Map BASIN

Design: M.D.G.
Drawn: C.D.S.
Checked: E.A.H.
Date: AUG. 2020
Scale: AS SHOWN

JOB # 7071

J:\7Dev\7071--Crown Point Segment 2 (6754)\Dwg -2D\Production plans\7071p-pf_Basin Map.dwg, BASIN, 11/8/2021 3:25:15 PM, TShull


Boone Rd SE
250 ft
5
NB Interstate 5 FW
SB Interstate 5 FW
OS#1
Area = 1 ac
402 ft

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PRIVATE STORM DRAIN PLAN

CROWN POINT SEGMENT 2

DIMENSIONS & NOTES TAKE PRECEDENCE OVER GRAPHICAL REPRESENTATION.

Design: M.D.G.
Drawn: C.D.S.
Checked: E.A.H.
Date: AUG. 2020
Scale: AS SHOWN

REGISTERED PROFESSIONAL ENGINEER
OREGON
MAY 14, 1978
MARK D. GRENZ
EXPIRES: 06-30-2023

JOB # 7071

SDR6

Appendix B

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

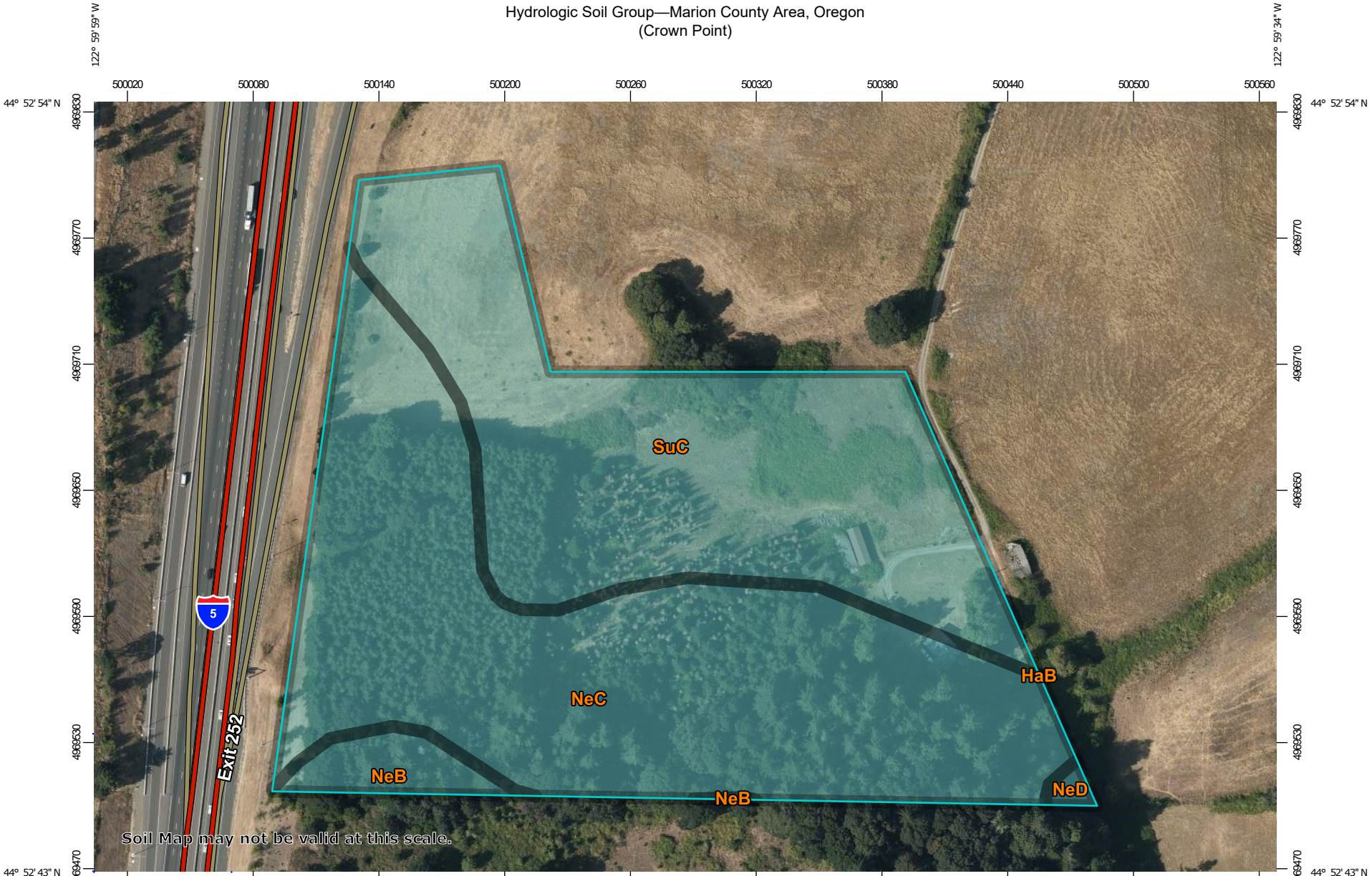
A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Marion County Area, Oregon

Crown Point

August 14, 2020

Hydrologic Soil Group—Marion County Area, Oregon
(Crown Point)



Map Scale: 1:2,580 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 35 70 140 210

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 17, Jun 11, 2020

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
HaB	Hazelair silt loam, 2 to 6 percent slopes	C/D	0.0	0.0%
NeB	Nekia silty clay loam, 2 to 7 percent slopes	C	0.6	3.2%
NeC	Nekia silty clay loam, 7 to 12 percent slopes	C	10.1	53.9%
NeD	Nekia silty clay loam, 12 to 20 percent slopes	C	0.1	0.4%
SuC	Silverton silt loam, 2 to 12 percent slopes	C	8.0	42.4%
Totals for Area of Interest			**18.8**	**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.

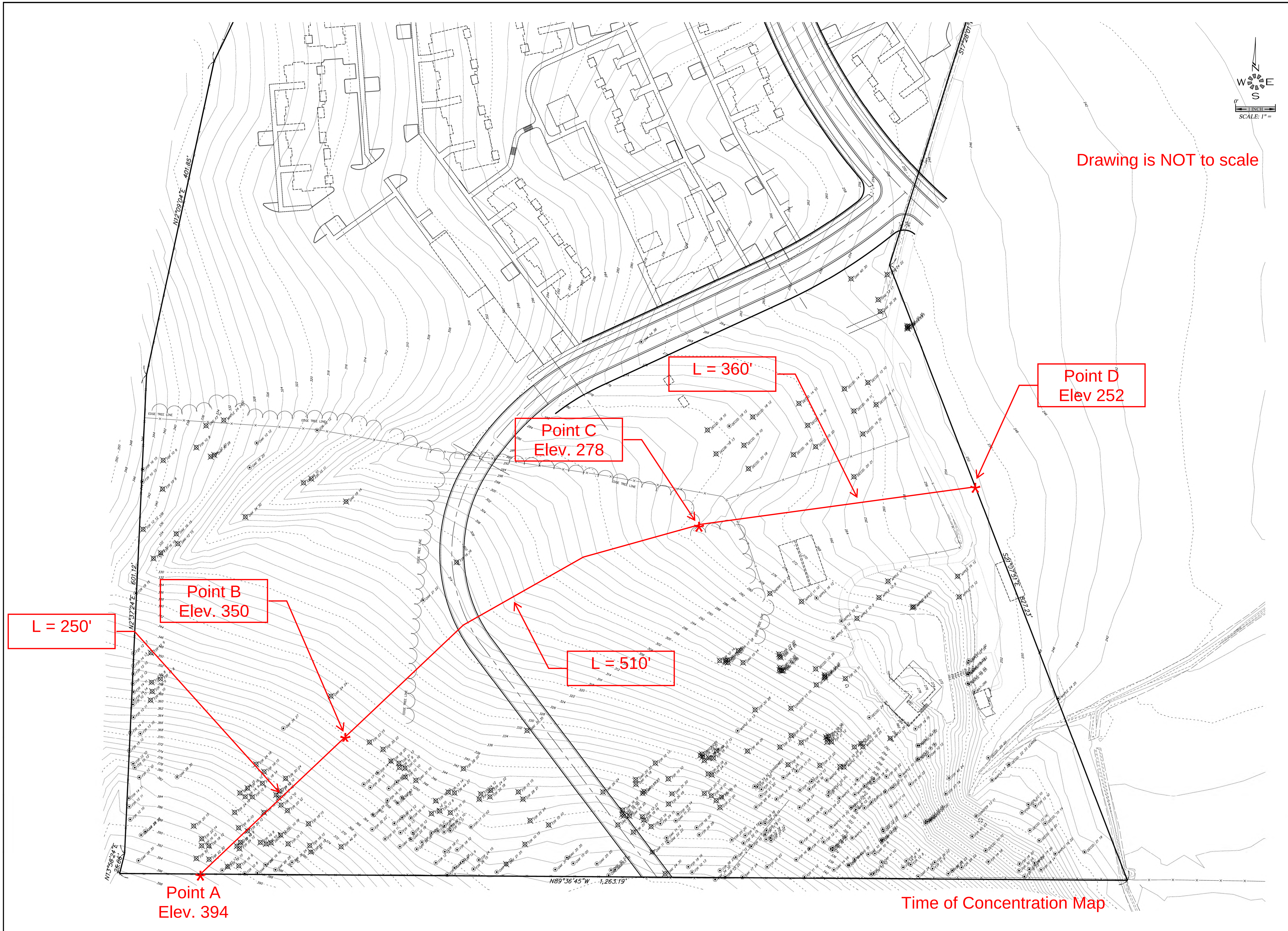
Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Appendix C



MULTI/TECH
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EXISTING CONDITIONS PLAN

CROWN POINT SEGMENT 2

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: C.D.S.
Checked: E.A.H.
Date: AUG. 2020
Scale: AS SHOWN

JOB # 7071

SDR2

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

Project	By	Date
Crown Point Segment 2	M. Hendrick	10/2020
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)	Woodland and Forest	
2.	Manning's roughness coefficient, n (Table 4D-4)	0.40	
3.	Flow length, L (total L † 300 ft) ft	250	
4.	Two-year 24-hour rainfall, P_2 in	2.2	
5.	Land slope, s ft/ft	0.176	
6.	$T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t hr	0.376 +	= 0.376

Shallow concentrated flow

	Segment ID	B-C	C-D
7.	Surface description (paved or unpaved)	Forest	Pasture
8.	Flow length, L ft	510	360
9.	Watercourse slope, s ft/ft	0.141	0.072
10.	Average velocity, V (figure 3-1) ft/s	1.0	1.7
11.	$T_t = \frac{L}{3600\ V}$ Compute T_t hr	0.142 +	0.059 = 0.201

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		0.577

0.58 Hrs = 35 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

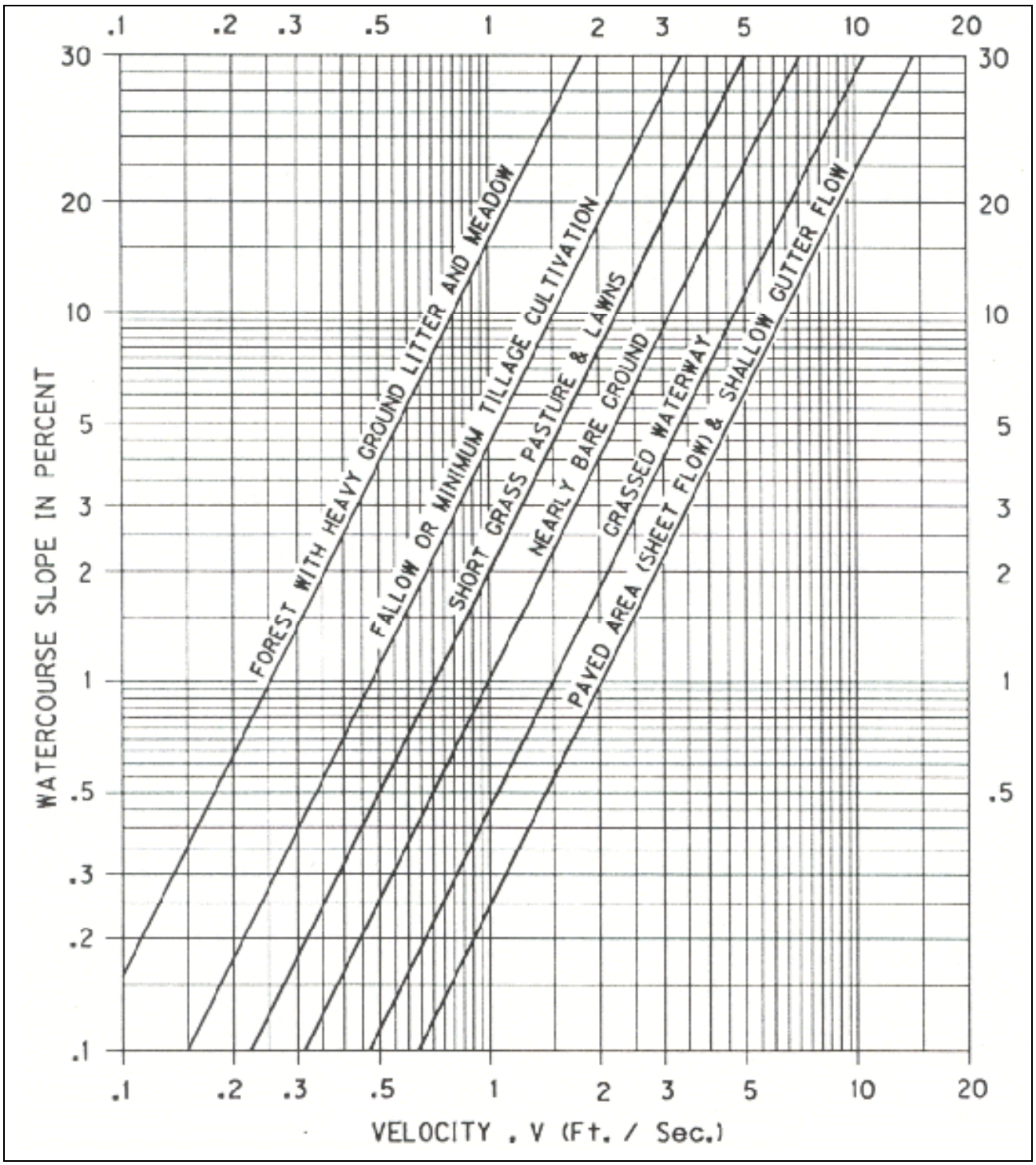
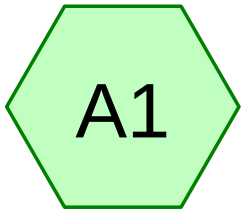
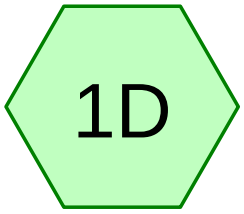


Figure 4D-2. Average Velocity of Shallow Concentrated Flow

Appendix D



Existing Conditions



Developed Conditions

Subcat Reach Pond Link

Routing Diagram for 20211109 Crown Point PH2
Prepared by Multitech Engineering Services, Inc., Printed 11/9/2021

Summary for Subcatchment A1: Existing Conditions

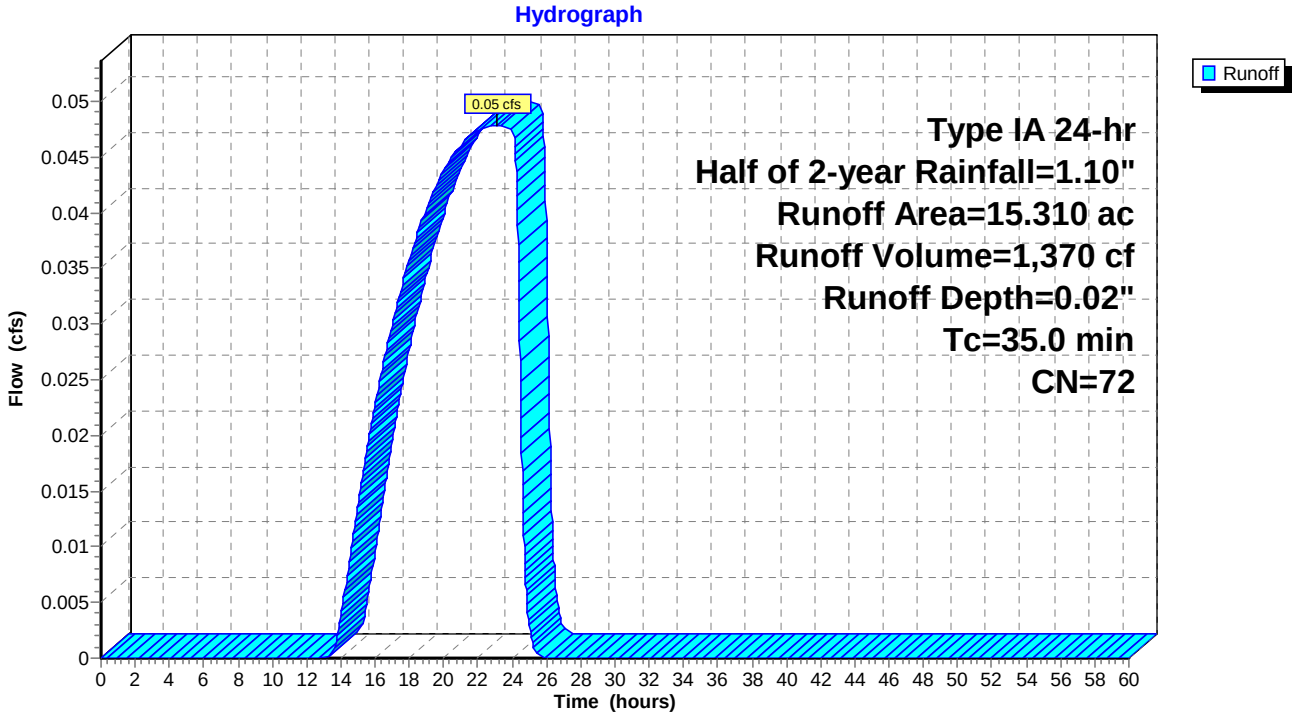
Runoff = 0.05 cfs @ 23.06 hrs, Volume= 1,370 cf, Depth= 0.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs
Type IA 24-hr Half of 2-year Rainfall=1.10"

	Area (ac)	CN	Description
*	14.310	72	City of Salem Pre-developed, HSG C
	1.000	70	Woods, Good, HSG C
	15.310	72	Weighted Average
	15.310		100.00% Pervious Area

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

Subcatchment A1: Existing Conditions



Summary for Subcatchment 1D: Developed Conditions

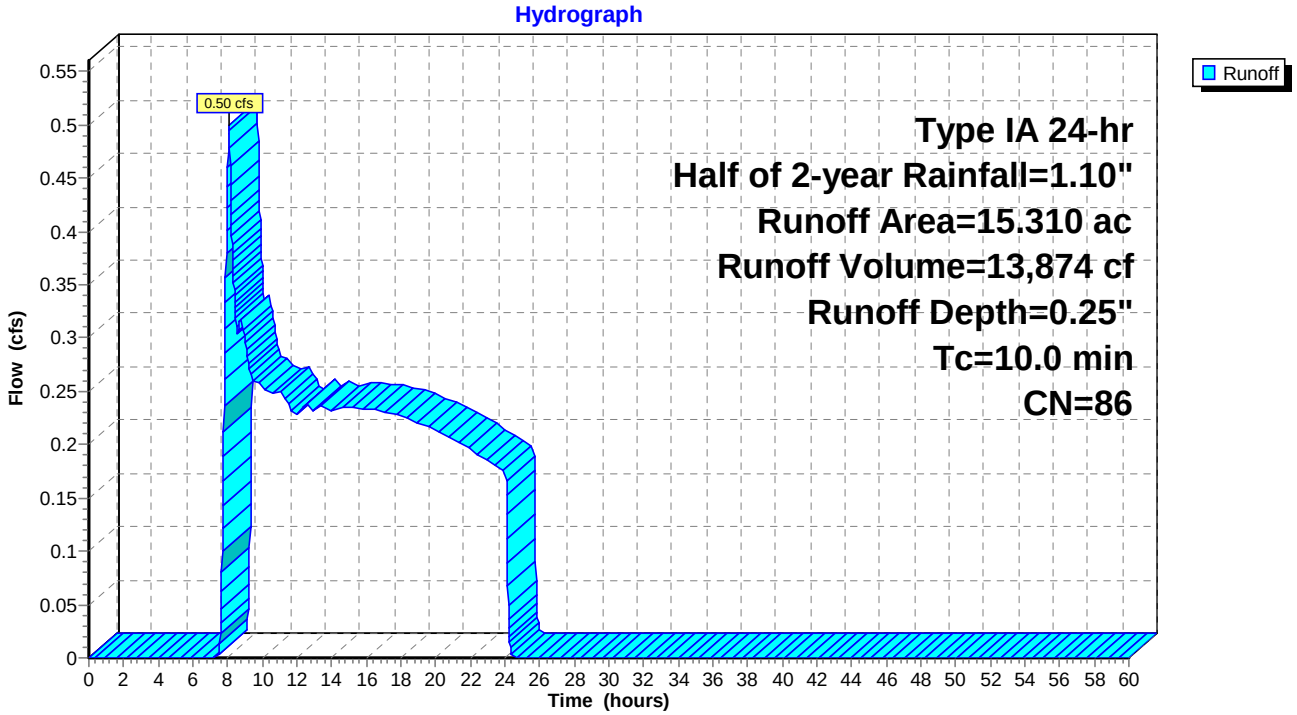
Runoff = 0.50 cfs @ 8.07 hrs, Volume= 13,874 cf, Depth= 0.25"
Routed to nonexistent node WQ

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs
Type IA 24-hr Half of 2-year Rainfall=1.10"

	Area (ac)	CN	Description
	6.440	74	>75% Grass cover, Good, HSG C
*	7.870	98	Roofs, paved parking and sidewalk HSG C
	1.000	70	Woods, Good, HSG C
	15.310	86	Weighted Average
	7.440		48.60% Pervious Area
	7.870		51.40% Impervious Area

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

Subcatchment 1D: Developed Conditions



Summary for Subcatchment A1: Existing Conditions

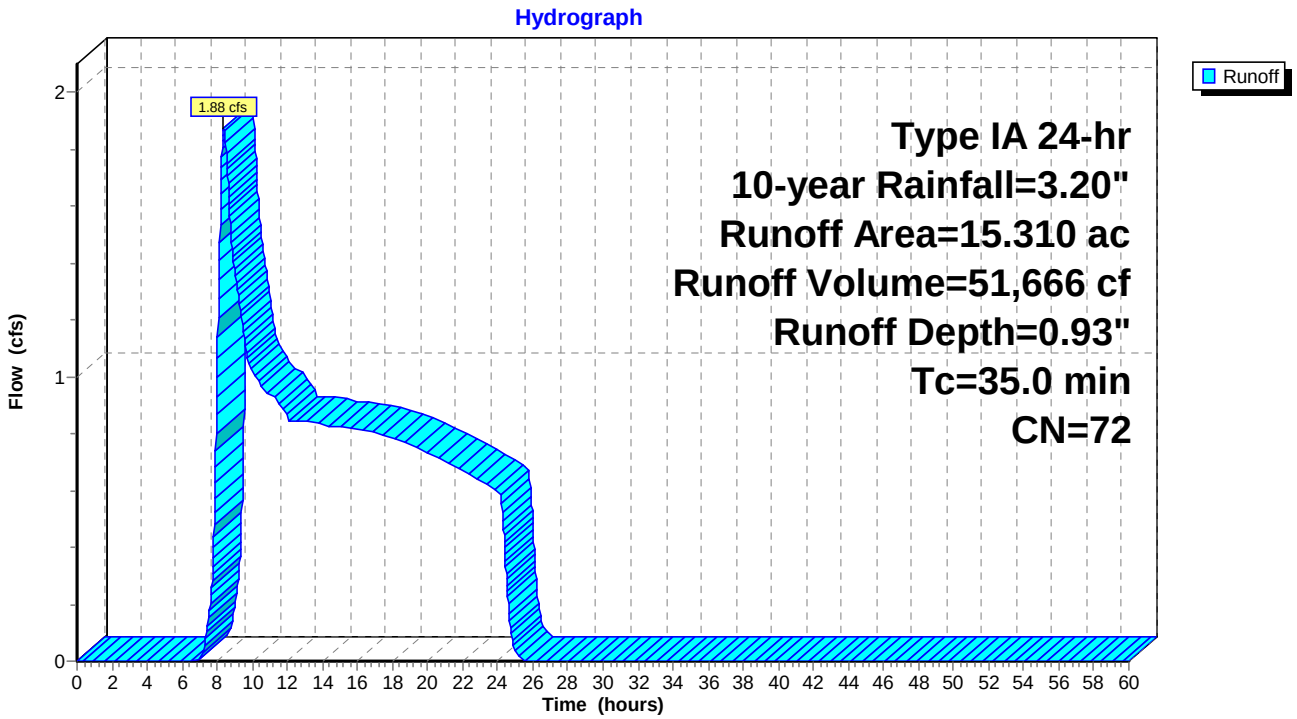
Runoff = 1.88 cfs @ 8.38 hrs, Volume= 51,666 cf, Depth= 0.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs
Type IA 24-hr 10-year Rainfall=3.20"

	Area (ac)	CN	Description
*	14.310	72	City of Salem Pre-developed, HSG C
	1.000	70	Woods, Good, HSG C
	15.310	72	Weighted Average
	15.310		100.00% Pervious Area

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

Subcatchment A1: Existing Conditions



Summary for Subcatchment 1D: Developed Conditions

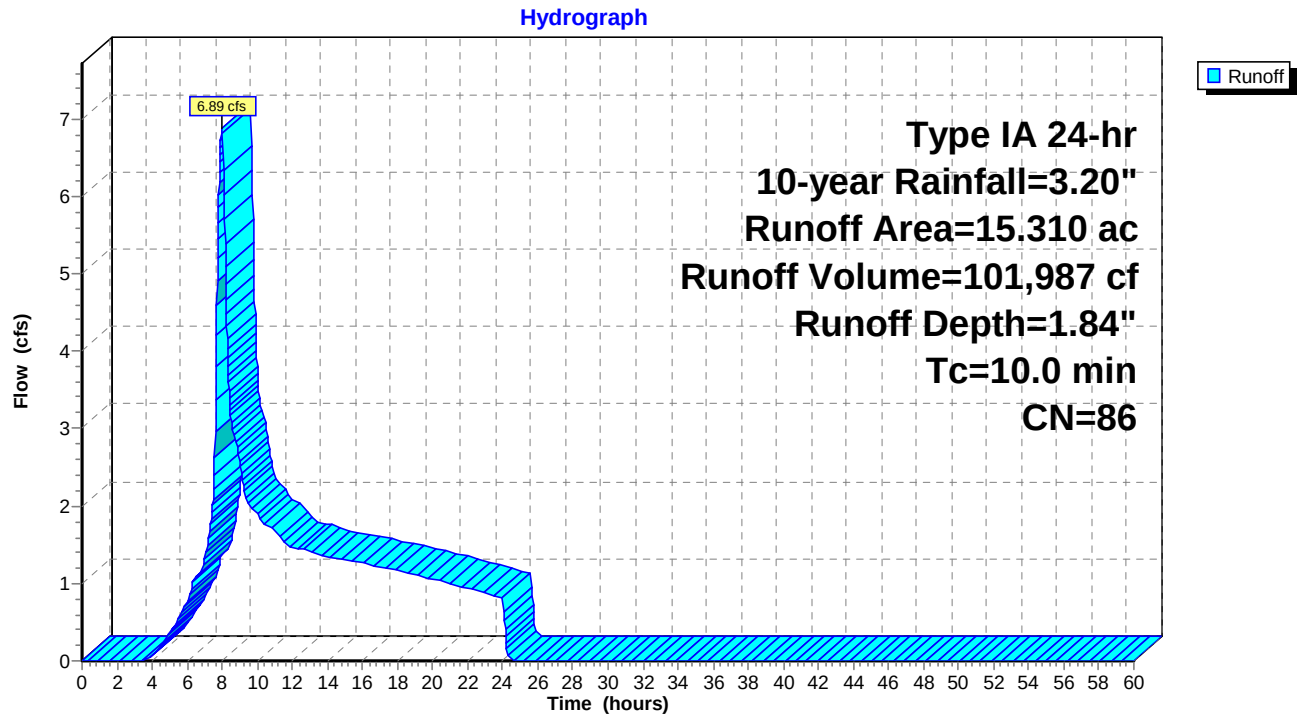
Runoff = 6.89 cfs @ 8.01 hrs, Volume= 101,987 cf, Depth= 1.84"
Routed to nonexistent node WQ

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs
Type IA 24-hr 10-year Rainfall=3.20"

	Area (ac)	CN	Description
	6.440	74	>75% Grass cover, Good, HSG C
*	7.870	98	Roofs, paved parking and sidewalk HSG C
	1.000	70	Woods, Good, HSG C
	15.310	86	Weighted Average
	7.440		48.60% Pervious Area
	7.870		51.40% Impervious Area

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

Subcatchment 1D: Developed Conditions



Summary for Subcatchment A1: Existing Conditions

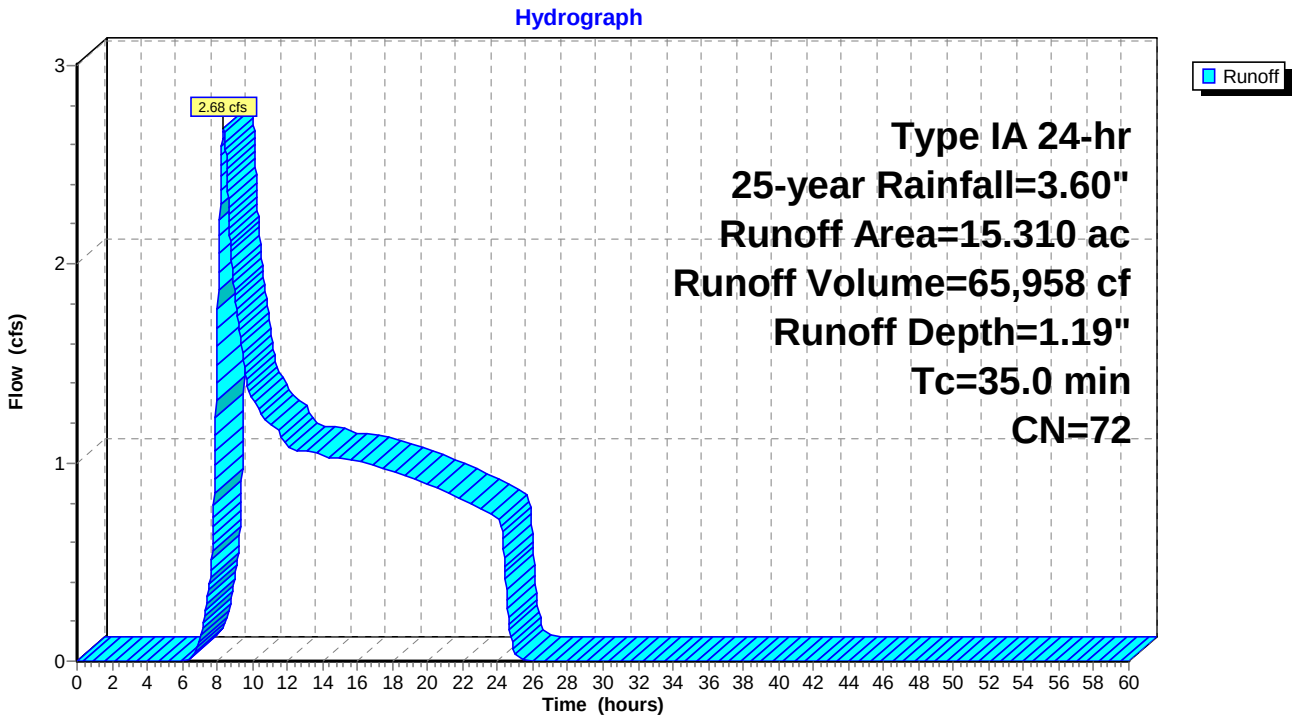
Runoff = 2.68 cfs @ 8.36 hrs, Volume= 65,958 cf, Depth= 1.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs
Type IA 24-hr 25-year Rainfall=3.60"

	Area (ac)	CN	Description
*	14.310	72	City of Salem Pre-developed, HSG C
	1.000	70	Woods, Good, HSG C
	15.310	72	Weighted Average
	15.310		100.00% Pervious Area

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

Subcatchment A1: Existing Conditions



Summary for Subcatchment 1D: Developed Conditions

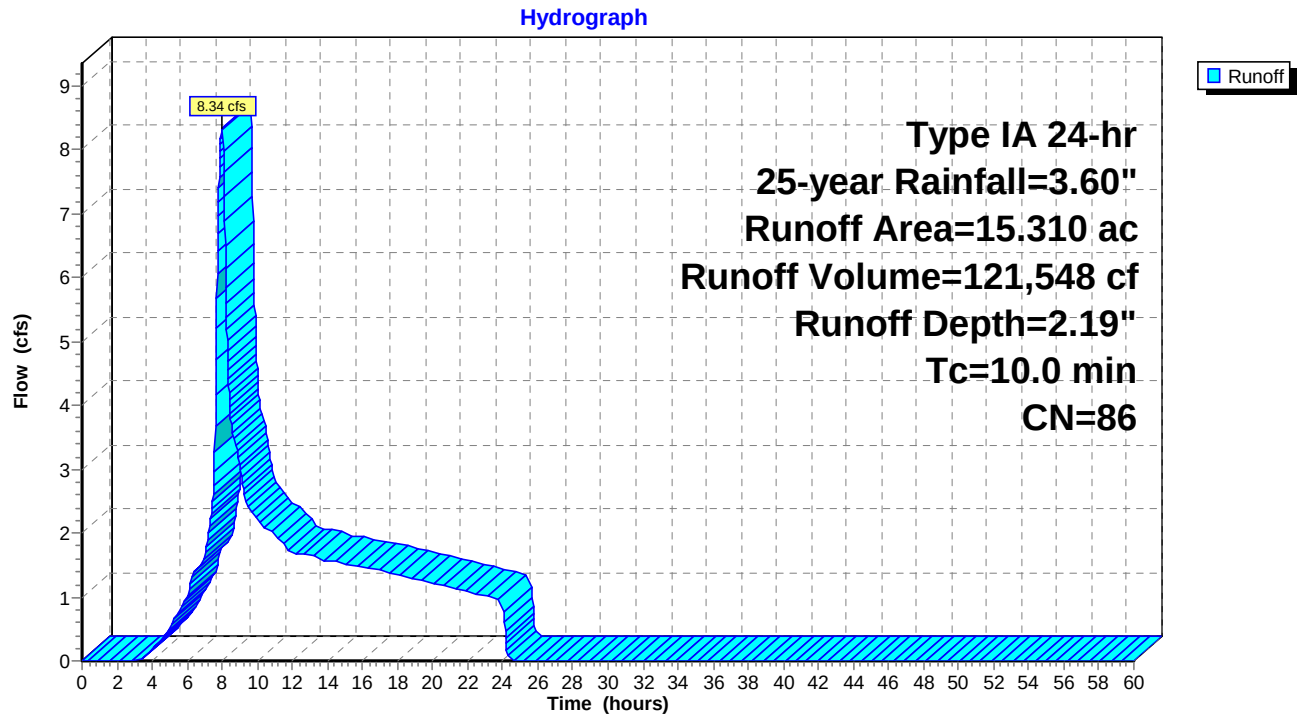
Runoff = 8.34 cfs @ 8.01 hrs, Volume= 121,548 cf, Depth= 2.19"
Routed to nonexistent node WQ

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs
Type IA 24-hr 25-year Rainfall=3.60"

	Area (ac)	CN	Description
	6.440	74	>75% Grass cover, Good, HSG C
*	7.870	98	Roofs, paved parking and sidewalk HSG C
	1.000	70	Woods, Good, HSG C
	15.310	86	Weighted Average
	7.440		48.60% Pervious Area
	7.870		51.40% Impervious Area

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

Subcatchment 1D: Developed Conditions



Summary for Subcatchment A1: Existing Conditions

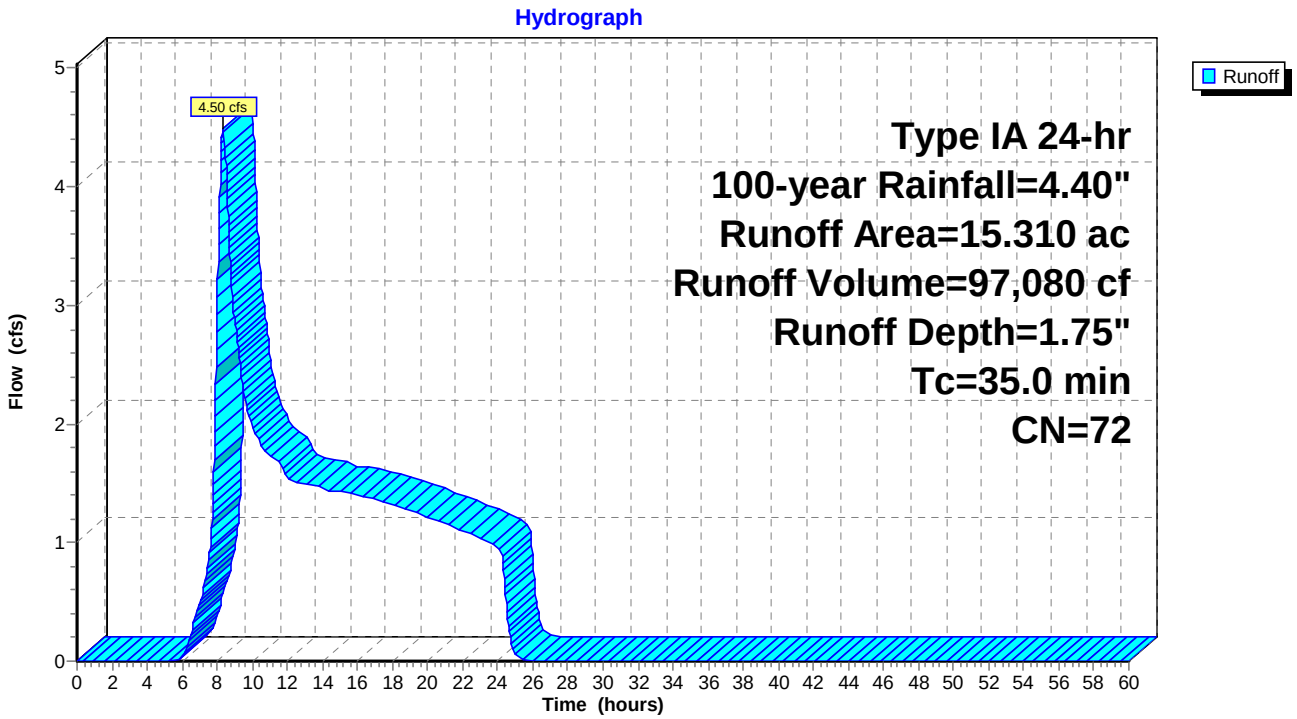
Runoff = 4.50 cfs @ 8.33 hrs, Volume= 97,080 cf, Depth= 1.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs
Type IA 24-hr 100-year Rainfall=4.40"

	Area (ac)	CN	Description
*	14.310	72	City of Salem Pre-developed, HSG C
	1.000	70	Woods, Good, HSG C
	15.310	72	Weighted Average
	15.310		100.00% Pervious Area

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

Subcatchment A1: Existing Conditions



Summary for Subcatchment 1D: Developed Conditions

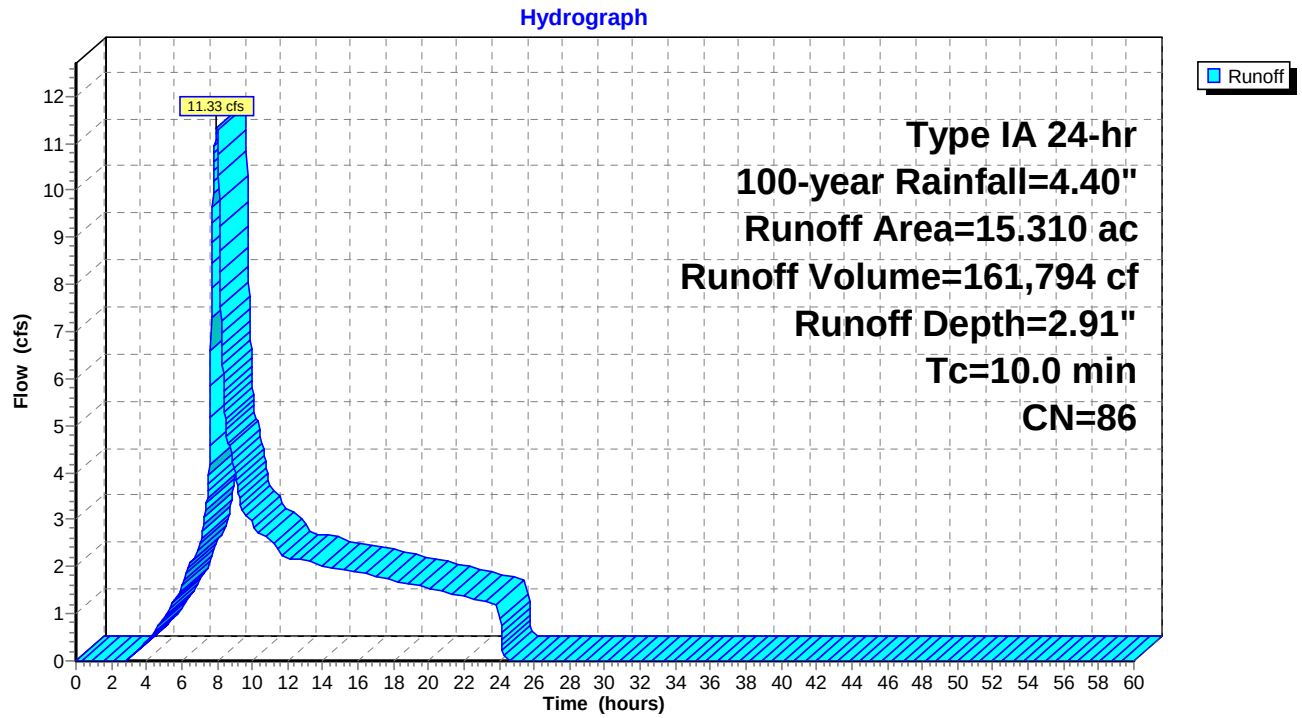
Runoff = 11.33 cfs @ 7.99 hrs, Volume= 161,794 cf, Depth= 2.91"
Routed to nonexistent node WQ

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs
Type IA 24-hr 100-year Rainfall=4.40"

	Area (ac)	CN	Description
	6.440	74	>75% Grass cover, Good, HSG C
*	7.870	98	Roofs, paved parking and sidewalk HSG C
	1.000	70	Woods, Good, HSG C
	15.310	86	Weighted Average
	7.440		48.60% Pervious Area
	7.870		51.40% Impervious Area

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

Subcatchment 1D: Developed Conditions



Summary for Subcatchment A1: Existing Conditions

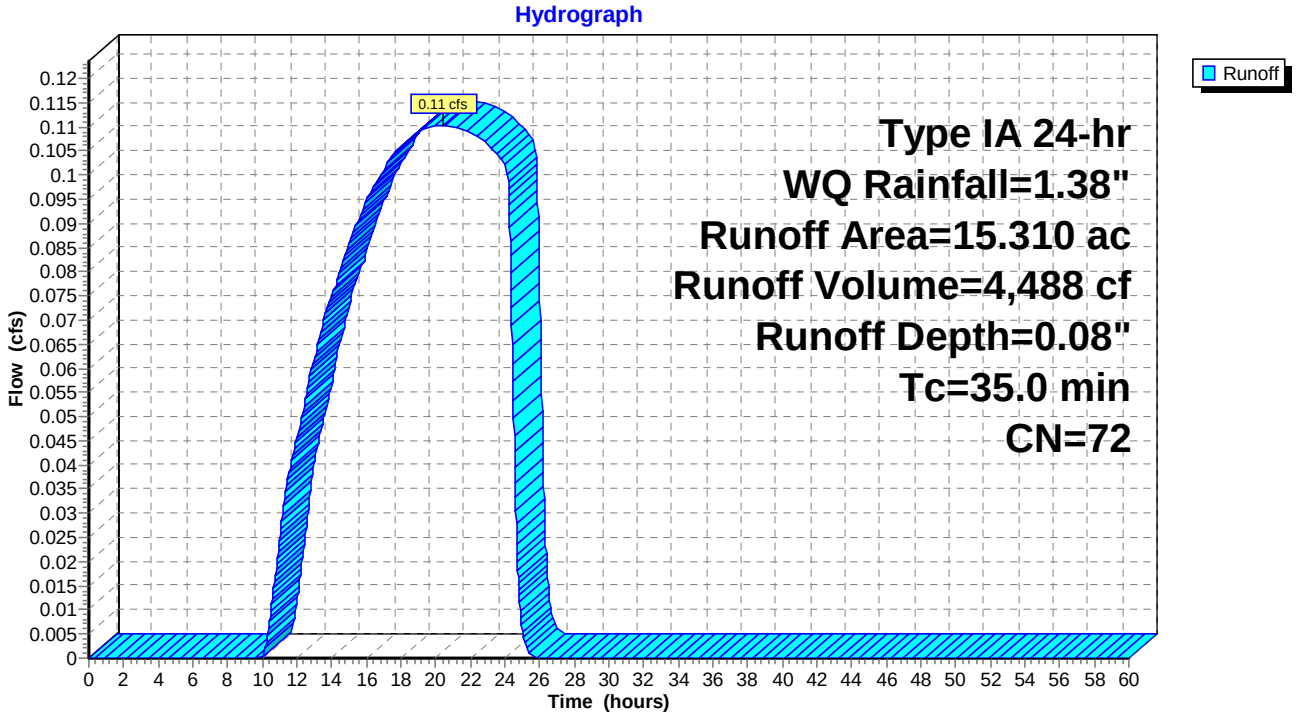
Runoff = 0.11 cfs @ 20.42 hrs, Volume= 4,488 cf, Depth= 0.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs
Type IA 24-hr WQ Rainfall=1.38"

	Area (ac)	CN	Description
*	14.310	72	City of Salem Pre-developed, HSG C
	1.000	70	Woods, Good, HSG C
	15.310	72	Weighted Average
	15.310		100.00% Pervious Area

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

Subcatchment A1: Existing Conditions



Summary for Subcatchment 1D: Developed Conditions

Runoff = 1.12 cfs @ 8.05 hrs, Volume= 23,035 cf, Depth= 0.41"
Routed to nonexistent node WQ

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs
Type IA 24-hr WQ Rainfall=1.38"

	Area (ac)	CN	Description
	6.440	74	>75% Grass cover, Good, HSG C
*	7.870	98	Roofs, paved parking and sidewalk HSG C
	1.000	70	Woods, Good, HSG C
	15.310	86	Weighted Average
	7.440		48.60% Pervious Area
	7.870		51.40% Impervious Area

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

Subcatchment 1D: Developed Conditions