Preliminary Drainage Analysis

For

Barlow Hotel

6782 Sebastopol Avenue & 385 Morris Street
Sebastopol, California
APN 004-750-030, 004-011-017 & 020

JN 24174
August 1th, 2024

Prepared for:

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Santa Rosa, CA 95404
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David R Brown, RCE 41833
My license expires 3/31/2026

Prepared by:

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Prepared By: DL
Checked By: AP

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Drainage Narrative

Preliminary Barlow Hotel & Parking Drainage Narrative

Project Description

The Barlow Hotel is located at 6782 Sebastopol Avenue in Sebastopol, California. This project proposes to construct a commercial hotel, shed, AC and pervious paver parking lot, AC driveway, and associated hardscape. For the Barlow Hotel, offsite parking is being proposed at a separate location located at 385 Morris Street in Sebastopol, California. The project has a total of 111,462 square feet of new/replaced impervious area.

The project area is around 4.42 acres and is located on two different lots. The lot located on 6782 Sebastopol Avenue is currently located on an existing private road called Gravenstein Court. The existing lot contains an existing commercial building, parking lot and associated hardscape. Natural slopes on the site are relatively flat ranging from 1 to 5 percent, with the parking lot of the property sloping towards a storm drainpipe located under Gravenstein Court on the western property line. The lot located on 385 Morris Street is an empty lot that consists of several concrete pads, stockpiles, and retaining walls located around the property. Surface runoff flows from a high point located on the easternly and northernly property line towards two low points located in the center of the property. The soil type present on 6782 Sebastopol Avenue consists primarily of SbC (Sebastopol sandy loam, type C soil) with a minor portion of BcA (Blucher fine sandy loam, type C soil). The makeup of soil types within 385 Morris Street consist primarily of BcA (Blucher fine sandy loam, type C soil) and a minor portion of CfA (Clear lake clay, type C/D soil), which is located on the eastern section of the property where little to no work is to be performed. Therefore, for ease of analysis the entirety of the report utilizes type C soils in the calculations. No creeks or wetlands have been located on the property. Trees will be protected to the maximum extent feasible.

.Methodology

The onsite drainage watershed was divided into several basins based on their tributary areas and the Incremental Rational Method (IRM) along with AutoDesk® Storm and Sanitary Sewer Analysis in accordance with the Sonoma County Water Agency's (SCWA's) Flood Management Design Manual (FMDM, 2020) to analyze the site drainage for the 10-year storm event (SCWA Flood Management Design Manual, FMDM) was used to establish the total flow going into the public stormdrain system, refer to the **Post-Construction Hydrology Maps** and **10-Year SSA & Incremental Rational Method Drainage Study** for proposed stormdrain layout and flow calculations. Runoff coefficients were calculated for each subbasin by approximating the impervious fraction and applying that value to Table C-1 Runoff Coefficients from the FMDM. The time of concentration was assumed

to be 7, 10, & 15 minutes for each site dependent on area size. The IRM was utilized to determine the pre and post construction peak flow rates along with the pre and post models that were produced within SSA as a means to calibrate and confirm design sizing.

Retention analyses have been performed using Autodesk Storm and Sanitary Analysis SSA with Synthetic Unit Method as outlined by FMDM. Basins, as delineated in the ***Stormwater Retention Analysis Maps,*** of both the Hotel project site (2.31 acres) and the northeastern parking lot (2.17 acres) were modeled to confirm viability of the design and to attenuate peak discharge to that of the pre-construction rate. Analysis results are summarized in ***Retention Analysis Results*** (details of the analysis model, configuration and input data will be included in Final Drainage Report).

The preliminary design of the bioretention facilities have been included in the analysis model, through the development of surfaces in Autodesk Civil 3D, whereby the Stage Storage tool of such program tabulated the volume capacity and thus allowed us to specify elevations to attenuate peak flows through orifice relief. The 4.48 acres combined developed site generates a total (unmitigated) peak runoff of **8.61 cfs** (4.86+3.75) for 10-yr storm events. The proposed bioretention facilities are found to sufficiently regulate the peak discharge flow to **1.97 cfs** at the off-site outfall for the Hotel project site and **0.39 cfs** Parking project site without overtopping the rims of the bioretention pits

Hydraulic Toolbox 4.4 was used to calculate the normal depth in conveyance facilities**.** Hydraulics have been calculated using a Manning's roughness of 0.035 for grass lined swales, 0.050 for rock lines swales, and 0.012 for all pipes.

Retention Analysis Results

In **pre**-construction condition, ***IRM**: peak runoff from the combined site was calculated as **7.34 cfs** for 10-yr storm event, **4.86** cfs at the hotel site (A1) and **2.48** cfs within the future designated parking lot (A2). See IRM Results. * **SSA**: peak runoff from the combined site was calculated as **5.10 cfs** for 10-yr storm event, **2.76** cfs at the hotel site (A1) and **2.34** cfs within the future designated parking lot (A2). See SSA Results.

For **post**-construction condition, ***IRM**: peak runoff from the combined site was calculated as **8.61 cfs** for 10-yr storm event, **4.86** cfs at the hotel site (A1) and **3.75** cfs within the future designated parking lot (A2). ***SSA** with bioretention modeled resulted in peak runoff from the combined site was calculated as **2.36 cfs** for 10-yr storm event, **1.97** cfs at the hotel site (A1) and 0**.39** cfs within the future designated parking lot (A2). See SSA Results.

The low CFS output in the post construction results along with the steep decline and rapid rises witnessed in the hydrograph result from the grate elevations within the bioretention sitting above the water level of the pit and quickly relieving with an increase in the

incoming flows, as this is a preliminary analysis we will determine orifice size and elevations further in the design process

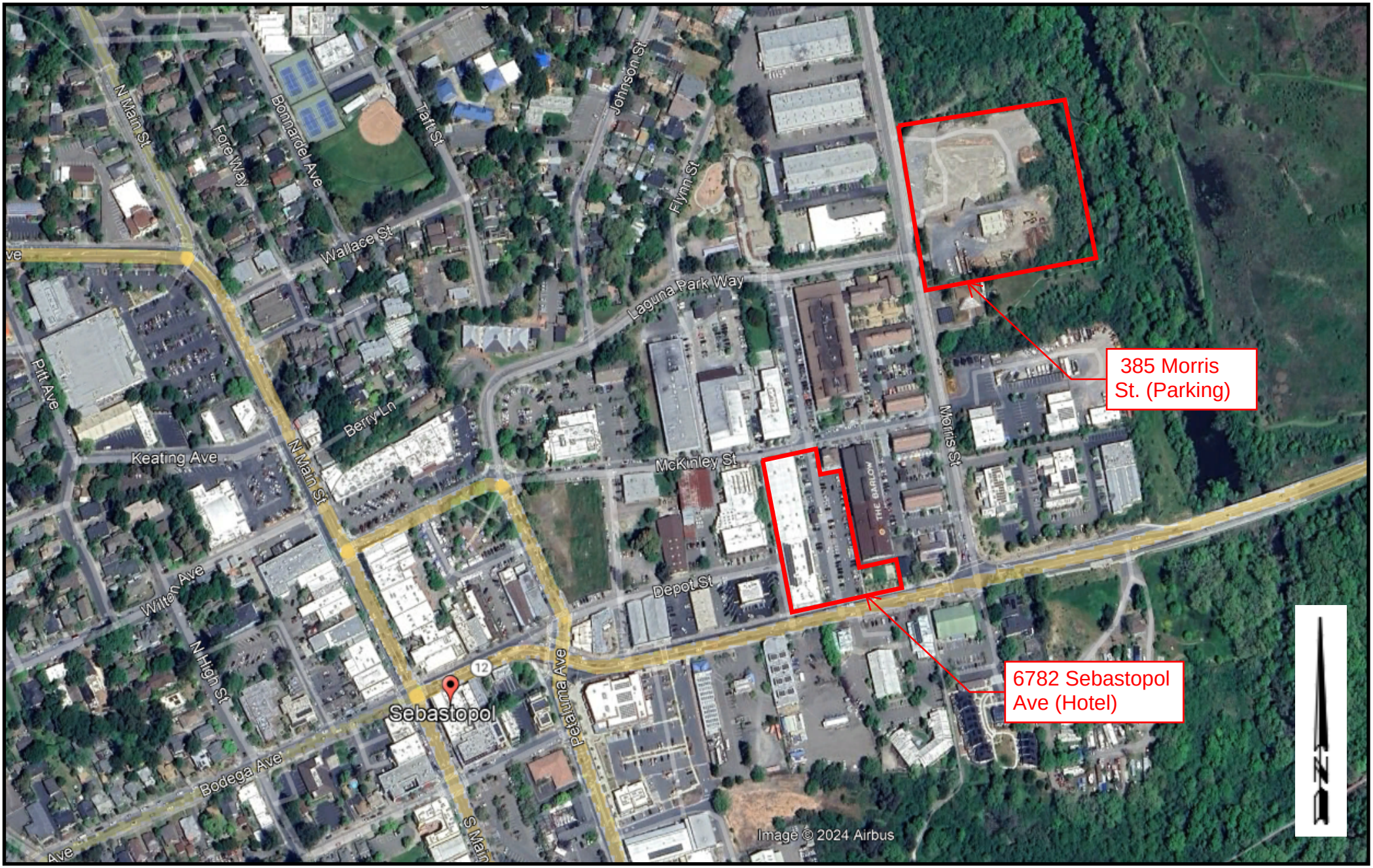
Conclusion

The project proposed drainage improvements including bioretention facilities and a storm drain system that connects to the existing public storm drain system, the results herein display adequate capacity of the proposed system to mitigate the increased runoff from the addition of impervious area. Onsite stormdrain facilities are sized to handle runoff from 10-yr storm events and contain 100-yr flows within the system meeting the FMDM design criteria. Stormwater retention analyses have been performed for the proposed watershed of the project sites. These analysis results have confirmed that the proposed bioretention facilities have sufficient capacity to attenuate the 10-year peak discharge flow to that of the pre-construction condition.

AERIAL PHOTO

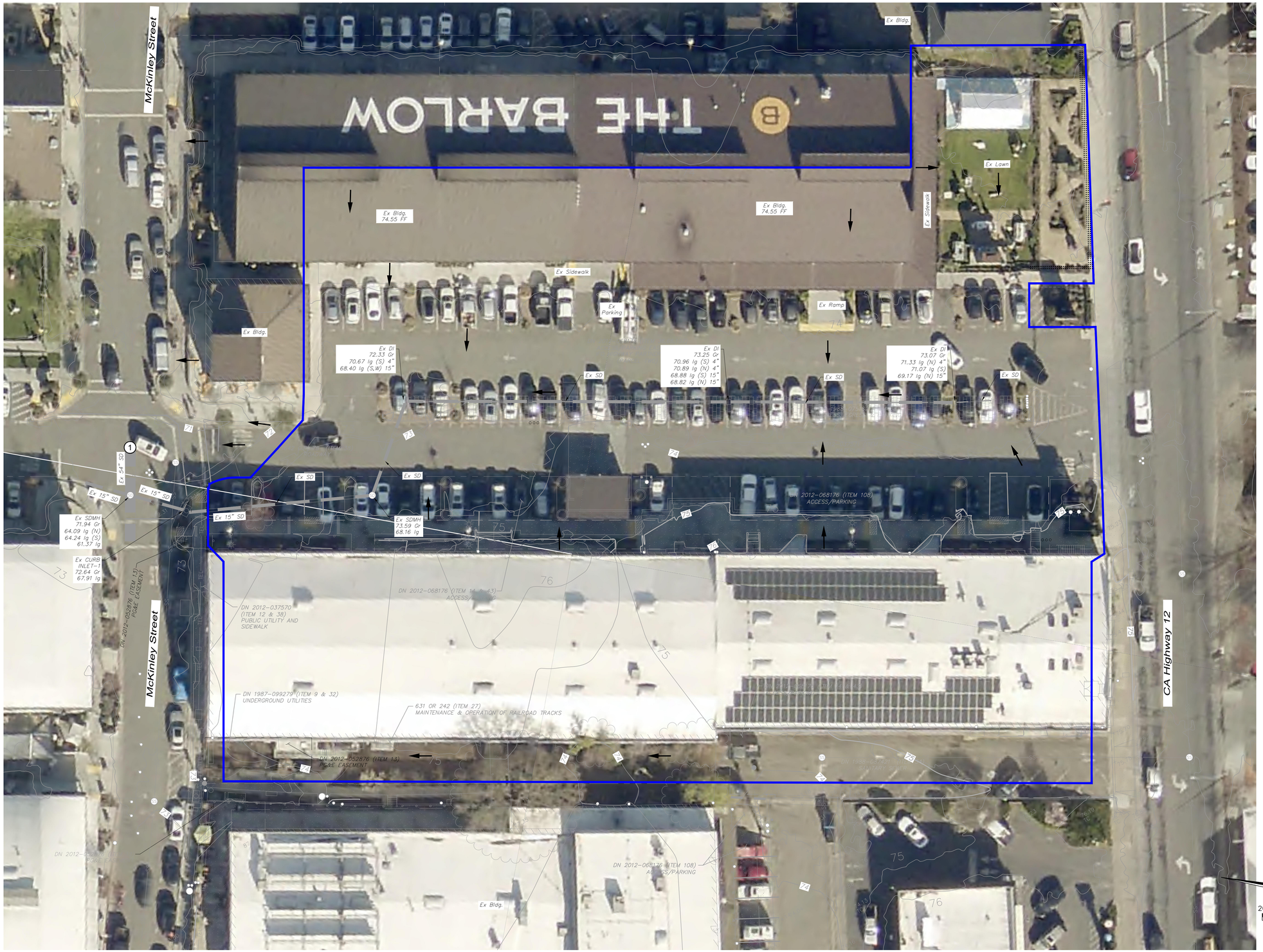
Aerial Photo

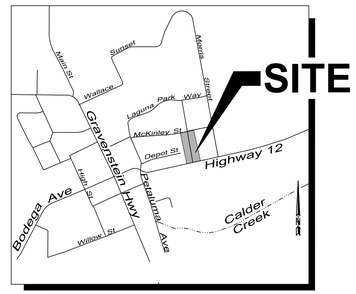
6782 Sebastopol Ave & 385 Morris St.
Sebastopol, CA



10-YEAR SSA &INCREMENTAL RATIONAL METHOD DRAINAGE STUDY

Pre-Construction Hydrology Maps





KEY MAP
NTS

DRAINAGE AREA TABLE

A1 = 2.31 AC
(100,594 SF)

PRE:
- CN: 97
- RUNOFF COEFFICIENT: 0.49
- IMPERVIOUS FRACTION: 0.94

POST:
- CN: 97
- RUNOFF COEFFICIENT: 0.90
- IMPERVIOUS FRACTION: 0.93

DRAINAGE ROUTING

A1

(1)

EX 54" SD WITHIN McKINLEY STREET

DRAINAGE AREA LEGEND

- A1 — DRAINAGE AREA
- (1) — POINT OF CONCENTRATION
- DRAINAGE AREA BOUNDARY
- PROPERTY LINE (P/L)
- LINE OF ANALYSIS
- DIRECTION OF FLOW

20' 10' 0 10' 20' 40' 60'

Graphic Scale: 1" = 20'

PRELIMINARY

July 31, 2024

BARLOW HOTEL PRE-CONSTRUCTION HYDROLOGY MAP (HOTEL)

BARLOW HOTEL
6782 Sebastopol Avenue, Sebastopol, CA
APN 004-750-030

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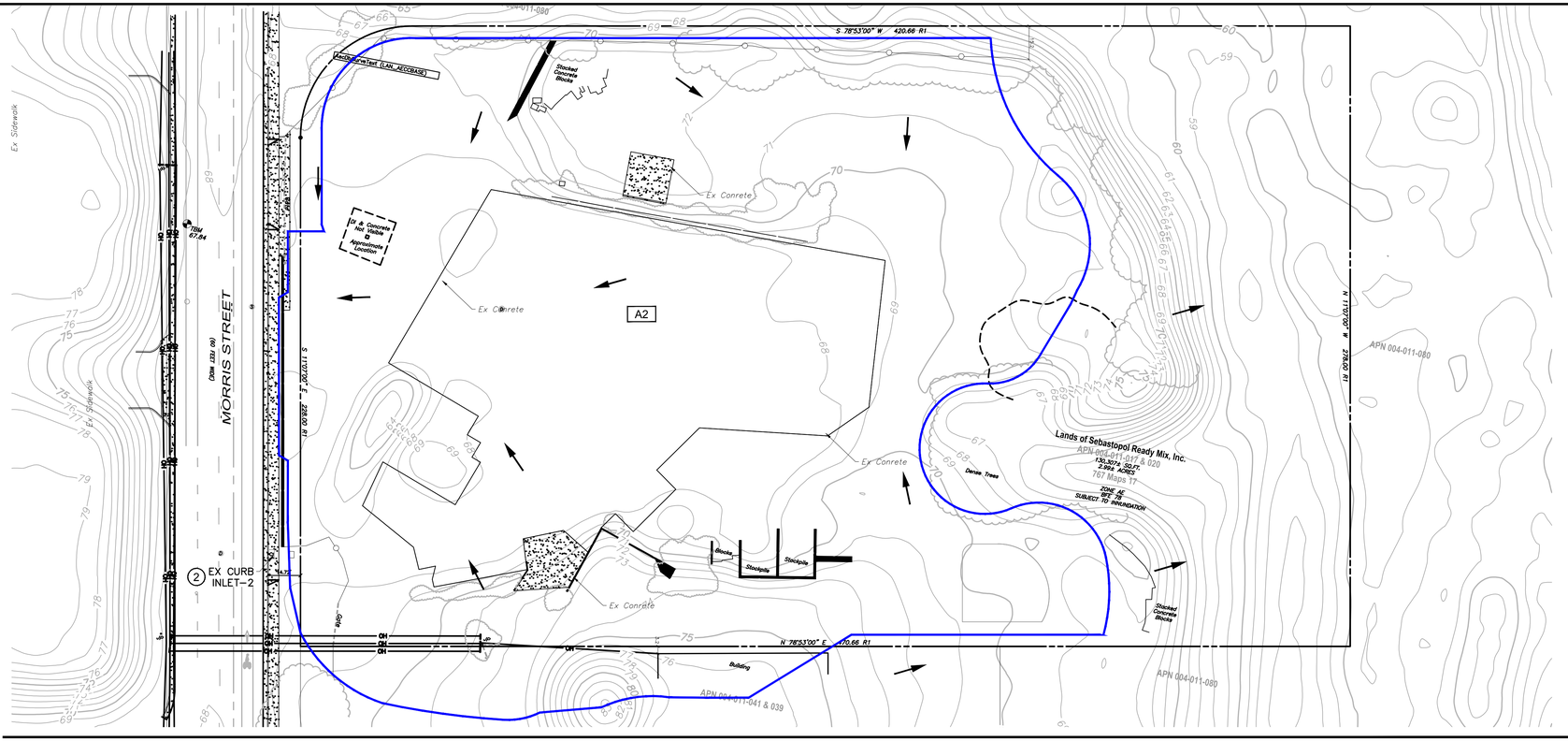
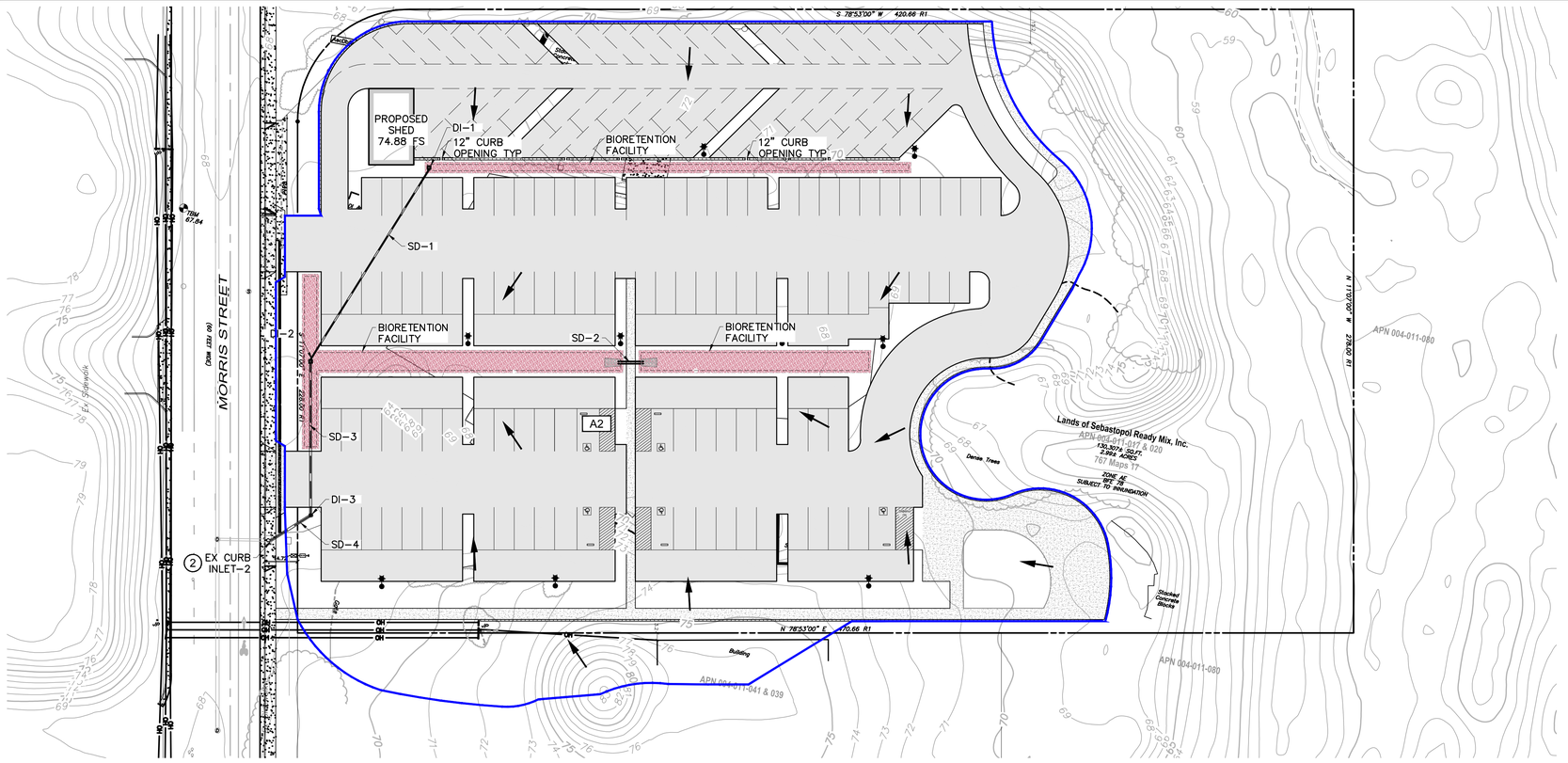
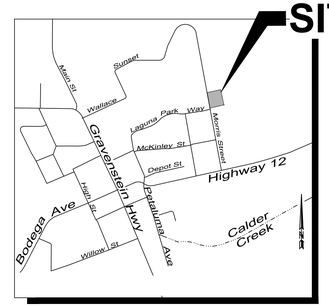
PRE-CONSTRUCTION



POST-CONSTRUCTION





KEY MAP
NTS

NOTE:

1–FT & 5–FT CONTOURS SHOWN ARE FROM LIDAR AND ARE SHOWN FOR GRAPHIC PURPOSES ONLY

REFER TO SUBMITTED GRADING & DRAINAGE PLANS FOR INVERTS, FLOW LINES, TOP OF GRATE ELEVATIONS AND DRAINAGE SPECIFICATIONS

THIS MAP IS FOR REFERENCE ONLY

DRAINAGE ROUTING

A2 → 2 EX CURB INLET–2

DRAINAGE AREA TABLE

A2(Pre & Post) =2.17 AC (94,633 SF)

PRE:
–CN: 89
–RUNOFF COEFFICIENT: 0.49
–IMPERVIOUS FRACTION: 0.27

POST:
–CN: 93
–RUNOFF COEFFICIENT: 0.74
–IMPERVIOUS FRACTION: 0.62

DRAINAGE AREA LEGEND

- A1 — DRAINAGE AREA
- 1 — POINT OF CONCENTRATION
- DRAINAGE AREA BOUNDARY
- PROPERTY LINE (P.L.)
- LINE OF ANALYSIS
- DIRECTION OF FLOW

N

30' 15' 0 15' 30' 60' 90'

Graphic Scale: 1" = 30'

PRELIMINARY

July 31, 2024

BARLOW HOTEL POST-CONSTRUCTION DETENTION ANALYSIS (PARKING LOT)

BARLOW HOTEL
6782 Sebastopol Avenue, Sebastopol, CA
APN 004-750-030

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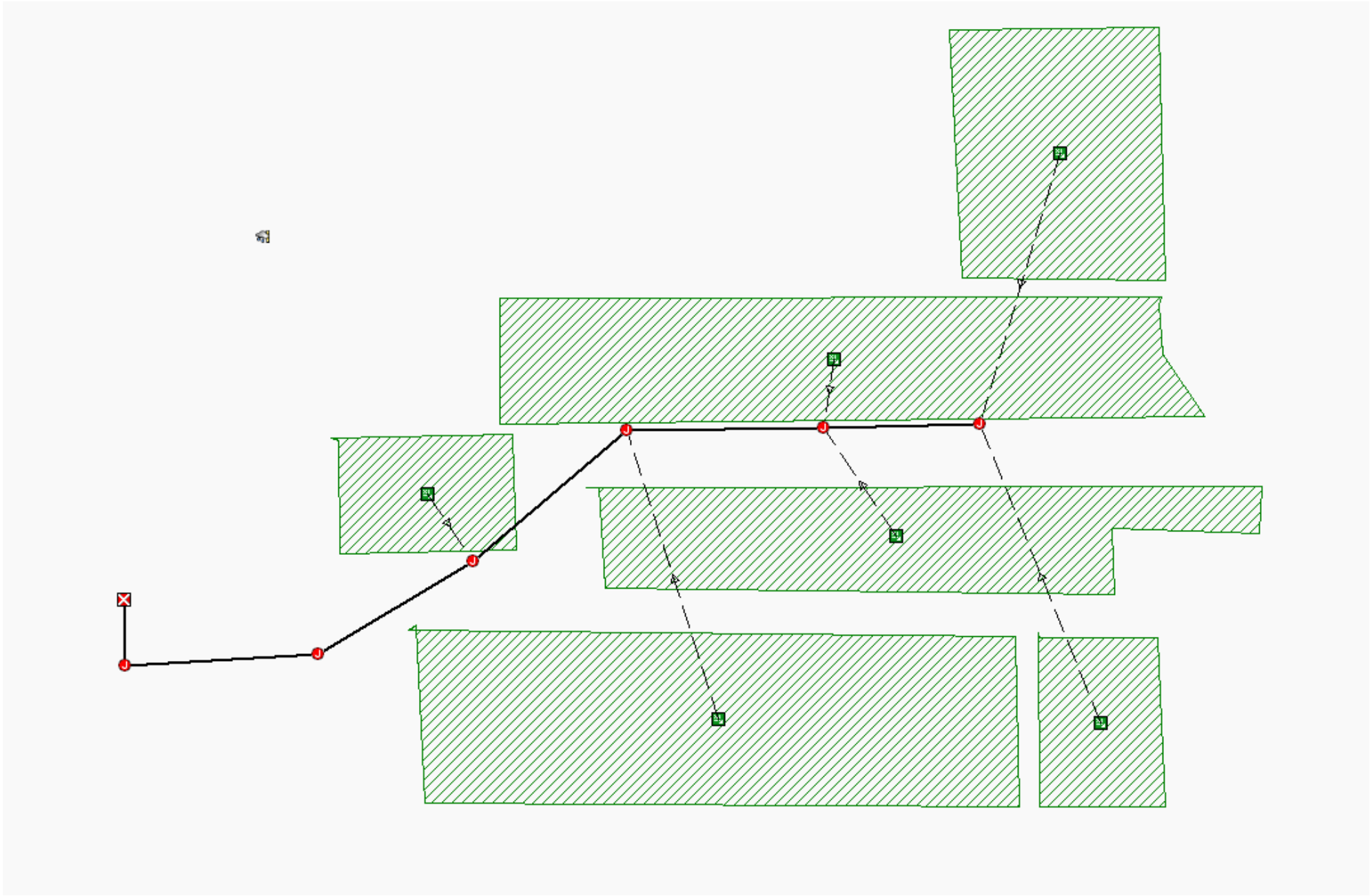
10-Year Storm Event Pre-Construction Results

Pre-Construction (Hotel)
10-Year Storm Event

6782 Sebastopol Ave
Sebastopol, CA



Outfalls

General
Outfall ID: Out-01

Inflow sources
External inflows: NO
Treatments: NO

Delete
Show
Report

Description: HotelOutfallPRE

Physical properties
Invert elevation: 61.11 ft
Flap gate

Boundary condition
Type: Free
Water elevation: ft
Tidal curve:
Time series:

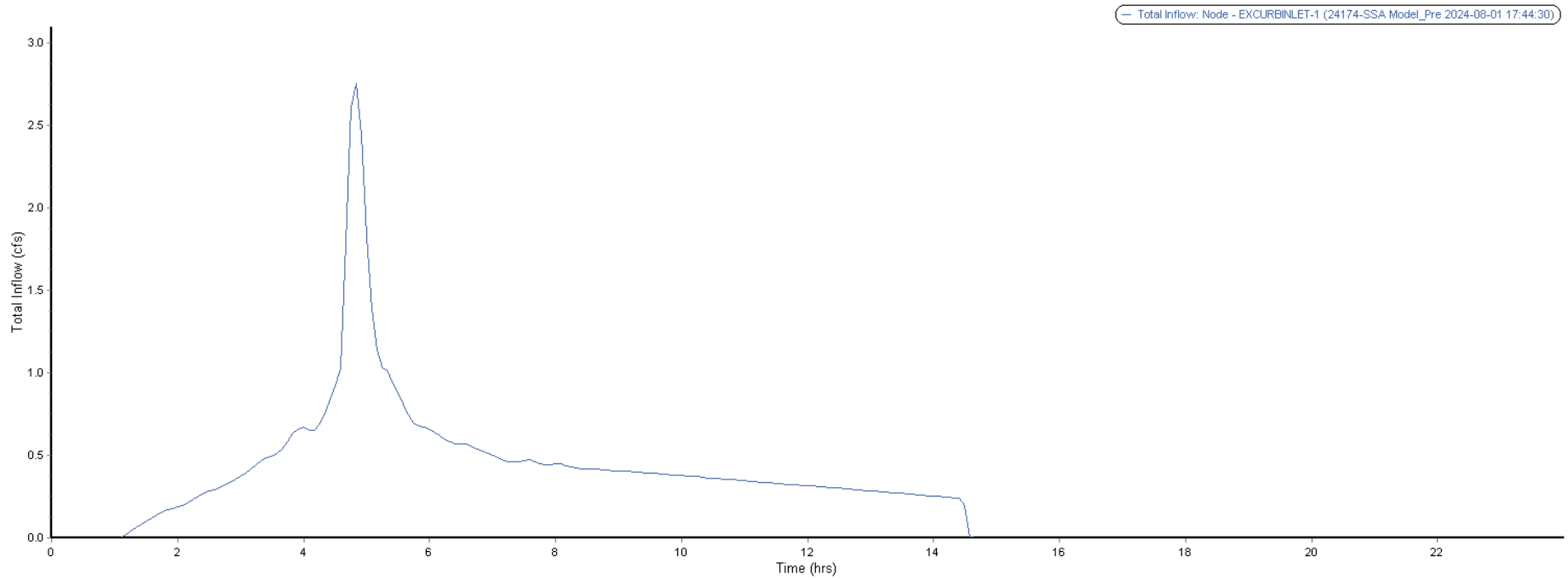
Analysis summary
Max water depth: 0.46 ft
Max water elevation: 61.57 ft
Peak inflow: 2.76 cfs

	ID	Invert Elev.	Flap Gate	Lateral Inflows	Treatments	Outfall Type
1	Out-01	61.11	No	No	No	Free

Close
Help

Pre-Construction (Hotel)
10-Year Storm Event

6782 Sebastopol Ave
Sebastopol, CA



Total Inflow Summary Table

Time period
From: 07/31/2024, 12:00:00 AM
To: 08/01/2024, 12:00:00 AM

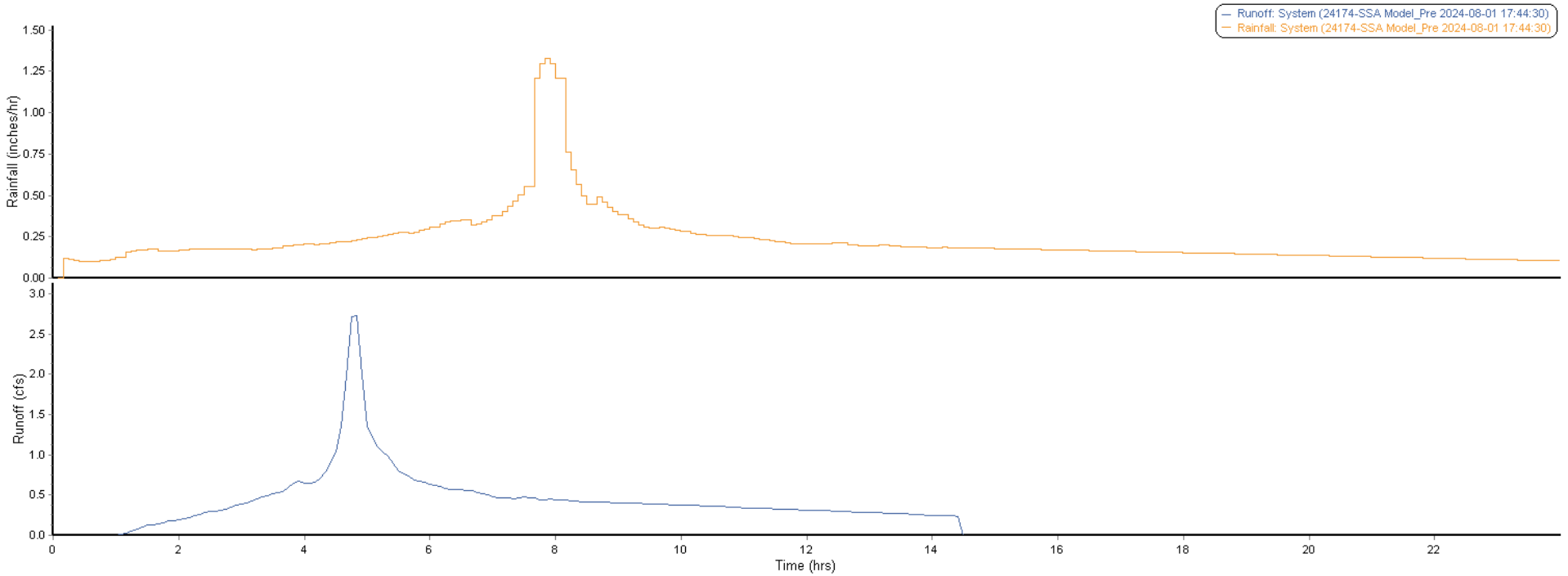
Thresholds
Exceedance: 0
Deficit: 0

Detention storage
Max flow: 0

Element ID	EXCURBINLET-1
Maximum Total Inflow (cfs)	2.75
Minimum Total Inflow (cfs)	0.00
Event Mean Total Inflow (cfs)	0.27
Duration of Exceedances (hrs)	N/A
Duration of Deficits (hrs)	N/A
Number of Exceedances	N/A
Number of Deficits	N/A
Volume of Exceedance (ft³)	N/A
Volume of Deficit (ft³)	N/A
Total Inflow Volume (ft³)	23123.75
Detention Storage (ft³)	N/A

Pre-Construction (Hotel)
10-Year Storm Event

6782 Sebastopol Ave
Sebastopol, CA



Runoff Summary Table

Time period
From: 07/31/2024, 12:00:00 AM
To: 08/01/2024, 12:00:00 AM

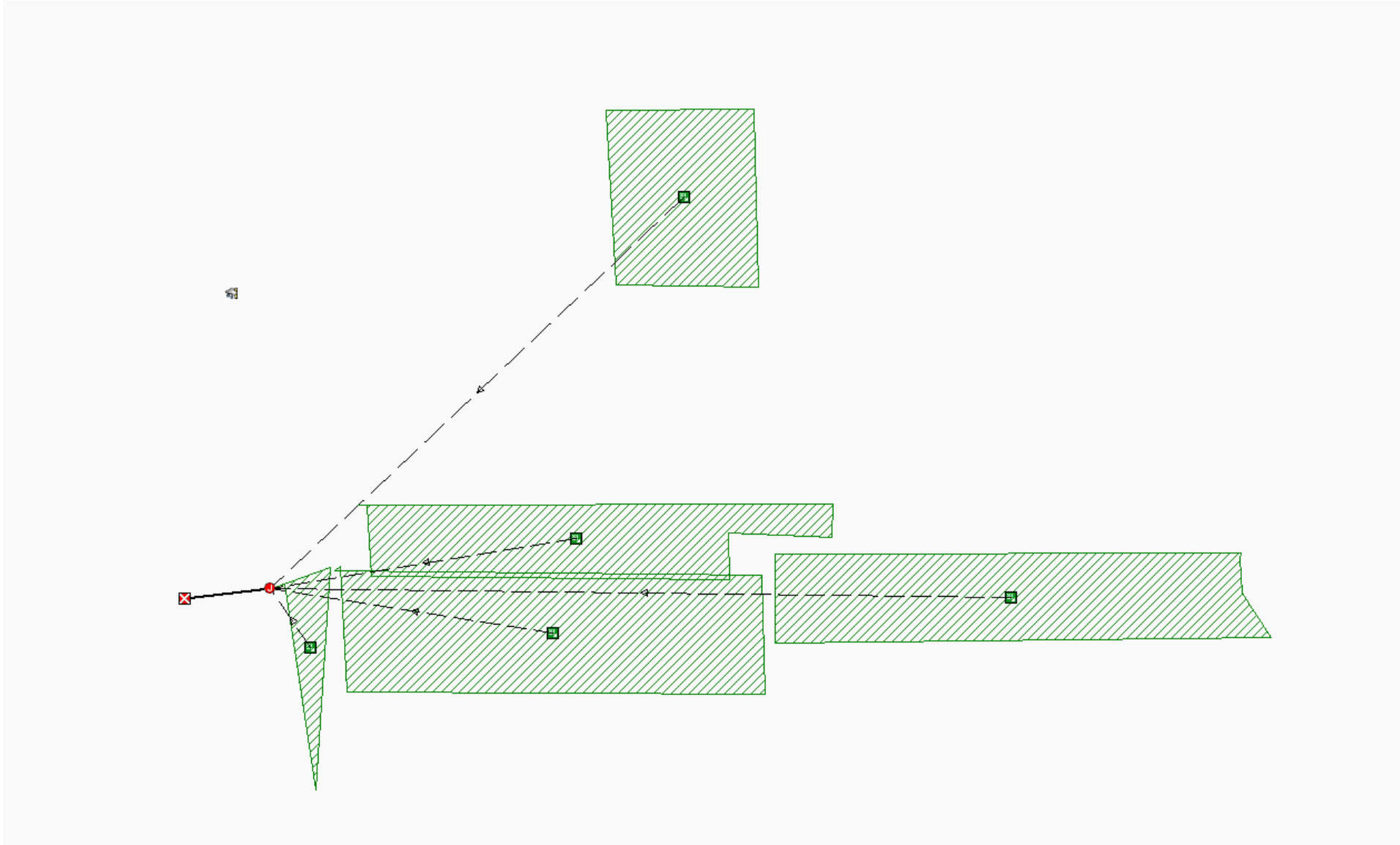
Thresholds
Exceedance: 0
Deficit: 0

Detention storage
Max flow: 0

Element ID	System
Maximum Runoff (cfs)	2.73
Minimum Runoff (cfs)	0.00
Event Mean Runoff (cfs)	0.27
Duration of Exceedances (hrs)	N/A
Duration of Deficits (hrs)	N/A
Number of Exceedances	N/A
Number of Deficits	N/A
Volume of Exceedance (ft³)	N/A
Volume of Deficit (ft³)	N/A
Total Runoff (ft³)	22950.9
Detention Storage (ft³)	N/A

Pre-Construction (Parking)
10-Year Storm Event

6782 Sebastopol Ave
Sebastopol, CA



Pre-Construction (Parking)
10-Year Storm Event

6782 Sebastopol Ave
Sebastopol, CA

Outfalls

General
Outfall ID: Out-02

Inflow sources
External inflows: NO
Treatments: NO

Delete
Show
Report

Description: ParkingLotOutfallPRE

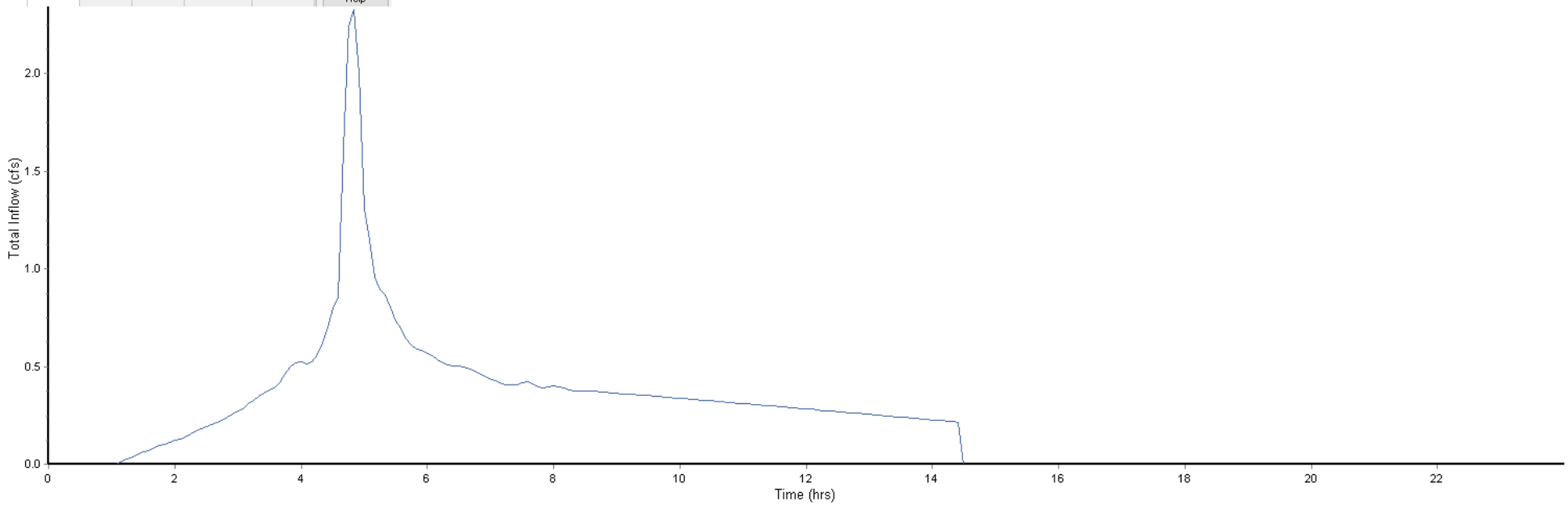
Physical properties
Invert elevation: 61.11 ft
Flap gate

Boundary condition
Type: Free
Water elevation: ft
Tidal curve:
Time series:

Analysis summary
Max water depth: 0.38 ft
Max water elevation: 61.49 ft
Peak inflow: 2.34 cfs

	ID	Invert Elev.	Flap Gate	Lateral Inflows	Treatments	Outfall Type
1	Out-02	61.11	No	No	No	Free

Close
Help



Total Inflow Summary Table

Time period
From: 07/31/2024, 12:00:00 AM
To: 08/01/2024, 12:00:00 AM

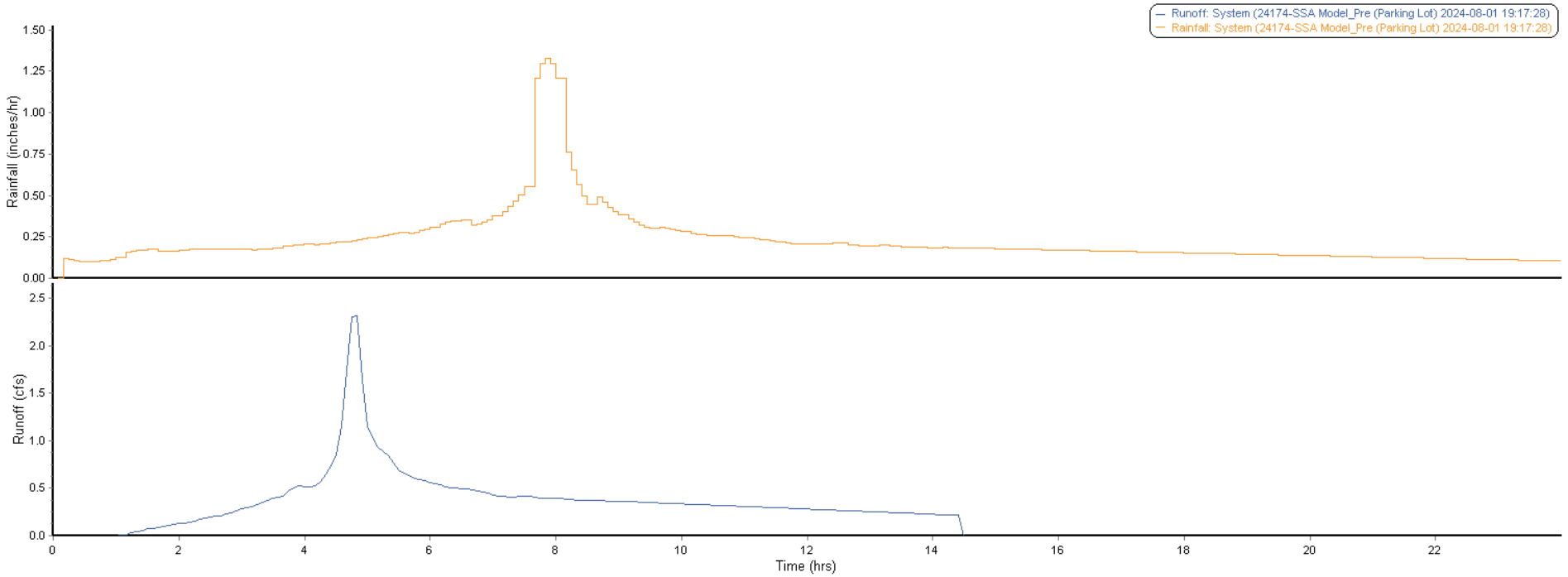
Thresholds
Exceedance: 0
Deficit: 0

Detention storage
Max flow: 0

Element ID	EXCURBINLET-2
Maximum Total Inflow (cfs)	2.33
Minimum Total Inflow (cfs)	0.00
Event Mean Total Inflow (cfs)	0.23
Duration of Exceedances (hrs)	N/A
Duration of Deficits (hrs)	N/A
Number of Exceedances	N/A
Number of Deficits	N/A
Volume of Exceedance (ft³)	N/A
Volume of Deficit (ft³)	N/A
Total Inflow Volume (ft³)	19578.89
Detention Storage (ft³)	N/A

Pre-Construction (Parking)
10-Year Storm Event

6782 Sebastopol Ave
Sebastopol, CA



Runoff Summary Table

Time period
From: 07/31/2024, 12:00:00 AM
To: 08/01/2024, 12:00:00 AM

Thresholds
Exceedance: 0
Deficit: 0

Detention storage
Max flow: 0

Element ID	System
Maximum Runoff (cfs)	2.31
Minimum Runoff (cfs)	0.00
Event Mean Runoff (cfs)	0.23
Duration of Exceedances (hrs)	N/A
Duration of Deficits (hrs)	N/A
Number of Exceedances	N/A
Number of Deficits	N/A
Volume of Exceedance (ft³)	N/A
Volume of Deficit (ft³)	N/A
Total Runoff (ft³)	19529.4
Detention Storage (ft³)	N/A

Incremental Rational Method Drainage Study

10 -Yr Storm Event Pre-Construction

Project: 24174-Barlow Hotel **Date:** 1/12/2023

Point of Concentration	Area	Elevation	Distance	Slope	V(ft/s)	Travel Time (min)	Total Time (min)	I	C	A	A_{total}	AC	Sum AC	Q (cfs)	Remarks
10 year															
ON SITE FLOW RATES															
1	A 1	-	-	-	-	15.00	15.00	2.34	0.90	2.31	2.31	2.08	2.08	4.86	Total Flow from Site Pre & Post Construction
1														4.86	Total Flow to Ex 54" SD within McKinley Street
2	A 2	-	-	-	-	15.00	15.00	2.34	0.49	2.17	2.17	1.06	1.06	2.48	Total Flow from Site Pre & Post Construction
2														2.48	Total Flow to Ex 54" SD within McKinley Street

DRAINAGE AREA	ACRES	C	t (min)	LAND* USE	SOIL TYPE	AVE SLOPE (%)
A 1	2.31	0.90	15.00	B/C	C	>2-6
A 2	2.17	0.49	15.00	B/C	C	>2-6

***Land Use Designation**

HD - High Density
LD - Low Density
MD - Medium Density
MLD - Medium/Low Density
R - Rural
B/C - Business or Commercial
I - Industrial
P - Parks and Recreation
AG - Agricultural or Open Space
Reference Table C-1 of the Sonoma County FMDM, 2020.

Rainfall Intensity vs Duration

$$I = 10.42 / t^{0.552}$$

I = intensity (in/hour)

t = time of concentration (minutes)

Intensity Duration Frequency Curve (IDF Curve)

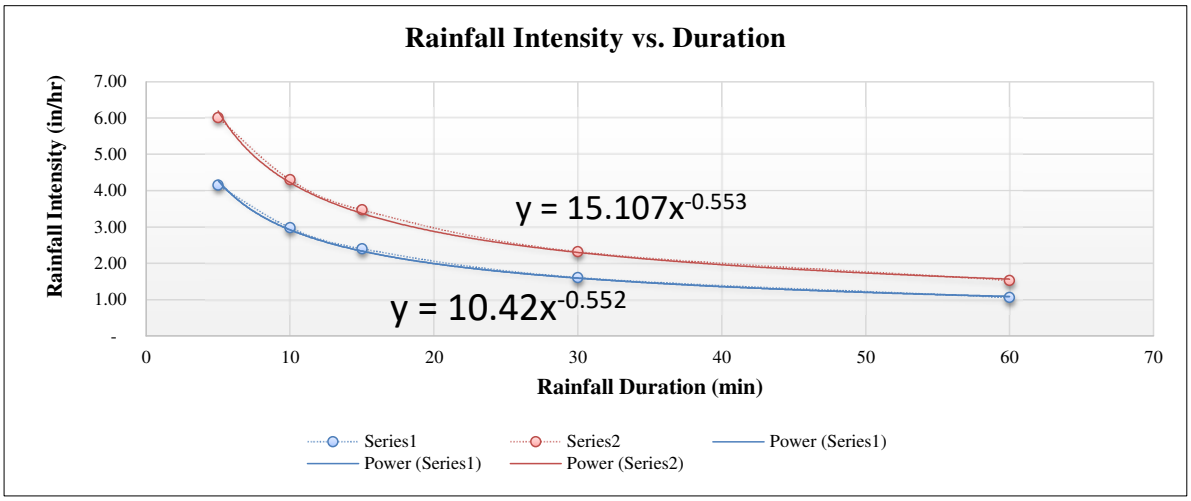
NOAA Atlas 14 Point Precipitation Frequency Estimates

https://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html

Project: The Canopy
JN: 22181

Date: 1/19/2023
Designer: AP

Location: Santa Rosa, CA



NOAA Atlas 14 Data Rainfall Intensity (in/hr)		
Duration (min)	**10-yr**	**100-yr**
5	4.15	6.01
10	2.98	4.30
15	2.40	3.47
30	1.61	2.32
60	1.06	1.53

Rainfall Intensity vs Duration

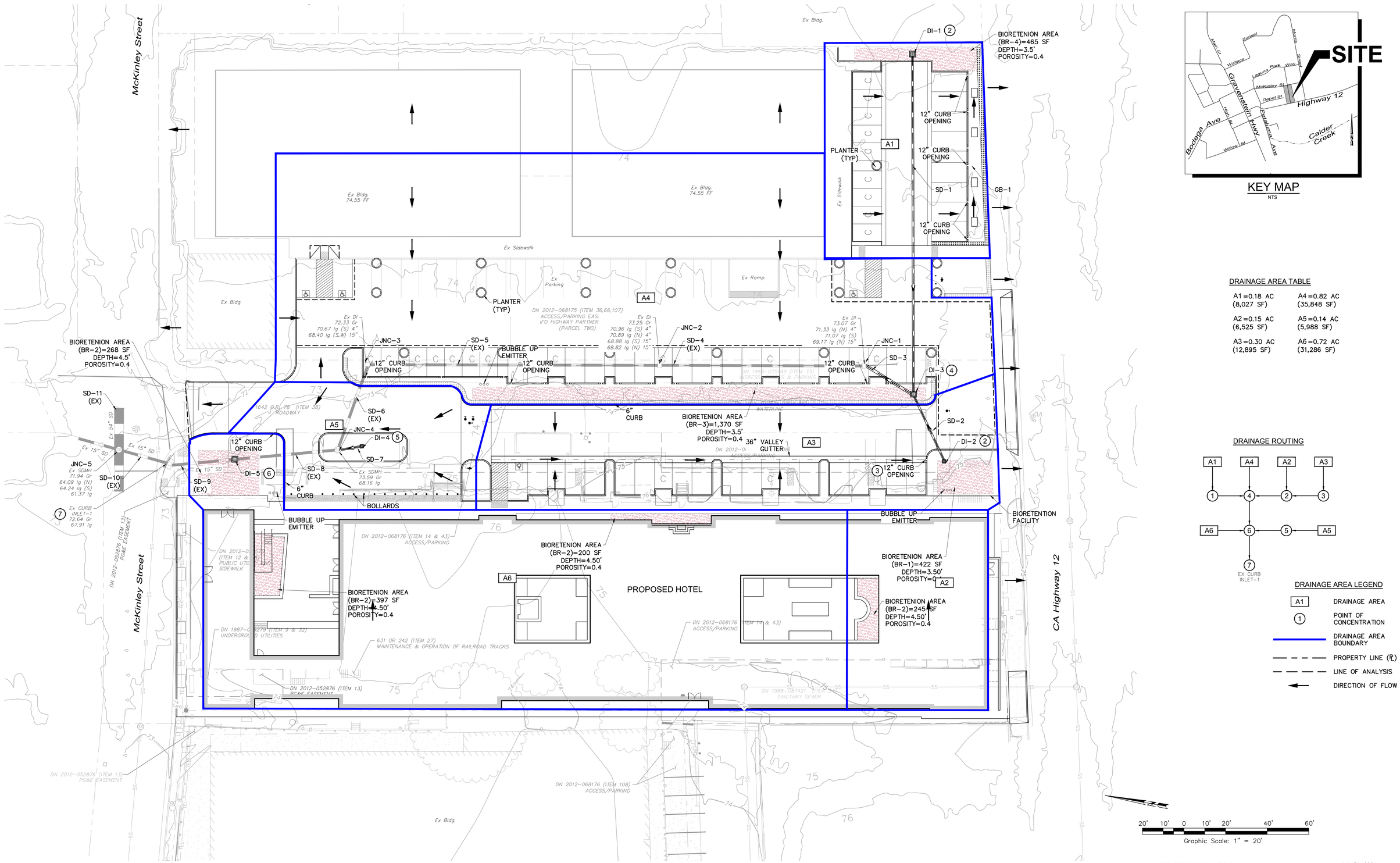
$$I = a * t^{b}$$

I = intensity (in/hour)
t = time of concentration/ rainfall duration (minutes)

10-Year Trendline Values	
a =	10.420
b =	-0.552

100-Year Trendline Values	
a =	15.107
b =	-0.553

Post-Construction Hydrology Maps



T:\2024 PROJECTS\2417A\dwg\Adobe-Design\Prelim\Drainage\24174-Stormwater Detention Analysis (Building).dwg, Doron Lewis, 8/1/2024 8:01:54 PM

PRELIMINARY

July 31, 2024

BARLOW HOTEL STORMWATER RETENTION ANALYSIS & IRM (HOTEL)

BARLOW HOTEL
6782 Sebastopol Avenue, Sebastopol, CA
APN 004-750-030

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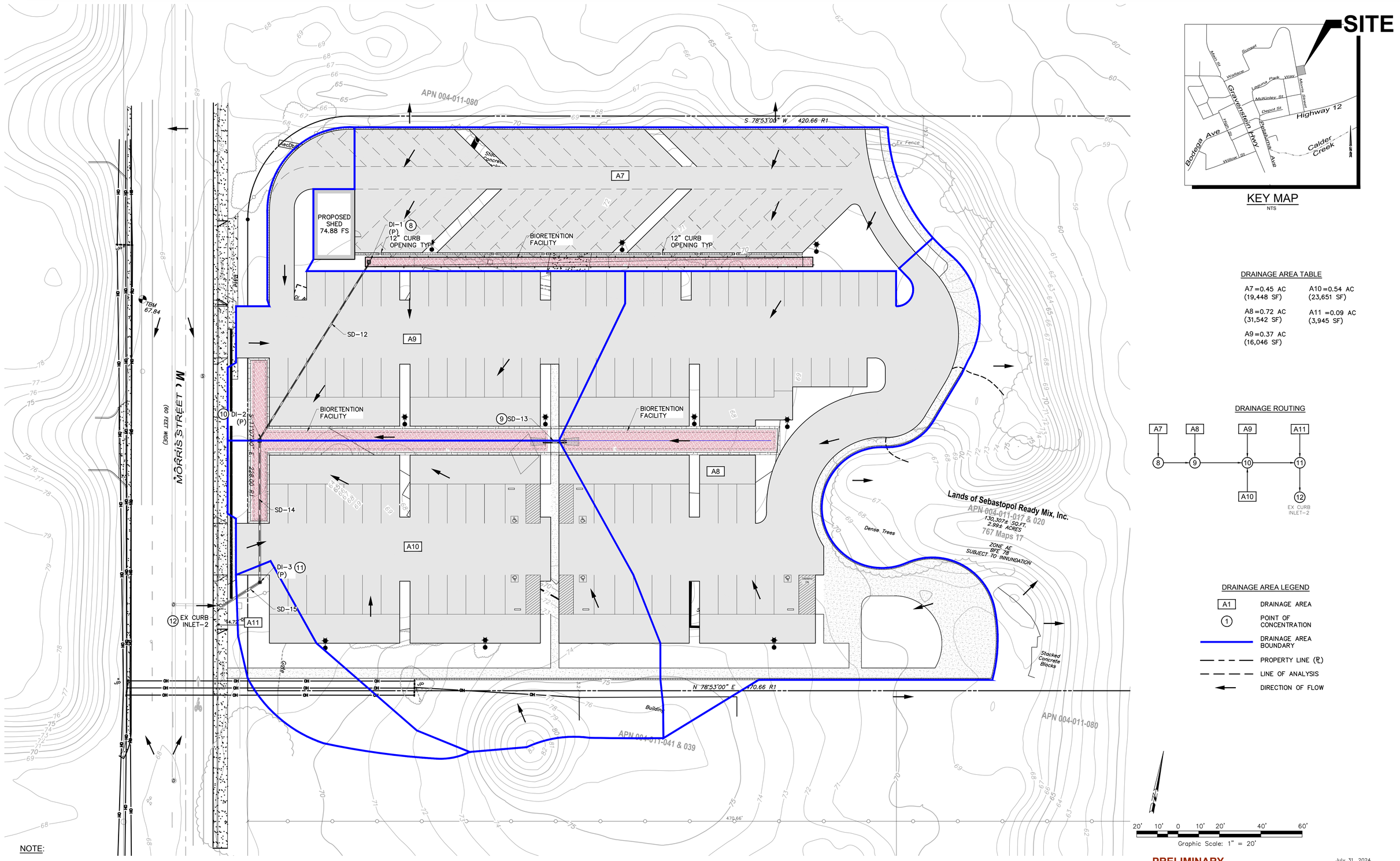

KEY MAP
NTS

DRAINAGE AREA TABLE

A7 =0.45 AC (19,448 SF)	A10 =0.54 AC (23,651 SF)
A8 =0.72 AC (31,542 SF)	A11 =0.09 AC (3,945 SF)
A9 =0.37 AC (16,046 SF)	

DRAINAGE ROUTING

DRAINAGE AREA LEGEND

- A1 — DRAINAGE AREA
- 1 — POINT OF CONCENTRATION
- DRAINAGE AREA BOUNDARY
- PROPERTY LINE (P/L)
- LINE OF ANALYSIS
- DIRECTION OF FLOW

NOTE:

1-FT & 5-FT CONTOURS SHOWN ARE FROM LIDAR AND ARE SHOWN FOR GRAPHIC PURPOSES ONLY

REFER TO SUBMITTED GRADING & DRAINAGE PLANS FOR INVERTS, FLOW LINES, TOP OF GRATE ELEVATIONS AND DRAINAGE SPECIFICATIONS

THIS MAP IS FOR REFERENCE ONLY

T:\2024 PROJECTS\24174\dwg\Adobe-Design\Prelim\Drainage\24174-Post-Const Hydro Map (Parking).dwg, Doran Lewis, 8/1/2024 7:25:15 PM

PRELIMINARY

July 31, 2024

BARLOW HOTEL STORMWATER RETENTION ANALYSIS & IRM (PARKING LOT)

BARLOW HOTEL
6782 Sebastopol Avenue, Sebastopol, CA
APN 004-750-030

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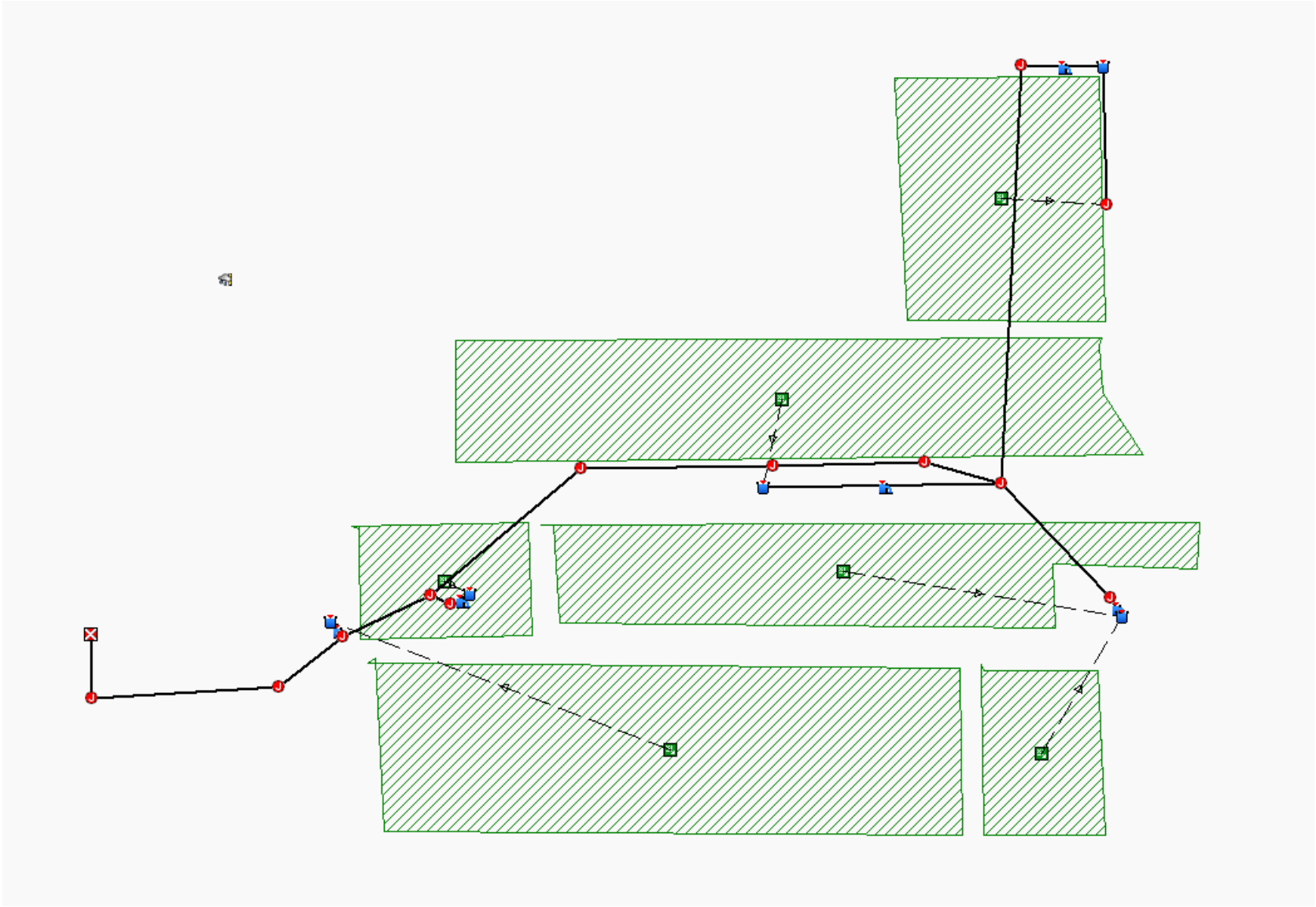
10-Year Storm Event Post-Construction Results & Retention Analysis Results

Post-Construction (Hotel)
10-Year Storm Event

6782 Sebastopol Ave
Sebastopol, CA



Post-Construction (Hotel)
10-Year Storm Event

6782 Sebastopol Ave
Sebastopol, CA

Outfalls

General
Outfall ID: Out-01

Inflow sources
External inflows: NO
Treatments: NO

Delete
Show
Report

Description: HotelOutfall

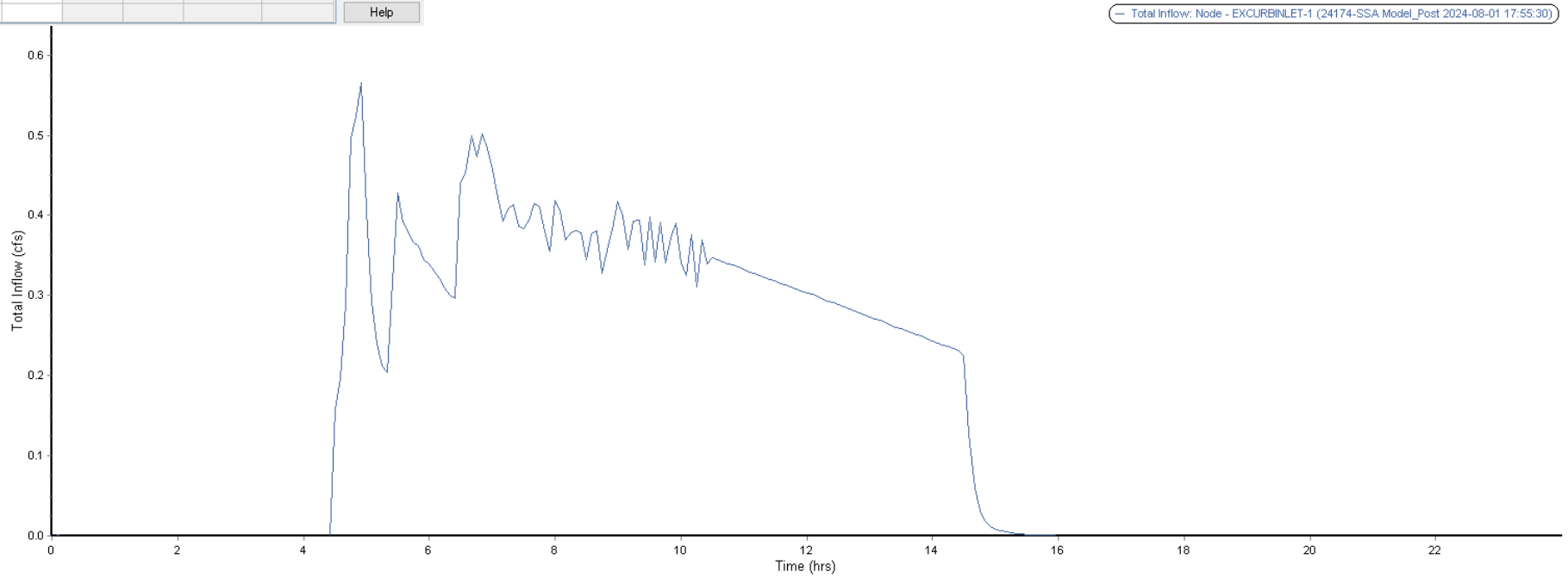
Physical properties
Invert elevation: 61.11 ft
Flap gate

Boundary condition
Type: Free
Water elevation: ft
Tidal curve:
Time series:

Analysis summary
Max water depth: 0.39 ft
Max water elevation: 61.50 ft
Peak inflow: 1.97 cfs

	ID	Invert Elev.	Flap Gate	Lateral Inflows	Treatments	Outfall Type
1	Out-01	61.11	No	No	No	Free

Close
Help



Total Inflow Summary Table

Time period
From: 07/31/2024, 12:00:00 AM
To: 08/01/2024, 12:00:00 AM

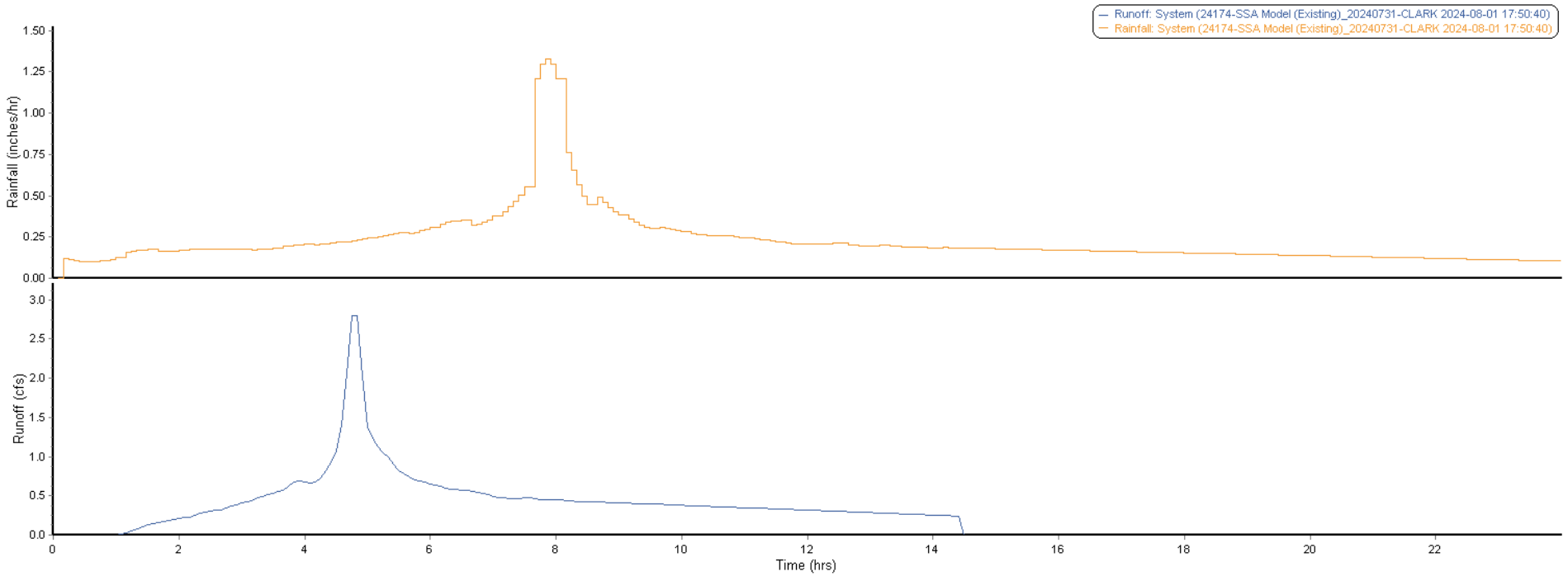
Thresholds
Exceedance: 0
Deficit: 0

Detention storage
Max flow: 0

Element ID	EXCURBINLET-1
Maximum Total Inflow (cfs)	0.57
Minimum Total Inflow (cfs)	0.00
Event Mean Total Inflow (cfs)	0.14
Duration of Exceedances (hrs)	N/A
Duration of Deficits (hrs)	N/A
Number of Exceedances	N/A
Number of Deficits	N/A
Volume of Exceedance (ft³)	N/A
Volume of Deficit (ft³)	N/A
Total Inflow Volume (ft³)	12376.35
Detention Storage (ft³)	N/A

Post-Construction (Hotel)
10-Year Storm Event

6782 Sebastopol Ave
Sebastopol, CA



Runoff Summary Table

Time period
From: 07/31/2024, 12:00:00 AM
To: 08/01/2024, 12:00:00 AM

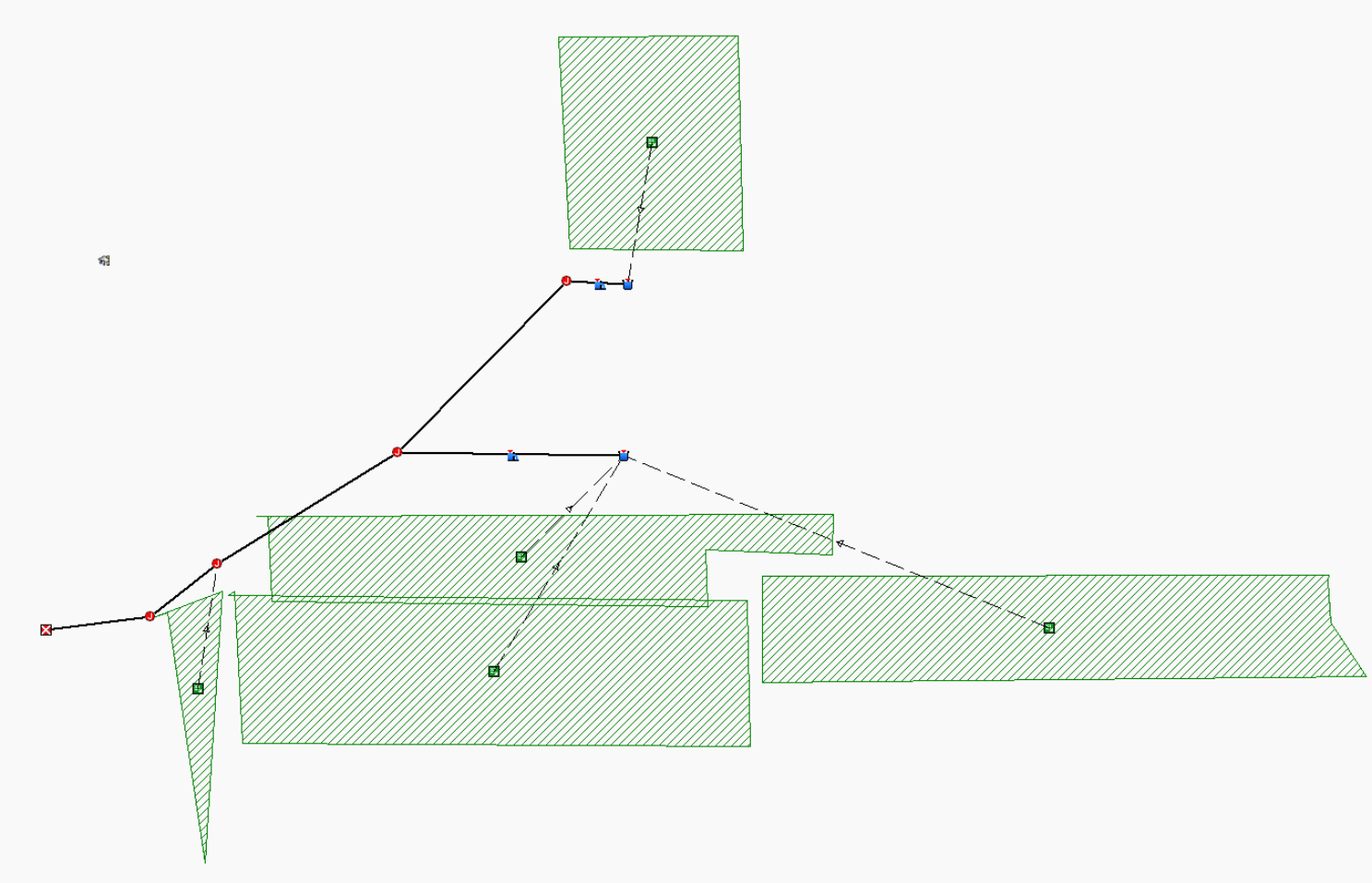
Thresholds
Exceedance: 0
Deficit: 0

Detention storage
Max flow: 0

Element ID	System
Maximum Runoff (cfs)	2.80
Minimum Runoff (cfs)	0.00
Event Mean Runoff (cfs)	0.27
Duration of Exceedances (hrs)	N/A
Duration of Deficits (hrs)	N/A
Number of Exceedances	N/A
Number of Deficits	N/A
Volume of Exceedance (ft³)	N/A
Volume of Deficit (ft³)	N/A
Total Runoff (ft³)	23450.4
Detention Storage (ft³)	N/A

Post-Construction (Parking)
10-Year Storm Event

6782 Sebastopol Ave
Sebastopol, CA



Outfalls

General
Outfall ID: Out-02

Inflow sources
External inflows: NO
Treatments: NO

Delete
Show
Report

Description: ParkingLotOutfall

Physical properties
Invert elevation: 61.11 ft
Flap gate

Boundary condition
Type: Free
Water elevation: ft
Tidal curve:
Time series:

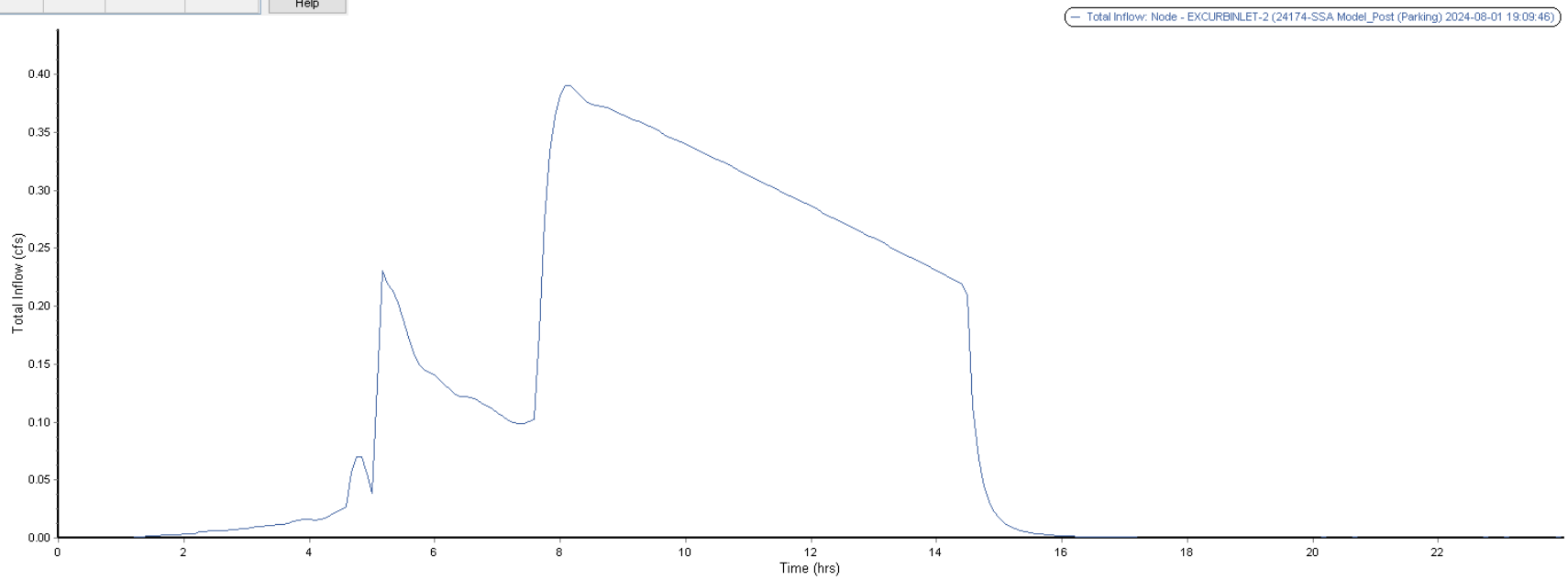
Analysis summary
Max water depth: 0.15 ft
Max water elevation: 61.26 ft
Peak inflow: 0.39 cfs

	ID	Invert Elev.	Flap Gate	Lateral Inflows	Treatments	Outfall Type
1	Out-02	61.11	No	No	No	Free

Close
Help

Post-Construction (Parking)
10-Year Storm Event

6782 Sebastopol Ave
Sebastopol, CA



Total Inflow Summary Table

Time period
From: 07/31/2024, 12:00:00 AM
To: 08/01/2024, 12:00:00 AM

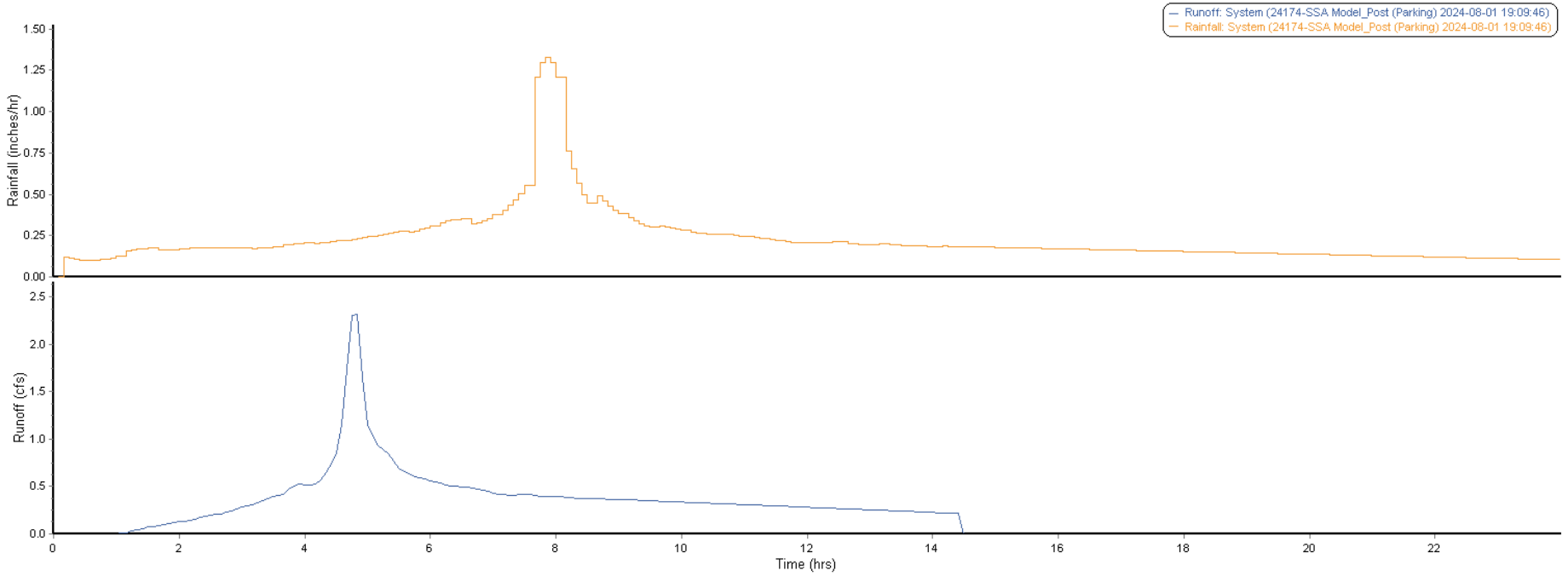
Thresholds
Exceedance: 0
Deficit: 0

Detention storage
Max flow: 0

Element ID	EXCURBINLET-2
Maximum Total Inflow (cfs)	0.39
Minimum Total Inflow (cfs)	0.00
Event Mean Total Inflow (cfs)	0.11
Duration of Exceedances (hrs)	N/A
Duration of Deficits (hrs)	N/A
Number of Exceedances	N/A
Number of Deficits	N/A
Volume of Exceedance (ft³)	N/A
Volume of Deficit (ft³)	N/A
Total Inflow Volume (ft³)	9173.34
Detention Storage (ft³)	N/A

Post-Construction (Parking)
10-Year Storm Event

6782 Sebastopol Ave
Sebastopol, CA



Runoff Summary Table

Time period
From: 07/31/2024, 12:00:00 AM
To: 08/01/2024, 12:00:00 AM

Thresholds
Exceedance: 0
Deficit: 0

Detention storage
Max flow: 0

Element ID	System
Maximum Runoff (cfs)	2.31
Minimum Runoff (cfs)	0.00
Event Mean Runoff (cfs)	0.23
Duration of Exceedances (hrs)	N/A
Duration of Deficits (hrs)	N/A
Number of Exceedances	N/A
Number of Deficits	N/A
Volume of Exceedance (ft³)	N/A
Volume of Deficit (ft³)	N/A
Total Runoff (ft³)	19529.4
Detention Storage (ft³)	N/A

Incremental Rational Method Drainage Study

10 -Yr Storm Event Post-Construction

Project: 24174-Barlow Hotel **Date:** 1/12/2023

Point of Concentration	Area	Elevation	Distance	Slope	V(ft/s)	Travel Time (min)	Total Time (min)	I	C	A	A_{total}	AC	Sum AC	Q (cfs)	Remarks
10 year															
ON SITE FLOW RATES															
1	A 1	-	-	-	-	15.00	15.00	2.34	0.90	2.31	2.31	2.08	2.08	4.86	Total Flow from Site Pre & Post Construction
1														4.86	Total Flow to Ex 54" SD within McKinley Street
2	A 2	-	-	-	-	15.00	15.00	2.34	0.74	2.17	2.17	1.61	1.61	3.75	Total Flow from Site Pre & Post Construction
2														3.75	Total Flow to Ex 54" SD within McKinley Street

DRAINAGE AREA	ACRES	C	t (min)	LAND* USE	SOIL TYPE	AVE SLOPE (%)
A 1	2.31	0.90	15.00	B/C	C	>2-6
A 2	2.17	0.74	15.00	B/C	C	>2-6

***Land Use Designation**

HD - High Density
LD - Low Density
MD - Medium Density
MLD - Medium/Low Density
R - Rural
B/C - Business or Commercial
I - Industrial
P - Parks and Recreation
AG - Agricultural or Open Space
Reference Table C-1 of the Sonoma County FMDM, 2020.

Rainfall Intensity vs Duration

$$I = 10.42 / t^{0.552}$$

I = intensity (in/hour)

t = time of concentration (minutes)

Appendix I
Stormdrain Analysis

Intensity Duration Frequency Curve (IDF Curve)

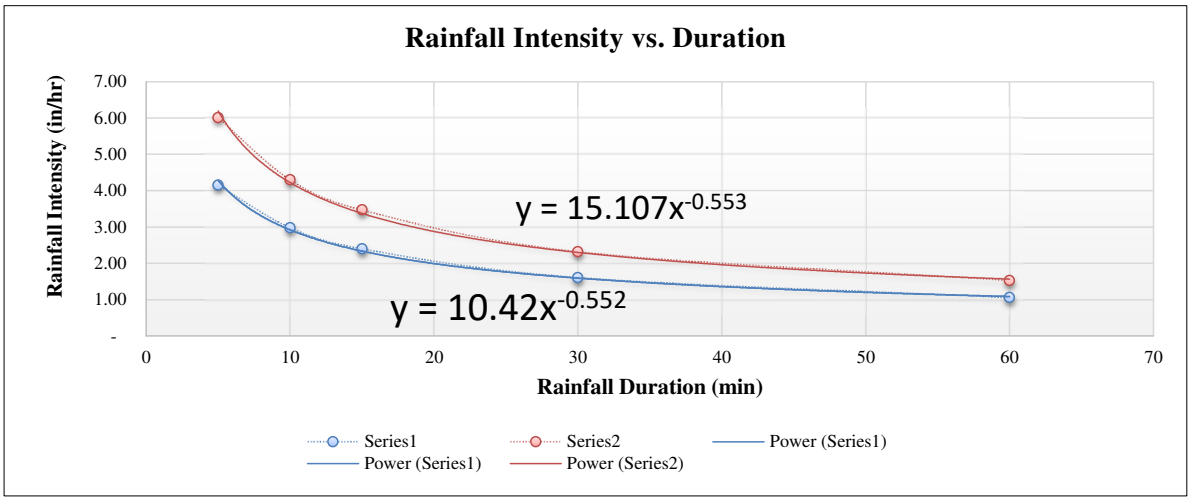
NOAA Atlas 14 Point Precipitation Frequency Estimates

https://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html

Project: The Canopy
JN: 22181

Date: 1/19/2023
Designer: AP

Location: Santa Rosa, CA



NOAA Atlas 14 Data Rainfall Intensity (in/hr)		
Duration (min)	**10-yr**	**100-yr**
5	4.15	6.01
10	2.98	4.30
15	2.40	3.47
30	1.61	2.32
60	1.06	1.53

Rainfall Intensity vs Duration

$$I = a * t^{b}$$

I = intensity (in/hour)
t = time of concentration/ rainfall duration (minutes)

10-Year Trendline Values	
a =	10.420
b =	-0.552

100-Year Trendline Values	
a =	15.107
b =	-0.553

Appendix I

a. IRM for Stormdrain Analysis

Incremental Rational Method Drainage Study

10 -Yr Storm Event Post Construction

Project: 24174-Barlow Hotel **Date:** 7/31/2024

Point of Concentration	Area	Elevation	Distance	Slope	V(ft/s)	Travel Time (min)	Total Time (min)	I	C	A	A_{total}	AC	Sum AC	Q (cfs)	Remarks
10 year															
ON SITE FLOW RATES															
Hotel															
1	A 1	-	-	-	-	7.00	7.00	3.56	0.90	0.18	0.18	0.16	0.16	0.58	Total Flow to SD-1
2	A 2	-	-	-	-	7.00	7.00	3.56	0.90	0.15	0.15	0.14	0.14	0.48	Roof Flow to SD-2
3	A 3	-	-	-	-	7.00	7.00	3.56	0.90	0.30	0.30	0.27	0.27	0.96	Overland Flow to SD-2
3								Combines POC 2 & 3						1.44	Total Flow to SD-2
4	A 4	-	-	-	-	15.00	15.00	2.34	0.90	0.82	0.82	0.74	0.74	1.72	Overland Flow to SD-3
4								Combines POC 1, 2, 3, & 4						3.74	Total Flow to SD-3
5	A 5	-	-	-	-	7.00	7.00	3.56	0.90	0.14	0.14	0.13	0.13	0.45	Total Flow to SD-7
5								Combines POC 1, 2, 3, 4, & 5						4.19	Total Flow to Ex SD-8
6	A 6	-	-	-	-	15.00	15.00	2.34	0.90	0.72	0.72	0.65	0.65	1.51	Overland Flow to Ex SD-9 & Curb Inlet-1
6								Combines POC 1, 2, 3, 4, & 5						5.71	Total Flow to Ex SD-9,10,11, & Curb Inlet-1
Parking Lot															
7	A 7	-	-	-	-	7.00	7.00	3.56	0.90	0.45	0.45	0.41	0.41	1.44	Total Flow to SD-12
8	A 8	-	-	-	-	15.00	15.00	2.34	0.90	0.72	0.72	0.65	0.65	1.51	Total Flow to SD-13
9	A 9	-	-	-	-	10.00	10.00	2.92	0.90	0.37	0.37	0.33	0.33	0.97	Overland Flow to SD-14
10	A 10	-	-	-	-	10.00	10.00	2.92	0.90	0.54	0.54	0.49	0.49	1.42	Overland Flow to SD-14
16								Combines POC 7, 8, 9, & 10						5.35	Total Flow to SD-14
11	A 11	-	-	-	-	7.00	7.00	3.56	0.90	0.09	0.09	0.08	0.08	0.29	Overland Flow to SD-15
15								Combines POC 15 & 16						5.64	Total Flow to SD-15 & Curb-Inlet-2

ON SITE - POST CONSTRUCTION RUNOFF COEFFICIENT

DRAINAGE AREA		ACRES	C	t (min)	LAND* USE	SOIL TYPE	AVE SLOPE (%)
A	1	0.18	0.90	7.00	MD	C	>2-6
A	2	0.15	0.90	7.00	MD	C	>2-6
A	3	0.30	0.90	7.00	MD	C	>2-6
A	4	0.82	0.90	15.00	MLD	C	>2-6
A	5	0.14	0.90	7.00	MD	C	>2-6
A	6	0.72	0.90	15.00	MD	C	>2-6
A	7	0.45	0.90	7.00	MD	C	>2-6
A	8	0.72	0.90	15.00	MD	C	>2-6
A	9	0.37	0.90	10.00	MD	C	>2-6
A	10	0.54	0.90	10.00	MD	C	>2-6
A	11	0.09	0.90	7.00	MLD	C	>2-6

***Land Use Designation**

HD - High Density
LD - Low Density
MD - Medium Density
MLD - Medium/Low Density
R - Rural
B/C - Business or Commercial
I - Industrial
P - Parks and Recreation
AG - Agricultural or Open Space
Reference Table C-1 of the Sonoma County FMDM, 2020.

Rainfall Intensity vs Duration

$$I = 10.42 / t^{0.552}$$

I = intensity (in/hour)

t = time of concentration (minutes)

Appendix I

b. Stormdrain Analysis

Hydraulic Analysis Report

Project Data

Project Title: 24174-Barlow Hotel

Designer:

Project Date: Thursday, August 1, 2024

Project Units: U.S. Customary Units

Notes:

Channel Analysis: SD-1

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter: 0.8300 ft

Longitudinal Slope: 0.0050 ft/ft

Manning's n: 0.0120

Flow: 0.5800 cfs

Result Parameters

Depth: 0.3386 ft

Area of Flow: 0.2075 ft^2

Wetted Perimeter: 1.1501 ft

Hydraulic Radius: 0.1804 ft

Average Velocity: 2.7956 ft/s

Top Width: 0.8158 ft

Froude Number: 0.9770

Critical Depth: 0.3344 ft

Critical Velocity: 2.8429 ft/s

Critical Slope: 0.0052 ft/ft

Critical Top Width: 0.81 ft

Calculated Max Shear Stress: 0.1056 lb/ft^2

Calculated Avg Shear Stress: 0.0563 lb/ft^2

Channel Analysis: SD-2

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter: 0.8300 ft

Longitudinal Slope: 0.0100 ft/ft

Manning's n: 0.0120

Flow: 1.4400 cfs

Result Parameters

Depth: 0.4697 ft

Area of Flow: 0.3158 ft^2

Wetted Perimeter: 1.4135 ft

Hydraulic Radius: 0.2234 ft

Average Velocity: 4.5596 ft/s

Top Width: 0.8228 ft

Froude Number: 1.2969

Critical Depth: 0.5378 ft

Critical Velocity: 3.8820 ft/s

Critical Slope: 0.0066 ft/ft

Critical Top Width: 0.79 ft

Calculated Max Shear Stress: 0.2931 lb/ft^2

Calculated Avg Shear Stress: 0.1394 lb/ft^2

Channel Analysis: SD-3

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter: 1.2500 ft

Longitudinal Slope: 0.0100 ft/ft

Manning's n: 0.0120

Flow: 3.7400 cfs

Result Parameters

Depth: 0.6502 ft

Area of Flow: 0.6451 ft^2

Wetted Perimeter: 2.0140 ft

Hydraulic Radius: 0.3203 ft

Average Velocity: 5.7974 ft/s

Top Width: 1.2490 ft

Froude Number: 1.4215

Critical Depth: 0.7813 ft

Critical Velocity: 4.6353 ft/s

Critical Slope: 0.0056 ft/ft

Critical Top Width: 1.21 ft

Calculated Max Shear Stress: 0.4057 lb/ft^2

Calculated Avg Shear Stress: 0.1999 lb/ft^2

Channel Analysis: SD-4

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter: 1.2500 ft

Longitudinal Slope: 0.0100 ft/ft

Manning's n: 0.0120

Flow: 3.7400 cfs

Result Parameters

Depth: 0.6502 ft

Area of Flow: 0.6451 ft^2

Wetted Perimeter: 2.0140 ft

Hydraulic Radius: 0.3203 ft

Average Velocity: 5.7974 ft/s

Top Width: 1.2490 ft

Froude Number: 1.4215

Critical Depth: 0.7813 ft

Critical Velocity: 4.6353 ft/s

Critical Slope: 0.0056 ft/ft

Critical Top Width: 1.21 ft

Calculated Max Shear Stress: 0.4057 lb/ft^2

Calculated Avg Shear Stress: 0.1999 lb/ft^2

Channel Analysis: SD-5

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter: 1.2500 ft

Longitudinal Slope: 0.0100 ft/ft

Manning's n: 0.0120

Flow: 3.7400 cfs

Result Parameters

Depth: 0.6502 ft

Area of Flow: 0.6451 ft^2

Wetted Perimeter: 2.0140 ft

Hydraulic Radius: 0.3203 ft

Average Velocity: 5.7974 ft/s

Top Width: 1.2490 ft

Froude Number: 1.4215

Critical Depth: 0.7813 ft

Critical Velocity: 4.6353 ft/s

Critical Slope: 0.0056 ft/ft

Critical Top Width: 1.21 ft

Calculated Max Shear Stress: 0.4057 lb/ft^2

Calculated Avg Shear Stress: 0.1999 lb/ft^2

Channel Analysis: SD-6

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter: 1.2500 ft

Longitudinal Slope: 0.0100 ft/ft

Manning's n: 0.0120

Flow: 3.7400 cfs

Result Parameters

Depth: 0.6502 ft

Area of Flow: 0.6451 ft^2

Wetted Perimeter: 2.0140 ft

Hydraulic Radius: 0.3203 ft

Average Velocity: 5.7974 ft/s

Top Width: 1.2490 ft

Froude Number: 1.4215

Critical Depth: 0.7813 ft

Critical Velocity: 4.6353 ft/s

Critical Slope: 0.0056 ft/ft

Critical Top Width: 1.21 ft

Calculated Max Shear Stress: 0.4057 lb/ft^2

Calculated Avg Shear Stress: 0.1999 lb/ft^2

Channel Analysis: SD-7

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter: 1.2500 ft

Longitudinal Slope: 0.0100 ft/ft

Manning's n: 0.0120

Flow: 0.4500 cfs

Result Parameters

Depth: 0.2148 ft

Area of Flow: 0.1405 ft^2

Wetted Perimeter: 1.0687 ft

Hydraulic Radius: 0.1315 ft

Average Velocity: 3.2018 ft/s

Top Width: 0.9432 ft

Froude Number: 1.4617

Critical Depth: 0.2606 ft

Critical Velocity: 2.4268 ft/s

Critical Slope: 0.0046 ft/ft

Critical Top Width: 1.02 ft

Calculated Max Shear Stress: 0.1341 lb/ft^2

Calculated Avg Shear Stress: 0.0821 lb/ft^2

Channel Analysis: SD-8

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter: 1.2500 ft

Longitudinal Slope: 0.0100 ft/ft

Manning's n: 0.0120

Flow: 4.1900 cfs

Result Parameters

Depth: 0.6969 ft

Area of Flow: 0.7033 ft^2

Wetted Perimeter: 2.1077 ft

Hydraulic Radius: 0.3337 ft

Average Velocity: 5.9576 ft/s

Top Width: 1.2417 ft

Froude Number: 1.3950

Critical Depth: 0.8289 ft

Critical Velocity: 4.8505 ft/s

Critical Slope: 0.0059 ft/ft

Critical Top Width: 1.18 ft

Calculated Max Shear Stress: 0.4349 lb/ft^2

Calculated Avg Shear Stress: 0.2082 lb/ft^2

Channel Analysis: SD-9

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter: 1.2500 ft

Longitudinal Slope: 0.0100 ft/ft

Manning's n: 0.0120

Flow: 5.7100 cfs

Result Parameters

Depth: 0.8581 ft

Area of Flow: 0.8981 ft^2

Wetted Perimeter: 2.4413 ft

Hydraulic Radius: 0.3679 ft

Average Velocity: 6.3580 ft/s

Top Width: 1.1598 ft

Froude Number: 1.2733

Critical Depth: 0.9674 ft

Critical Velocity: 5.6030 ft/s

Critical Slope: 0.0075 ft/ft

Critical Top Width: 1.05 ft

Calculated Max Shear Stress: 0.5355 lb/ft^2

Calculated Avg Shear Stress: 0.2296 lb/ft^2

Channel Analysis: SD-10

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter: 1.2500 ft

Longitudinal Slope: 0.0100 ft/ft

Manning's n: 0.0120

Flow: 5.1700 cfs

Result Parameters

Depth: 0.7993 ft

Area of Flow: 0.8286 ft^2

Wetted Perimeter: 2.3167 ft

Hydraulic Radius: 0.3577 ft

Average Velocity: 6.2395 ft/s

Top Width: 1.2004 ft

Froude Number: 1.3235

Critical Depth: 0.9216 ft

Critical Velocity: 5.3302 ft/s

Critical Slope: 0.0068 ft/ft

Critical Top Width: 1.10 ft

Calculated Max Shear Stress: 0.4988 lb/ft^2

Calculated Avg Shear Stress: 0.2232 lb/ft^2

Channel Analysis: SD-11

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter: 4.5000 ft

Longitudinal Slope: 0.0026 ft/ft

Manning's n: 0.0120

Flow: 5.7100 cfs

Result Parameters

Depth: 0.7010 ft

Area of Flow: 1.5803 ft^2

Wetted Perimeter: 3.6517 ft

Hydraulic Radius: 0.4328 ft

Average Velocity: 3.6132 ft/s

Top Width: 3.2639 ft

Froude Number: 0.9151

Critical Depth: 0.6702 ft

Critical Velocity: 3.8569 ft/s

Critical Slope: 0.0031 ft/ft

Critical Top Width: 3.20 ft

Calculated Max Shear Stress: 0.1137 lb/ft^2

Calculated Avg Shear Stress: 0.0702 lb/ft^2

Channel Analysis: SD-12

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter: 0.6700 ft

Longitudinal Slope: 0.0200 ft/ft

Manning's n: 0.0120

Flow: 1.4400 cfs

Result Parameters

Depth: 0.4400 ft

Area of Flow: 0.2455 ft^2

Wetted Perimeter: 1.2660 ft

Hydraulic Radius: 0.1939 ft

Average Velocity: 5.8665 ft/s

Top Width: 0.6362 ft

Froude Number: 1.6644

Critical Depth: 0.5627 ft

Critical Velocity: 4.5555 ft/s

Critical Slope: 0.0113 ft/ft

Critical Top Width: 0.49 ft

Calculated Max Shear Stress: 0.5491 lb/ft^2

Calculated Avg Shear Stress: 0.2420 lb/ft^2

Channel Analysis: SD-13

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter: 0.5000 ft

Longitudinal Slope: 0.0200 ft/ft

Manning's n: 0.0120

Flow: 0.7500 cfs

Result Parameters

Depth: 0.3615 ft

Area of Flow: 0.1520 ft^2

Wetted Perimeter: 1.0165 ft

Hydraulic Radius: 0.1495 ft

Average Velocity: 4.9339 ft/s

Top Width: 0.4475 ft

Froude Number: 1.4919

Critical Depth: 0.4336 ft

Critical Velocity: 4.1465 ft/s

Critical Slope: 0.0139 ft/ft

Critical Top Width: 0.34 ft

Calculated Max Shear Stress: 0.4511 lb/ft^2

Calculated Avg Shear Stress: 0.1866 lb/ft^2

Channel Analysis: SD-14

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter: 1.0000 ft

Longitudinal Slope: 0.0200 ft/ft

Manning's n: 0.0120

Flow: 5.3500 cfs

Result Parameters

Depth: 0.8022 ft

Area of Flow: 0.6754 ft^2

Wetted Perimeter: 2.2199 ft

Hydraulic Radius: 0.3042 ft

Average Velocity: 7.9217 ft/s

Top Width: 0.7966 ft

Froude Number: 1.5162

Critical Depth: 0.9331 ft

Critical Velocity: 7.0137 ft/s

Critical Slope: 0.0166 ft/ft

Critical Top Width: 0.50 ft

Calculated Max Shear Stress: 1.0012 lb/ft^2

Calculated Avg Shear Stress: 0.3797 lb/ft^2

Channel Analysis: SD-15

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter: 1.0000 ft

Longitudinal Slope: 0.0200 ft/ft

Manning's n: 0.0120

Flow: 5.6400 cfs

Result Parameters

Depth: 0.8532 ft

Area of Flow: 0.7138 ft^2

Wetted Perimeter: 2.3551 ft

Hydraulic Radius: 0.3031 ft

Average Velocity: 7.9017 ft/s

Top Width: 0.7079 ft

Froude Number: 1.3867

Critical Depth: 0.9443 ft

Critical Velocity: 7.3420 ft/s

Critical Slope: 0.0185 ft/ft

Critical Top Width: 0.46 ft

Calculated Max Shear Stress: 1.0647 lb/ft^2

Calculated Avg Shear Stress: 0.3782 lb/ft^2

Appendix II
Soil Analysis

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 Sonoma County, California

July 15, 2024

Custom Soil Resource Report
Soil Map

Map Scale: 1:1,500 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 20 40 80 120

Feet: 0 50 100 200 300

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.

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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: Sonoma County, California
Survey Area Data: Version 17, Sep 11, 2023

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

Date(s) aerial images were photographed: Mar 26, 2022—Apr 25, 2022

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
BcA	Blucher fine sandy loam, overwash, 0 to 2 percent slopes	1.1	18.2%
SbC	Sebastopol sandy loam, 2 to 9 percent slopes	4.9	81.8%
Totals for Area of Interest		**6.0**	**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.

Sonoma County, California

BcA—Blucher fine sandy loam, overwash, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: hfb4
Elevation: 0 to 500 feet
Mean annual precipitation: 25 to 50 inches
Mean annual air temperature: 57 to 61 degrees F
Frost-free period: 250 to 270 days
Farmland classification: Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season

Map Unit Composition

Blucher and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Blucher

Setting

Landform: Drainageways, alluvial fans
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Side slope, tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from sedimentary rock

Typical profile

H1 - 0 to 20 inches: fine sandy loam
H2 - 20 to 34 inches: fine sandy loam
H3 - 34 to 60 inches: clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Medium
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 42 to 60 inches
Frequency of flooding: Occasional
Frequency of ponding: Occasional
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 9.7 inches)

Interpretive groups

Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C
Ecological site: R014XG907CA - Loamy Bottom
Hydric soil rating: Yes

Minor Components

Pajaro

Percent of map unit: 8 percent
Hydric soil rating: No

Steinbeck

Percent of map unit: 7 percent
Hydric soil rating: No

SbC—Sebastopol sandy loam, 2 to 9 percent slopes

Map Unit Setting

National map unit symbol: hfjc
Elevation: 100 to 1,000 feet
Mean annual precipitation: 40 inches
Mean annual air temperature: 55 degrees F
Frost-free period: 200 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Sebastopol and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sebastopol

Setting

Landform: Terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from sedimentary rock

Typical profile

H1 - 0 to 24 inches: sandy loam
H2 - 24 to 28 inches: sandy clay loam
H3 - 28 to 57 inches: clay
H4 - 57 to 62 inches: clay loam
H5 - 62 to 72 inches: sandy clay loam

Properties and qualities

Slope: 2 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: High
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: More than 80 inches

Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.3 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: R014XG912CA - Loamy Terrace
Hydric soil rating: No

Minor Components

Blucher

Percent of map unit: 5 percent
Hydric soil rating: No

Goldridge

Percent of map unit: 5 percent
Hydric soil rating: No

Cotati

Percent of map unit: 5 percent
Hydric soil rating: No

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 Sonoma County, California

July 29, 2024

Custom Soil Resource Report
Soil Map

Map Scale: 1:1,100 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 15 30 60 90

Feet: 0 50 100 200 300

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

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Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BcA	Blucher fine sandy loam, overwash, 0 to 2 percent slopes	2.4	68.1%
CfA	Clear Lake clay, ponded, 0 to 2 percent slopes	1.1	31.9%
Totals for Area of Interest		**3.5**	**100.0%**

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

Sonoma County, California

BcA—Blucher fine sandy loam, overwash, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: hfb4
Elevation: 0 to 500 feet
Mean annual precipitation: 25 to 50 inches
Mean annual air temperature: 57 to 61 degrees F
Frost-free period: 250 to 270 days
Farmland classification: Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season

Map Unit Composition

Blucher and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Blucher

Setting

Landform: Drainageways, alluvial fans
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Side slope, tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from sedimentary rock

Typical profile

H1 - 0 to 20 inches: fine sandy loam
H2 - 20 to 34 inches: fine sandy loam
H3 - 34 to 60 inches: clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Medium
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 42 to 60 inches
Frequency of flooding: Occasional
Frequency of ponding: Occasional
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 9.7 inches)

Interpretive groups

Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C
Ecological site: R014XG907CA - Loamy Bottom
Hydric soil rating: Yes

Minor Components

Pajaro

Percent of map unit: 8 percent
Hydric soil rating: No

Steinbeck

Percent of map unit: 7 percent
Hydric soil rating: No

CfA—Clear Lake clay, ponded, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2y8vg
Elevation: 50 to 210 feet
Mean annual precipitation: 27 to 40 inches
Mean annual air temperature: 57 to 58 degrees F
Frost-free period: 265 to 315 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Clear lake and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Clear Lake

Setting

Landform: Basin floors
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Alluvium derived from volcanic and sedimentary rock

Typical profile

Apg - 0 to 8 inches: clay
Assg - 8 to 25 inches: clay
Bssg - 25 to 46 inches: clay
Bkssg - 46 to 52 inches: clay
2Bkg - 52 to 60 inches: clay loam
2Btg - 60 to 72 inches: clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Negligible
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 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 7 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 10.0
Available water supply, 0 to 60 inches: High (about 9.7 inches)

Interpretive groups

Land capability classification (irrigated): 2s
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: C/D
Ecological site: R014XG907CA - Loamy Bottom
Hydric soil rating: Yes

Minor Components

Wright

Percent of map unit: 6 percent
Landform: Stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Huichica

Percent of map unit: 6 percent
Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Zamora

Percent of map unit: 3 percent
Landform: Alluvial fans
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No