B. Jack 7611

PRELIMINARY DRAINAGE ANALYSIS
FOR

Clear Lake Subdivision
Keizer, Oregon

Owner:
Trademark Enterprises
PO Box 5248
Salem, Or 97304

February 28, 2024

Renew date: 6.30.2025

MULTI/TECH
ENGINEERING SERVICES, INC.

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CONTENTS

INTRODUCTION

The Clear Lake project is a proposed 20-lot subdivision with a mix of public and private access located at 1135 Clear Lake Rd NE. The parcel of land to be developed is Tax Lot 5300 of Marion County Assessor's Map 06 3W 23AC and is approximately 1.7-acres in size. A vicinity map is included in Appendix A and an aerial image is shown below.

Figure 1. Project Site

Green Stormwater Infrastructure (GSI) to the Maximum Extent Feasible (MEF) will be used for the newly developed areas per city of Keizer Design Standards. All facilities will be constructed to meet the city of Keizer standards.

EXISTING CONDITIONS

The 1.7-acre project site is rectangular in shape. Surface conditions consist of short grass, a few maple and cedar trees spread across the property, and an existing structure that will be removed during this project. There are no identified wetlands or sensitive areas located on the property. The existing site is very flat with less than a 1-foot relief across the property and a maximum elevation of 179 feet. With

this topography and that of the surrounding area no additional runoff is expected to reach the site. The abutting properties are zoned single-family residential and urban transition. The soil map from the NRCS Web Soil Survey in Appendix B shows that this location is comprised of Amity silt loam and Concord silt loam which are both classified as hydrologic soil groups C/D. The hydrologic soil group will be treated as C which as directed by the city of Keizer Design Standards correlates to a curve number of 72.

The infiltration rate was tested at the proposed facility location using the open pit falling head procedure. This test found an average rate of 9.84 inches per hour. The design infiltration rate will apply a safety factor of 2 to the tested average and therefore be treated as 4.92 in/hr. Infiltration test results are contained in Appendix C.

Developed Conditions

This project will require the extension of Barbara Avenue NE and Mikayla Road N, as well as the construction of a new accessway. Each of the 20 lots will add new hard surface in the form of driveways, roofs, and patios. The average lot size for the project is 2,489 sq-ft and based on the impervious area map shown in Appendix A, the new hard surface is approximately 1,400 sq-ft per lot. Therefore, the total impervious area for the site is 50,190 sq-ft, leaving 25,375 sq-ft of pervious area. In this analysis impervious area will have a curve number of 98 and pervious area will be classified as open space with >75% grass cover and have a curve number of 74. Weighting by area the composite curve number for this site is 90.

Explanation of Design

Vertically, the proposed infiltration rain garden is designed with the top of storage 2 feet above the growing media, 12 inches of growing media, 3 inches of separation rock, and 4 feet of 30% void drain rock. This facility will provide water quality treatment by allowing for the removal of pollutants through sedimentation, adsorption onto surrounding vegetation, filtration, and biological uptake. The north side of the facility is designed with a 3:1 slope and the remaining three sides utilize a retaining wall. The retaining wall is required to provide the necessary storage volume and prevent the water depth during the water quality event from exceeding 4 inches. Storms beyond the water quality event will utilize a 24-inch beehive inlet, with its rim 18 inches above the growing media, to bypass treatment and enter the drain rock through an 8-inch perforated pipe. A second beehive inlet with its rim set 2 feet above the growing media will serve as the emergency overflow. The facility has about a half foot of freeboard between the rim of the emergency overflow and the rim of the lowest inlet catch basin. The emergency overflow connects with an existing stormwater manhole to the south. A 42-inch-tall chain link fence will surround the facility to provide fall protection and perimeter security. This analysis considers a 2,379 sq-ft rain garden for water quality and quantity requirements.

Stormwater Analysis

The city of Keizer standards require that facilities with an infiltration rate greater than 2 in/hr treat the water quality storm and retain up to the 100-yr storm event. Stormwater analysis is performed using HydroCAD 10.20 and based on the region, these storms were modeled as type IA 24-hr. Smaller storm events are analyzed to show the range of performance but do not affect the design.

Table 1. Keizer Design Storms

Storm Event	Intensity (in/hr)
Water Quality	1.38
5-yr	2.70
10-yr	3.20
25-yr	3.60
50-yr	4.10
100-yr	4.40

WATER QUALITY

In this analysis the primary outflow shows water passing through the growing medium and the secondary outflow represents water passing through the beehive inlet. For this storm event the water may not exceed 4 inches in depth and the top of the growing media is at an elevation of 174.50 ft. As directed by the city of Keizer the infiltration rate through the growing medium was modeled at 2 in/hr.

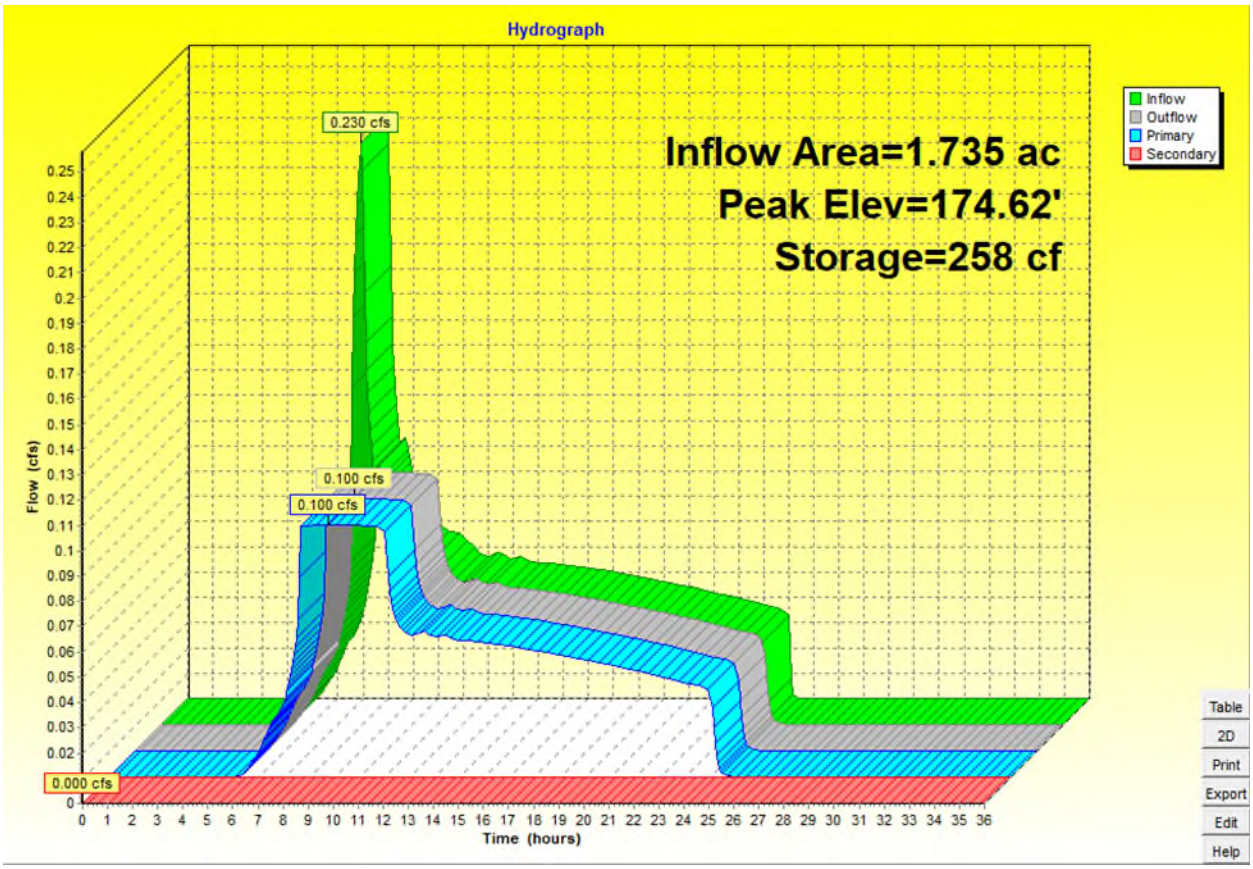


Figure 2. Water passing through growing medium.

This graph shows the maximum water height was 0.12 feet above the soil and the beehive was not used during the water quality event. More information regarding this hydrograph can be found in Appendix D.

Water Quantity

In this rain garden the rock gallery is intended to retain and infiltrate all runoff up to and including the 100-year event. Table 2 lists the water surface elevation in the facility for each storm event. The top of the drain rock is at an elevation of 173.25 ft.

Table 2. Water Quantity

Storm Event	Water Surface Elevation in Drain Rock (ft)
5-yr	169.27
10-yr	169.29
25-yr	169.92
50-yr	171.73
100-yr	173.06

Table 2 notes that across all design storms, the facility will have the required storage to retain and the surface area to infiltrate runoff. The hydrographs used to create this summary can be found in Appendix E.

Operations and Maintenance

This facility will handle runoff from a public street and therefore the city of Keizer will be responsible for all maintenance.

Design Summary

This analysis shows that a surface area of 2,379 sq-ft is sufficient to manage the water quality event and facilitate enough infiltration for all design storms.

Table 3. Design Summary

Location	Elevation (ft)
Top of Facility	176.50
Top of Beehive	175.00
Top of Growing Media	174.50
Top of Separation Rock	173.50
Top of Drain Rock	173.25
Bottom of Drain Rock	169.25

Conclusion

This facility should be adequate to meet both water quality and quantity design requirements as shown. If there are any questions, please contact Brenden Jack at BJack@mtengineering.net or Natalie Janney at NJanney@mtengineering.net.

APPENDIX A: MAPS

06 3W 23AC

SEE MAP 063W23AB

1/16 COR

N89 30W 659.44

MR 24

50'

30'

22.7'

SEE MAP 063W23A

1/16 COR

600
5.93 AC

100
4.90 AC

S89 55E 884.60

N38 41E 124.70

N38 41E 698 +/-

S89 55E 400.62

200
0.68 AC

92.65

75.00

N89 55W 454.47

M. R. 24

300
0.95 AC

92.35

S89 55E 408.66

S0 5W 225.00

150.00

S0 06W 335.00

400
0.90 AC

92.35

75.00

95.00

24.65

99.50

N89 55W 165.12

N89 55W 558.25

S89 53 55W 458.80

738.85

SEE MAP 063W23B

N89 55W 476.91

20.00

500
2.88 AC

1700
5.01 AC

201.58

N0 01 27W 357.75

S53 26W 384 +/-

S53 26W 217.52

92 41 0

761.98

58.30

90.00

100.00

100.41

900
0.28 AC

1000

1100

2

1300

1400

1500

1600

CLEAR LAKE

131.41

125.07

125.41

125.75

126.09

126.43

17.24

122.86

1200

4

700
0.14 AC

156.00

127.00

74.80

60.00

82.17

800
0.10 AC

110.00

107.31

JAYS DRIVE NE

60'

CLEAR LAKE ADD NO 2

N89 53 55E 205.25

1800
1.00 AC

2900
0.48 AC

2700

2600

1

2500
0.50 AC

2300

2200
0.43 AC

2000

1900

3

ADD NO 2

N0 01 27W 212.25

S0 02 20W 212.25

S0 02 02W 570.00

147.82

126.00

128.85

171.69

85.00

75.00

75.41

192.76

107.67

3000
0.26 AC

3100

3200

2

3300

3400

5200
0.95 AC

5300
1.70 AC

5400
0.95 AC

24 21 0

5701
2.72 AC

205.25

252.92

S89 53 55W 458.17

BARBARA AVENUE NE

CLEAR LAKE GARDENS

WHEATLAND ROAD

64'

3159-00018

4100
0.19 AC

4000
0.31 AC

3900
0.27 AC

3800

1

3700

3600

3500

4200
0.24 AC

4600

4300
0.48 AC

4400
0.14 AC

4700

4800

4900

5000

5100

6

5

4

3

2

1

404.55

404.79

S0 01 27W 293.80

S0 02 20W 349.84

5500
0.34 AC

5600
0.39 AC

255.08

120.00

115.00

145.00

(20.08)

222.79

40' CLEAR LAKE RD NE

CTR SEC

CLEAR LAKE RD NE

C R 613

1/16 COR

SEE MAP 063W23CA

SEE MAP 063W23DB

SEE MAP 063W23DA

BRUNNER CT

R=45'

GALINA CT

44' ST

60'

48'

46'

54'

34'

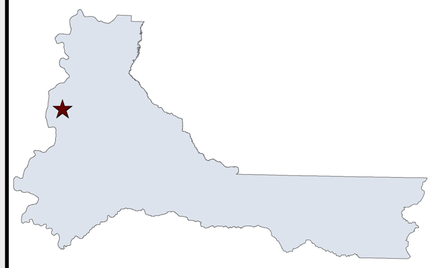
20'

30'

40'

06 3W 23AC

06 3W 23AC KEIZER



MARION COUNTY, OREGON

SW1/4 NE1/4 SEC23 T6S 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

2100
2400
2800
4500
5700

DISCLAIMER: THIS MAP WAS PREPARED FOR ASSESSMENT PURPOSES ONLY

Marion County OREGON — Assessors Office Cartography Dept

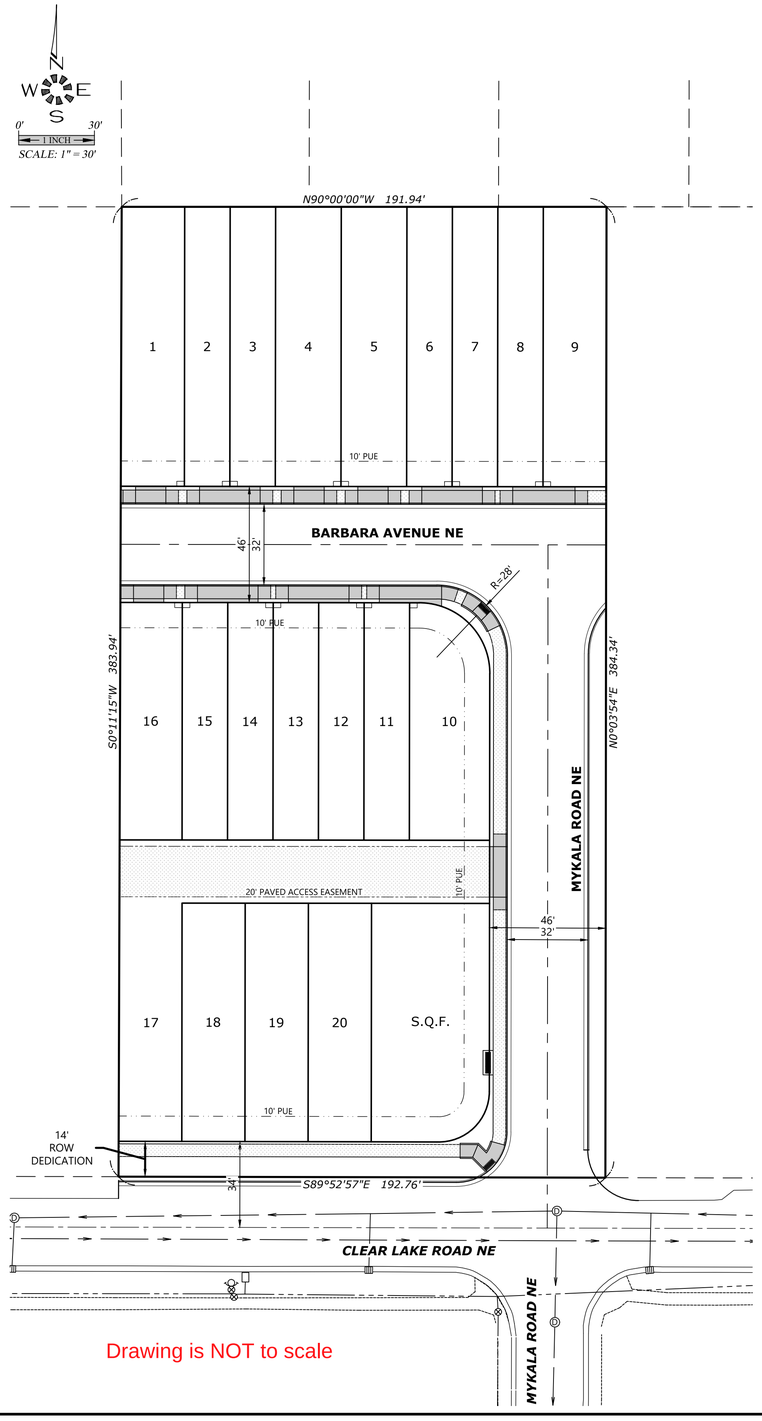
FOR ADDITIONAL MAPS VISIT OUR WEBSITE AT www.co.marion.or.us

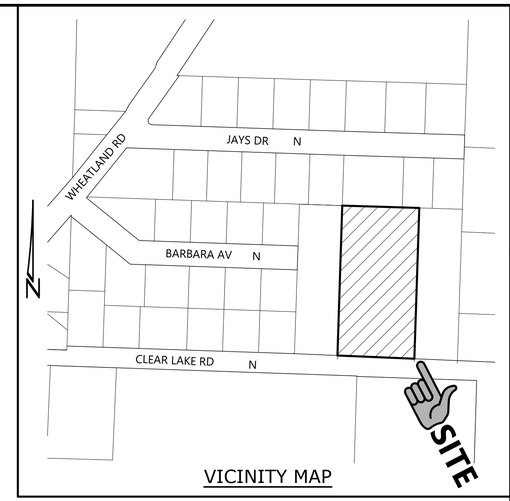
PLOT DATE: 10/16/2020

KEIZER
06 3W 23AC

CLEARLAKE

SEC. 23, T. 6 S., R. 3 W., W.M.
1135 CLEAR LAKE ROAD NE CITY OF KEIZER
MARION COUNTY, OREGON 97303





ABBREVIATIONS

A.C.	ASPHALTIC CONCRETE	L	LENGTH, LINE
ACMP	ALUMINIZED CMP	L.P.	LIGHT POLE
ASSY.	ASSEMBLY	M	METER, MAIN
B.O.	BLOW OFF	M.H.	MANHOLE
B.F.V.	BUTTERFLY VALVE	MTL.	METAL
C & G	CURB & GUTTER	O.H.	OVERHEAD
CATV	CABLE TELEVISION	PC	POINT OF CURVE
C.B.	CATCH BASIN	PCC	POINT OF CONTINUING CURVE
C.B.C.O.	CATCH BASIN CLEANOUT	PED.	PEDESTAL
C.B.I.	CATCH BASIN INLET	PRC	POINT OF REVERSE CURVE
CCR	COMPACTED CRUSHED ROCK	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
D.I.	DUCTILE IRON	P.P.	POWER POLE
DIA.	DIAMETER	P.L.	PROPERTY LINE
DWG	DRAWING	R	RADIUS
EASMT.	EASEMENT	R-	RIM
E.G.	EXIST. GRADE / GROUND	RD	ROOF DRAIN
EOP, E.P.	EDGE OF PAVEMENT	R.O.W.	RIGHT-OF-WAY
ELEC.	ELECTRIC	SAN.S. or S.S.	SANITARY SEWER
ELEV. or EL.	ELEVATION	S	SLOPE
EX. or EXIST.	EXISTING	S.Q.F.	STORMWATER QUALITY FACILITY
F.D.C.	FIRE DEPT. CONNECTION	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
		W.M.	WATER MAIN

SYMBOLS

EX.	PROP.		EX.	PROP.	
⊖	◓	BLOW OFF ASSY.	Ⓢ	Ⓢ	MANHOLE SAN. SEWER
▥	▥	CATCH BASIN	Ⓓ	Ⓓ	MANHOLE STORM DRAIN
▣	■	CATCH BASIN CLEANOUT	②	②	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 CONST.
DITCH C.L.	STORM DRAIN EXIST.
ELECTRICAL LINE	STORM DRAIN CONST.
GAS MAIN	WATER MAIN EXIST.
TELEPHONE LINE	WATER MAIN CONST.

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SHEET INDEX

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COVER SHEET

7611b 101-CS
Design: M.D.G.
Drawn: M.K.D.
Checked: J.J.G
Issue Date: 11/10/2023
Scale: AS SHOWN
As-Built: ----

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9654
OREGON
JULY 14, 1978
MARK D. GRENZ
EXPIRES: 06-30-2025

JOB # 7611

101

CLEARLAKE

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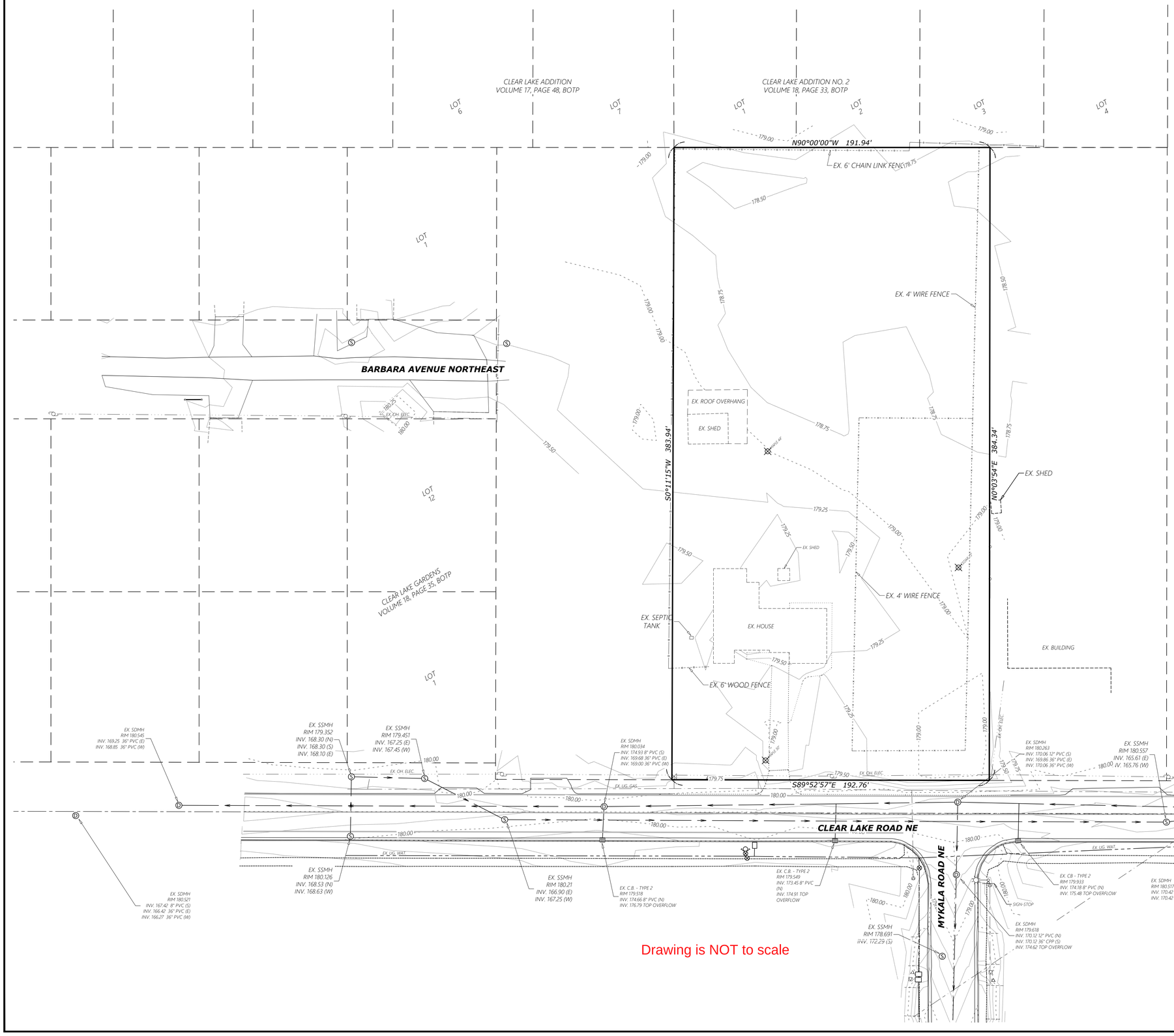

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EXISTING CONDITIONS PLAN

CLEARLAKE

76x11b 102-XCOND

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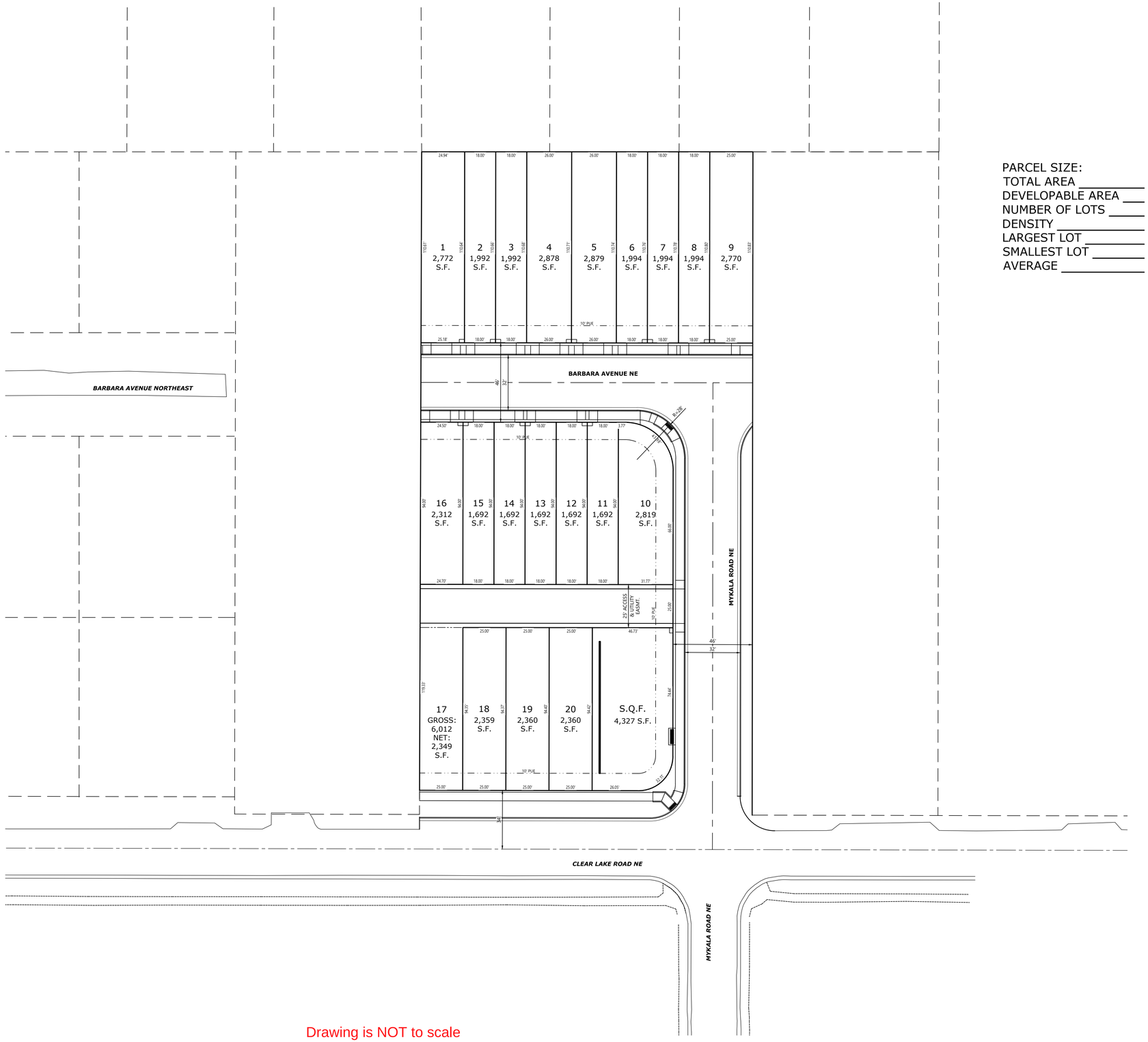
102



Drawing is NOT to scale

PARCEL SIZE:

TOTAL AREA	1.70 Ac.
DEVELOPABLE AREA	1.63 Ac.
NUMBER OF LOTS	21
DENSITY	12.88 UNITS/Ac.
LARGEST LOT	6012 S.F.
SMALLEST LOT	1692 S.F.
AVERAGE	2489 S.F.

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SITE PLAN

CLEARLAKE

7611b 701-SITE

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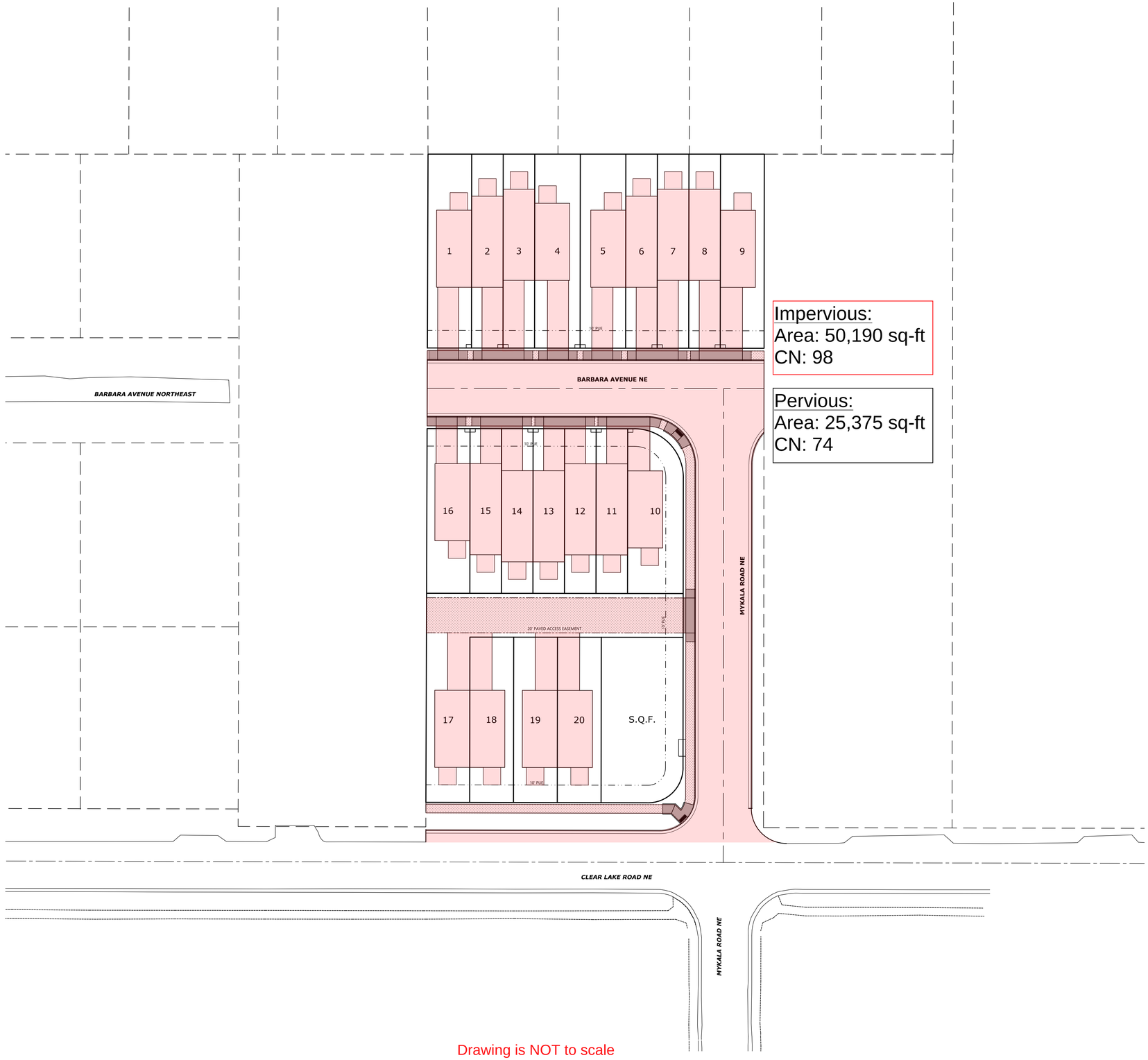

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SIDEWALK PLAN

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7611b 702-SW

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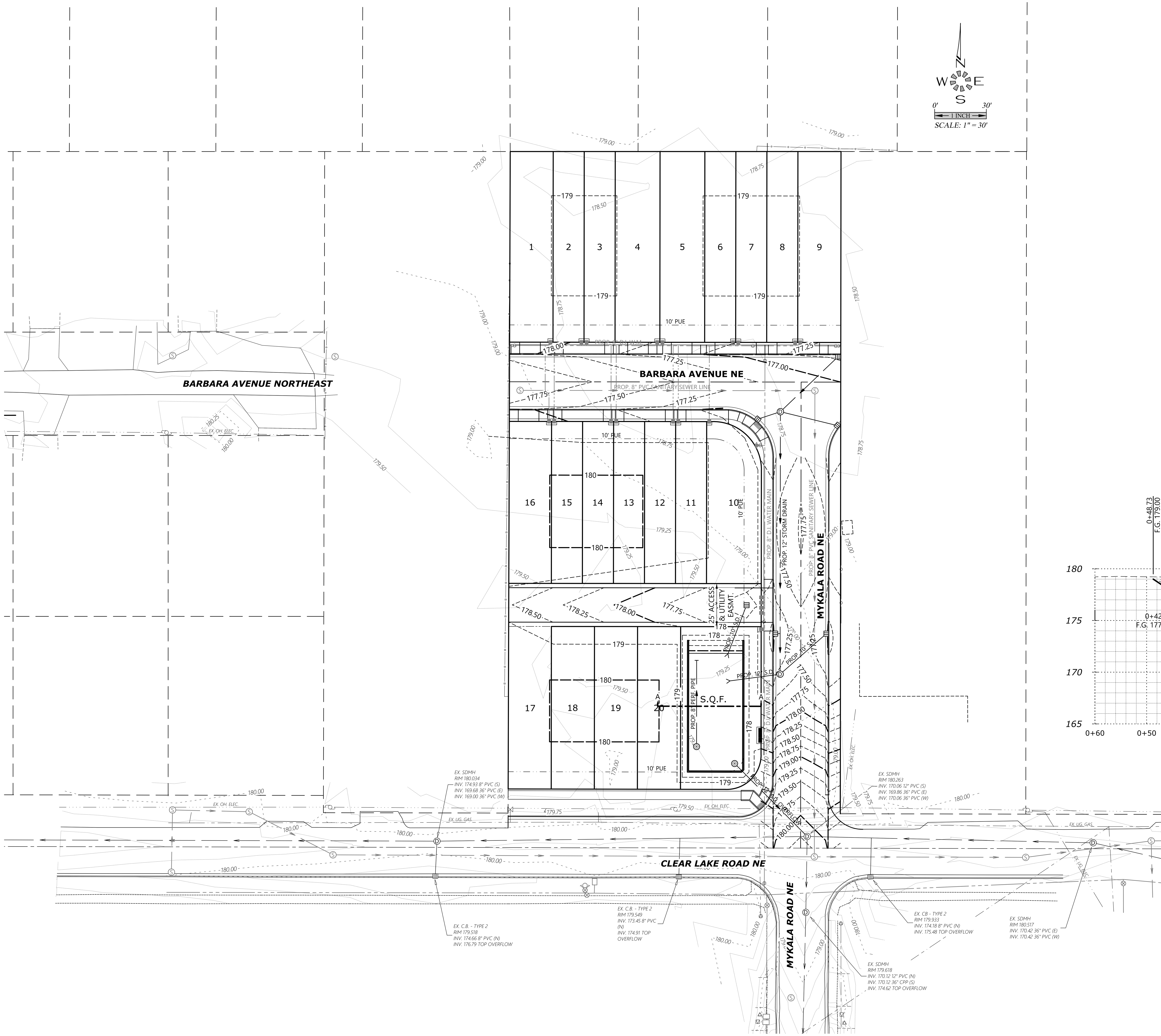
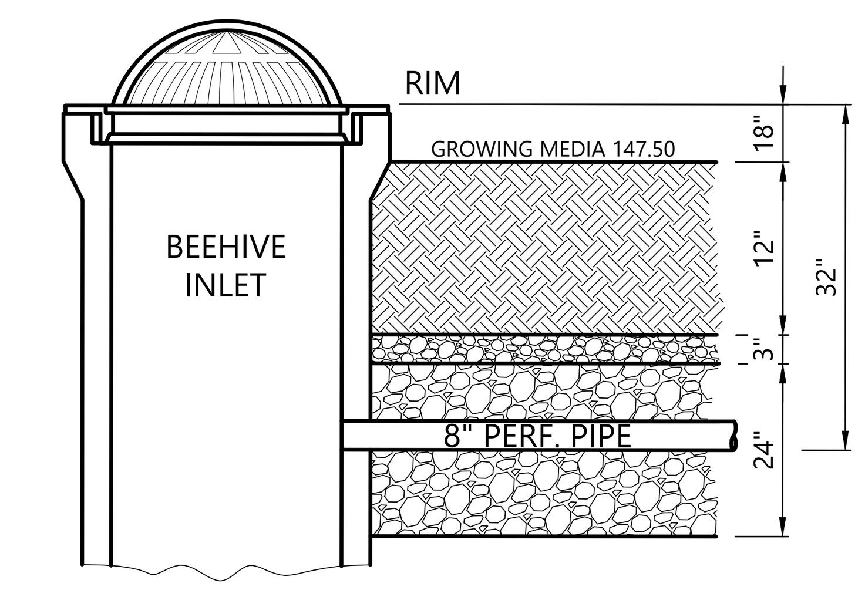
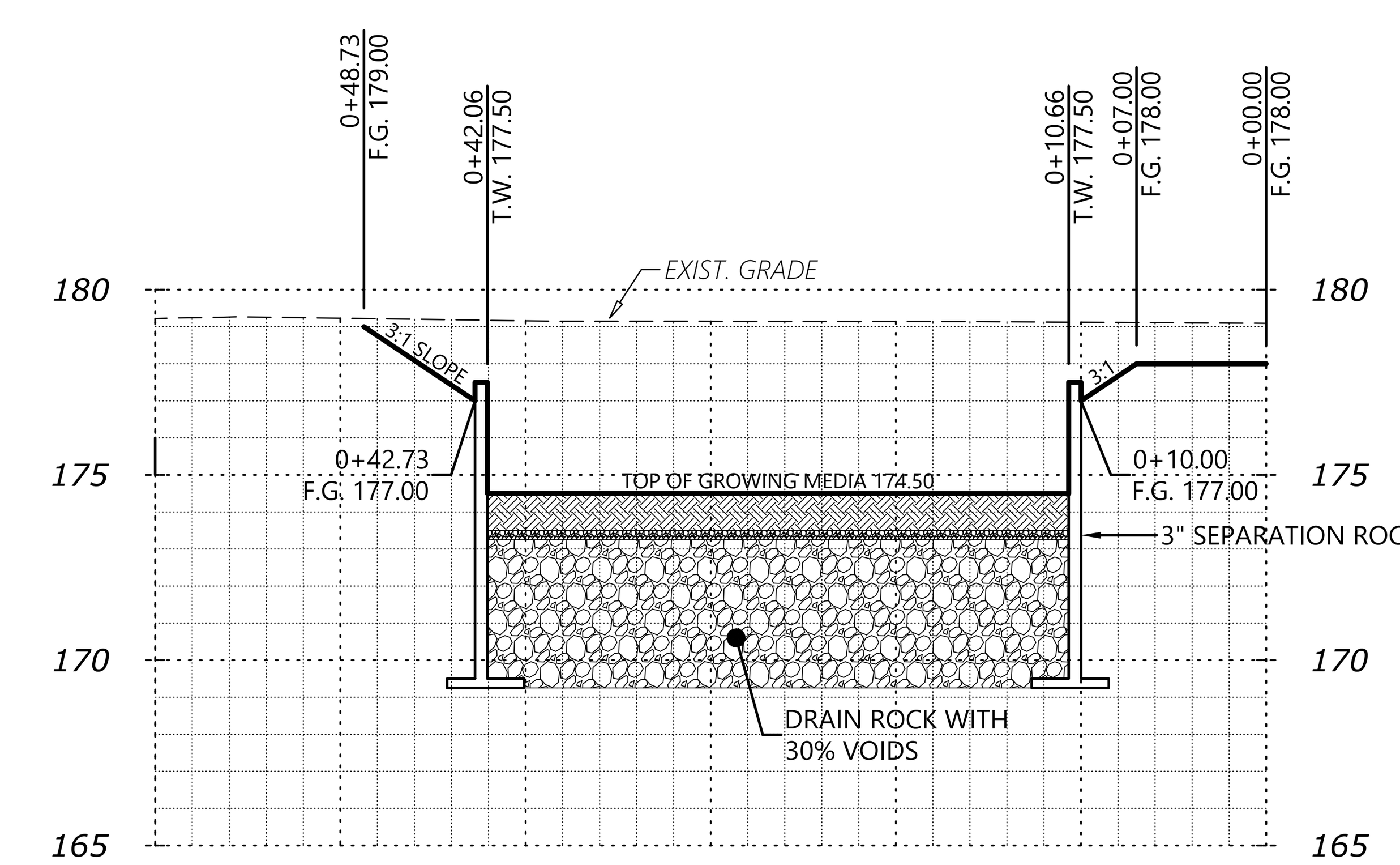
702





BEEHIVE INLET IN S.W.Q. FACILITY DETAIL

-NTS-



SECTION VIEW A-A

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STORM DRAIN PLAN

CLEARLAKE

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.

7611b 301-SD

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OREGON
JULY 14, 1978
MARK D. GRENZ
EXPIRES: 06-30-2025

JOB # 7611

301

APPENDIX B: NRCS WEB SOIL SURVEY

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

Map Scale: 1:686 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 10 20 40 60

Feet: 0 30 60 120 180

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 Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

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 21, Sep 8, 2023

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.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Am	Amity silt loam	0.8	50.9%
Co	Concord silt loam	0.8	49.1%
Totals for Area of Interest		**1.6**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however,

onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Marion County Area, Oregon

Am—Amity silt loam

Map Unit Setting

National map unit symbol: 24ns
Elevation: 120 to 350 feet
Mean annual precipitation: 40 to 45 inches
Mean annual air temperature: 52 to 54 degrees F
Frost-free period: 190 to 210 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Amity and similar soils: 85 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Amity

Setting

Landform: Terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear, convex
Across-slope shape: Linear
Parent material: Mixed silty alluvium

Typical profile

H1 - 0 to 24 inches: silt loam
H2 - 24 to 37 inches: silty clay loam
H3 - 37 to 60 inches: silt loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 12.0 inches)

Interpretive groups

Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Ecological site: R002XC007OR - Valley Swale Group
Forage suitability group: Somewhat Poorly Drained (G002XY005OR)
Other vegetative classification: Somewhat Poorly Drained (G002XY005OR)
Hydric soil rating: No

Minor Components

Concord

Percent of map unit: 5 percent
Landform: Terraces

Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Poorly Drained (G002XY006OR)
Hydric soil rating: Yes

Co—Concord silt loam

Map Unit Setting

National map unit symbol: 24p2
Elevation: 120 to 350 feet
Mean annual precipitation: 40 to 45 inches
Mean annual air temperature: 52 to 54 degrees F
Frost-free period: 190 to 210 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Concord and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Concord

Setting

Landform: Terraces
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Mixed mineralogy alluvium

Typical profile

H1 - 0 to 15 inches: silt loam
H2 - 15 to 29 inches: silty clay
H3 - 29 to 60 inches: silt loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Available water supply, 0 to 60 inches: High (about 11.4 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Ecological site: R002XC007OR - Valley Swale Group

Forage suitability group: Poorly Drained (G002XY006OR)
Other vegetative classification: Poorly Drained (G002XY006OR)
Hydric soil rating: Yes

Minor Components

Dayton

Percent of map unit: 10 percent
Landform: Terraces
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Poorly Drained (G002XY006OR)
Hydric soil rating: Yes

APPENDIX C: INFILTRATION TEST RESULTS

Clear Lake Road

Near Clear Lake Road, center of site frontage

Infiltration Test

Test No.1

November 11th, 2023

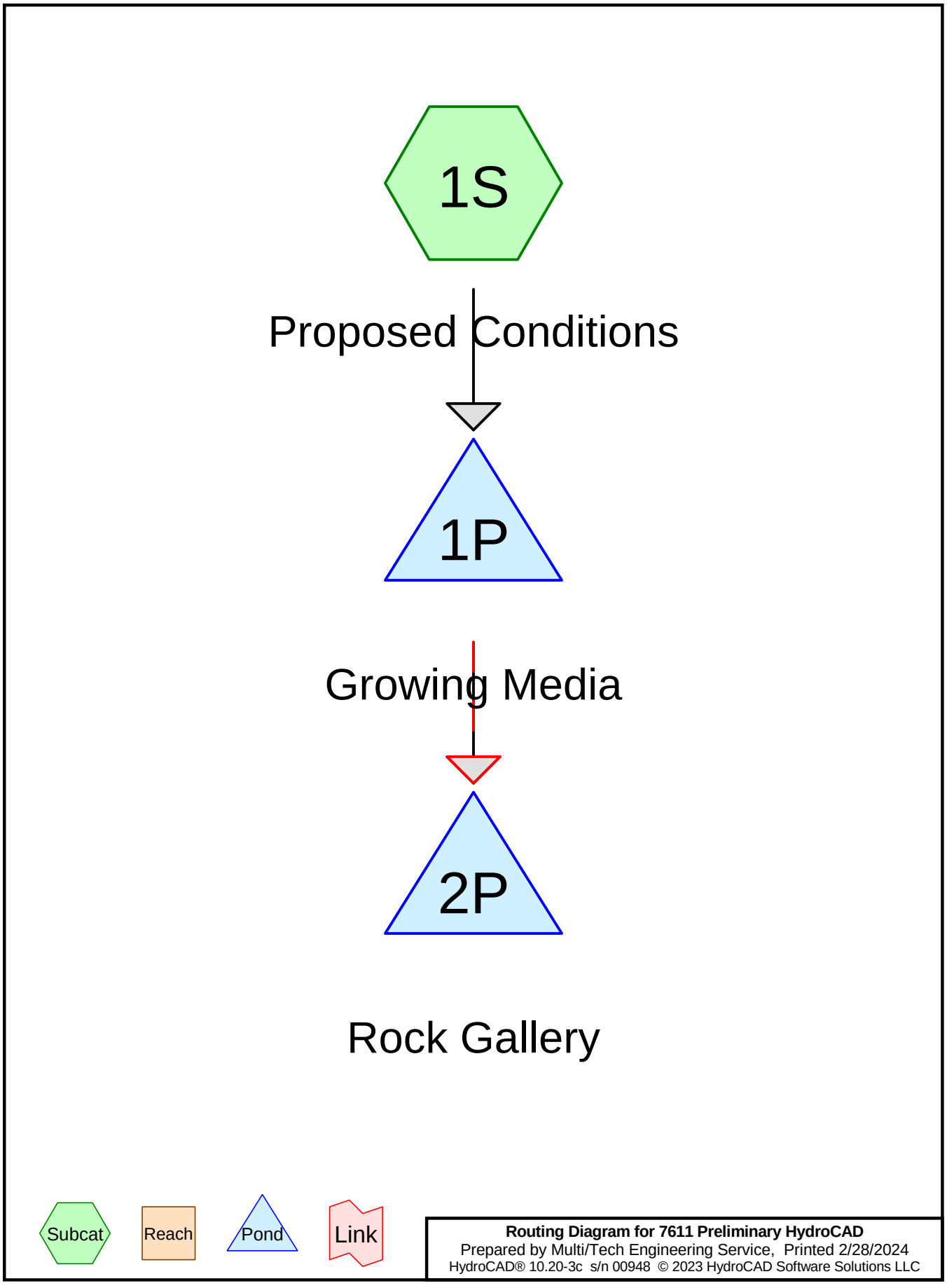
Time *(min)*	Time Difference *(min)*	Water Level *(feet)*	Infiltration *(feet)*	Infiltration *(inches)*	Infiltration Rate *In/Min*	Infiltration Rate *In/hr*	Cumilative Infiltration *(inches)*
0		0.8					
	4		0.1	1.2	0.3	18	1.2
4		0.9					
	4		0.1	1.2	0.3	18	2.4
8		1					
	4		0.05	0.6	0.15	9	3
12		1.05					
	4		0.06	0.72	0.18	10.8	3.72
16		1.11					
	4		0.05	0.6	0.15	9	4.32
20		1.16					
	10		0.12	1.44	0.144	8.64	5.76
30		1.28					
	10		0.12	1.44	0.144	8.64	7.2
40		1.4					
	10		0.11	1.32	0.132	7.92	8.52
50		1.51					
	10		0.11	1.32	0.132	7.92	9.84
60		1.62					
	10						
70							
	10		0	0	0	0	0
80							
	10		0	0	0	0	0
90							
	10		0	0	0	0	0
100							
	20		0	0	0	0	0
120							

Average Rate 9.84

Design Rate 9 *in/hr*

24 Hour Design Rate ***216 in***

APPENDIX D: WATER QUALITY HYDROGRAPHS



Routing Diagram for 7611 Preliminary HydroCAD
Prepared by Multi/Tech Engineering Service, Printed 2/28/2024

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	Water Quality	Type IA 24-hr		Default	24.00	1	1.38	2

Summary for Subcatchment 1S: Proposed Conditions

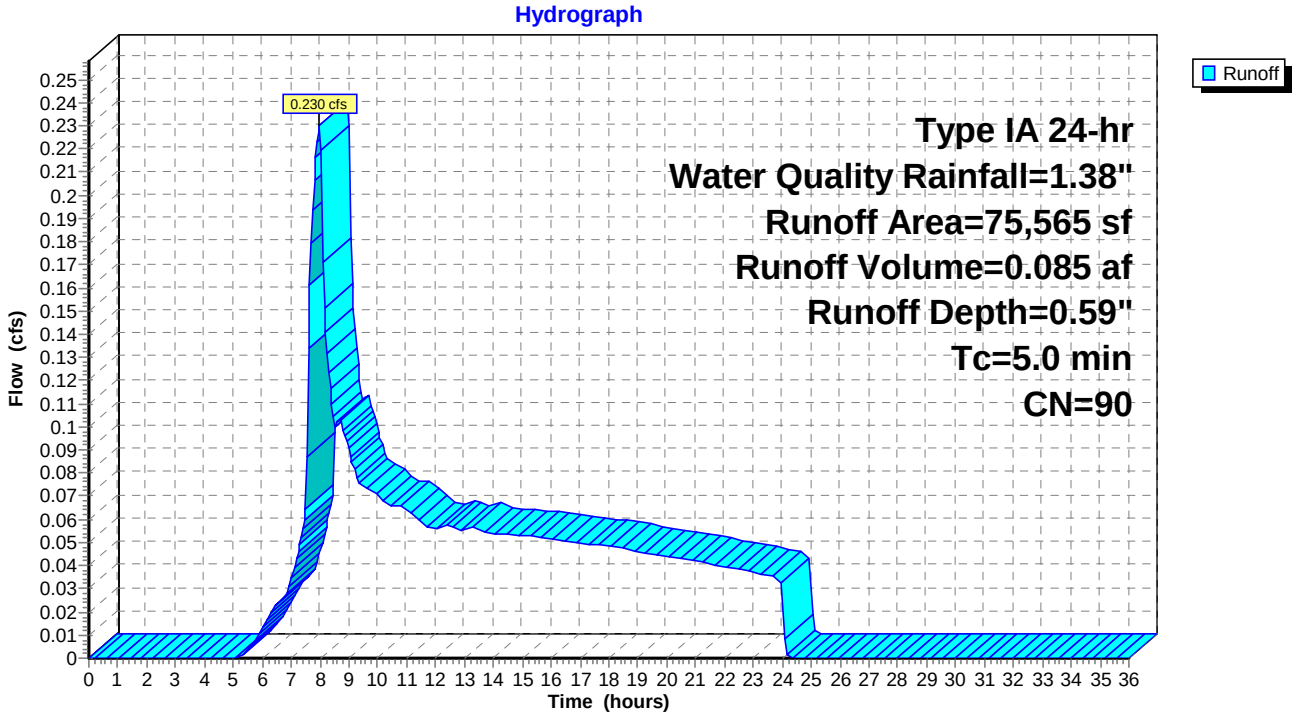
Runoff = 0.230 cfs @ 7.98 hrs, Volume= 0.085 af, Depth= 0.59"
Routed to Pond 1P : Growing Media

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type IA 24-hr Water Quality Rainfall=1.38"

Area (sf)	CN	Description
50,190	98	Paved parking, HSG C
25,375	74	>75% Grass cover, Good, HSG C
75,565	90	Weighted Average
25,375		33.58% Pervious Area
50,190		66.42% Impervious Area

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

Subcatchment 1S: Proposed Conditions



Summary for Pond 1P: Growing Media

Inflow Area = 1.735 ac, 66.42% Impervious, Inflow Depth = 0.59" for Water Quality event
Inflow = 0.230 cfs @ 7.98 hrs, Volume= 0.085 af
Outflow = 0.100 cfs @ 8.77 hrs, Volume= 0.085 af, Atten= 57%, Lag= 47.8 min
Primary = 0.100 cfs @ 8.77 hrs, Volume= 0.085 af
Routed to Pond 2P : Rock Gallery
Secondary = 0.000 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond 2P : Rock Gallery

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 174.62' @ 8.77 hrs Surf.Area= 2,157 sf Storage= 258 cf

Plug-Flow detention time= 14.6 min calculated for 0.085 af (100% of inflow)
Center-of-Mass det. time= 14.7 min (838.2 - 823.5)

Volume	Invert	Avail.Storage	Storage Description
#1	174.50'	4,522 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

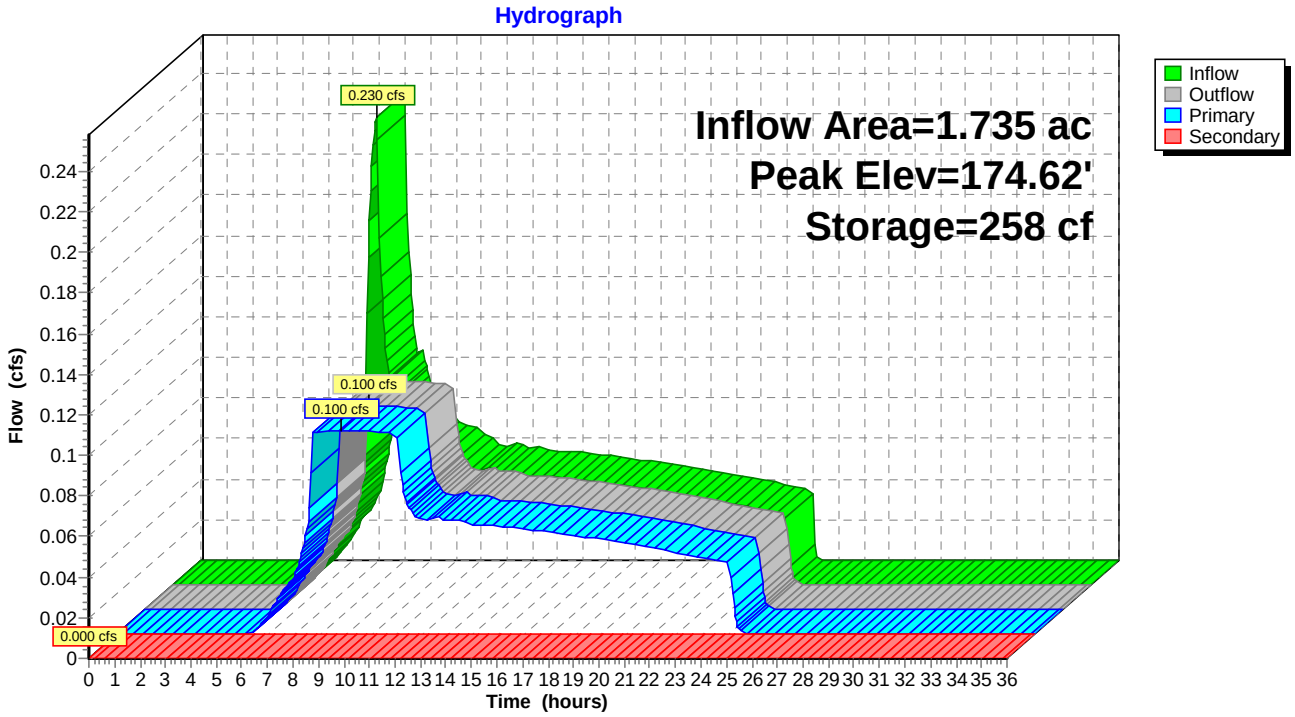
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
174.50	2,143	0	0
176.50	2,379	4,522	4,522

Device	Routing	Invert	Outlet Devices
#1	Primary	174.50'	**2.000 in/hr Exfiltration over Surface area**
#2	Secondary	176.00'	**8.00" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.100 cfs @ 8.77 hrs HW=174.62' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.100 cfs)

Secondary OutFlow Max=0.000 cfs @ 0.00 hrs HW=174.50' (Free Discharge)
2=Orifice/Grate (Controls 0.000 cfs)

Pond 1P: Growing Media



Summary for Pond 2P: Rock Gallery

Inflow Area = 1.735 ac, 66.42% Impervious, Inflow Depth = 0.59" for Water Quality event
Inflow = 0.100 cfs @ 8.77 hrs, Volume= 0.085 af
Outflow = 0.100 cfs @ 8.80 hrs, Volume= 0.085 af, Atten= 0%, Lag= 1.7 min
Discarded = 0.100 cfs @ 8.80 hrs, Volume= 0.085 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 169.26' @ 8.80 hrs Surf.Area= 2,379 sf Storage= 11 cf

Plug-Flow detention time= 1.8 min calculated for 0.085 af (100% of inflow)
Center-of-Mass det. time= 1.8 min (839.9 - 838.2)

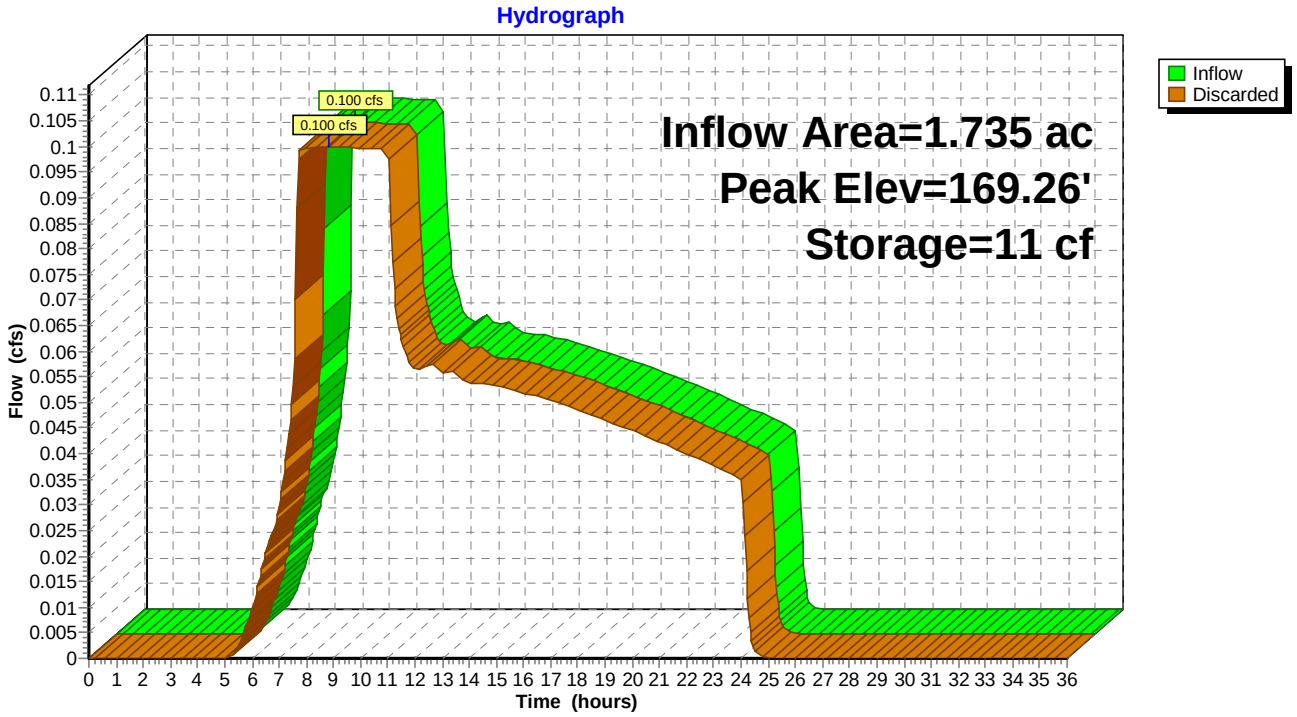
Volume	Invert	Avail.Storage	Storage Description
#1	169.25'	2,855 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 9,516 cf Overall x 30.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
169.25	2,379	0	0
173.25	2,379	9,516	9,516

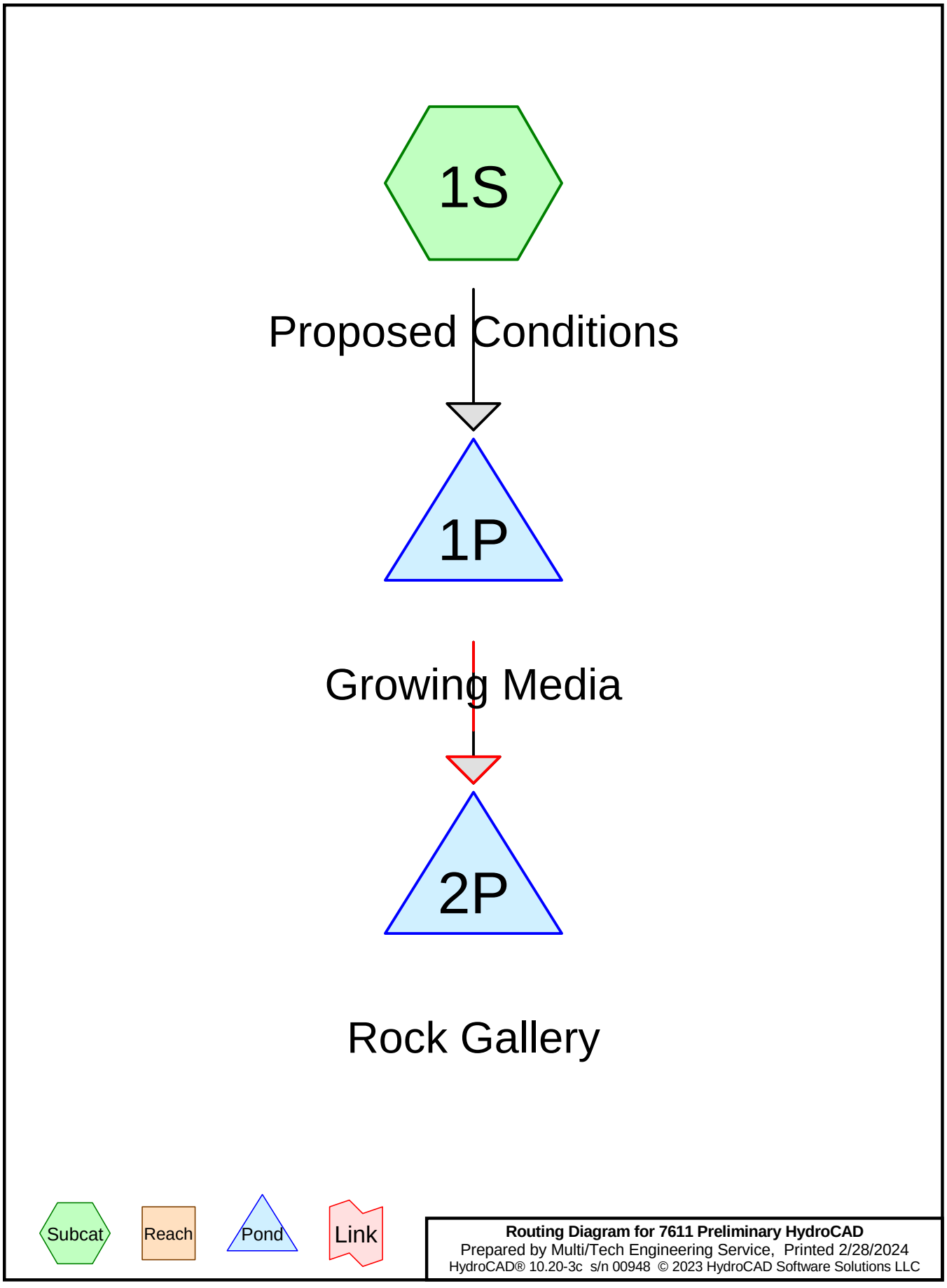
Device	Routing	Invert	Outlet Devices
#1	Discarded	169.25'	**4.920 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.271 cfs @ 8.80 hrs HW=169.26' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.271 cfs)

Pond 2P: Rock Gallery



APPENDIX E: WATER QUANTITY HYDROGRAPHS



Routing Diagram for 7611 Preliminary HydroCAD
Prepared by Multi/Tech Engineering Service, Printed 2/28/2024

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	5 Year	Type IA 24-hr		Default	24.00	1	2.70	2
2	10 Year	Type IA 24-hr		Default	24.00	1	3.20	2
3	25 Year	Type IA 24-hr		Default	24.00	1	3.60	2
4	50 Year	Type IA 24-hr		Default	24.00	1	4.10	2
5	100 Year	Type IA 24-hr		Default	24.00	1	4.40	2

Summary for Subcatchment 1S: Proposed Conditions

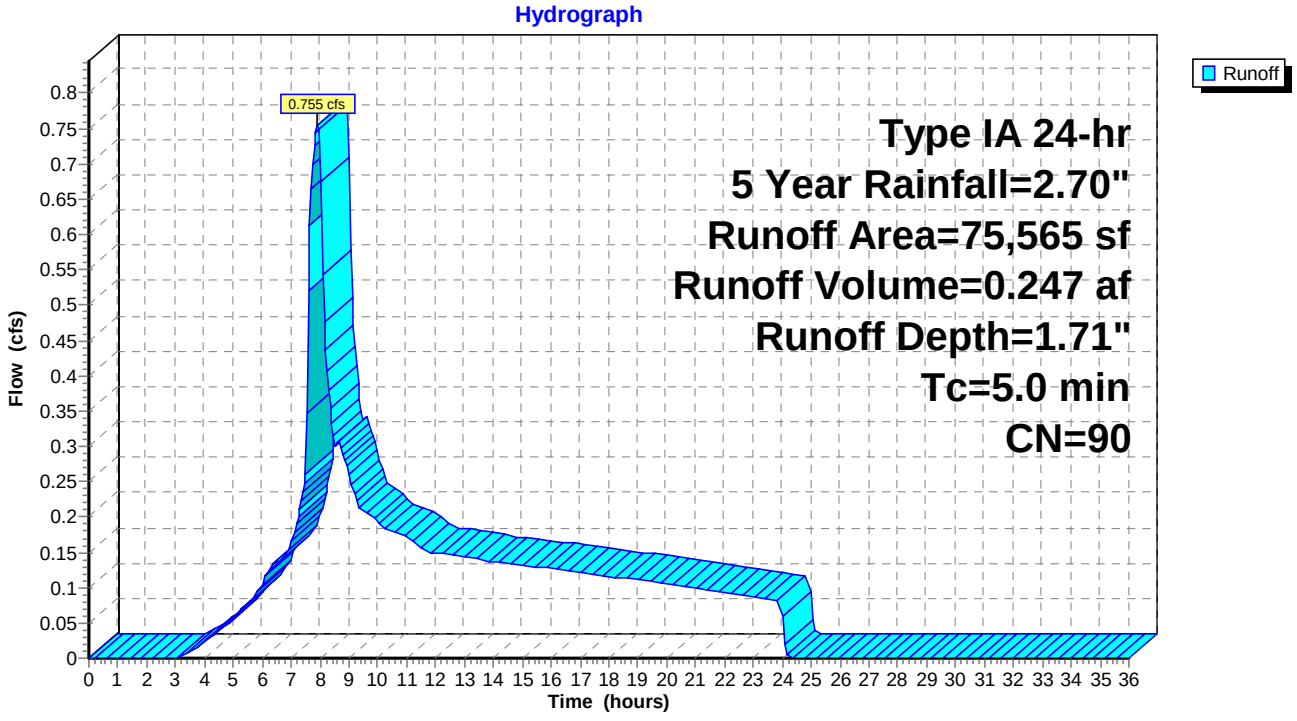
Runoff = 0.755 cfs @ 7.92 hrs, Volume= 0.247 af, Depth= 1.71"
Routed to Pond 1P : Growing Media

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type IA 24-hr 5 Year Rainfall=2.70"

Area (sf)	CN	Description
50,190	98	Paved parking, HSG C
25,375	74	>75% Grass cover, Good, HSG C
75,565	90	Weighted Average
25,375		33.58% Pervious Area
50,190		66.42% Impervious Area

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

Subcatchment 1S: Proposed Conditions



Summary for Pond 1P: Growing Media

Inflow Area = 1.735 ac, 66.42% Impervious, Inflow Depth = 1.71" for 5 Year event
Inflow = 0.755 cfs @ 7.92 hrs, Volume= 0.247 af
Outflow = 0.131 cfs @ 15.28 hrs, Volume= 0.247 af, Atten= 83%, Lag= 441.5 min
Primary = 0.108 cfs @ 15.28 hrs, Volume= 0.240 af
Routed to Pond 2P : Rock Gallery
Secondary = 0.023 cfs @ 15.28 hrs, Volume= 0.007 af
Routed to Pond 2P : Rock Gallery

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 176.02' @ 15.28 hrs Surf.Area= 2,323 sf Storage= 3,399 cf

Plug-Flow detention time= 356.3 min calculated for 0.247 af (100% of inflow)
Center-of-Mass det. time= 356.6 min (1,116.0 - 759.5)

Volume	Invert	Avail.Storage	Storage Description
#1	174.50'	4,522 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

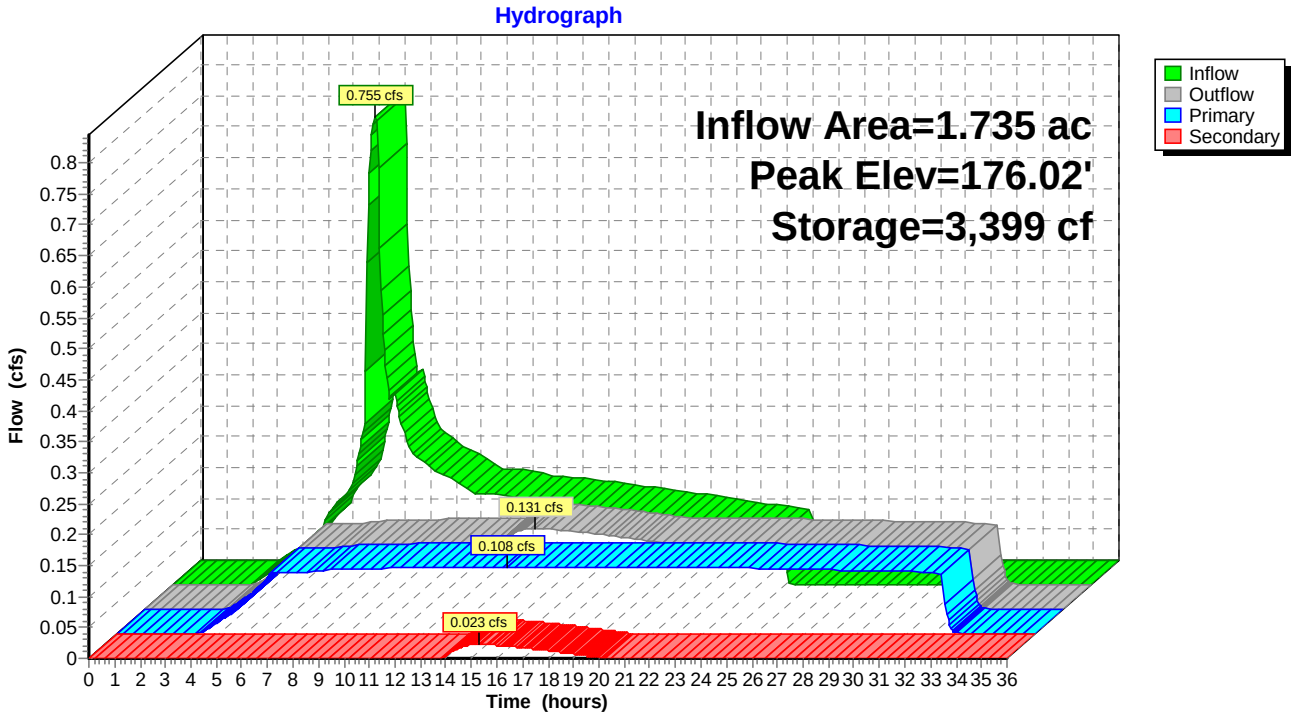
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
174.50	2,143	0	0
176.50	2,379	4,522	4,522

Device	Routing	Invert	Outlet Devices
#1	Primary	174.50'	**2.000 in/hr Exfiltration over Surface area**
#2	Secondary	176.00'	**8.00" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.108 cfs @ 15.28 hrs HW=176.02' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.108 cfs)

Secondary OutFlow Max=0.023 cfs @ 15.28 hrs HW=176.02' (Free Discharge)
2=Orifice/Grate (Weir Controls 0.023 cfs @ 0.49 fps)

Pond 1P: Growing Media



Summary for Pond 2P: Rock Gallery

Inflow Area = 1.735 ac, 66.42% Impervious, Inflow Depth = 1.71" for 5 Year event
Inflow = 0.131 cfs @ 15.28 hrs, Volume= 0.247 af
Outflow = 0.131 cfs @ 15.31 hrs, Volume= 0.247 af, Atten= 0%, Lag= 1.9 min
Discarded = 0.131 cfs @ 15.31 hrs, Volume= 0.247 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 169.27' @ 15.31 hrs Surf.Area= 2,379 sf Storage= 14 cf

Plug-Flow detention time= 1.8 min calculated for 0.247 af (100% of inflow)
Center-of-Mass det. time= 1.8 min (1,117.8 - 1,116.0)

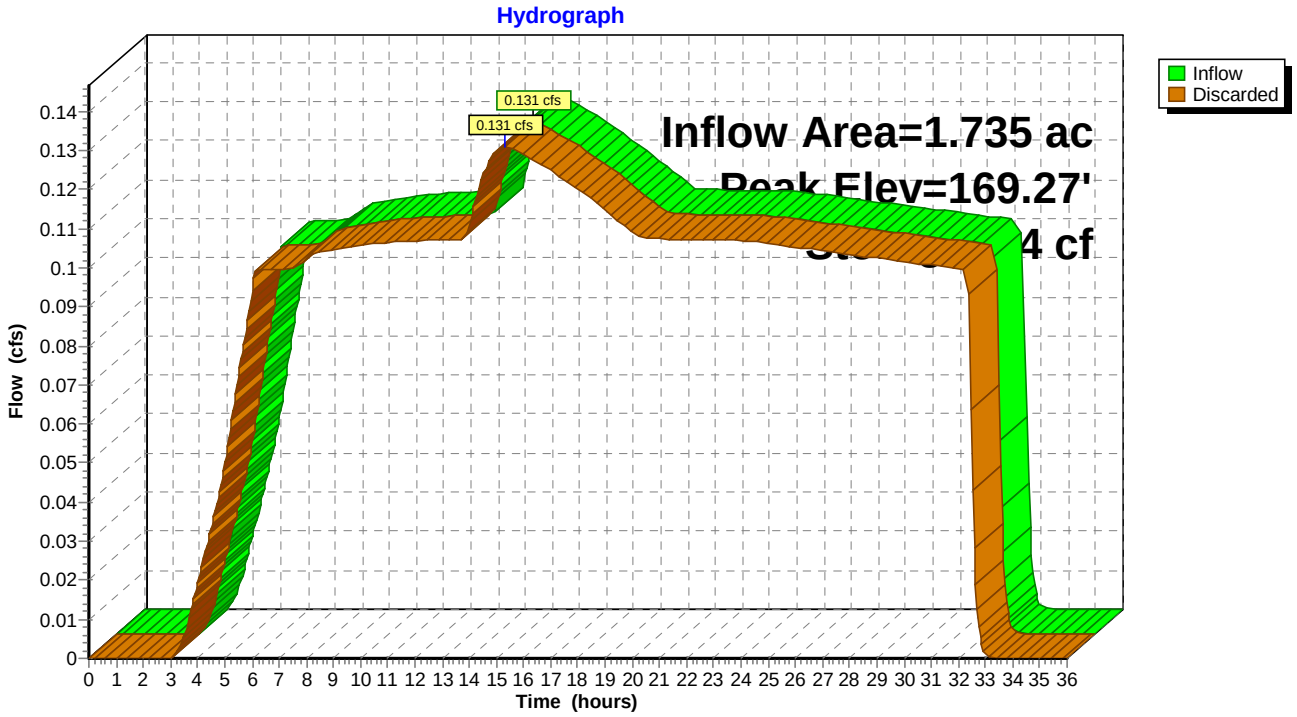
Volume	Invert	Avail.Storage	Storage Description
#1	169.25'	2,855 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 9,516 cf Overall x 30.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
169.25	2,379	0	0
173.25	2,379	9,516	9,516

Device	Routing	Invert	Outlet Devices
#1	Discarded	169.25'	**4.920 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.271 cfs @ 15.31 hrs HW=169.27' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.271 cfs)

Pond 2P: Rock Gallery



Summary for Subcatchment 1S: Proposed Conditions

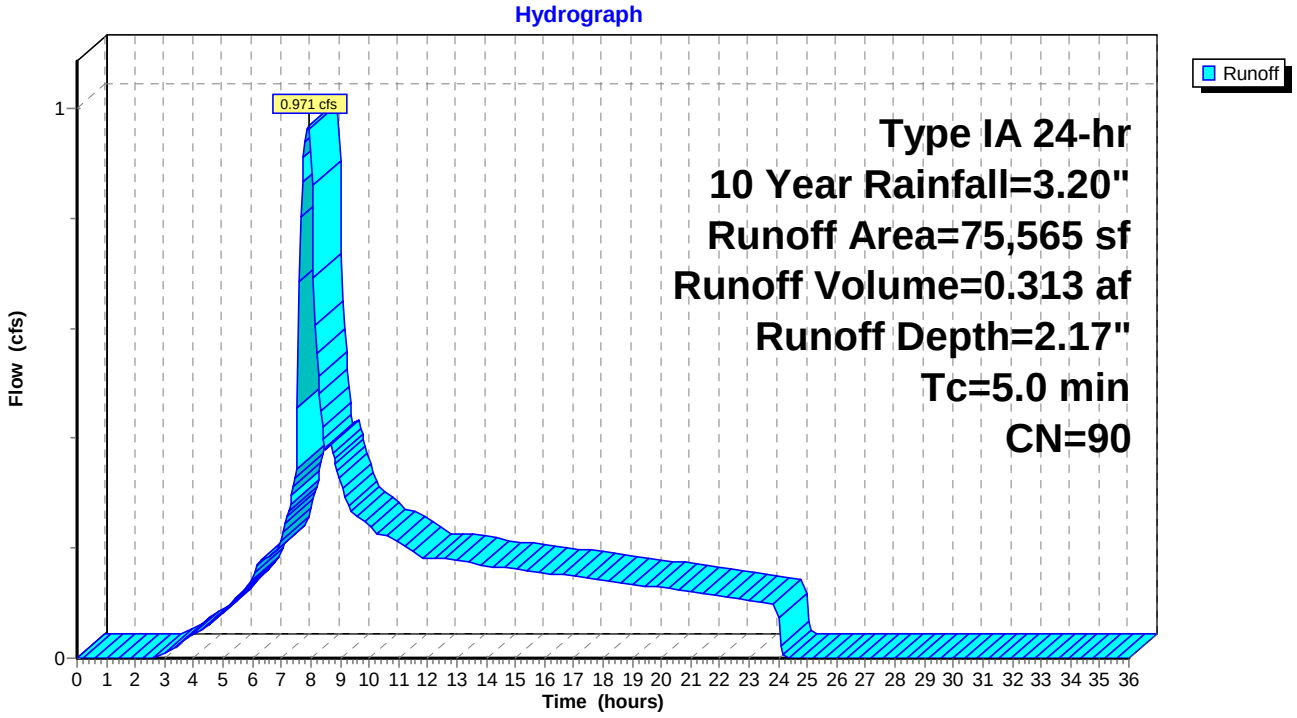
Runoff = 0.971 cfs @ 7.91 hrs, Volume= 0.313 af, Depth= 2.17"
Routed to Pond 1P : Growing Media

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10 Year Rainfall=3.20"

Area (sf)	CN	Description
50,190	98	Paved parking, HSG C
25,375	74	>75% Grass cover, Good, HSG C
75,565	90	Weighted Average
25,375		33.58% Pervious Area
50,190		66.42% Impervious Area

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

Subcatchment 1S: Proposed Conditions



Summary for Pond 1P: Growing Media

Inflow Area = 1.735 ac, 66.42% Impervious, Inflow Depth = 2.17" for 10 Year event
Inflow = 0.971 cfs @ 7.91 hrs, Volume= 0.313 af
Outflow = 0.249 cfs @ 9.86 hrs, Volume= 0.313 af, Atten= 74%, Lag= 116.8 min
Primary = 0.108 cfs @ 9.86 hrs, Volume= 0.250 af
Routed to Pond 2P : Rock Gallery
Secondary = 0.142 cfs @ 9.86 hrs, Volume= 0.063 af
Routed to Pond 2P : Rock Gallery

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 176.08' @ 9.86 hrs Surf.Area= 2,329 sf Storage= 3,522 cf

Plug-Flow detention time= 309.0 min calculated for 0.313 af (100% of inflow)
Center-of-Mass det. time= 309.3 min (1,055.7 - 746.4)

Volume	Invert	Avail.Storage	Storage Description
#1	174.50'	4,522 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

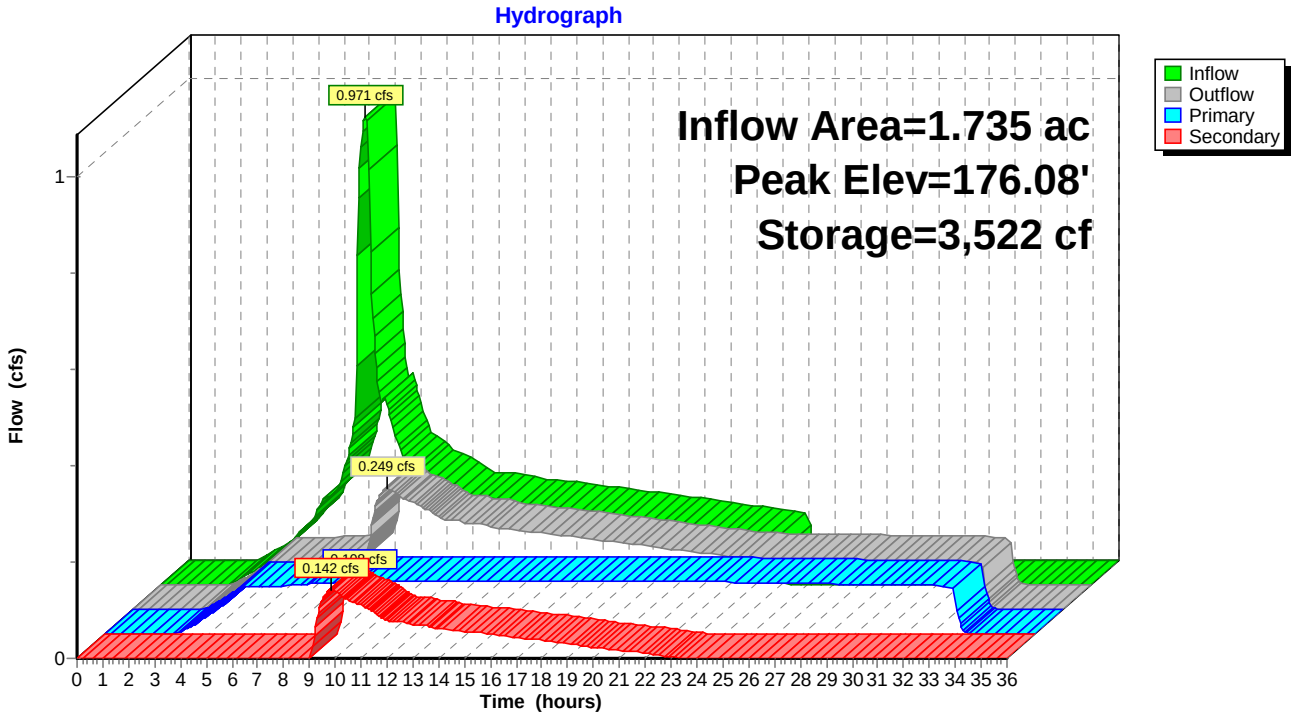
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
174.50	2,143	0	0
176.50	2,379	4,522	4,522

Device	Routing	Invert	Outlet Devices
#1	Primary	174.50'	**2.000 in/hr Exfiltration over Surface area**
#2	Secondary	176.00'	**8.00" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.108 cfs @ 9.86 hrs HW=176.08' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.108 cfs)

Secondary OutFlow Max=0.141 cfs @ 9.86 hrs HW=176.08' (Free Discharge)
2=Orifice/Grate (Weir Controls 0.141 cfs @ 0.90 fps)

Pond 1P: Growing Media



Summary for Pond 2P: Rock Gallery

Inflow Area = 1.735 ac, 66.42% Impervious, Inflow Depth = 2.17" for 10 Year event
Inflow = 0.249 cfs @ 9.86 hrs, Volume= 0.313 af
Outflow = 0.249 cfs @ 9.89 hrs, Volume= 0.313 af, Atten= 0%, Lag= 1.9 min
Discarded = 0.249 cfs @ 9.89 hrs, Volume= 0.313 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 169.29' @ 9.89 hrs Surf.Area= 2,379 sf Storage= 26 cf

Plug-Flow detention time= 1.8 min calculated for 0.313 af (100% of inflow)
Center-of-Mass det. time= 1.8 min (1,057.5 - 1,055.7)

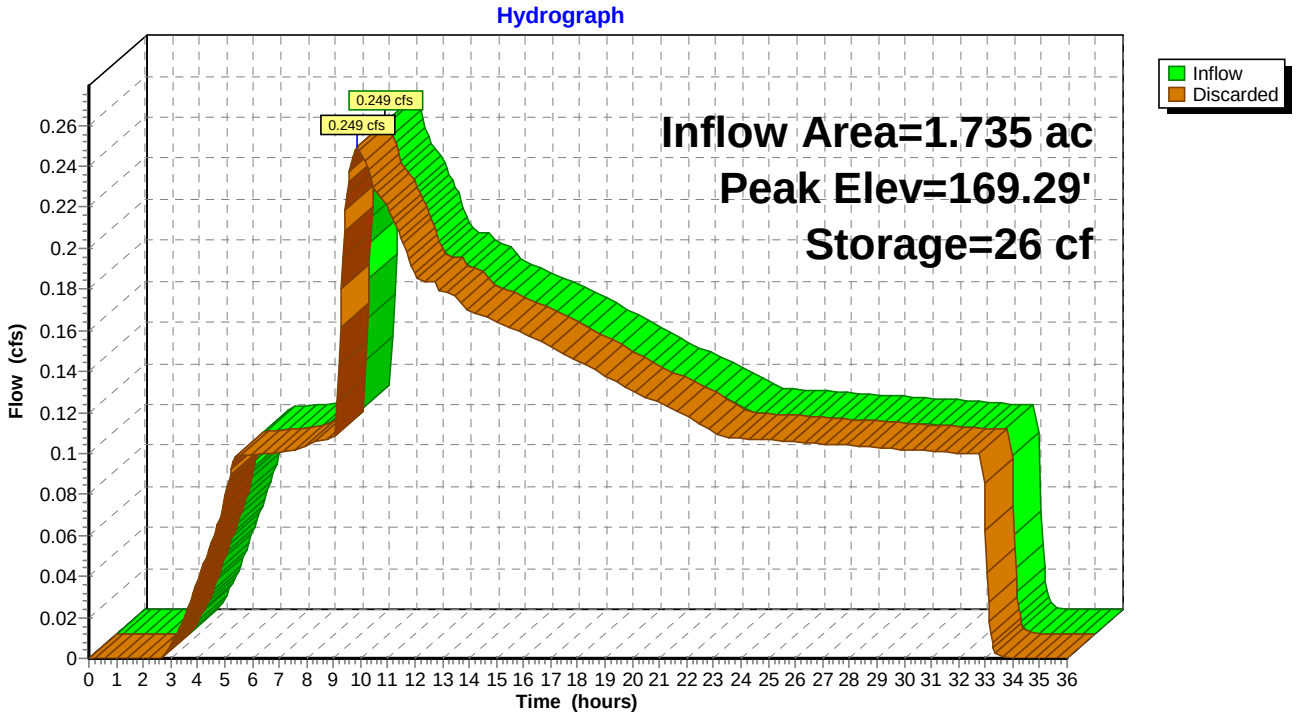
Volume	Invert	Avail.Storage	Storage Description
#1	169.25'	2,855 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 9,516 cf Overall x 30.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
169.25	2,379	0	0
173.25	2,379	9,516	9,516

Device	Routing	Invert	Outlet Devices
#1	Discarded	169.25'	**4.920 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.271 cfs @ 9.89 hrs HW=169.29' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.271 cfs)

Pond 2P: Rock Gallery



Summary for Subcatchment 1S: Proposed Conditions

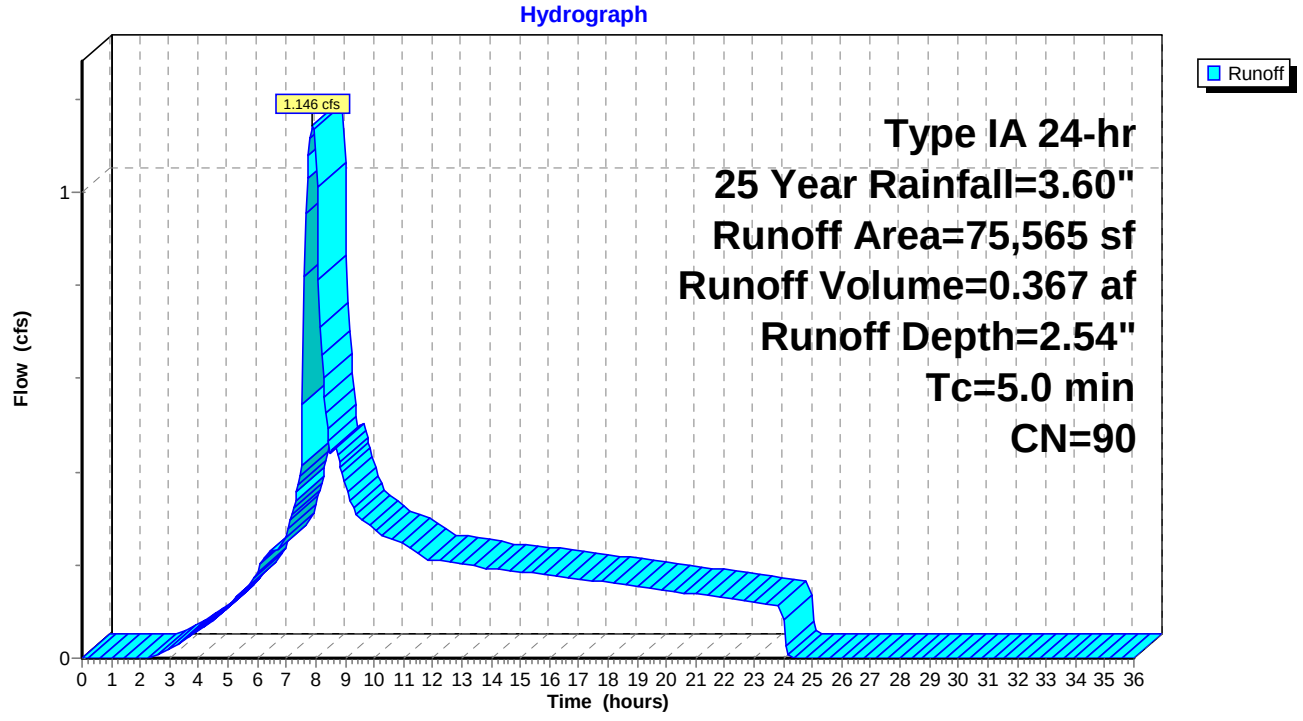
Runoff = 1.146 cfs @ 7.90 hrs, Volume= 0.367 af, Depth= 2.54"
Routed to Pond 1P : Growing Media

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25 Year Rainfall=3.60"

Area (sf)	CN	Description
50,190	98	Paved parking, HSG C
25,375	74	>75% Grass cover, Good, HSG C
75,565	90	Weighted Average
25,375		33.58% Pervious Area
50,190		66.42% Impervious Area

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

Subcatchment 1S: Proposed Conditions



Summary for Pond 1P: Growing Media

Inflow Area = 1.735 ac, 66.42% Impervious, Inflow Depth = 2.54" for 25 Year event
Inflow = 1.146 cfs @ 7.90 hrs, Volume= 0.367 af
Outflow = 0.415 cfs @ 8.83 hrs, Volume= 0.367 af, Atten= 64%, Lag= 55.8 min
Primary = 0.108 cfs @ 8.83 hrs, Volume= 0.255 af
Routed to Pond 2P : Rock Gallery
Secondary = 0.307 cfs @ 8.83 hrs, Volume= 0.112 af
Routed to Pond 2P : Rock Gallery

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 176.13' @ 8.83 hrs Surf.Area= 2,335 sf Storage= 3,640 cf

Plug-Flow detention time= 271.9 min calculated for 0.367 af (100% of inflow)
Center-of-Mass det. time= 271.8 min (1,009.8 - 738.0)

Volume	Invert	Avail.Storage	Storage Description
#1	174.50'	4,522 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

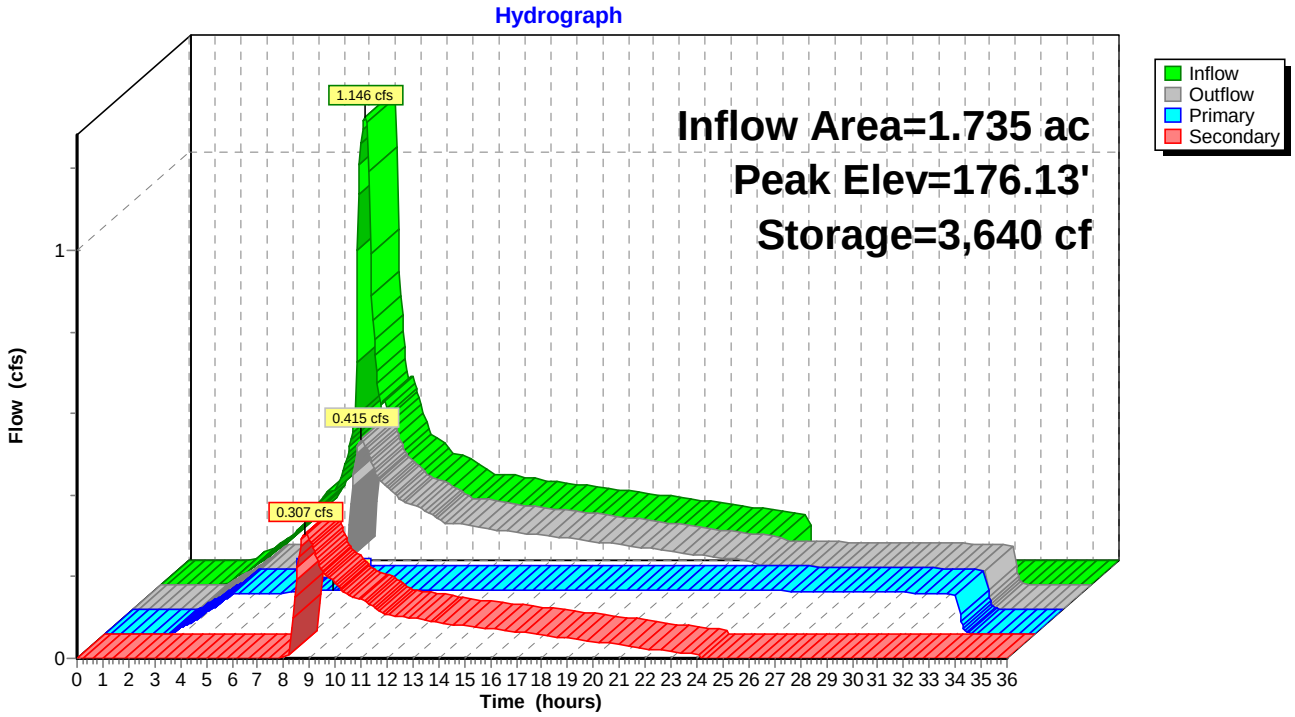
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
174.50	2,143	0	0
176.50	2,379	4,522	4,522

Device	Routing	Invert	Outlet Devices
#1	Primary	174.50'	**2.000 in/hr Exfiltration over Surface area**
#2	Secondary	176.00'	**8.00" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.108 cfs @ 8.83 hrs HW=176.13' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.108 cfs)

Secondary OutFlow Max=0.306 cfs @ 8.83 hrs HW=176.13' (Free Discharge)
2=Orifice/Grate (Weir Controls 0.306 cfs @ 1.16 fps)

Pond 1P: Growing Media



Summary for Pond 2P: Rock Gallery

Inflow Area = 1.735 ac, 66.42% Impervious, Inflow Depth = 2.54" for 25 Year event
Inflow = 0.415 cfs @ 8.83 hrs, Volume= 0.367 af
Outflow = 0.271 cfs @ 8.50 hrs, Volume= 0.367 af, Atten= 35%, Lag= 0.0 min
Discarded = 0.271 cfs @ 8.50 hrs, Volume= 0.367 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 169.92' @ 10.35 hrs Surf.Area= 2,379 sf Storage= 476 cf

Plug-Flow detention time= 6.9 min calculated for 0.367 af (100% of inflow)
Center-of-Mass det. time= 7.0 min (1,016.8 - 1,009.8)

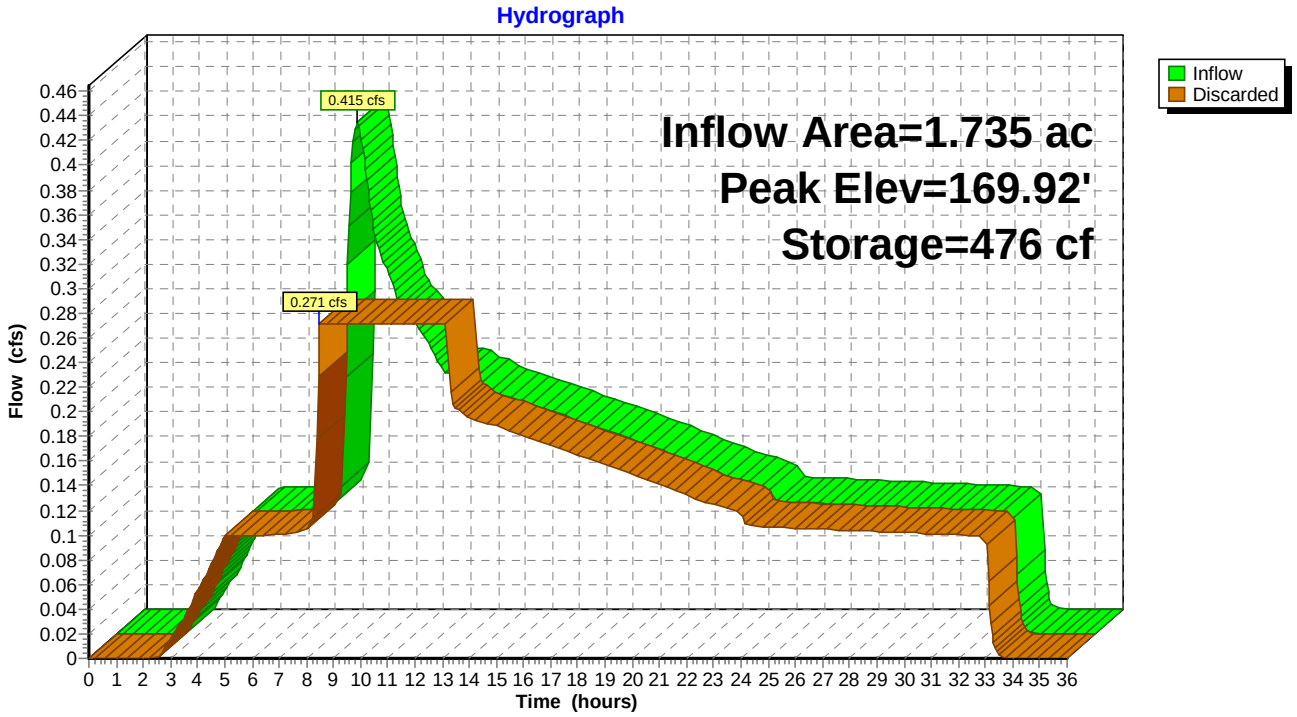
Volume	Invert	Avail.Storage	Storage Description
#1	169.25'	2,855 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 9,516 cf Overall x 30.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
169.25	2,379	0	0
173.25	2,379	9,516	9,516

Device	Routing	Invert	Outlet Devices
#1	Discarded	169.25'	**4.920 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.271 cfs @ 8.50 hrs HW=169.29' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.271 cfs)

Pond 2P: Rock Gallery



Summary for Subcatchment 1S: Proposed Conditions

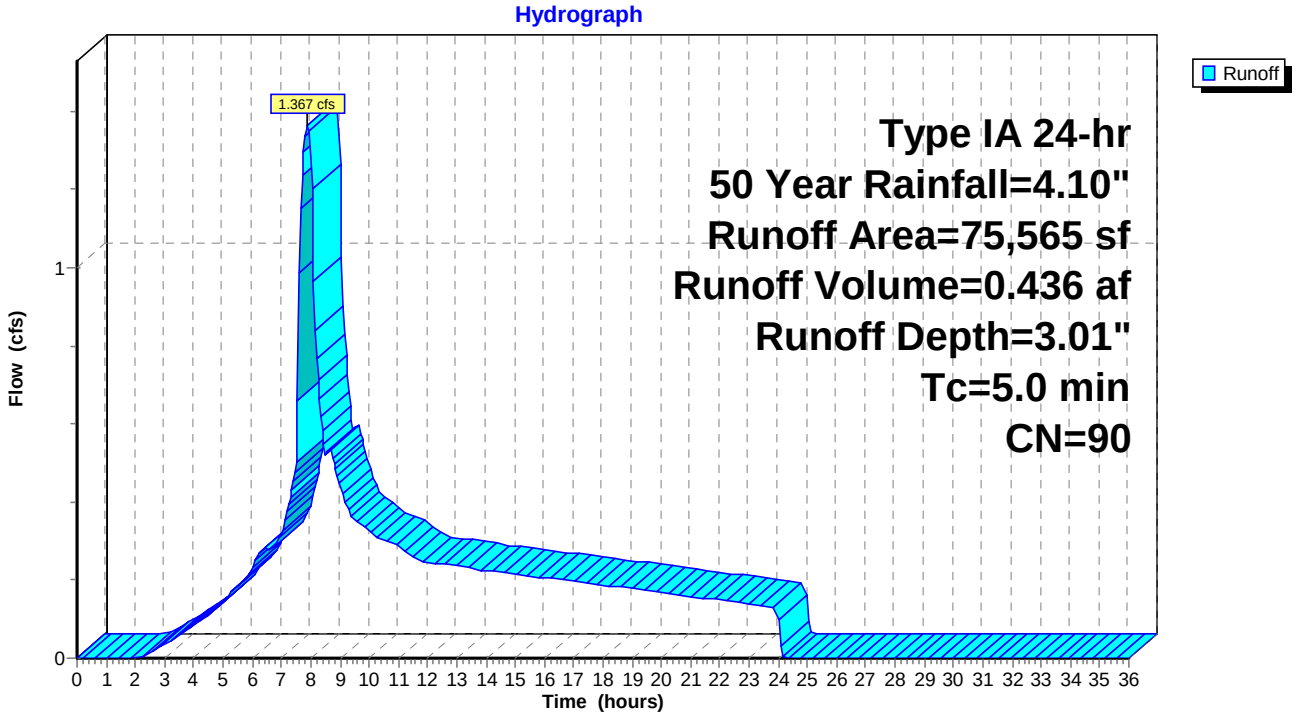
Runoff = 1.367 cfs @ 7.90 hrs, Volume= 0.436 af, Depth= 3.01"
Routed to Pond 1P : Growing Media

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type IA 24-hr 50 Year Rainfall=4.10"

Area (sf)	CN	Description
50,190	98	Paved parking, HSG C
25,375	74	>75% Grass cover, Good, HSG C
75,565	90	Weighted Average
25,375		33.58% Pervious Area
50,190		66.42% Impervious Area

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

Subcatchment 1S: Proposed Conditions



Summary for Pond 1P: Growing Media

Inflow Area = 1.735 ac, 66.42% Impervious, Inflow Depth = 3.01" for 50 Year event
Inflow = 1.367 cfs @ 7.90 hrs, Volume= 0.436 af
Outflow = 0.730 cfs @ 8.24 hrs, Volume= 0.436 af, Atten= 47%, Lag= 20.5 min
Primary = 0.109 cfs @ 8.24 hrs, Volume= 0.260 af
Routed to Pond 2P : Rock Gallery
Secondary = 0.621 cfs @ 8.24 hrs, Volume= 0.176 af
Routed to Pond 2P : Rock Gallery

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 176.20' @ 8.24 hrs Surf.Area= 2,344 sf Storage= 3,818 cf

Plug-Flow detention time= 235.0 min calculated for 0.435 af (100% of inflow)
Center-of-Mass det. time= 235.4 min (964.6 - 729.2)

Volume	Invert	Avail.Storage	Storage Description
#1	174.50'	4,522 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

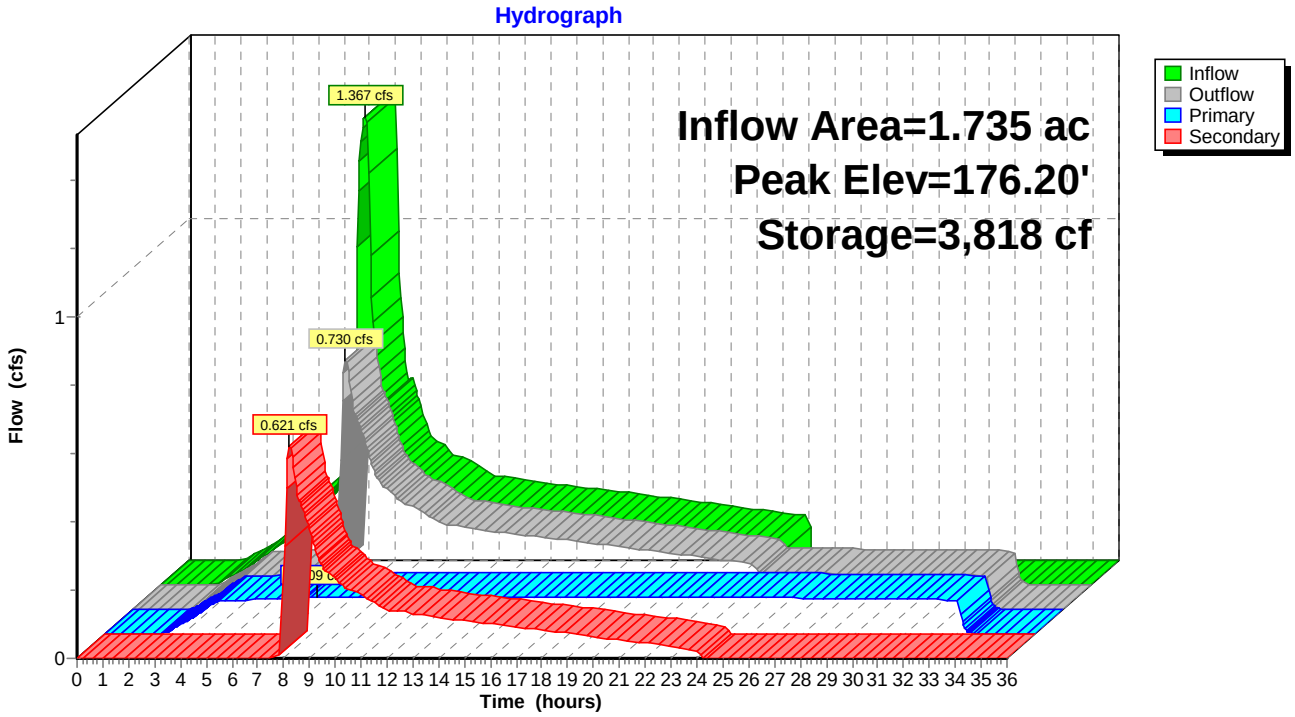
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
174.50	2,143	0	0
176.50	2,379	4,522	4,522

Device	Routing	Invert	Outlet Devices
#1	Primary	174.50'	**2.000 in/hr Exfiltration over Surface area**
#2	Secondary	176.00'	**8.00" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.109 cfs @ 8.24 hrs HW=176.20' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.109 cfs)

Secondary OutFlow Max=0.620 cfs @ 8.24 hrs HW=176.20' (Free Discharge)
2=Orifice/Grate (Weir Controls 0.620 cfs @ 1.47 fps)

Pond 1P: Growing Media



Summary for Pond 2P: Rock Gallery

Inflow Area = 1.735 ac, 66.42% Impervious, Inflow Depth = 3.01" for 50 Year event
Inflow = 0.730 cfs @ 8.24 hrs, Volume= 0.436 af
Outflow = 0.271 cfs @ 8.05 hrs, Volume= 0.436 af, Atten= 63%, Lag= 0.0 min
Discarded = 0.271 cfs @ 8.05 hrs, Volume= 0.436 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 171.73' @ 11.53 hrs Surf.Area= 2,379 sf Storage= 1,771 cf

Plug-Flow detention time= 44.7 min calculated for 0.435 af (100% of inflow)
Center-of-Mass det. time= 44.6 min (1,009.3 - 964.6)

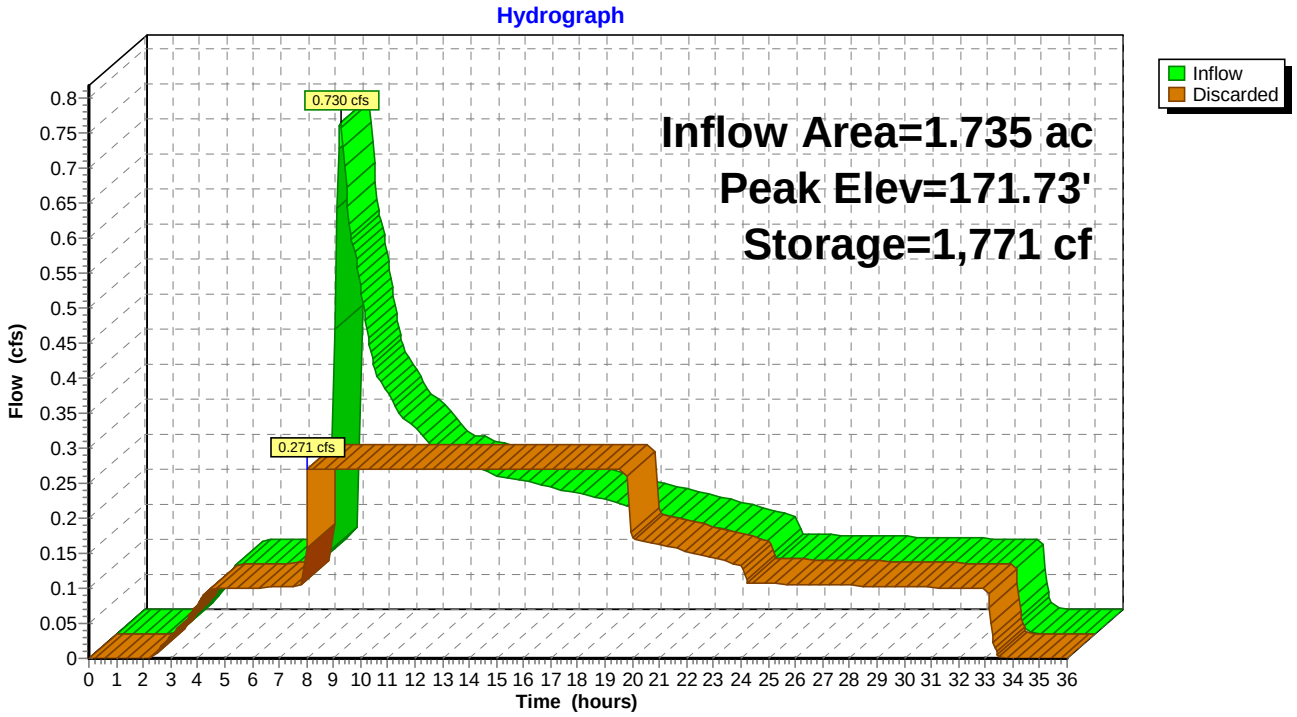
Volume	Invert	Avail.Storage	Storage Description
#1	169.25'	2,855 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 9,516 cf Overall x 30.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
169.25	2,379	0	0
173.25	2,379	9,516	9,516

Device	Routing	Invert	Outlet Devices
#1	Discarded	169.25'	**4.920 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.271 cfs @ 8.05 hrs HW=169.30' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.271 cfs)

Pond 2P: Rock Gallery



Summary for Subcatchment 1S: Proposed Conditions

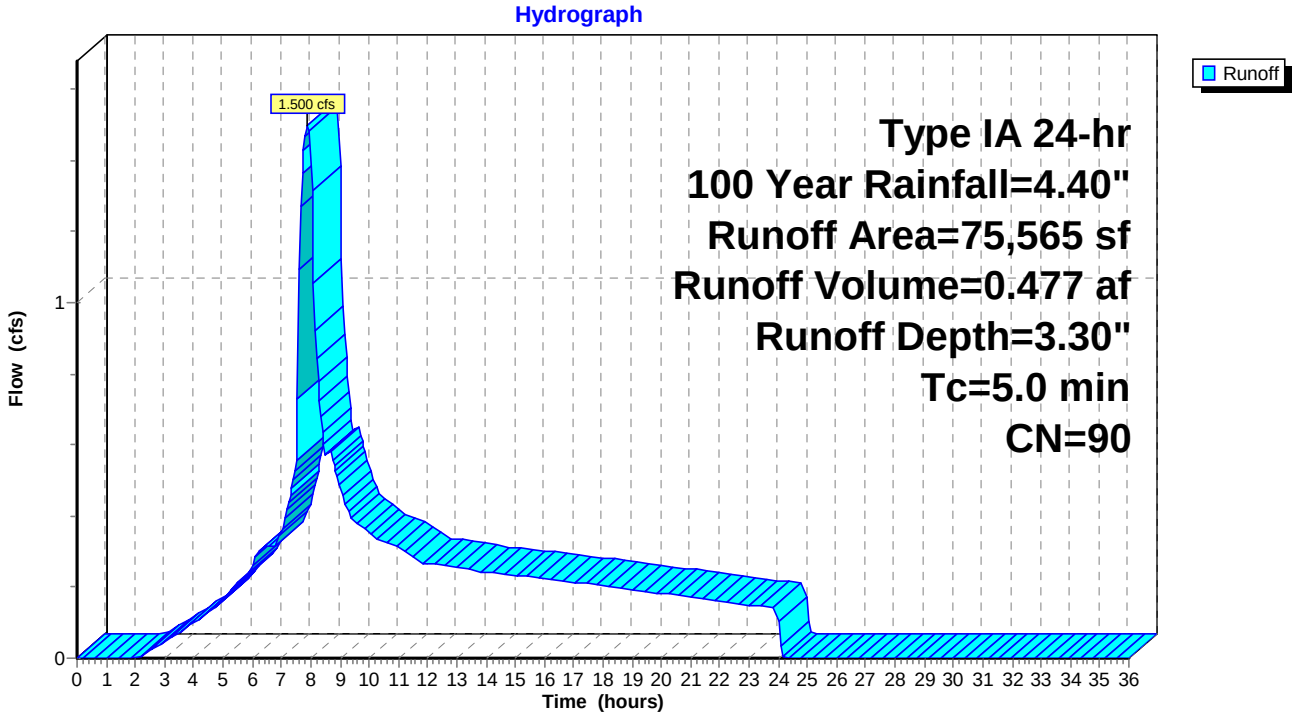
Runoff = 1.500 cfs @ 7.89 hrs, Volume= 0.477 af, Depth= 3.30"
Routed to Pond 1P : Growing Media

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100 Year Rainfall=4.40"

Area (sf)	CN	Description
50,190	98	Paved parking, HSG C
25,375	74	>75% Grass cover, Good, HSG C
75,565	90	Weighted Average
25,375		33.58% Pervious Area
50,190		66.42% Impervious Area

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

Subcatchment 1S: Proposed Conditions



Summary for Pond 1P: Growing Media

Inflow Area = 1.735 ac, 66.42% Impervious, Inflow Depth = 3.30" for 100 Year event
Inflow = 1.500 cfs @ 7.89 hrs, Volume= 0.477 af
Outflow = 0.993 cfs @ 8.12 hrs, Volume= 0.477 af, Atten= 34%, Lag= 13.8 min
Primary = 0.109 cfs @ 8.12 hrs, Volume= 0.262 af
Routed to Pond 2P : Rock Gallery
Secondary = 0.884 cfs @ 8.12 hrs, Volume= 0.215 af
Routed to Pond 2P : Rock Gallery

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 176.28' @ 8.12 hrs Surf.Area= 2,353 sf Storage= 3,993 cf

Plug-Flow detention time= 217.8 min calculated for 0.476 af (100% of inflow)
Center-of-Mass det. time= 218.3 min (943.0 - 724.7)

Volume	Invert	Avail.Storage	Storage Description
#1	174.50'	4,522 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

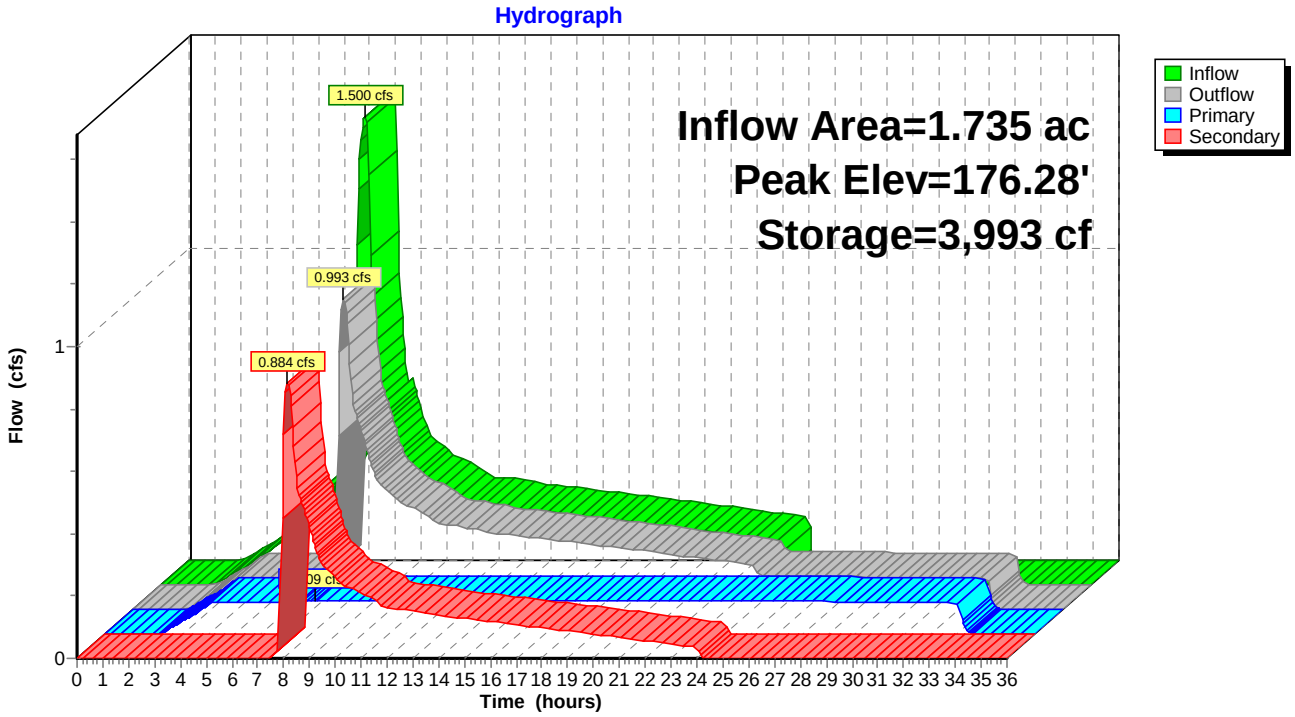
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
174.50	2,143	0	0
176.50	2,379	4,522	4,522

Device	Routing	Invert	Outlet Devices
#1	Primary	174.50'	**2.000 in/hr Exfiltration over Surface area**
#2	Secondary	176.00'	**8.00" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.109 cfs @ 8.12 hrs HW=176.27' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.109 cfs)

Secondary OutFlow Max=0.880 cfs @ 8.12 hrs HW=176.27' (Free Discharge)
2=Orifice/Grate (Orifice Controls 0.880 cfs @ 2.52 fps)

Pond 1P: Growing Media



Summary for Pond 2P: Rock Gallery

Inflow Area = 1.735 ac, 66.42% Impervious, Inflow Depth = 3.30" for 100 Year event
Inflow = 0.993 cfs @ 8.12 hrs, Volume= 0.477 af
Outflow = 0.271 cfs @ 7.95 hrs, Volume= 0.477 af, Atten= 73%, Lag= 0.0 min
Discarded = 0.271 cfs @ 7.95 hrs, Volume= 0.477 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 173.06' @ 11.95 hrs Surf.Area= 2,379 sf Storage= 2,717 cf

Plug-Flow detention time= 86.4 min calculated for 0.476 af (100% of inflow)
Center-of-Mass det. time= 86.2 min (1,029.2 - 943.0)

Volume	Invert	Avail.Storage	Storage Description
#1	169.25'	2,855 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 9,516 cf Overall x 30.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
169.25	2,379	0	0
173.25	2,379	9,516	9,516

Device	Routing	Invert	Outlet Devices
#1	Discarded	169.25'	**4.920 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.271 cfs @ 7.95 hrs HW=169.32' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.271 cfs)

Pond 2P: Rock Gallery