HYDROLOGY AND HYDRAULICS STUDY

FOR
APN: 118-270-024 & 118-270-054
W. 2nd STREET& 91 FREEWAY
CITY OF CORONA
CALIFORNIA

OWNER:

GREENS GROUP
16530 Bake Parkway, Suite 200
Irvine, CA 92618
949-829-4930

PREPARED BY:

1485 Spruce Street, STE M
Riverside, CA 92507
951-907-5077

May 2024

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INTRODUCTION

The proposed project entails the construction of two new buildings, a gas canopy with an associated parking lot, a infiltration trench on a 1.4-acre site and proposed sidewalk improvements along W. Second street is located in Corona, California. The project is located north of the W. Second Street at the State Highway 91 onramp between South Buena Vista Avenue and South Lincoln Avenue in the City of Corona, California.

Figure 1- Site Location

METHODOLOGY

The hydrology calculations were performed using the Civil Cad/Civil Design procedures.

Peak discharge to basin is determined by the following equation:
Q = CIA

Where:
Q = peak discharge, in cubic feet per second (ft^3/s)
C = runoff coefficient, proportion of the rainfall that runs off the surface (no units)
I = average rainfall intensity (in/hr)
A = drainage area contributing to the design location (acres)

Included in this report are the Pre-development and post-development condition of 2-year, 10-year, and 100-year storm hydrology calculations.

EXISTING CONDITIONS

The existing site is currently vacant. The site was demolished prior to the construction of the W. Second St. alignment between South Buena Vista Avenue and South Lincoln Avenue. Under existing conditions, flow that originates onsite flows towards two different directions with a ridgeline crossing the site.

The south area of the ridge line flows towards the south-east corner of the site towards W. Second St. There is no storm drain onsite and no storm drain on W. Second St., water sheet flows out to the street. The project area of 1.4 acres currently results in a discharge of approximately 1.58 cfs for a 10-year storm and 2.59 cfs for a 100-year storm.

The north area of the ridge lines flows towards the north-west of the site towards the Caltrans right of way. This top area of 0.38 acres currently results in a discharge of approximately 0.81 cfs for a 10-year storm and 1.31 for a 100-year storm.

PROPOSED SITE CONDITIONS

The site is a drive-thru and a convenience store with provided parking in between. The site has been divided into one (1) drainage areas based on the storm drain layout and sizing.

The main drainage pattern will be similar to the existing condition. There is no off-site drainage runoff from the area surrounding the site. The proposed onsite sheet flows throughout the site layout and conveys the discharge into an infiltration trench within the site. The infiltration trench was based to contain the 85th percentile 24-hour duration storm event for water quality volume only in accordance with section 4 of the Water Quality Management Plan – Technical Guidance Document for the Santa Ana Region of Riverside County. The Flood events larger than water quality volume, when the infiltration trench has reached capacity, the excess runoff will be discharged into W 2nd Street through a proposed parkway drain. Storm flows generated by the project site travel easterly along 2nd street and Buena Vista Avenue. The infiltration trench will contain and infiltrate the water quality volume for the 85th percentile 24-hour duration storm event and mitigate for a 100 yr. flood pre/post condition. The infiltration trench is located along the northerly property line and will take care of flows from the roof drains, parking lot of the site, and concrete flatwork. For emergency purposes, the parkway drain will serve as the 100-year overflow and discharge into W. Second Ave. existing curb and gutter.

CONCLUSION

Hydrology Results

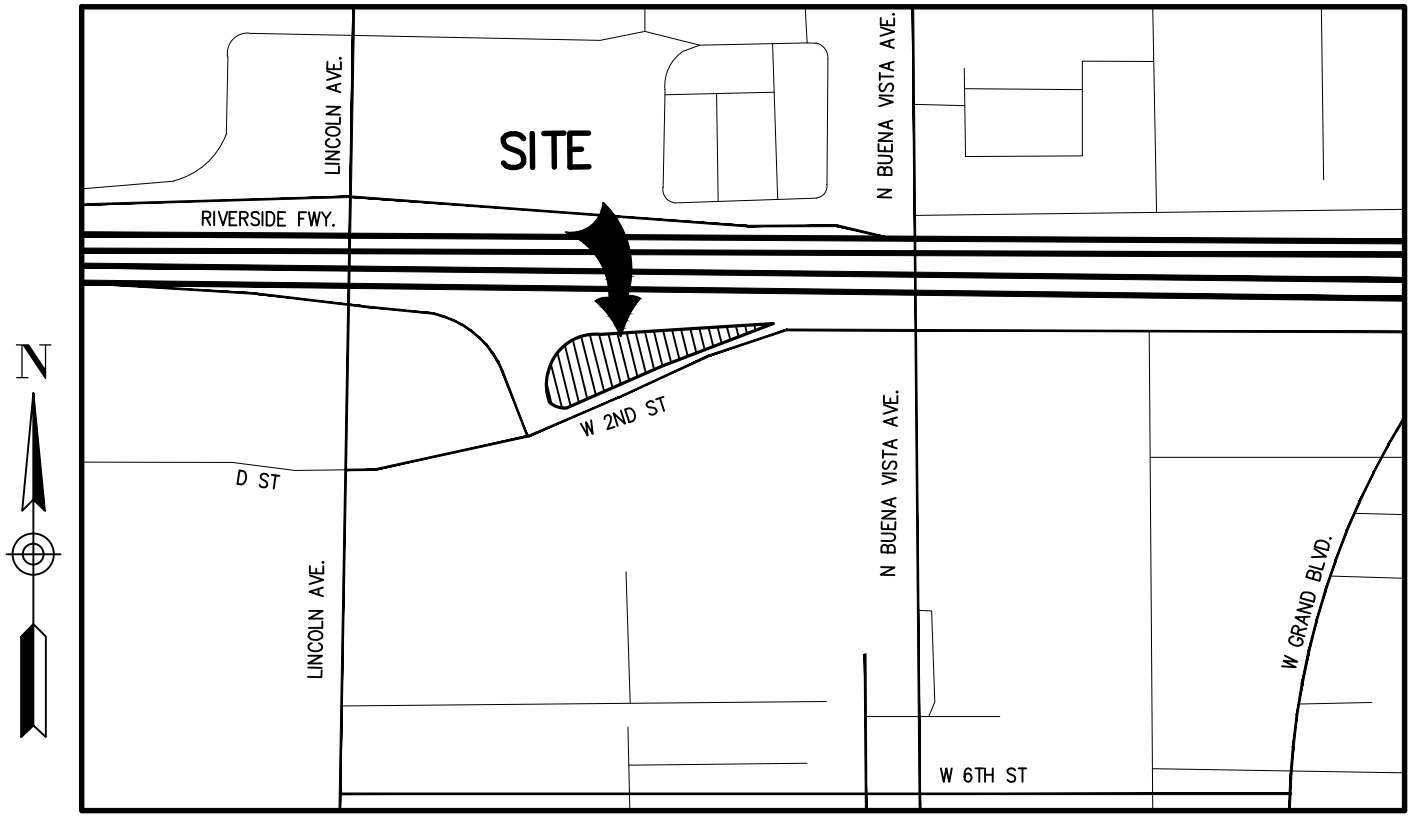
System	Exist. Q2 (cfs)	Exist. Q10 (cfs)	Exist. Q100 (cfs)	Proposed Q100 (cfs)	Proposed Q10 (cfs)	Proposed Q2 (cfs)	Water Quality Vol (req) (CF)	Flood Vol (pre/post) (CF)	Provided Volume (CF)
A	0.89	1.58	2.59	4.60	2.96	1.82	2,604.5		3,567
Total	0.89	1.58	2.59	4.60	2.96	1.82	2,604.5	3,450	3,567

The project proposes an infiltration trench along the northerly property line. The drainage management area requires a water quality volume of 2,604.5. The total volume provided by the infiltration trench is 3,567 cubic feet. Therefore, the volume provided is greater than the required volume. Refer to WQMP report for calculations.

Synthetic Unit Hydrograph results indicate: 100 year – 24 hr
Pre-development condition= 22,687 CF
Post-development condition= **26,137 CF**
Pre/Post Difference= 26,137- 22,687 = **3,450 CF**

Infiltration Trench Capacity
Infiltration Trench 1: Provided Volume **3,567 CF**, Area= 1,486 SF

3,567 CF is greater than 3,450 CF Pre/Post difference.

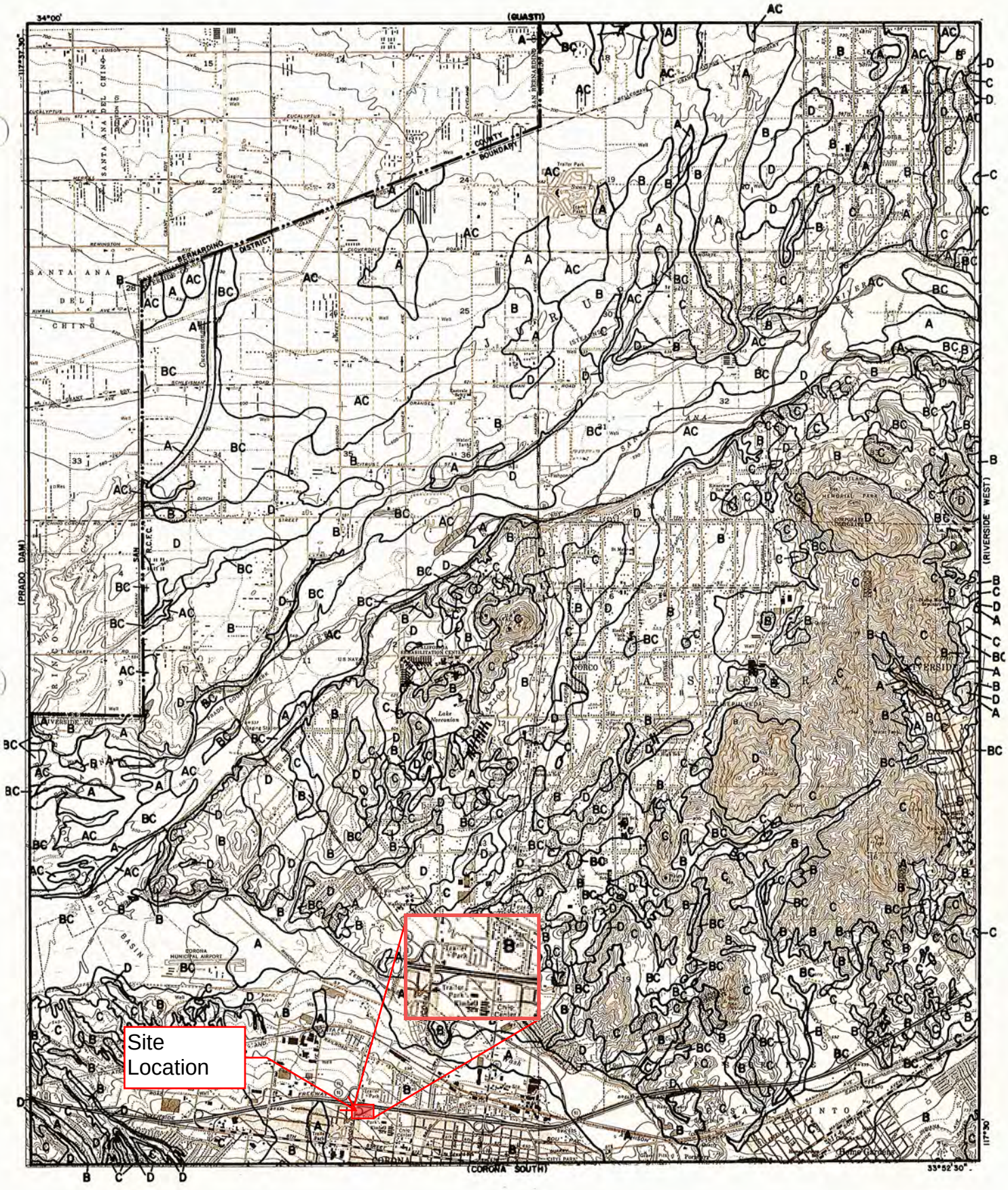


VICINITY MAP

SECTION 26, TOWNSHIP 3 SOUTH, RANGE 7 WEST
NOT TO SCALE

II. HYDRAULIC PARAMETERS

- Soil group
- Rainfall Data



LEGEND

—— SOILS GROUP BOUNDARY

A SOILS GROUP DESIGNATION

RCFC&WCD

HYDROLOGY MANUAL

0 FEET 5000

HYDROLOGIC SOILS GROUP MAP FOR CORONA-NORTH

PLATE C-1.14

NOAA Atlas 14, Volume 6, Version 2
Location name: Corona, California, USA*
Latitude: 33.8802°, Longitude: -117.5718°
Elevation: 630 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.102** (0.085-0.123)	**0.137** (0.114-0.165)	**0.183** (0.153-0.222)	**0.222** (0.184-0.272)	**0.278** (0.221-0.352)	**0.321** (0.251-0.416)	**0.367** (0.279-0.488)	**0.416** (0.307-0.569)	**0.484** (0.342-0.692)	**0.539** (0.367-0.799)
10-min	**0.146** (0.122-0.177)	**0.196** (0.163-0.237)	**0.263** (0.219-0.318)	**0.319** (0.263-0.390)	**0.398** (0.317-0.504)	**0.461** (0.359-0.597)	**0.527** (0.400-0.700)	**0.596** (0.440-0.816)	**0.694** (0.490-0.992)	**0.772** (0.526-1.14)
15-min	**0.177** (0.148-0.214)	**0.237** (0.198-0.286)	**0.318** (0.265-0.385)	**0.386** (0.318-0.472)	**0.481** (0.384-0.610)	**0.557** (0.434-0.722)	**0.637** (0.484-0.846)	**0.721** (0.532-0.987)	**0.839** (0.593-1.20)	**0.934** (0.636-1.38)
30-min	**0.261** (0.218-0.315)	**0.349** (0.291-0.422)	**0.468** (0.390-0.567)	**0.568** (0.469-0.695)	**0.709** (0.565-0.898)	**0.821** (0.640-1.06)	**0.938** (0.713-1.25)	**1.06** (0.784-1.45)	**1.24** (0.873-1.77)	**1.38** (0.937-2.04)
60-min	**0.387** (0.323-0.467)	**0.517** (0.432-0.625)	**0.693** (0.577-0.841)	**0.842** (0.695-1.03)	**1.05** (0.837-1.33)	**1.22** (0.948-1.58)	**1.39** (1.06-1.85)	**1.57** (1.16-2.16)	**1.83** (1.29-2.62)	**2.04** (1.39-3.02)
2-hr	**0.573** (0.480-0.692)	**0.759** (0.634-0.917)	**1.01** (0.840-1.22)	**1.22** (1.01-1.49)	**1.51** (1.20-1.92)	**1.74** (1.36-2.26)	**1.99** (1.51-2.64)	**2.24** (1.66-3.07)	**2.60** (1.84-3.72)	**2.88** (1.96-4.28)
3-hr	**0.711** (0.595-0.859)	**0.940** (0.786-1.14)	**1.25** (1.04-1.51)	**1.51** (1.24-1.84)	**1.87** (1.49-2.36)	**2.15** (1.68-2.79)	**2.45** (1.86-3.25)	**2.76** (2.04-3.78)	**3.19** (2.26-4.57)	**3.54** (2.41-5.25)
6-hr	**0.999** (0.836-1.21)	**1.33** (1.11-1.61)	**1.77** (1.48-2.15)	**2.14** (1.77-2.62)	**2.66** (2.12-3.36)	**3.06** (2.38-3.96)	**3.48** (2.64-4.62)	**3.91** (2.89-5.36)	**4.52** (3.19-6.46)	**5.00** (3.41-7.42)
12-hr	**1.28** (1.07-1.55)	**1.76** (1.47-2.12)	**2.38** (1.99-2.89)	**2.90** (2.40-3.55)	**3.62** (2.88-4.58)	**4.17** (3.25-5.40)	**4.75** (3.61-6.31)	**5.34** (3.94-7.32)	**6.17** (4.36-8.82)	**6.82** (4.65-10.1)
24-hr	**1.69** (1.49-1.95)	**2.37** (2.10-2.74)	**3.28** (2.89-3.80)	**4.02** (3.52-4.70)	**5.04** (4.27-6.08)	**5.83** (4.84-7.18)	**6.64** (5.38-8.37)	**7.49** (5.90-9.69)	**8.64** (6.54-11.7)	**9.55** (6.99-13.3)
2-day	**2.12** (1.87-2.44)	**3.00** (2.65-3.46)	**4.16** (3.66-4.81)	**5.11** (4.47-5.97)	**6.42** (5.44-7.74)	**7.44** (6.17-9.16)	**8.49** (6.87-10.7)	**9.58** (7.55-12.4)	**11.1** (8.38-14.9)	**12.2** (8.96-17.1)
3-day	**2.30** (2.04-2.65)	**3.26** (2.88-3.77)	**4.54** (4.00-5.26)	**5.60** (4.89-6.53)	**7.05** (5.96-8.50)	**8.18** (6.78-10.1)	**9.34** (7.57-11.8)	**10.6** (8.32-13.7)	**12.2** (9.26-16.5)	**13.6** (9.92-18.9)
4-day	**2.51** (2.22-2.89)	**3.56** (3.15-4.11)	**4.97** (4.38-5.75)	**6.13** (5.36-7.15)	**7.73** (6.54-9.32)	**8.99** (7.45-11.1)	**10.3** (8.33-13.0)	**11.6** (9.17-15.1)	**13.5** (10.2-18.2)	**15.0** (11.0-20.9)
7-day	**2.88** (2.55-3.32)	**4.08** (3.61-4.71)	**5.69** (5.02-6.59)	**7.04** (6.15-8.21)	**8.90** (7.53-10.7)	**10.4** (8.59-12.7)	**11.9** (9.62-15.0)	**13.5** (10.6-17.4)	**15.7** (11.9-21.1)	**17.4** (12.8-24.3)
10-day	**3.10** (2.75-3.58)	**4.40** (3.88-5.08)	**6.14** (5.41-7.11)	**7.60** (6.64-8.87)	**9.63** (8.15-11.6)	**11.2** (9.32-13.8)	**12.9** (10.5-16.3)	**14.7** (11.6-19.0)	**17.1** (13.0-23.1)	**19.1** (14.0-26.6)
20-day	**3.72** (3.29-4.29)	**5.27** (4.65-6.08)	**7.38** (6.51-8.55)	**9.18** (8.03-10.7)	**11.7** (9.93-14.1)	**13.8** (11.4-17.0)	**15.9** (12.9-20.1)	**18.2** (14.4-23.6)	**21.5** (16.3-29.0)	**24.1** (17.7-33.6)
30-day	**4.41** (3.90-5.08)	**6.22** (5.49-7.18)	**8.73** (7.69-10.1)	**10.9** (9.51-12.7)	**14.0** (11.8-16.8)	**16.5** (13.7-20.3)	**19.2** (15.5-24.1)	**22.0** (17.4-28.5)	**26.1** (19.8-35.2)	**29.5** (21.6-41.1)
45-day	**5.24** (4.64-6.05)	**7.33** (6.48-8.47)	**10.3** (9.05-11.9)	**12.8** (11.2-15.0)	**16.5** (14.0-19.9)	**19.6** (16.3-24.1)	**22.9** (18.5-28.8)	**26.5** (20.9-34.3)	**31.7** (24.0-42.7)	**35.9** (26.3-50.1)
60-day	**6.04** (5.34-6.96)	**8.36** (7.38-9.65)	**11.6** (10.3-13.5)	**14.5** (12.7-17.0)	**18.8** (15.9-22.6)	**22.3** (18.5-27.4)	**26.1** (21.1-32.9)	**30.3** (23.9-39.2)	**36.4** (27.6-49.1)	**41.5** (30.4-57.9)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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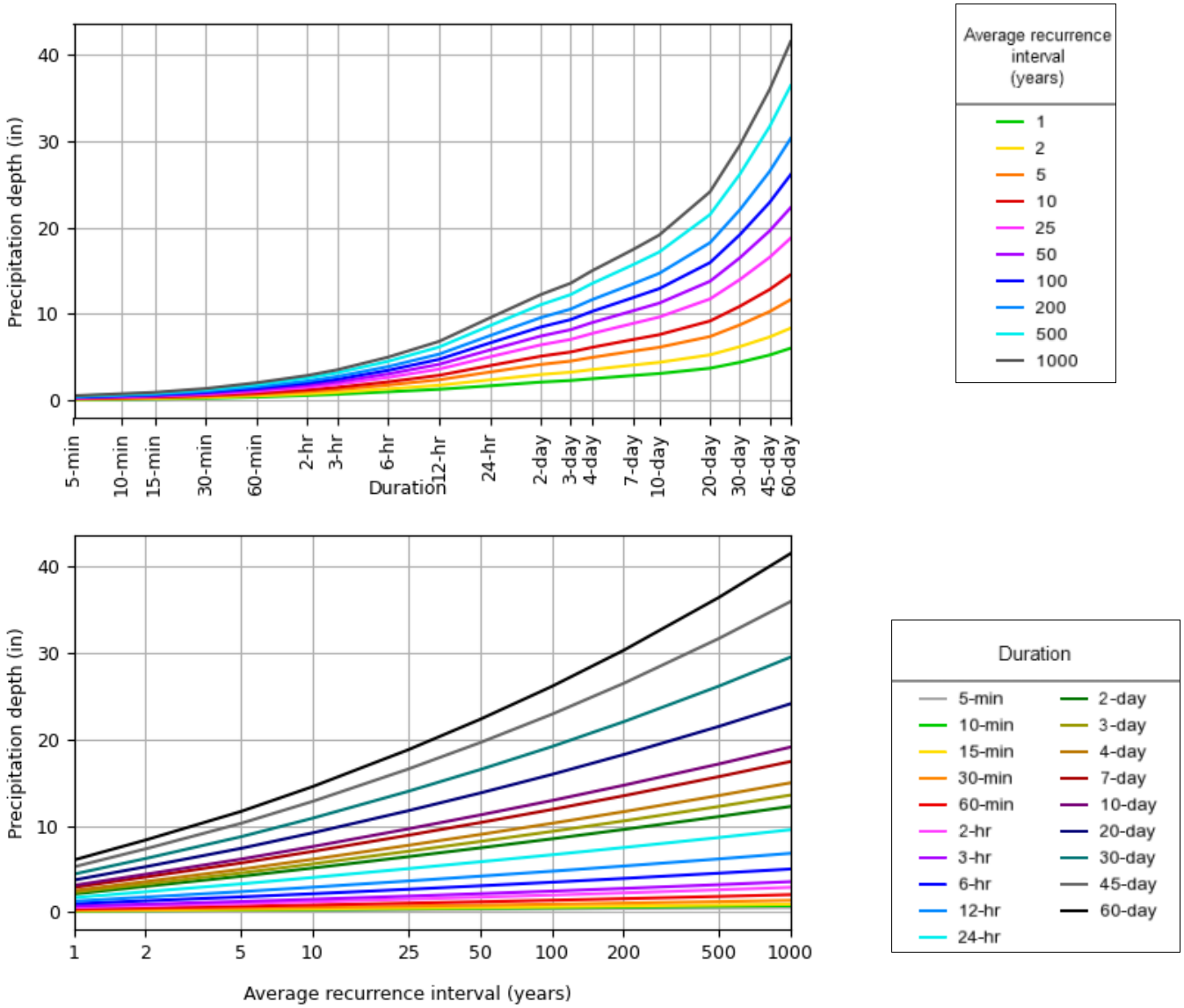
PF graphical

PDS-based depth-duration-frequency (DDF) curves
Latitude: 33.8802°, Longitude: -117.5718°



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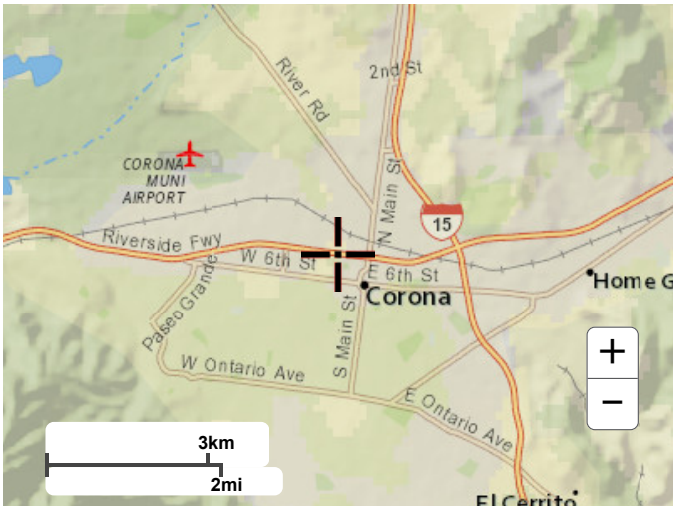
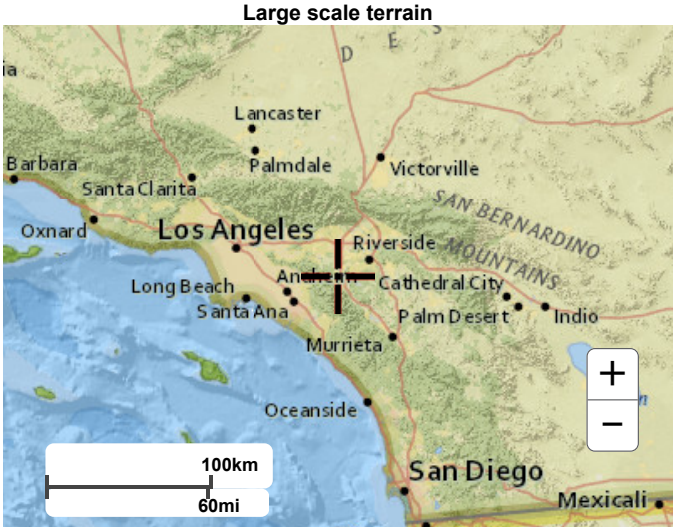
Maps & aerials

Small scale terrain



Large scale terrain



Large scale map

Large scale aerial

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National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

III. EXISTING HYDROLOGY CALCULATIONS

- 2/10/100-Year Storm Hydrology Calculations for Area: A
- 2/10/100-Year Storm Hydrology Calculations for Area: B
- Hydrology Map
- 100- Year Synthetic Unit Hydrograph for Area: A

PROPOSED HYDROLOGY CALCULATIONS

- 2/10/100-Year Storm Hydrology Calculations
- Hydrology Map
- 100- Year Synthetic Unit Hydrograph

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2018 Version 9.0
Rational Hydrology Study Date: 05/08/24 File:PRE2CORONA.out

CORONA 2ND
2 YEAR STORM EVENT
PRE DEVELOPMENT - SUB-AREA A

********* Hydrology Study Control Information **********

English (in-lb) Units used in input data file

Program License Serial Number 6539

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) = 2.00 Antecedent Moisture Condition = 2

Standard intensity-duration curves data (Plate D-4.1)
For the [Corona] area used.
10 year storm 10 minute intensity = 2.220(In/Hr)
10 year storm 60 minute intensity = 0.940(In/Hr)
100 year storm 10 minute intensity = 3.430(In/Hr)
100 year storm 60 minute intensity = 1.450(In/Hr)

Storm event year = 2.0
Calculated rainfall intensity data:
1 hour intensity = 0.584(In/Hr)
Slope of intensity duration curve = 0.4800

++
Process from Point/Station 10.000 to Point/Station 11.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 625.000(Ft.)
Top (of initial area) elevation = 653.800(Ft.)
Bottom (of initial area) elevation = 637.060(Ft.)

```
Difference in elevation =    16.740(Ft.)
Slope =    0.02678  s(percent)=       2.68
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.357 min.
Rainfall intensity =      1.159(In/Hr) for a     2.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.680
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  78.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      0.890(CFS)
Total initial stream area =        1.130(Ac.)
Pervious area fraction = 1.000
End of computations, total study area =            1.13 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number =  78.0
```

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2018 Version 9.0
Rational Hydrology Study Date: 05/08/24 File:PRE10CORONA.out

CORONA 2ND
10 YEAR STORM EVENT
PRE-DEVELOPMENT - SUB-AREA A

********* Hydrology Study Control Information **********

English (in-lb) Units used in input data file

Program License Serial Number 6539

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) = 10.00 Antecedent Moisture Condition = 2

Standard intensity-duration curves data (Plate D-4.1)
For the [Corona] area used.
10 year storm 10 minute intensity = 2.220(In/Hr)
10 year storm 60 minute intensity = 0.940(In/Hr)
100 year storm 10 minute intensity = 3.430(In/Hr)
100 year storm 60 minute intensity = 1.450(In/Hr)

Storm event year = 10.0
Calculated rainfall intensity data:
1 hour intensity = 0.940(In/Hr)
Slope of intensity duration curve = 0.4800

++

Process from Point/Station 10.000 to Point/Station 11.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 625.000(Ft.)
Top (of initial area) elevation = 653.800(Ft.)
Bottom (of initial area) elevation = 637.060(Ft.)

```
Difference in elevation =    16.740(Ft.)
Slope =    0.02678  s(percent)=       2.68
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.357 min.
Rainfall intensity =      1.867(In/Hr) for a    10.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.749
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  78.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      1.581(CFS)
Total initial stream area =        1.130(Ac.)
Pervious area fraction = 1.000
End of computations, total study area =            1.13 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number =  78.0
```

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2018 Version 9.0
Rational Hydrology Study Date: 05/08/24
File:PRE100CORONA.out

CORONA 2ND
100 YEAR STORM EVENT
PRE DEVELOPMENT - SUB-AREA A

********* Hydrology Study Control Information **********

English (in-lb) Units used in input data file

Program License Serial Number 6539

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) = 100.00 Antecedent Moisture Condition = 2

Standard intensity-duration curves data (Plate D-4.1)
For the [Corona] area used.
10 year storm 10 minute intensity = 2.220(In/Hr)
10 year storm 60 minute intensity = 0.940(In/Hr)
100 year storm 10 minute intensity = 3.430(In/Hr)
100 year storm 60 minute intensity = 1.450(In/Hr)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.450(In/Hr)
Slope of intensity duration curve = 0.4800

++

Process from Point/Station 10.000 to Point/Station 11.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 625.000(Ft.)
Top (of initial area) elevation = 653.800(Ft.)

Bottom (of initial area) elevation =   637.060(Ft.)
Difference in elevation =   16.740(Ft.)
Slope =   0.02678 s(percent)=   2.68
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.357 min.
Rainfall intensity =   2.881(In/Hr) for a   100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.796
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 78.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff =   2.591(CFS)
Total initial stream area =   1.130(Ac.)
Pervious area fraction = 1.000
End of computations, total study area =   1.13 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number = 78.0

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2018 Version 9.0
Rational Hydrology Study Date: 05/08/24 File:PRE2CORONAB.out

CORONA 2ND
2 YEAR STORM EVENT
PRE DEVELOPMENT - SUB-AREA B

********* Hydrology Study Control Information **********

English (in-lb) Units used in input data file

Program License Serial Number 6539

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) = 2.00 Antecedent Moisture Condition = 2

Standard intensity-duration curves data (Plate D-4.1)
For the [Corona] area used.
10 year storm 10 minute intensity = 2.220(In/Hr)
10 year storm 60 minute intensity = 0.940(In/Hr)
100 year storm 10 minute intensity = 3.430(In/Hr)
100 year storm 60 minute intensity = 1.450(In/Hr)

Storm event year = 2.0
Calculated rainfall intensity data:
1 hour intensity = 0.584(In/Hr)
Slope of intensity duration curve = 0.4800

++

Process from Point/Station 10.000 to Point/Station 11.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 104.000(Ft.)
Top (of initial area) elevation = 654.900(Ft.)
Bottom (of initial area) elevation = 651.300(Ft.)

```
Difference in elevation =     3.600(Ft.)
Slope =    0.03462  s(percent)=       3.46
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    6.656 min.
Rainfall intensity =      1.677(In/Hr) for a     2.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.735
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  78.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      0.468(CFS)
Total initial stream area =        0.380(Ac.)
Pervious area fraction = 1.000
End of computations, total study area =            0.38 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number =  78.0
```

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2018 Version 9.0
Rational Hydrology Study Date: 05/08/24
File:PRE10CORONAB.out

CORONA 2ND
10 YEAR STORM EVENT
PRE DEVELOPMENT - SUB-AREA B

********* Hydrology Study Control Information **********

English (in-lb) Units used in input data file

Program License Serial Number 6539

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) = 10.00 Antecedent Moisture Condition = 2

Standard intensity-duration curves data (Plate D-4.1)
For the [Corona] area used.
10 year storm 10 minute intensity = 2.220(In/Hr)
10 year storm 60 minute intensity = 0.940(In/Hr)
100 year storm 10 minute intensity = 3.430(In/Hr)
100 year storm 60 minute intensity = 1.450(In/Hr)

Storm event year = 10.0
Calculated rainfall intensity data:
1 hour intensity = 0.940(In/Hr)
Slope of intensity duration curve = 0.4800

++

Process from Point/Station 10.000 to Point/Station 11.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 104.000(Ft.)
Top (of initial area) elevation = 654.900(Ft.)

Bottom (of initial area) elevation =   651.300(Ft.)
Difference in elevation =   3.600(Ft.)
Slope =   0.03462 s(percent)=   3.46
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   6.656 min.
Rainfall intensity =   2.701(In/Hr) for a   10.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.790
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 78.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff =   0.811(CFS)
Total initial stream area =   0.380(Ac.)
Pervious area fraction = 1.000
End of computations, total study area =   0.38 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number = 78.0

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2018 Version 9.0
Rational Hydrology Study Date: 05/08/24
File:PRE100CORONAB.out

CORONA 2ND
100 YEAR STORM EVENT
PRE-DEVELOPMENT - SUB-AREA B

********* Hydrology Study Control Information **********

English (in-lb) Units used in input data file

Program License Serial Number 6539

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) = 100.00 Antecedent Moisture Condition = 2

Standard intensity-duration curves data (Plate D-4.1)
For the [Corona] area used.
10 year storm 10 minute intensity = 2.220(In/Hr)
10 year storm 60 minute intensity = 0.940(In/Hr)
100 year storm 10 minute intensity = 3.430(In/Hr)
100 year storm 60 minute intensity = 1.450(In/Hr)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.450(In/Hr)
Slope of intensity duration curve = 0.4800

++

Process from Point/Station 10.000 to Point/Station 11.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 104.000(Ft.)
Top (of initial area) elevation = 654.900(Ft.)

Bottom (of initial area) elevation =   651.300(Ft.)
Difference in elevation =   3.600(Ft.)
Slope =   0.03462 s(percent)=   3.46
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   6.656 min.
Rainfall intensity =   4.166(In/Hr) for a   100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.825
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 78.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff =   1.307(CFS)
Total initial stream area =   0.380(Ac.)
Pervious area fraction = 1.000
End of computations, total study area =   0.38 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number = 78.0

U n i t H y d r o g r a p h A n a l y s i s

Study date 05/08/24 File: PRE100CORONAUH24100.out

++

Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6539

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

CORONA 2ND
100 YEAR STORM EVENT
PRE DEVELOPMENT - SUB-AREA A

Drainage Area = 1.13(Ac.) = 0.002 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 1.13(Ac.) = 0.002 Sq. Mi.
Length along longest watercourse = 625.00(Ft.)
Length along longest watercourse measured to centroid = 312.50(Ft.)
Length along longest watercourse = 0.118 Mi.
Length along longest watercourse measured to centroid = 0.059 Mi.
Difference in elevation = 16.74(Ft.)
Slope along watercourse = 141.4195 Ft./Mi.
Average Manning's 'N' = 0.040
Lag time = 0.057 Hr.
Lag time = 3.41 Min.
25% of lag time = 0.85 Min.
40% of lag time = 1.37 Min.
Unit time = 30.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

```
Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
        1.13            2.37                    2.68

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
        1.13            6.64                    7.50

STORM EVENT (YEAR) =  100.00
Area Averaged 2-Year Rainfall =    2.370(In)
Area Averaged 100-Year Rainfall =    6.640(In)

Point rain (area averaged) =    6.640(In)
Areal adjustment factor =  100.00 %
Adjusted average point rain =    6.640(In)

Sub-Area Data:
Area(Ac.)         Runoff Index   Impervious %
     1.130           91.00         0.000
 Total Area Entered =      1.13(Ac.)


RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
AMC2 AMC-3     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
91.0  96.4      0.047     0.000        0.047       1.000      0.047
                                                 Sum (F) =   0.047
Area averaged mean soil loss (F) (In/Hr) =  0.047
Minimum soil loss rate ((In/Hr)) =  0.023
(for 24 hour storm duration)
Soil low loss rate (decimal) =   0.900
------------------------------------------------------------------------

                U n i t  H y d r o g r a p h
                       VALLEY S-Curve
------------------------------------------------------------------------
                Unit Hydrograph Data
------------------------------------------------------------------------
Unit time period   Time % of lag   Distribution   Unit Hydrograph
    (hrs)                           Graph %           (CFS)
------------------------------------------------------------------------
    1   0.500        879.063        100.000             1.139
                               Sum = 100.000   Sum=       1.139
------------------------------------------------------------------------

 The following loss rate calculations reflect use of the minimum calculated loss
 rate subtracted from the Storm Rain to produce the maximum Effective Rain value

 Unit Time   Pattern   Storm Rain     Loss rate(In./Hr)     Effective
      (Hr.)  Percent   (In/Hr)         Max   |   Low        (In/Hr)
```

1	0.50	0.50	0.066	(0.082)	0.060	0.007
2	1.00	0.70	0.093	0.080	(0.084)	0.013
3	1.50	0.60	0.080	(0.078)	0.072	0.008
4	2.00	0.70	0.093	0.077	(0.084)	0.016
5	2.50	0.80	0.106	0.075	(0.096)	0.032
6	3.00	1.00	0.133	0.073	(0.120)	0.060
7	3.50	1.00	0.133	0.071	(0.120)	0.062
8	4.00	1.10	0.146	0.069	(0.131)	0.077
9	4.50	1.30	0.173	0.068	(0.155)	0.105
10	5.00	1.50	0.199	0.066	(0.179)	0.133
11	5.50	1.30	0.173	0.064	(0.155)	0.109
12	6.00	1.60	0.212	0.062	(0.191)	0.150
13	6.50	1.80	0.239	0.061	(0.215)	0.178
14	7.00	2.00	0.266	0.059	(0.239)	0.206
15	7.50	2.10	0.279	0.058	(0.251)	0.221
16	8.00	2.50	0.332	0.056	(0.299)	0.276
17	8.50	3.00	0.398	0.054	(0.359)	0.344
18	9.00	3.30	0.438	0.053	(0.394)	0.385
19	9.50	3.90	0.518	0.051	(0.466)	0.466
20	10.00	4.30	0.571	0.050	(0.514)	0.521
21	10.50	3.00	0.398	0.049	(0.359)	0.350
22	11.00	4.00	0.531	0.047	(0.478)	0.484
23	11.50	3.80	0.505	0.046	(0.454)	0.459
24	12.00	3.50	0.465	0.044	(0.418)	0.420
25	12.50	5.10	0.677	0.043	(0.610)	0.634
26	13.00	5.70	0.757	0.042	(0.681)	0.715
27	13.50	6.80	0.903	0.041	(0.813)	0.862
28	14.00	4.60	0.611	0.039	(0.550)	0.572
29	14.50	5.30	0.704	0.038	(0.633)	0.666
30	15.00	5.10	0.677	0.037	(0.610)	0.640
31	15.50	4.70	0.624	0.036	(0.562)	0.588
32	16.00	3.80	0.505	0.035	(0.454)	0.470
33	16.50	0.80	0.106	0.034	(0.096)	0.072
34	17.00	0.60	0.080	0.033	(0.072)	0.047
35	17.50	1.00	0.133	0.032	(0.120)	0.101
36	18.00	0.90	0.120	0.031	(0.108)	0.089
37	18.50	0.80	0.106	0.030	(0.096)	0.076
38	19.00	0.50	0.066	0.029	(0.060)	0.037
39	19.50	0.70	0.093	0.028	(0.084)	0.065
40	20.00	0.50	0.066	0.027	(0.060)	0.039
41	20.50	0.60	0.080	0.027	(0.072)	0.053
42	21.00	0.50	0.066	0.026	(0.060)	0.040
43	21.50	0.50	0.066	0.025	(0.060)	0.041
44	22.00	0.50	0.066	0.025	(0.060)	0.041
45	22.50	0.50	0.066	0.024	(0.060)	0.042
46	23.00	0.40	0.053	0.024	(0.048)	0.029
47	23.50	0.40	0.053	0.024	(0.048)	0.029
48	24.00	0.40	0.053	0.023	(0.048)	0.030

(Loss Rate Not Used)

Sum = 100.0 Sum = 11.1

Flood volume = Effective rainfall 5.53(In)

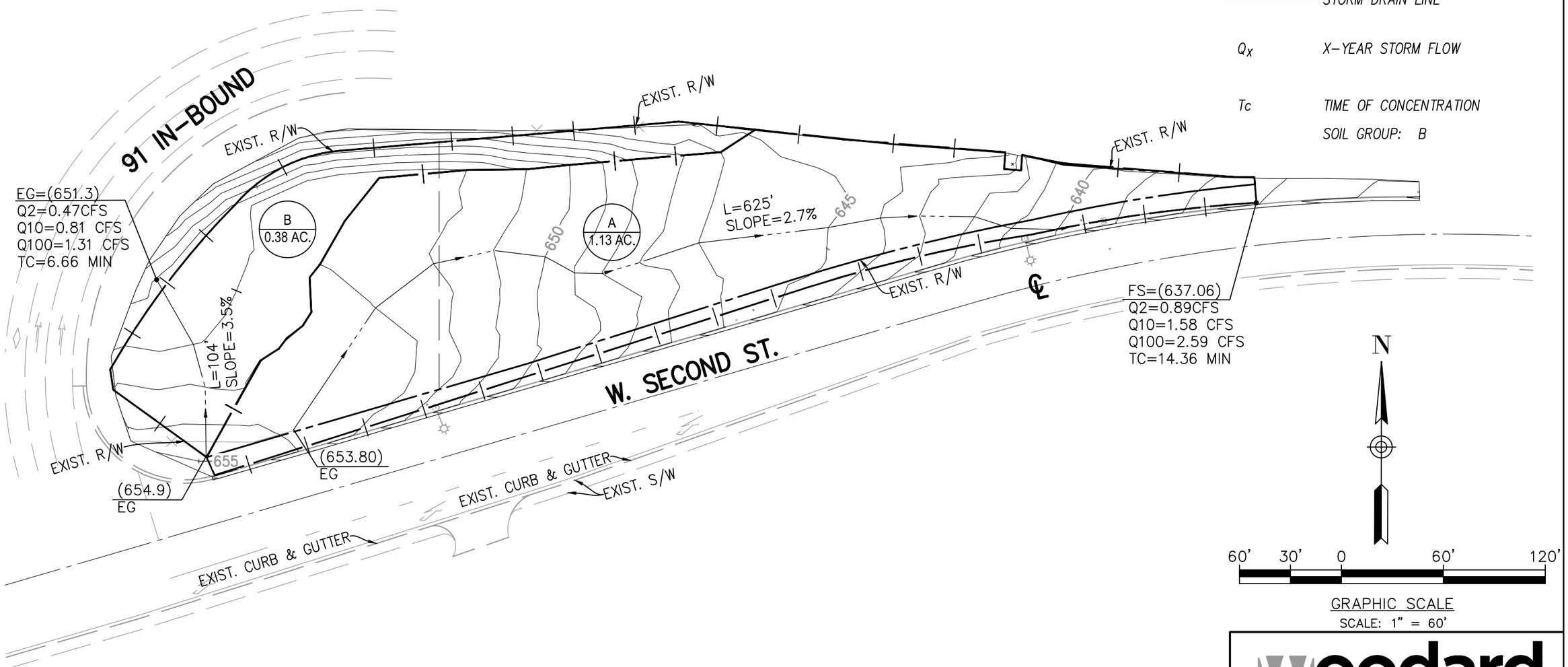
```
 times area       1.1(Ac.)/[(In)/(Ft.)] =       0.5(Ac.Ft)
Total soil loss =      1.11(In)
Total soil loss =     0.104(Ac.Ft)
Total rainfall =      6.64(In)
Flood volume =       22687.0 Cubic Feet
Total soil loss =        4549.6 Cubic Feet
---------------------------------------------------------------------
 Peak flow rate of this hydrograph =      0.983(CFS)
---------------------------------------------------------------------
+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                    24 - H O U R    S T O R M
                R u n o f f      H y d r o g r a p h
---------------------------------------------------------------------
             Hydrograph in  30   Minute intervals ((CFS))

---------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
---------------------------------------------------------------------
  0+30       0.0003      0.01  Q         |         |         |         |
  1+ 0       0.0009      0.01  Q         |         |         |         |
  1+30       0.0013      0.01  Q         |         |         |         |
  2+ 0       0.0021      0.02  Q         |         |         |         |
  2+30       0.0035      0.04  Q         |         |         |         |
  3+ 0       0.0064      0.07  Q         |         |         |         |
  3+30       0.0093      0.07  Q         |         |         |         |
  4+ 0       0.0129      0.09  Q         |         |         |         |
  4+30       0.0178      0.12  QV        |         |         |         |
  5+ 0       0.0241      0.15  QV        |         |         |         |
  5+30       0.0292      0.12  Q V       |         |         |         |
  6+ 0       0.0363      0.17  Q V       |         |         |         |
  6+30       0.0447      0.20  Q  V      |         |         |         |
  7+ 0       0.0544      0.24  Q   V     |         |         |         |
  7+30       0.0648      0.25  |Q  V     |         |         |         |
  8+ 0       0.0778      0.31  |Q   V    |         |         |         |
  8+30       0.0940      0.39  |Q     V  |         |         |         |
  9+ 0       0.1121      0.44  |Q      V |         |         |         |
  9+30       0.1341      0.53  | Q       V         |         |         |
 10+ 0       0.1586      0.59  | Q         V       |         |         |
 10+30       0.1751      0.40  |Q        |  V      |         |         |
 11+ 0       0.1979      0.55  | Q       |    V    |         |         |
 11+30       0.2195      0.52  | Q       |     V   |         |         |
 12+ 0       0.2393      0.48  |Q        |       V |         |         |
 12+30       0.2691      0.72  | Q       |         V         |         |
 13+ 0       0.3028      0.81  |  Q      |         |  V      |         |
 13+30       0.3434      0.98  |  Q      |         |     V   |         |
 14+ 0       0.3703      0.65  | Q       |         |       V |         |
 14+30       0.4017      0.76  |  Q      |         |         V         |
 15+ 0       0.4318      0.73  | Q       |         |         |  V      |
 15+30       0.4595      0.67  | Q       |         |         |    V    |
 16+ 0       0.4816      0.54  | Q       |         |         |     V   |
 16+30       0.4850      0.08  Q         |         |         |      V  |
```

```
   17+ 0       0.4873      0.05  Q         |          |          |      V  |
   17+30       0.4920      0.12  Q         |          |          |      V  |
   18+ 0       0.4962      0.10  Q         |          |          |       V |
   18+30       0.4998      0.09  Q         |          |          |       V |
   19+ 0       0.5015      0.04  Q         |          |          |       V |
   19+30       0.5046      0.07  Q         |          |          |       V |
   20+ 0       0.5064      0.04  Q         |          |          |       V |
   20+30       0.5089      0.06  Q         |          |          |        V|
   21+ 0       0.5108      0.05  Q         |          |          |        V|
   21+30       0.5127      0.05  Q         |          |          |        V|
   22+ 0       0.5147      0.05  Q         |          |          |        V|
   22+30       0.5167      0.05  Q         |          |          |        V|
   23+ 0       0.5180      0.03  Q         |          |          |        V|
   23+30       0.5194      0.03  Q         |          |          |        V|
   24+ 0       0.5208      0.03  Q         |          |          |         V
-------------------------------------------------------------------------
```

PRE-DEVELOPMENT SITE CONDITION
HYDROLOGY MAP

HYDROLOGY LEGEND

ID / AC.	HYDROLOGY SUB-AREAS
	HYDROLOGY DRAINAGE BOUNDARY
	FLOW LINE
	STORM DRAIN LINE
Q_X	X-YEAR STORM FLOW
Tc	TIME OF CONCENTRATION
	SOIL GROUP: B



GRAPHIC SCALE
SCALE: 1" = 60'

woodard group

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2018 Version 9.0
Rational Hydrology Study Date: 05/08/24 File:PST2CORONA.out

CORONA 2ND
2 YEAR STORM EVENT
POST DEVELOPMENT - SUB-AREA A

********* Hydrology Study Control Information **********

English (in-lb) Units used in input data file

Program License Serial Number 6539

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) = 2.00 Antecedent Moisture Condition = 2

Standard intensity-duration curves data (Plate D-4.1)
For the [Corona] area used.
10 year storm 10 minute intensity = 2.220(In/Hr)
10 year storm 60 minute intensity = 0.940(In/Hr)
100 year storm 10 minute intensity = 3.430(In/Hr)
100 year storm 60 minute intensity = 1.450(In/Hr)

Storm event year = 2.0
Calculated rainfall intensity data:
1 hour intensity = 0.584(In/Hr)
Slope of intensity duration curve = 0.4800

++
Process from Point/Station 10.000 to Point/Station 11.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 520.000(Ft.)
Top (of initial area) elevation = 651.930(Ft.)
Bottom (of initial area) elevation = 639.000(Ft.)

```
Difference in elevation =    12.930(Ft.)
Slope =    0.02487  s(percent)=       2.49
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.663 min.
Rainfall intensity =      1.567(In/Hr) for a     2.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.864
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      1.814(CFS)
Total initial stream area =        1.340(Ac.)
Pervious area fraction = 0.100
End of computations, total study area =            1.34 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.100
Area averaged RI index number =  56.0
```

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2018 Version 9.0
Rational Hydrology Study Date: 05/08/24 File:PST10CORONA.out

CORONA 2ND
10 YEAR STORM EVENT
POST DEVELOPMENT - SUB-AREA A

********* Hydrology Study Control Information **********

English (in-lb) Units used in input data file

Program License Serial Number 6539

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) = 10.00 Antecedent Moisture Condition = 2

Standard intensity-duration curves data (Plate D-4.1)
For the [Corona] area used.
10 year storm 10 minute intensity = 2.220(In/Hr)
10 year storm 60 minute intensity = 0.940(In/Hr)
100 year storm 10 minute intensity = 3.430(In/Hr)
100 year storm 60 minute intensity = 1.450(In/Hr)

Storm event year = 10.0
Calculated rainfall intensity data:
1 hour intensity = 0.940(In/Hr)
Slope of intensity duration curve = 0.4800

++
Process from Point/Station 10.000 to Point/Station 11.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 520.000(Ft.)
Top (of initial area) elevation = 651.930(Ft.)
Bottom (of initial area) elevation = 639.000(Ft.)

```
Difference in elevation =    12.930(Ft.)
Slope =    0.02487  s(percent)=       2.49
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.663 min.
Rainfall intensity =      2.524(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.874
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      2.955(CFS)
Total initial stream area =        1.340(Ac.)
Pervious area fraction = 0.100
End of computations, total study area =            1.34 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.100
Area averaged RI index number =  56.0
```

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2018 Version 9.0
Rational Hydrology Study Date: 05/08/24
File:PST100CORONA.out

CORONA 2ND
100 YEAR STORM EVENT
POST DEVELOPMENT - SUB-AREA A

********* Hydrology Study Control Information **********

English (in-lb) Units used in input data file

Program License Serial Number 6539

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) = 100.00 Antecedent Moisture Condition = 2

Standard intensity-duration curves data (Plate D-4.1)
For the [Corona] area used.
10 year storm 10 minute intensity = 2.220(In/Hr)
10 year storm 60 minute intensity = 0.940(In/Hr)
100 year storm 10 minute intensity = 3.430(In/Hr)
100 year storm 60 minute intensity = 1.450(In/Hr)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.450(In/Hr)
Slope of intensity duration curve = 0.4800

++

Process from Point/Station 10.000 to Point/Station 11.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 520.000(Ft.)
Top (of initial area) elevation = 651.930(Ft.)

Bottom (of initial area) elevation =   639.000(Ft.)
Difference in elevation =   12.930(Ft.)
Slope =   0.02487 s(percent)=   2.49
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   7.663 min.
Rainfall intensity =   3.894(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.881
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 56.00
Pervious area fraction = 0.100; Impervious fraction = 0.900
Initial subarea runoff =   4.596(CFS)
Total initial stream area =   1.340(Ac.)
Pervious area fraction = 0.100
End of computations, total study area =   1.34 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.100
Area averaged RI index number = 56.0

U n i t H y d r o g r a p h A n a l y s i s

Study date 05/08/24 File: PST100CORONAUH24100.out

++

Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6539

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

CORONA 2ND
100 YEAR STORM EVENT
POST DEVELOPMENT - SUB-AREA A

Drainage Area = 1.34(Ac.) = 0.002 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 1.34(Ac.) = 0.002 Sq. Mi.
Length along longest watercourse = 520.00(Ft.)
Length along longest watercourse measured to centroid = 260.00(Ft.)
Length along longest watercourse = 0.098 Mi.
Length along longest watercourse measured to centroid = 0.049 Mi.
Difference in elevation = 12.93(Ft.)
Slope along watercourse = 131.2892 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.019 Hr.
Lag time = 1.13 Min.
25% of lag time = 0.28 Min.
40% of lag time = 0.45 Min.
Unit time = 30.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

```
Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
        1.34            2.37                    3.18

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
        1.34            6.64                    8.90

STORM EVENT (YEAR) =  100.00
Area Averaged 2-Year Rainfall =    2.370(In)
Area Averaged 100-Year Rainfall =    6.640(In)

Point rain (area averaged) =    6.640(In)
Areal adjustment factor =  100.00 %
Adjusted average point rain =    6.640(In)

Sub-Area Data:
Area(Ac.)         Runoff Index   Impervious %
     1.340           56.00         0.770
 Total Area Entered =      1.34(Ac.)


RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
AMC2 AMC-3     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
56.0  74.8      0.305     0.770        0.094       1.000      0.094
                                                 Sum (F) =   0.094
Area averaged mean soil loss (F) (In/Hr) =  0.094
Minimum soil loss rate ((In/Hr)) =  0.047
(for 24 hour storm duration)
Soil low loss rate (decimal) =   0.280
------------------------------------------------------------------------

                U n i t  H y d r o g r a p h
                       VALLEY S-Curve
------------------------------------------------------------------------
                Unit Hydrograph Data
------------------------------------------------------------------------
Unit time period   Time % of lag   Distribution   Unit Hydrograph
    (hrs)                          Graph %           (CFS)
------------------------------------------------------------------------
    1   0.500       2658.041        100.000             1.350
                               Sum = 100.000   Sum=       1.350
------------------------------------------------------------------------

 The following loss rate calculations reflect use of the minimum calculated loss
 rate subtracted from the Storm Rain to produce the maximum Effective Rain value

 Unit Time   Pattern   Storm Rain     Loss rate(In./Hr)     Effective
      (Hr.)  Percent   (In/Hr)         Max   |   Low        (In/Hr)
```

1	0.50	0.50	0.066	(0.165)	0.019	0.048
2	1.00	0.70	0.093	(0.161)	0.026	0.067
3	1.50	0.60	0.080	(0.157)	0.022	0.057
4	2.00	0.70	0.093	(0.153)	0.026	0.067
5	2.50	0.80	0.106	(0.150)	0.030	0.076
6	3.00	1.00	0.133	(0.146)	0.037	0.096
7	3.50	1.00	0.133	(0.142)	0.037	0.096
8	4.00	1.10	0.146	(0.139)	0.041	0.105
9	4.50	1.30	0.173	(0.135)	0.048	0.124
10	5.00	1.50	0.199	(0.132)	0.056	0.143
11	5.50	1.30	0.173	(0.128)	0.048	0.124
12	6.00	1.60	0.212	(0.125)	0.059	0.153
13	6.50	1.80	0.239	(0.122)	0.067	0.172
14	7.00	2.00	0.266	(0.119)	0.074	0.191
15	7.50	2.10	0.279	(0.115)	0.078	0.201
16	8.00	2.50	0.332	(0.112)	0.093	0.239
17	8.50	3.00	0.398	0.109	(0.112)	0.289
18	9.00	3.30	0.438	0.106	(0.123)	0.332
19	9.50	3.90	0.518	0.103	(0.145)	0.415
20	10.00	4.30	0.571	0.100	(0.160)	0.471
21	10.50	3.00	0.398	0.097	(0.112)	0.301
22	11.00	4.00	0.531	0.095	(0.149)	0.437
23	11.50	3.80	0.505	0.092	(0.141)	0.413
24	12.00	3.50	0.465	0.089	(0.130)	0.376
25	12.50	5.10	0.677	0.086	(0.190)	0.591
26	13.00	5.70	0.757	0.084	(0.212)	0.673
27	13.50	6.80	0.903	0.081	(0.253)	0.822
28	14.00	4.60	0.611	0.079	(0.171)	0.532
29	14.50	5.30	0.704	0.076	(0.197)	0.627
30	15.00	5.10	0.677	0.074	(0.190)	0.603
31	15.50	4.70	0.624	0.072	(0.175)	0.552
32	16.00	3.80	0.505	0.070	(0.141)	0.435
33	16.50	0.80	0.106	(0.068)	0.030	0.076
34	17.00	0.60	0.080	(0.066)	0.022	0.057
35	17.50	1.00	0.133	(0.064)	0.037	0.096
36	18.00	0.90	0.120	(0.062)	0.033	0.086
37	18.50	0.80	0.106	(0.060)	0.030	0.076
38	19.00	0.50	0.066	(0.058)	0.019	0.048
39	19.50	0.70	0.093	(0.057)	0.026	0.067
40	20.00	0.50	0.066	(0.055)	0.019	0.048
41	20.50	0.60	0.080	(0.054)	0.022	0.057
42	21.00	0.50	0.066	(0.052)	0.019	0.048
43	21.50	0.50	0.066	(0.051)	0.019	0.048
44	22.00	0.50	0.066	(0.050)	0.019	0.048
45	22.50	0.50	0.066	(0.049)	0.019	0.048
46	23.00	0.40	0.053	(0.048)	0.015	0.038
47	23.50	0.40	0.053	(0.047)	0.015	0.038
48	24.00	0.40	0.053	(0.047)	0.015	0.038

(Loss Rate Not Used)

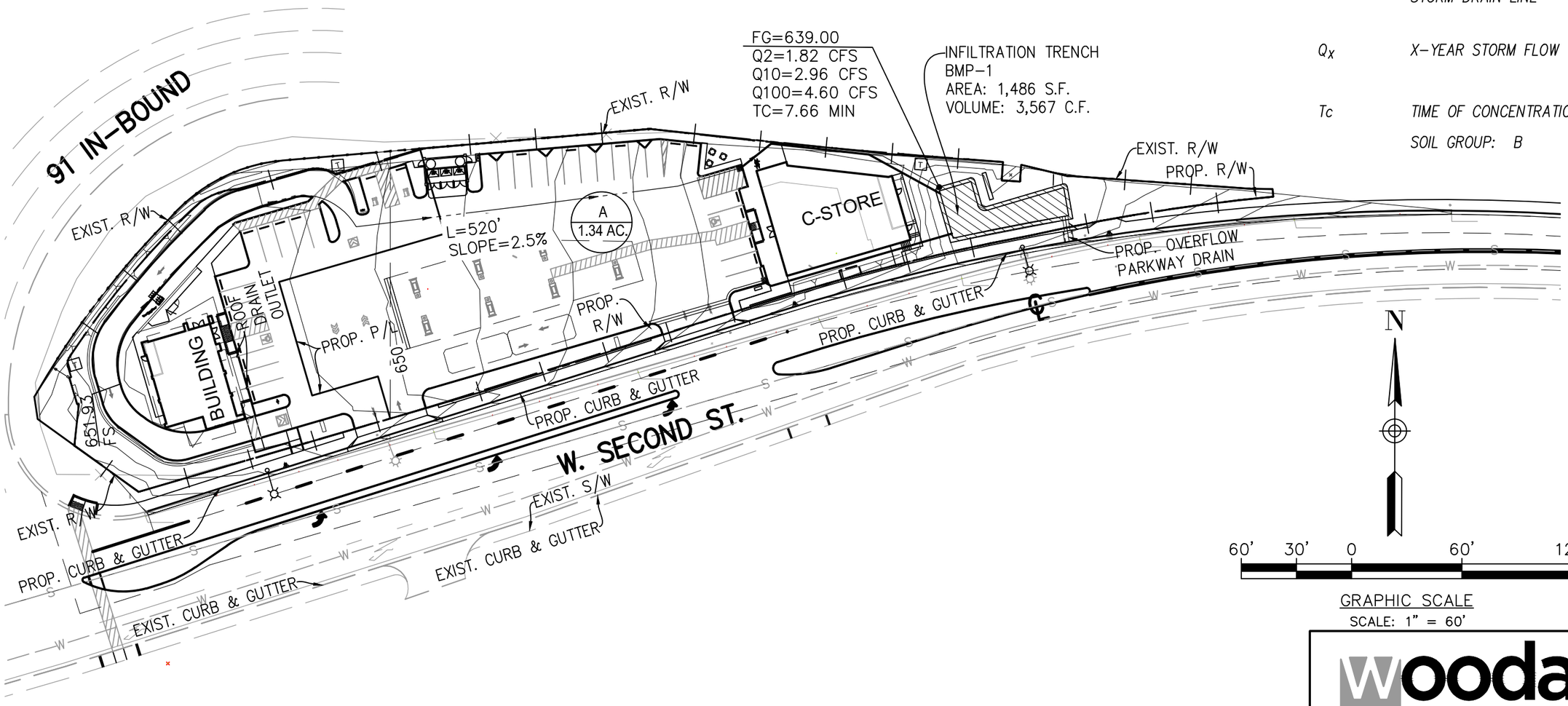
Sum = 100.0 Sum = 10.7

Flood volume = Effective rainfall 5.37(In)

```
 times area       1.3(Ac.)/[(In)/(Ft.)] =       0.6(Ac.Ft)
Total soil loss =      1.27(In)
Total soil loss =     0.141(Ac.Ft)
Total rainfall =      6.64(In)
Flood volume =       26137.2 Cubic Feet
Total soil loss =        6161.0 Cubic Feet
------------------------------------------------------------------------
 Peak flow rate of this hydrograph =      1.110(CFS)
------------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                    24 - H O U R    S T O R M
                R u n o f f      H y d r o g r a p h
------------------------------------------------------------------------
             Hydrograph in  30   Minute intervals ((CFS))

------------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
------------------------------------------------------------------------
  0+30       0.0027      0.06  Q         |         |         |         |
  1+ 0       0.0064      0.09  Q         |         |         |         |
  1+30       0.0096      0.08  Q         |         |         |         |
  2+ 0       0.0133      0.09  Q         |         |         |         |
  2+30       0.0176      0.10  QV        |         |         |         |
  3+ 0       0.0230      0.13  QV        |         |         |         |
  3+30       0.0283      0.13  QV        |         |         |         |
  4+ 0       0.0342      0.14  Q V       |         |         |         |
  4+30       0.0411      0.17  Q V       |         |         |         |
  5+ 0       0.0491      0.19  Q  V      |         |         |         |
  5+30       0.0561      0.17  Q  V      |         |         |         |
  6+ 0       0.0646      0.21  Q   V     |         |         |         |
  6+30       0.0742      0.23  Q   V     |         |         |         |
  7+ 0       0.0849      0.26  |Q   V    |         |         |         |
  7+30       0.0961      0.27  |Q    V   |         |         |         |
  8+ 0       0.1094      0.32  |Q     V  |         |         |         |
  8+30       0.1256      0.39  |Q      V |         |         |         |
  9+ 0       0.1441      0.45  |Q       V|         |         |         |
  9+30       0.1673      0.56  | Q        V        |         |         |
 10+ 0       0.1936      0.64  | Q       | V       |         |         |
 10+30       0.2104      0.41  |Q        |   V     |         |         |
 11+ 0       0.2348      0.59  | Q       |    V    |         |         |
 11+30       0.2578      0.56  | Q       |      V  |         |         |
 12+ 0       0.2788      0.51  | Q       |       V |         |         |
 12+30       0.3118      0.80  |  Q      |         V         |         |
 13+ 0       0.3494      0.91  |  Q      |         |  V      |         |
 13+30       0.3953      1.11  |   Q     |         |     V   |         |
 14+ 0       0.4250      0.72  | Q       |         |       V |         |
 14+30       0.4600      0.85  |  Q      |         |         V         |
 15+ 0       0.4937      0.81  |  Q      |         |         | V       |
 15+30       0.5245      0.75  | Q       |         |         |   V     |
 16+ 0       0.5488      0.59  | Q       |         |         |     V   |
 16+30       0.5530      0.10  Q         |         |         |     V   |
```

```
   17+ 0       0.5563      0.08  Q         |          |          |      V  |
   17+30       0.5616      0.13  Q         |          |          |      V  |
   18+ 0       0.5664      0.12  Q         |          |          |      V  |
   18+30       0.5707      0.10  Q         |          |          |       V |
   19+ 0       0.5733      0.06  Q         |          |          |       V |
   19+30       0.5771      0.09  Q         |          |          |       V |
   20+ 0       0.5797      0.06  Q         |          |          |       V |
   20+30       0.5829      0.08  Q         |          |          |       V |
   21+ 0       0.5856      0.06  Q         |          |          |        V|
   21+30       0.5883      0.06  Q         |          |          |        V|
   22+ 0       0.5910      0.06  Q         |          |          |        V|
   22+30       0.5936      0.06  Q         |          |          |        V|
   23+ 0       0.5958      0.05  Q         |          |          |        V|
   23+30       0.5979      0.05  Q         |          |          |        V|
   24+ 0       0.6000      0.05  Q         |          |          |        V|
-------------------------------------------------------------------------
```

POST-DEVELOPMENT SITE CONDITION
HYDROLOGY MAP



HYDROLOGY LEGEND

ID / AC.	HYDROLOGY SUB-AREAS
	HYDROLOGY DRAINAGE BOUNDARY
	FLOW LINE
	STORM DRAIN LINE
Q_X	X-YEAR STORM FLOW
Tc	TIME OF CONCENTRATION
	SOIL GROUP: B

N

60' 30' 0 60' 120'

GRAPHIC SCALE
SCALE: 1" = 60'

woodard group

IV. WQMP CALCULATIONS AND EXHIBIT

(FOR REFERENCE ONLY. REFER TO WQMP REPORT FOR FULL REPORT)

- Preliminary Infiltration Trench design calculations
- WQMP Exhibit

Santa Ana Watershed - BMP Design Volume, V_{BMP}

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name	Woodard Group	Date	5/1/2024
Designed by	OG	Case No	
Company Project Number/Name	2nd Street & 91 Freeway - Corona		

BMP Identification

BMP NAME / ID: BMP-1 - INFILTRATION TRENCH

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

D_{85}= 0.75 inches

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
1-A	*39604*	*Concrete or Asphalt*	*1*	*0.89*	*35326.8*			
1-B	*5456*	*Roofs*	*1*	*0.89*	*4866.8*			
1-C	*13380*	*Ornamental Landscaping*	*0.1*	*0.11*	*1477.9*			
	58440	***Total***			**41671.5**	**0.75**	***2604.5***	***3567***

Notes:

Infiltration Trench - Design Procedure	BMP ID: BMP-1	Legend:	Required Entries / Calculated Cells
Company Name:	Woodard Group	Date:	5/1/2024
Designed by:	OG	County/City Case No.:	

Design Volume

Enter the area tributary to this feature, Max = 10 acres	A_t =	1	acres
Enter V_{BMP} determined from Section 2.1 of this Handbook	V_{BMP} =	2,605	ft^3

Calculate Maximum Depth of the Reservoir Layer

Enter Infiltration rate	I =	9.8	in/hr
Enter Factor of Safety, FS (unitless)	FS =	3	
Obtain from Table 1, Appendix A: "Infiltration Testing" of this BMP Handbook			
	n =	40	%
Calculate D_1. $D_1 = \frac{I\ (in/hr) \times 72\ hrs}{12\ (in/ft) \times (n/100) \times FS}$	D_1 =	48.95	ft
Enter depth to historic high groundwater mark (measured from finished grade)		60	ft
Enter depth to top of bedrock or impermeable layer (measured from finished grade)		100	ft
D_2 is the smaller of: Depth to groundwater - 11 ft; & Depth to impermeable layer - 6 ft	D_2 =	49.0	ft
D_{MAX} is the smaller value of D_1 and D_2, must be less than or equal to 8 feet.	D_{MAX} =	8.0	ft

Trench Sizing

Enter proposed reservoir layer depth D_R, must be ≤ D_{MAX}	D_R =	6.00	ft
Calculate the design depth of water, d_W			
Design d_W = (D_R) x (n/100)	Design d_W =	2.40	ft
Minimum Surface Area, A_S $A_S = \frac{V_{BMP}}{d_W}$	A_S =	1,085	ft^2
Proposed Design Surface Area	A_D =	1,486	ft^2
Minimum Width = D_R + 1 foot pea gravel		7.00	ft
Sediment Control Provided? (Use pulldown)			
Geotechnical report attached? (Use pulldown)			

If the trench has been designed correctly, there should be no error messages on the spreadsheet.

Drawdown Calculation

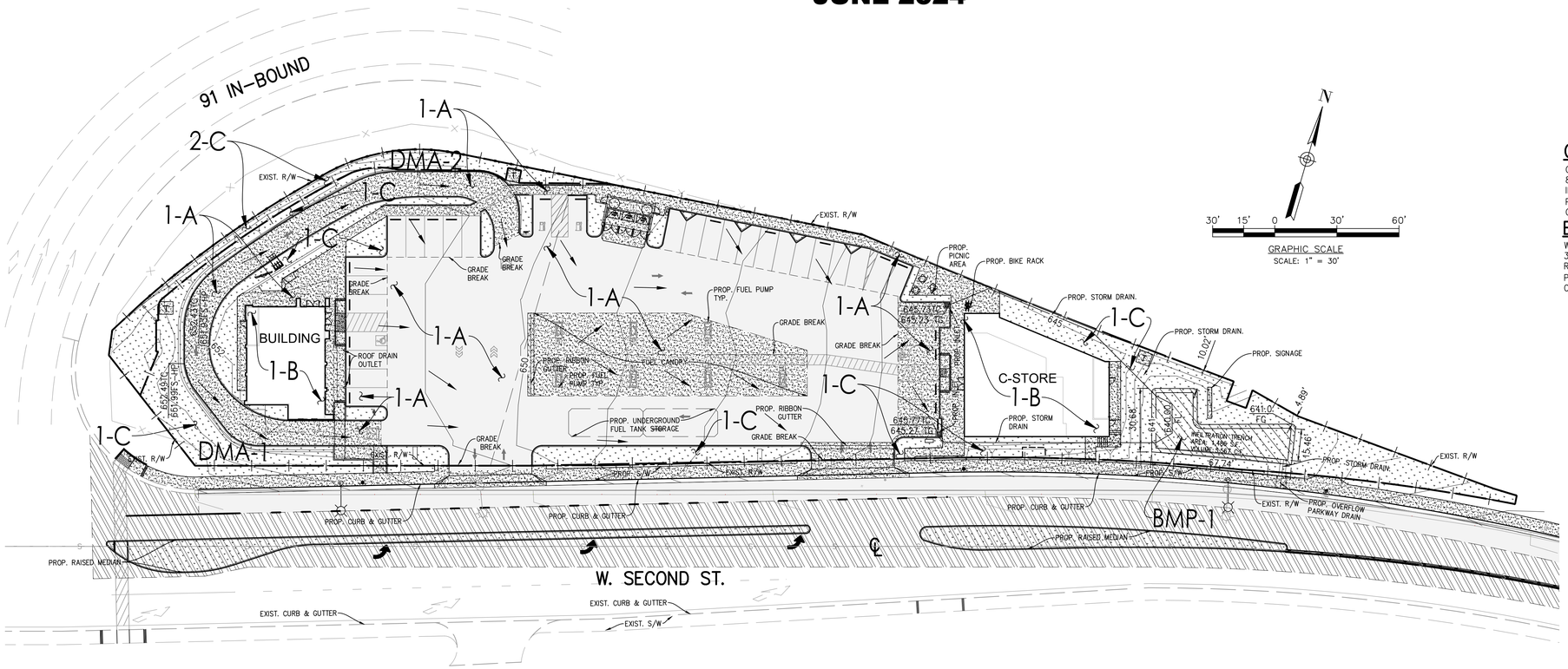
System A

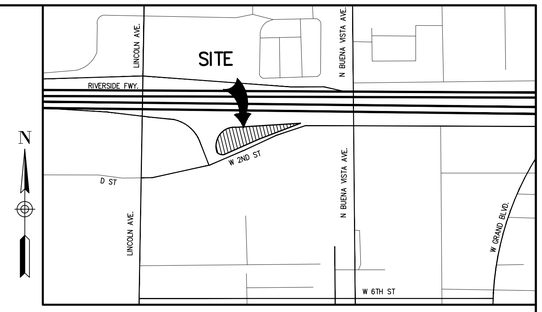
Surface Area from Plan	1486	SF
Raw Inf. Rate	9.8	In/hr
FS	3	
Infiltration Rate	3.2667	
	0.2722	ft/hr
Basin inf. Rate	404.52	CF/hr
Volume req.	2662.8	CF
Drawdown time	***6.5826***	***hours***

<48

Good

WQMP SITE PLAN
W. SECOND STREET & 91 FREEWAY
CORONA, CALIFORNIA
JUNE 2024





VICINITY MAP
SECTION 26, TOWNSHIP 3 SOUTH, RANGE 7 WEST
NOT TO SCALE

OWNER/APPLICANT
GREENS LA CADENA LLC
8815 RESEARCH DRIVE
IRVINE, CA 92618
PH: (949) 322-1760
CONTACT: ATMAN KADAKIA

ENGINEER
WOODARD GROUP
3585 MAIN STREET, SUITE 205
RIVERSIDE, CA 92501
PH: (951) 907-5077
CONTACT: ANDREW C. WOODARD

LEGEND
- EXISTING PROPERTY LINE
- PROPOSED RIGHT OF WAY
- EXISTING RIGHT OF WAY
- EXISTING CENTERLINE
- PROPOSED CURB
- EXISTING CURB
- PROPOSED SIDEWALK
- EXISTING SIDEWALK
- EXISTING DIRT ROAD
- PROPOSED PARKING STRIPE
- EXISTING EASEMENT
- EXISTING CONTOUR MAJOR
- EXISTING CONTOUR MINOR
- EXISTING FENCE
- EXISTING BUILDING
- EXISTING CONCRETE
- 12" SD — PROPOSED UNDERGROUND UTILITY
- 12" SD — EXISTING UNDERGROUND UTILITY
- EXISTING EDGE OF PAVEMENT
- PROPOSED EDGE OF PAVEMENT
- EXISTING CONTOUR ELEVATION
- 915 / 901.5 — EXISTING SPOT ELEVATION
- ROOF DRAIN
- PROPOSED AC PAVEMENT
- PROPOSED LANDSCAPE
- PROPOSED CONCRETE
- PROPOSED INFILTRATION TRENCH

BMP LEGEND
- DIRECTION OF FLOW
- PROPOSED DRAINAGE MANAGEMENT AREA BOUNDARY
- 1-A — PROPOSED DRAINAGE MANAGEMENT AREA IDENTIFICATION
- BMP-1 — PROPOSED INFILTRATION TRENCH

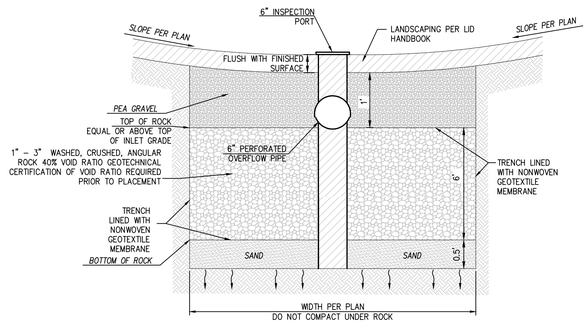
LID SOURCE CONTROL
- ON-SITE STORM DRAIN INLET – MAINTAIN PERIODICALLY
- LANDSCAPE / OUTDOOR PESTICIDE USE – MAINTAIN LANDSCAPE USING MINIMUM OR NO PESTICIDES. MINIMIZE IRRIGATION AND RUNOFF TO PROMOTE SURFACE INFILTRATION.
- REFUSE AREAS – OUTDOORS DUMPSTERS OR OTHER RECEPTACLES
- FOOD SERVICES – DESIGNATED CLEANING AREAS.
- FUEL DISPENSING AREAS – DRY SWEEP THE FUELING AREA ROUTINELY.
- PARKING LOT – SWEEP REGULARLY

LOT DRAINAGE MANAGEMENT AREAS

DMA ID	SURFACE TYPE	AREA (S.F.)	PERV. (S.F.)	IMPERV. (S.F.)	% PERV.	% IMPERV.	DCV (CF)	V_{BMP} (CF)	BMP NAME/TYPE
1–A	CONCRETE OR ASPHALT	39,604	13,380	45,060	22.9	77.1	2,604.5	3,567	DMA–1 INFILTRATION–TRENCH
1–B	ROOF	5,456							
1–C	ORNAMENTAL LANDSCAPE	13,380							
EFFECTIVE AREA		58,440							

LOT DRAINAGE MANAGEMENT AREAS

DMA ID	SURFACE TYPE	AREA (S.F.)	PERV. (S.F.)	IMPERV. (S.F.)	% PERV.	% IMPERV.	DCV (CF)	V_{BMP} (CF)	BMP NAME/TYPE
2–C	ORNAMENTAL LANDSCAPE	2,192	2,192	0	100	0	–	–	DMA–1 SELF TREATING AREA
EFFECTIVE AREA		2,192							



INFILTRATION TRENCH DETAIL – BMP 1
NOT TO SCALE

woodard group

WQMP SITE PLAN
W. SECOND STREET
& 91 FREEWAY

V. Hydraulic calculations

- Parking Drain Capacity Q_{100}

Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Tuesday, Apr 9 2024

Parkway Drain Capacity Q100

Rectangular

Bottom Width (ft)	= 3.00
Total Depth (ft)	= 0.40
Invert Elev (ft)	= 100.00
Slope (%)	= 2.00
N-Value	= 0.015

Calculations

Compute by:	Known Q
Known Q (cfs)	= 4.75

Highlighted

Depth (ft)	= 0.30
Q (cfs)	= 4.750
Area (sqft)	= 0.90
Velocity (ft/s)	= 5.28
Wetted Perim (ft)	= 3.60
Crit Depth, Yc (ft)	= 0.40
Top Width (ft)	= 3.00
EGL (ft)	= 0.73